

**AN ETHNOBOTANICAL STUDY OF AFRICAN TRADITIONAL MEDICINAL  
PLANTS IN THE HERITAGE PARK OF THE NORTH WEST PROVINCE**

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## ABSTRACT

South Africa has an extraordinary diversity of plant species, couple with a rich cultural tradition and knowledge of plant use for healing various ailments in both people and animals. The value and potential of medicinal plants as an affordable remedy against diseases, as well as being a source of new drugs is well documented worldwide. In South Africa it is estimated that up to 60% of the population consult traditional healers and depend on African Traditional Medicine (ATM) as their primary source of health care. Despite the increasing acceptance of ATM in South Africa, there exist a significant gap in the documentation of indigenous knowledge in the North West Province, and only a few ethnobotanical studies have been published. The documentation of plants used as ATM is important in that the knowledge can be preserved and the plants conserved for sustainable utilization.

The aim of this study was therefore to document the indigenous ethnobotanical knowledge on the conservation and the sustainable utilization of medicinal plants for African Traditional Medicine (ATM) by the community of Molatedi village in the North West Province. The village is located within a Heritage Park that is under the North West Parks and Tourism Board (NWP&TB) management as a protected area. The *in situ* conservation approach used by the board was meant to stop the degradation that was occurring in the area. It is however known that the knowledge of names, growth distribution and abundance of medicinal plants species is vital for their effective use and conservation. The objectives of the study were thus to document the indigenous knowledge associated with the utilization and conservation strategies of medicinal plants in the Heritage Park, and to explore the community ethnobotanical knowledge of the medicinal plants within the Heritage Park.

Due to the cultural sensitivity of indigenous knowledge, the study adopted and used an indigenous research approach. The new Matrix Method according to De beer and Van Wyk (2011) was adopted as the quantitative methodology which was used in the study to reveal the Ethobotanical Knowledge Index (EKI) and Species Popularity Index (SPI) in Molatedi village. Three indigenous theories that underpinned the study were Afrocentrism, Ubuntu and postcolonial theories. From the target group members of the community who were willing to participate A sample size for in-depth interviews determined from a target group of ten (10) consisted of seven (7) who were willing and eventually only five (5) traditional healers were and also able to participate in the study. The sample size for Matrix Method consisted of three age categories as determined by the target population. Within each category, individuals were

randomly selected to give the following sample size: five (5) senior citizens; five (5) adults; and six (6) youth. The sample size for the learning cycle (focus group discussions) was determined by the availability of both traditional healers and knowledge holders. Therefore nine (9) participants consisting of traditional healers and knowledge holders availed themselves during focus group discussion meetings. A QUAL-quant mixed method design was used with in-depth interviews, participant observation and focus group discussion as methods for data collection. The data were analysed using both quantitative and qualitative methods.

Results of the qualitative study found thirty-eight (38) species belonging to twenty (20) different families were used for traditional medicine to treat forty nine (49) various conditions. The study also found five (5) indigenous traditional medicine preparation methods and nine (9) indigenous conservation strategies to conserve the medicinal plants. Furthermore the study discovered that thirty-nine percent (39%) of medicinal plants could treat more than one disease. Such multi-use plants were *Artemisia Tridentata* which can treat stomach ache and eyes, *Aloe zebrine* Bark which can treat blood disease and sores on the skin, *Lycium* sp whose roots can treat blood related diseases and dizziness and the leaves can treat baby fontanel.

Ethnobotanical Knowledge Index (EKI) and the Species Popularity Index (SPI) (range 0 to 1) were calculated according to the formulae proposed by De Beer and Van Wyk (2011) to express the knowledge of participants, and the popularity of the species. Interestingly, a comparison of the ethnobotanical knowledge index (EKI) amongst the different age groups within the study community revealed that senior citizens had lower EKI values (0.55) compared to adults (0.65) and youth (0.58) suggesting that it was the adults who possessed more knowledge than the other groups. The medicinal plant in Molatedi with the highest SPI value were found to be *Drimia altissima* (Mogaga) (SPI=1) and the medicinal plant with the lowest SPI was *Hibiscus micranthus* L.f. var *micranthus* (Mothlagala) (SPI = 0.13)

The study concluded that indigenous knowledge of African Traditional medicine is vital to the community of Molatedi village in treating various diseases and ailments suffered by members of the community. Ethnobotanical knowledge of medicinal plants is a rich heritage embedded within the community of Molatedi village and both the traditional healers and knowledge holders are recognised as useful to the community. Additional studies were recommended on the documentation of medicinal plants for African Traditional Medicine because of the realisation that this subject cannot be exhausted from a single study.

## **DEDICATION**

This dissertation is dedicated to Dr Ellen Kakhuta Materechera, a senior academic advisor who happened to be a colleague in academic advising and also my immediate supervisor at work. She is a friend, mentor, spiritual counsellor and was a source of encouragement throughout my studies. She was always caring, empathetic, showed understanding and was at my reach with academic and encouraging words.

M.M. Magodiolo

October 2018



## DECLARATION BY STUDENT

I, the undersigned, hereby declare that the work contained in this dissertation is my own original work and that I have not previously, in its entirety or in part, submitted it at any university for a degree.

Signature:  .

Date .....October 2018

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## LIST OF ACRONYMS AND ABBREVIATIONS

ATM	African Traditional Medicine
ANC	African National Congress
CAM	Complementary and Alternative Medicine
CCA	Central Corridor Area
CTL	Centre for Teaching and Learning
CTM	Chinese Traditional Medicine
DST	Department of Science and Technology
DWAF	Department of water affairs and forestry
EBK	Ethnobotanical Knowledge
EKI	Ethnobotanical Knowledge Index
HIV/AIDS	Human Immune Deficiency /Acquired Immune Deficiency Syndrome.
HP	Heritage Park
HPD	Heritage Park Development
IKS	Indigenous Knowledge Systems
IPUF	Indigenous Plant Use Forum
ITM	Idian Traditional Medicine
IUCN	International Union for Conservation of Nature
KMR	Kaupapa Maori research
MGR	Madikwe Game Reserve
MP	Medicinal Plants
NEPAD	New Partnership for African Development
NRF	National Research Foundation
NWPTB	North West Parks & Tourism Board
NWP	North West Province
PNP	Pilanesberg National Park
PPC	Pretoria Portland Cement
SADC	Southern Africa Development Cooperation
SAN Parks	South African National Parks
SPI	Species Popularity Index
TM	Traditional Medicine
UNESCO	United Nations Educational, Scientific and Cultural Organisation.

UNEP	United Nations Conference on Environment and Development
ATM	African Traditional Medicine
ANC	African National Congress
CAM	Complementary and Alternative Medicine
CCA	Central Corridor Area
CTL	Centre for Teaching and Learning
CTM	Chinese Traditional Medicine
DST	Department of Science and Technology
DWAF	Department of water affairs and forestry
EBK	Ethnobotanical Knowledge
EKI	Ethnobotanical Knowledge Index
HIV/AIDS	Human Immune Deficiency /Acquired Immune Deficiency Syndrome.
HP	Heritage Park
HPD	Heritage Park Development
IBC	Indigenous Biodiversity Conservation
IKS	Indigenous Knowledge Systems
IKH)	Indigenous Knowledge holders
IPUF	Indigenous Plant Use Forum
ITM	Idian Traditional Medicine
IUCN	International Union for Conservation of Nature
KMR	Kaupapa Maori research
MGR	Madikwe Game Reserve
MP	Medicinal Plants
NEPAD	New Partnership for African Development
NRF	National Research Foundation
NWPTB	North West Parks & Tourism Board
NWP	North West Province
PNP	Pilanesberg National Park
PPC	Pretoria Portland Cement
SADC	Southern Africa Development Cooperation
SAN Parks	South African National Parks
SPI	Species Popularity Index

TH	Traditional Healers
TM	Traditional Medicine
UNESCO	United Nations Educational, Scientific and Cultural Organisation.
UNEP	United Nations Conference on Environment and Development
UNCED	United Nations International Strategy for Disaster Reduction
UNISDR	United Nations International for Disaster Risk Reduction
VHAI	Voluntary Health Association of India.
WCPA	Wisconsin Concrete Pavement Association
WWF	World Wide Fund
WHO	World Health Organization
WPC	World Park Congress
UNCED	United Nations International Strategy for Disaster Reduction
UNISDR	United Nations International for Disaster Risk Reduction
VHAI	Voluntary Health Association of India.
WCPA	Wisconsin Concrete Pavement Association
WWF	World Wide Fund
WHO	World Health Organization
WPC	World Park Congress

## **PAPER FROM THE STUDY PRESENTED AT THE CONFERENCE**

Magodiello MM, Materechera SA, Otang Mbeng W., Matlapeng PS, Motaung L, Molefe A, Mokwena M & Seroke T. 2017. Traditional knowledge on the use and conservation of plant species for African Traditional Medicine by healers in Molatedi village, North West Province. Paper presented at the 20<sup>th</sup> Indigenous Plant Use Forum (IPUF) conference held at the Batter Boys Village in Montana, Pretoria, 9 to 12 July 2017.

## CHAPTER ONE

### GENERAL INTRODUCTION AND OBJECTIVES OF THE STUDY

#### 1.1 Background

The World Health Organisation's (WHO) Centre for Health Development defines African Traditional Medicine (ATM) as the sum total of all knowledge and practices, whether explicable or not, used in diagnosis, prevention and elimination of physical, mental, or societal imbalance, and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing (WHO, 2013). Even though African traditional medicine involves some aspects of "mind-body interventions" and use of animal-based products, it is largely plant-based (Makinde & Shorunke, 2013). The World Health Organisation estimates that up to 80 percent of the population in Africa makes use of traditional medicine as a means of their primary health care. In sub-Saharan Africa, the ratio of traditional healers to the population is approximately 1:500, while Western-trained medical doctors have a ratio of 1:40 000 to the population.

#### The importance of ATM

The importance of traditional medicine for humans as well as animals in Africa, both now and in the past, is enormous. In Africa, in particular, traditional medicine has always existed and has been practised as the only affordable and accessible health care method from time immemorial (Hirt and M'Pia, 1995). For many members of communities, traditional medicine is the health care of choice, or at the very least, a critical stop-gap measure before the patient consults at a modern health facility or medical practitioner (Mokgobi, 2014). African traditional medicine thus, plays an almost inestimable role in health care delivery, and the pharmacopoeia of indigenous prescriptions traditionally used in Africa, including the communities studied, is colossal (Makinde & Shorunke, 2013).

Plants have been an indispensable source of both preventive and curative medicinal preparations for human beings (Dery *et al.*, 1999). Besides serving medical and cultural functions, medicinal plants in Africa and other developing countries frequently provide economically disadvantaged groups such as small holders and landless people with their only form of cash income (German Technical Cooperation (GTZ), 2001). Medicinal plants are also important sources of therapeutic agents in the industrial production of pharmaceuticals



(Lambert *et al.*, 1997). The substantial contribution to human health and well-being made by medicinal plant species is now widely appreciated and understood. Indeed, there is a growing demand for many of the species and an increasing interest in their use. This, combined with continued habitat loss and erosion of traditional knowledge, is endangering many important medicinal plant species and populations and creating an urgent need for improved methods of conservation and sustainable use of these vital plant resources (Leaman *et al.*, 1999).

### **Sustainability issues**

Unmonitored trade of medicinal plant resources, destructive harvesting techniques, overexploitation, habitat loss, and habitat change are the primary threats to medicinal plant resources in most developing countries (International Union for the Conservation of Nature, 2001). SADC has put ATM on high priority agenda and practices, products and practitioners of ATM vary greatly from country to country in the SADC region, as they are influenced by factors such as culture, history, personal attitudes, philosophy and regulations. In many cases, theory and application of ATM are quite different from those of conventional medicine. Long historical use of many practices of ATM, has demonstrated the safety and efficacy of ATM (Fokunang *et al.*, 2011).

### **South African Biodiversity**

South Africa boasts a unique and diverse biodiversity of medicinal plant species used traditionally in health, food and cosmetic (Van Wyk and Gericke, 2000). Not only is South Africa rich in medicinal plants but it is also mostly endemic (Mulholland, 2005). In addition to this unique botanical heritage, South Africa has a long history of healing tradition and it is estimated that over 80% of the population, especially those in rural areas, are still dependent on traditional herbal remedies for their primary healthcare (De Wet *et al.*, 2012; Rasethe *et al.*, 2013). However, the rich tradition of herbal healing, which has the potential to tackle primary healthcare problems of millions and enable them to gain health security, is eroding fast due to lack of social and policy support (Fredericks, 2005).

African traditional medicine is the oldest medicinal system, mostly used by indigenous communities based in villages for cultural and health care purposes (Aziz *et al.*, 2018). There is also an emergence of traditional medicinal use proliferation even in cities across South Africa where western health care systems are prevalent. This suggests that traditional medicines can

play an important role in the health care system in South Africa. Like other countries in sub-Saharan African countries, extensive knowledge of medicinal plants and traditional healers are prevalent. A study of traditional healers in Durban, KwaZulu Natal, for example, showed that 70 % (percent) of patients would consult traditional healers (sangomas) or (herbal medicine practitioners) as a first choice. It was very clear that most popular and a significantly large number of patients consulted traditional healers even for life-threatening conditions (UNEP, 2008). The study indicates that traditional healing is an integral component of health care in South Africa. There are opportunities in South Africa for both traditional and western health care providers to come together in attacking many ailments, including HIV/AIDS (Semenya and Potgieter, 2014). The South African indigenous medicinal plant *Sutherlandia frutescens*, for centuries, used by traditional healers to cure immune-related disorders, is already being investigated for possible use in treating millions of poor people living with HIV/AIDS (Sibanda, Naidoo and Nlooto, 2016). Traditional healers in South Africa use innumerable ingredients from all sources of nature, including plants, animals and minerals. The herbalist or diviner administers *imithi* (emetics), which are usually of vegetable origin to treat diseases or ailments (Hirst, 2005). These raw herbs are ground into powders to be taken with water, or are boiled as barks or roots that are drunk as decoctions. Other *imuthi* (infusions) are used in bath water, rubbed into incisions (*ukuchaza*), inhaled as smoke (*ukuqhumisa*), nibbled on (especially roots), or licked from one's fingers (*ukuncinda*) (Hirst, 2005).

Different regions of South Africa have their own repertoire of traditional remedies, utilising mainly local plants. A study of traditional healers in Durban and Kwazulu Natal, for example, showed that 70 percent of patients consulted healers as a first choice. The North West Province (NWP) boasts a tremendous diversity of plant and animal biodiversity, which acts as a source of herbal medicine for many local communities. This indigenous system of medicine thrives on naturally occurring floral diversity, collectively referred to as medicinal plants (van der Merwe *et al.*, 2001). This traditional medicine, including healing technologies and innovations, which have a known history of treating and curing people and animal ailments, have evolved over generations of experience and practice (Spickett *et al.*, 2011; Mukandiwa *et al.*, 2012). Over the centuries, people in the NWP have had a fascination and respect for traditional plant ethics and herbal medicine and traditional medicine has become a part of their culture. This wealth of traditional herbal knowledge is diminishing with the advancement of modern medicine. However, studies have shown that many people still use and rely on this traditional medicine and healing systems for their well-being (Luseba *et al.*, 2007).

Indigenous Knowledge is linked to ATM and ethnobotanical knowledge because it is rich in herbal medicine know-how. Indigenous knowledge systems have enabled various communities to live in harmony with their environments for generations. However, the coexistence is not always perfect and latter-day socio-economic pressures in particular have exposed some of the weaknesses of the knowledge systems (Vlassoff, 2007). For instance, the power of community elders, responsible for enforcement of traditional rules, is being eroded in many cases. Indigenous knowledge faces the danger of being lost if not documented (Grenier, 1998). Indigenous knowledge systems are culture-specific and have evolved over time to cope with particular environments. While the systems may differ in detail, depending on local culture and environment, they share similarities and common challenges. Indigenous knowledge influences the lives of millions of people in project countries without formal government acknowledgement or recognition (Carm, 2014).

## **1.2 Statement of the problem**

Even though traditional medicine is critically important in South Africa, however, there are emerging problems of overexploitation of plant resources that form the basis of indigenous medicine and lack of legal protection of the intellectual property rights in traditional medicine. Most of the plants used in traditional medicine are collected from the wild, and only a few have been domesticated (Malan *et al.*, 2015). The dynamics of the trade in ATM is also changing to the detriment of conservation. Louw (2016) states that there has been an increase in the number of gatherers selling ATM directly to the public, thus leading to over-exploitation of wild ATM reserves since the gatherers often disregard conservation-friendly collection methods, which traditional healers often abide by.

Indigenous knowledge practices and natural disaster management seem to be working well within traditional communities. However, fast population growth and new socio-economic impacts, including science and technology are posing challenges to indigenous knowledge systems (Mawere and Awuah-Nyameke, 2015). It is evident that the forests and bushes in the Province are under increasing stress due to over exploitation, degradation and the destruction of the habitat affecting the very existence of medicinal plant flora. Already, many species of plants from the Province are endangered and feature on the “RED label” in the conservation books (Benhin, 2007). Thus, there is an urgent need of conservation priorities, primarily for

medicinal plants from the Province, which are facing maximum stress due to demand. Another problem facing traditional medicine in South Africa today is loss of knowledge over time since much of it is not documented. In fact, much of the rich medicinal plant folklore has already been lost (Mahomoodally, 2013). In addition, the younger generation is moving away from traditional customs and practices. South African healers themselves have acknowledged that they are losing their influence (Masuku 2017). Indigenous knowledge in traditional medicine is threatened in all the provinces of the country unless something is done to reverse the situation. The gradual loss of knowledge due to lack of documentation, is eroding the viability of the system. There is, therefore, a real danger of genetic erosion, which in turn, calls for the need for, not only documenting indigenous knowledge but also the collection and conservation of plant species used for ATM (International Union for the Conservation of Nature, 2001). Indigenous knowledge should be documented urgently to avoid loss of information since the elderly custodians of the knowledge are disappearing from the scene. Therefore, the statement of the problem is that, there is no documentation of ethnobotanical knowledge, regarding medicinal plant species, preparation and use, conservation, distribution of ethnobotanical knowledge amongst different age groups and the challenges affecting utilization.

### **1.3 Motivation for the study**

Majority of people in the North West Province of South Africa belong to the Batswana ethnic group, with traditional knowledge on medicinal plants, thus contributing to a broader understanding of medicinal plants in South Africa. The ethnobotanical knowledge held by the Batswana of Molatedi village, North West Province, was documented in this study. The study was prompted by the realisation that the management of the North West Parks and Tourism Board intend to fence out and exclude communities from accessing medicinal plants within the Heritage Park Conservation Corridor Area (CCA) in Madikwe District. This was part of the conservation strategy adopted by the management board to address perceptions that it was due to lack of conservation skills and overgrazing by communities which contributed to appearances of bare patches of land within the CCA. Molatedi village is only one of the villages that are partly enclosed within the Heritage Park Corridor on the eastern part of Madikwe Game Reserve gate. However, it is common knowledge that communities in these villages have lived in close relationship with the natural environment of the game reserve and that medicinal plants are an integral part of their livelihood. Their cultural norms, beliefs and spirituality of the

people are embedded within the use and conservation of the natural resources within the CCA. Therefore, the central question asked in the study was: what is the ethnobotanical knowledge of medicinal plants among the community of Molatedi village and how is this knowledge used to conserve medical plant species within the heritage park? The rationale for the study was that documentation of such indigenous knowledge, involving plant species used, plant parts, method of preparation and administration will add value to such indigenous knowledge by quantifying ethnobotanical knowledge among the community of Molatedi village. Since the local people have a long history of medicinal plant usage for medicinal purposes, documentation of plants used as traditional medicines is needed for the preservation of knowledge and for the sustainable utilisation of conserved plants. The current study, therefore, is an attempt to fill the gap in indigenous knowledge related to the use of medicinal plants and their conservation.

#### **1.4 Aim and objectives of the study**

The aim of the study was to document indigenous knowledge on the conservation and the sustainable utilisation of plants for African Traditional Medicine (ATM) by community members of Molatedi village. The specific objectives of the study were to: 1) establish indigenous knowledge associated with the utilisation and conservation strategies of medicinal plants within the Heritage Park; and 2) explore ethnobotanical knowledge among community members in Molatedi village with respect to medicinal plants within the Heritage Park.

#### **The following questions were raised in the study:**

- What is the knowledge of plant species found in the Heritage Park used for ATM by residents of Molatedi village?
- How are medicinal plants used to prepare ATM by traditional healers in Molatedi village?
- How is indigenous knowledge used by community members of Molatedi village to conserve medicinal plants in the Heritage Park?
- How does ethnobotanical knowledge differ among age groups within Molatedi village? and
- What challenges affect the utilisation of ethnobotanical knowledge for ATM within Molatedi village?
- Is there an erosion of indigenous knowledge in this cultural community?

#### **1.4 Significance and justification of the study**

The findings and recommendations of the study could assist in drawing up sustainable management strategies and policies on how to integrate parks and people when protected areas are established. It could also assist in developing natural resource conservation strategies based on local resources of the community by providing a link between natural resource conservation with livelihoods of local communities living in or adjacent to protected areas. It could also assist to close the existing knowledge gap between traditional knowledge and western knowledge on the use and conservation of ATM. The study could further contribute to the body of knowledge and information on the names, uses and conservation of medicinal plants within the Heritage Park.

#### **1.5 Operational theories and paradigm used in the study**

Since indigenous knowledge is embodied in languages, legends, folktales, stories, and cultural experiences of the formerly colonised and historically oppressed, the researcher adopted indigenous research methodologies and approaches in the study (Chilisa, 2012; Wilson, 2001; Kovach, 2010). Indigenous knowledge-driven research methodologies such as postcolonial indigenous knowledge, enable researchers to unveil knowledge that was previously ignored, thus enabling the researcher to close the knowledge gap created by imperialism, colonisation and the subjugation of indigenous knowledge (Smith 2008; Hart, 2010). The African adage of *Ubuntu* (“I am because we are”) was used in the study in order to theorise on relational ontologies, paradigms, epistemologies and axiologies from the perspective of the cultures and values of Batswana communities studied. The use of the local language enabled the researcher to bring to the fore, the development of other theoretical perspectives that are not so common in the literature. As stated by Cunneneen and Rowe (2014) and Chilisa (2012), the use of decolonising indigenous approaches to research could enable research to be carried out in respectful and ethical ways, which are culturally useful and beneficial to the local people. The researcher thus, adopted the view that when conducting research and evaluating African Traditional Medicine, knowledge and experiences obtained through the long history of established practices should be respected.



## **1.7 Organisation of the study**

The study is divided into six chapters. The first chapter provides the importance, uses, and the link between indigenous knowledge, African Traditional Medicine and ethnobotanical knowledge in order to justify the aim and significance of the study. Chapter 2 presents a critical review and examination of existing knowledge on the use of traditional medicine internationally, nationally and locally. Chapter 3 provides a synthesis of major epistemological and theoretical issues of the current literature, which forms the background of the research project as well as the basis upon which the study is conceptualised. The chapter also outlines the methodology and research design of the study.

Chapter 4 focuses on the results of medicinal plant resources identified by the study, their utilisation, methods of preparation and conservation strategies according to traditional healers and other knowledge holders within Molatedi village. In chapter 5, the results of the Matrix method used to rapidly assess and quantify ethnobotanical knowledge of the different age groups within the community of Molatedi community is reported. Knowledge related to the names, uses and methods of preparation of selected medicinal plants collected in the study is provided. Chapter 6 presents a comprehensive discussion that integrates the findings of the study and existing literature and draws some conclusions and recommendations on the different methods of conserving plant resources within the Heritage Park corridor. The next chapter is the literature review.

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## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

The literature review in this chapter will focus on what has been done in the area of ATM, with respect to the knowledge of the people and culture. It also establishes what has been done in Africa and other parts of the world with regard to the use, conservation and preparation of ATM. Furthermore, the difference with regard to type of knowledge on the uses, conservation strategies and preparation of ATM from medicinal plants is also examined in this chapter. The review further establishes how knowledge differs from different communities as informed by culture. Government involvement in controlling the use of medicinal plants for trade of ATM, knowledge of conservation within communities and how indigenous biodiversity is conserved are also examined in this chapter. Different concepts used in the study and how they relate with one another are also defined and explained in this section of the study.

#### 2.2 Definition of key concepts and terms used in the study

**Heritage Park** is a conservation corridor, also known as a Central Corridor Area (CCA) situated between Madikwe Game Reserve and Pilanesberg National Park.

**Indigenous Knowledge Systems** is a knowledge system developed by a community as opposed to the scientific knowledge that is generally referred to as “modern” knowledge (Ajibade, 2003).

**Indigenous Knowledge** is the sum total of the knowledge and skills, which people in a particular area possess, and which enables them to get the most out of their natural environment (De Beer and Whitlock, 2009).

**Culture** is defined by Zimmermann (2017) as the characteristics knowledge of a particular group of people, which encompasses language, religion, cuisine, social habits, music and arts, marriage, the right and wrong beliefs, how visitors are greeted, table manners and behaviour between lovers, among others.

**Local community** refers to as a group of interacting people who are sharing an environment, intent, belief, resources, preferences, needs, risks and many other conditions (Beck, 1992).

**Ethnobotany** is the study of the knowledge, skills and daily uses of plants in a particular area that enables the people of the local community to get the most out of their natural environment (De Beer and van Wyk, 2011).

**Ethnobotanical knowledge** is knowledge that encompasses both wild and domesticated species and has its roots on observation, relationships, needs, and traditional ways of knowing, which also evolves over time as it changes and adds new discoveries, ingenuity and methods (Botanical Dimensions, 2013).

**Medicinal plants** are all plants that have medicinal uses that are recognised, and the uses range from the products of mainstream pharmaceutical to herbal medicine preparations (Pandey *et al.*, 2013).

**Traditional healer** is a person who is recognised by the community where he or she lives as someone competent to provide health care by using plant, animal and mineral substances and other methods based on social, cultural and religious practices (WHO, 2000a).

**Traditional Medicine (TM)** is the sum total of knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used to maintain health, as well as to prevent, diagnose, improve, or treat physical and mental illnesses (WHO, 2000b).

**African Traditional Medicine (ATM)** includes diverse health practices, approaches, knowledge and beliefs incorporating plants, animals and /or mineral-based medicines, spiritual therapies, manual techniques and exercises applied singularly or in combination to maintain well-being, as well as to treat, diagnose or prevent illnesses (WHO, 2002).

**African Traditional Health system** is the performance of a function, activity, process or service based on a traditional philosophy that includes the utilisation of traditional medicines or traditional practices and which have its object as the maintenance or restoration of physical or mental health (WHO, 2002).

**Protected Area** is a geographical space that is clearly defined, recognised, dedicated and managed, through effective or legal means in order to achieve the long-term conservation of nature with all associated ecosystem services and cultural values (IUCN 2008, WCPA, and UNEP, 2016).

**Environment** is the interaction of all living species with climate, weather, and natural resources that affect human survival and economic activities (Johnson *et al.*, 1997).

**Conservation** is about the protection of biodiversity because species have inherent values (Soulé, 1985).

**Biodiversity** is defined by biologists as the totality of genes, species and ecosystems of a particular region (Larsson, 2001).

**Worldview** is the one that shapes the people's consciousness and also forms the theoretical framework within which knowledge is sought, critiqued and or understood (Sarpong, 2002).

**Traditional healers** are also referred to as practitioners of traditional African medicine. They take part in different social and political roles in the community such as divination, physical, emotional and spiritual healing, directing birth or death rituals, finding lost cattle, protecting warriors, counteracting witchcraft, and also in the narration of the history, cosmology and myths of their tradition (Cumes, 2004).

**Knowledge holders** are all indigenous people but all knowledge holders are not indigenous (UNESCO, 2009).

**Indigenous research** is an inquiry that is systematic and engages indigenous people as investigators or partners to extend knowledge that is significant for indigenous people and communities (Castellano, 2017).

**Ethics** refers to well-founded standards of rights and wrongs that prescribe what humans ought to do, usually in terms of rights, obligations, benefits, society, fairness or specific virtues (Velasquez *et al.*, 2017).

**Paradigm**, according to Kuhn (1996), refers to a set of concepts and practices that define a scientific discipline at any particular period of time. It is a set of concepts or thought patterns, including theories, research methods, postulates, and standards for what constitutes legitimate contributions.

### **2.3 The role of African Traditional Medicine in the livelihood of communities**

Research has shown that majority of the world's population depends on traditional medicine for their primary health needs (Helwig, 2010 and World Health Organisation, 2002). It is important that knowledge of indigenous societies accumulated over a historical period of time

be acknowledged (Oldfield and Alcom, 1991). De Beer & Whitlock (2009) define indigenous knowledge as the sum total of the knowledge and skills which people in a particular area possess, and which enables them to get the most out of their natural environment. Posey (1996) regards such knowledge as traditional knowledge, and observes that most traditional knowledge is transmitted orally rather than in written form and as a result, a lot of knowledge is lost. The knowledge or science, and its methods of investigation, cannot be divorced from a people's history, cultural context and worldview. Worldview is the one that shapes the people's consciousness and also forms the theoretical framework within which knowledge is sought, critiqued and or understood (Sarpong, 2002).

### **2.3.1 Indigenous knowledge systems (IKS) and its link to African Traditional Medicine**

The link between indigenous knowledge systems and ATM is brought about by community members. Indigenous Knowledge Systems (IKS) are forms of knowledge that have originated and are produced from local communities in a natural environment (Altieri, 1995 and Hammersmith, 2007). Communities have special complex kinship relationships among the people, relationship with the environment, plants, animals, the cosmos, the earth and many other different relationships. As they relate, that is where knowledge emanates, and other knowledge forms and also indigenous ways of knowing (Nyota and Mapara, 2008). There are other indigenous ways of knowing such as traditional knowledge, rural knowledge, ethnoscience (people science) as well as indigenous technical knowledge, also referred to as Indigenous Knowledge Systems (Altieri, 1995).

Indigenous Knowledge Systems came in through different dimensions such as agriculture, medicine, security, botany, zoology, craft skills and linguistics (Altieri, 1995). This is where the dimension of African Traditional Medicine (ATM) came into existence. This is the dimension where the indigenous people of Africa have contributed indigenous knowledge immensely to the medical field (Mapara, 2007). African Traditional Medicine (ATM) has made attempts to go beyond the boundaries of the physical body of a human being or animal, but entered into the spiritual realm. Bio-medicine is mechanically derived from the germ theory of diseases, whereas African Traditional Medicine emanates from indigenous knowledge systems, thus it is classified as mind-body medicine (Naamwintome & Millar, 2015).

### **2.3.2 The community and its link to African Traditional Medicine**

Cultural aspects of ATM and healing are intertwined with cultural and religious beliefs and encompasses all aspects that naturally affect a human being (Truter, 2007). African Traditional Medicine (ATM) and healing, as defined by WHO (2007), WHO (1976), and the United Nations Joint Programme on HIV/AIDS – UNAIDS (2006), Ashforth (2005), is “the sum total of all knowledge and practices, whether explicable or not, used in diagnosis, prevention and elimination of physical, mental, or societal imbalance, and relying exclusively on practical experience and observation handed down from generation to generation, whether "verbally or in writing”. African Traditional Medicine and healing is practised differently by different cultures within a specific ethnic group. There are African Traditional Healers who are specialists in the use of African Traditional Medicine within every cultural group.

In all African regions, African Traditional Healers play a very resourceful role in communities because they are themselves, the ‘medical knowledge storehouse’ (Yeboah, 2000). As “medical knowledge storehouse”, they serve important roles as educators regarding traditional culture, cosmology and spirituality. They serve as skilled and unskilled social and health practitioners of the community as well as custodians of indigenous knowledge systems (Mills, Cooper and Kanfer, 2005). The services of African Traditional healers go beyond the use of African Traditional Medicine (ATM), that deals with physical illness, but also become involve in matters regarding civil wars, social reconstruction and community rebuilding (Honwana, 1997).

### **2.3.3 Arguments for and against African Traditional Medicine**

There are arguments that tend to resurface among some individuals concerning traditional healers and ATM. This has been mentioned by George Kelly, an American psychologist and philosopher, who developed a philosophy referred to as ‘Constructive Alternativism’. This philosophy challenges the notion of a single objective reality (Boeree, n.d). He believes that though reality exists, it can be constructed, interpreted and understood in different ways. He also believes that African Traditional healers and Western healers have a different construction and ontology about schizophrenia. The African Traditional healer may look at witchcraft and ancestors as possible causes while Western healers are primarily focused on the biological aspect of schizophrenia. Therefore, none of them can claim that their construction is superior



than another, especially in the case of schizophrenia because the two constructions of reality are very different (Boeree, n.d). Boeree (n.d) argues and also maintains that there is no construction of any phenomena, including schizophrenia, which is ever complete because in such a large complicated world, there is no one who can claim to have the perfect perspective which can be regarded as universal. Even science cannot verify or discern anything beyond doubt or question (Rudinow and Barry, 2004). Thus, Teuton, Bentall and Dowrick (2007) maintain that during ill health, what needs to be emphasised is the issue of 'cultural relativism' since it suggests that experiences and interpretations of illness or misfortune are culture-dependent and the difference in the interpretation of illnesses and misfortunes are qualitative in nature.

Another argument is about issues of indigenous people's reclamation, revitalisation as well as the renewal of their knowledge systems. When indigenous people anywhere in the world claim that they been successful in the past in fields such as health and medicine, scholars such as Rodney (1982) argues that due to colonisation by the West, some ailments and other types of disease have afflicted the colonised and, in some instances, decimated them. Furthermore, Boehmer (1995) comments on the civilising mission of Westerners which resulted in the transmission of infections, including sexually transmitted diseases such as gonorrhoea and syphilis as they moved from Europe to the Pacific Islands. The point of argument between the two parties is that while Westerners argue to be the ones who brought advanced medical knowledge, those who were formerly colonised also point out that what white imperialism are claiming was a medical and health disaster for the colonised. The colonised also claim that they had wealth of medical knowledge that could sustain their populations prior to colonisation and also could continue sustaining them even long after the establishments of colonies (Boehmer, 1995).

#### **2.4 The use of traditional medicine in public health care**

Maluleka and Ngoepe (2018) highlighted in their study that ATM can be intergrated into the mainstream health care system in South Africa. This will alleviate some of the pressure faced by the health care sytem in South Africa. Different African communities use ATM for health care purposes. Therefore, traditional medicine in Africa is referred to as African Traditional Medicine (Romeo-Daza, 2002). African Traditional Medicine is used for "traditional healing' and researchers use the umbrella term 'traditional healing' when referring to many healing

systems different from the Western (modern) healing system. Traditional medicines and healing processes differ across the world because of different regions and countries of origin and also because of different agricultural systems (Good *et al.*, 1979). Therefore, traditional healing is not a homologous system of healing, but varies from one culture to another and also from the place of origin. In some countries, it may appear more established than in others (Sofowora, 1996). For example, in China, traditional healing is more established than in South Africa. According to Craffert (1997), the illness and health care systems of any society irrespective of being traditional or western, depends on the culture or world view of that particular society because every society develops their own cultural ways of handling illnesses and health care systems. Every indigenous community has its own special methods and also remedies that they use to deal with all forms of dynamic illnesses within their communities (Berg, 2003).

#### **2.4.1 The use of Traditional Medicine (TM) in diaspora (outside Africa)**

Chinsamy *et al.* (2011) found that approximately 6400 plants species are used in tropical Africa and 4000 of these plants are used as medicinal plants to treat many diseases and illnesses. Medicinal plants still make an important contribution to health care in spite of the great advances observed in modern medicines in recent decades (Calixto, 2000). All medicinal plants were harvested from the natural forest in ancient times (Balik and Cox, 1996; Dhillion *et al.*, 2002; Dhillion and Ampornpan, 2000; Sheldon *et al.*, 1997; Singh *et al.*, 1979). Dilshad *et al.* (2008) state that majority of ethnoveterinary practices in many parts of the world are based on the use of medicinal plants, which are available in local areas of communities compared to other remedies. According to Dilshad *et al.* (2008), it is evident that local communities live in close relationship with their environment and are able to extract meaningful health intervention from medicinal plants in their localities for the treatment of different diseases for both animals and humans.

Worldwide research has revealed that nationally and internationally, medicinal plants have been accepted by communities as well as governments as a formal component of health care (Balick *et al.*, 2000; Chinsamy *et al.*, 2011; Calixto, 2000; Coleman, 2013; De Beer and Van Wyk, 2011). Presently, in many rural communities, traditional medicine is still recognised as the primary health care system (Bannerman *et al.*, 1983; Manandhar, 1994, 1998; Svarstad *et al.*, 2000) because of cultural preferences and the effectiveness of traditional medicine.



However, that there is lack of modern medical alternatives (Plotkin and Famolare, 1992; Taylor *et al.*, 1995; Balick *et al.*, 1996; Tabuti *et al.*, 2003).

In some developed countries such as Germany, France, Italy and the United States of America, with a long tradition on the use of traditional medicine, herbal medicinal preparation are normally very popular and there are also guidelines for registration of such medicines Calixto (2000), Helwig (2010) and the World Health Organisation (2002) researched on traditional medicine and found that about 80% of the world's population depends on traditional medicine for its primary health needs. Currently, the World Health Organisation (2002) is preparing and implementing a strategy for the attainment by all the people of all level of health that will permit them to lead a socially and economically productive life.

The acceptance of traditional medicine by government as a formal component of health care has been slow in many countries, except in Asia and Europe. In other countries such as China, it is over three decades since they integrated traditional medicine in their national health care system (Balick *et al.*, 2000). At the international conference on Primary Health Care in Alma Ata (held in 1978), the World Health Assembly recommended that governments give high priority to the incorporation of traditional medical practitioners and birth attendants into the health care streams, and proven traditional medicine and remedies into national drug policies and regulations.

Coleman (2013) emphasises that herbal and traditional medicine play a critical role in the health care sector of many countries despite the dramatic advance and advantages of conventional medicine. Further estimations are that over 60% of the world's population and 80% of developing countries are directly dependant on plants or their medical purposes.

#### **2.4.2 The use of Traditional Medicine (TM) in Africa**

Africa, as a continent, has many plant species that could be utilised for medicinal purposes. According to Stanley (2004), there are approximately 6400 plants species used in tropical Africa and 4000 of these plants are used as medicinal plants to treat many diseases and illnesses. In Zimbabwe, out of more than 5000 plant species growing in different areas, about 10% of these plant species have medicinal properties and are used as traditional medicine (Maroyi, 2013). Traditional medicine (TM) used to be the dominant medical system available

to many people in Africa in both rural and urban communities before the introduction of cosmopolitan medicine (Abdullahi, 2011).

Indeed, traditional medicine was the only source of medical care for a greater portion of the population in Africa and in other parts of the world (Romeo-Daza, 2002). As a method of healing, traditional medicine is the most ancient and cultural method of healing that has stood the test of time. Human beings have used traditional medicines to deal with difficult and different forms of diseases that threaten lives and have managed to survive. Traditional medicine is a broad and diverse concept and was used generally, such that other cultures and societies have developed their own indigenous healing methods for example, Indians, Chinese and African traditional medicines (Romeo-Daza, 2002).

This is where African Traditional Medicine (ATM), Chinese Traditional Medicine (CTM), Indian Traditional Medicine (ITM) have evolved. When someone is in Africa, he or she talks about African Traditional Medicine and the same applies for people in China, India and any part of the world (Romeo-Daza, 2002). As a result of these different cultures, there is no single universally accepted definition for traditional medicine (TM), except the one that is the most acceptable among other definitions of TM, provided by the World Health Organisation. Thus, according to the World Health Organisation (WHO, 2000), traditional medicine (TM) is the sum total of knowledge, skills, and practices based on theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used to maintain health, as well as to prevent, diagnose, improve, or treat physical and mental illnesses.

There is also an increase in the number of communities that use traditional medicine. Despite the increasing acceptance of traditional medicine in Zimbabwe, there is still much of this rich indigenous knowledge on traditional remedies that is not adequately documented (Maroyi, 2013). Today, in Africa, there is a rapid increase in the acceptance and utilisation of herbal medicine partly because of the scientific support of their medicinal uses. Cumes (2004) states that Traditional African Medicine is a discipline that holistically involves the extensive use of indigenous herbalism, combined with aspects of African spiritualities.

Traditional medicine is mostly administered by traditional healers by virtue of their recognition by the community as a result of their competence to provide health care using either medicinal plants, animals and mineral substances and other methods based on the social and cultural religious practices (WHO, 2000). In Africa, traditional healers and traditional health care

systems are still used by majority of the people. Traditional healers are called various names such as Sangoma, Nyanga, Ngaka or matweetwee among South Africans, Babalawo, Adahunse or Oniseegun among the Yoruba-speaking people of Nigeria and Abia ibok among the Ibibio community of Nigeria (Abdullahi, 2011). Traditional healers prepare traditional medicine using various methods. Results of a study conducted by Diame (2010) in Ghana showed that traditional medicine is prepared from more than one plant species. Such preparation strategy, according to Igoli *et al.*, (2002), Bussman and Sharon (2006); and Diame (2010), could be attributed to some possible additive synergistic effects.

Other studies have revealed that most traditional medicines were prepared from a single medicinal plant species Macia, *et al.*, (2005) in Bolivia; and Tagola *et al.*, (2005) in Mali. Generally, the preparation methods of most traditional medicines were infusions, decoctions and powdering. The preparation of some traditional medicine consisted of mixing of plant and ingredients such as pepper (*Capsicum*) and ginger. Such preparations were taken orally, by enema and the dose varied from one traditional healer to the other.

In South Africa, plants still make an important contribution to health care in spite of the great advances observed in modern medicines in recent decades (Calixto, 2000). Coleman (2013) also adds and emphasises that herbal medicine and traditional medicine plays a critical role in the health care sector of many countries despite the dramatic advances and advantages of conventional medicine. Traditional medicine cannot be ignored to have played a role in modern medicine. Calixto (2000) states that it is estimated that about 25% of all modern medicine are directly or indirectly derived from higher plants. Meyer and Afoloyan (1995) state the important role of medicinal plants within the traditional health care system in South Africa.

They further point out that in 1994, approximately 60% of South Africans used an estimated 700 indigenous plants species for traditional remedies. Mander (1998), in his study on medicinal plant marketing in Bushbuckridge and Mpumalanga, South Africa, also recorded an estimation of 20 000 tonnes of indigenous plant materials used per annum to prepare traditional medicines. Traditional medicine is widely practised in South Africa, and is an essential part of African cultural beliefs. In KwaZulu Natal (in South Africa), a case study by Baker and Mander (1999) revealed interesting statistics. About 6 million indigenous medicine consumers were revealed and 27 million in the entire South Africa. It is believed that families spend between 4% and 6% of their annual income on indigenous medicine and services. More than 4 500

tonnes of plant materials are traded annually at a value of R62 million, which is equivalent to a third value of the annual maize harvest for the Province. According to the South African Traditional Research Group (SATMERG, 2013), it is estimated that 70% of South Africans regularly use traditional medicines, which mostly originate from plant species that are indigenous to the region. They obtain prescriptions from either traditional healers, if not purchased from the herbalists, or gather from the fields, medicinal plants for themselves. The plants are also used by communities and traditional healers as symbols for spiritual significance.

Njoroge and Bussmann (2006) as quoted by Soyela and Masika (2009), state that the reasons why livestock raisers use traditional medicine to treat their animals is the high cost of conventional medicines. Grierson and Afolayan (1999) (in their ethnobotanical study) documented 38 plant species that are frequently used for the treatment of human wounds in the Eastern Cape Province. In their study of traditional remedies used for the treatment of cattle wounds and myiasis in the Amatola Basin, Soyela and Masika (2009) found that majority of participants (67.9%) out of eighty three (83) famers used traditional remedies for the treatment of the conditions stated. Masika *et al.* (1997), and Van Wyk *et al.* (1997) agree with Soyela and Masika (2009) that it has been quite some time in the Eastern Cape Province that farmers use EVMs in the treatment of animal health problems.

The interesting finding in the study of Soyela and Masika was that 25.9% of the same participants combined traditional remedies with convectional medicines to treat their cattle. It is evident that traditional medicine could be used, together with western medicine, for the treatment of different diseases. Thus, the need for integration of traditional and western healing methods as an attempt to address health problems for both animals and humans. Soyela and Masika (2009) also found that the parts of medicinal plants frequently used are the leaves and the preparation method is usually through infusion. According to Van Wyk *et al.* (2000), in some cases, when traditional medicine is prepared, some parts of the plants are hardly used because of the variation of chemical compounds within different parts of the plants. This is because one part of a plant could be toxic while the other part is harmless. Furthermore, Van Wyk *et al.* (2000) validate the previous statement with an example of high concentration of active ingredients found in a tree bark.

Monakisi (2007) conducted a study on knowledge and use of traditional medicinal plants by the Setswana - speaking community of Kimberley, Northern Cape, South Africa. The results of the study revealed the three main Setswana methods of traditional plants preparations as follows: Plants are either “*Boiling or Soaked and in water*”; “*Ground to powder*”; “*Burnt to powder*” and inhaled as smoke. However, the results did not indicate Setswana names for the different preparation methods. Furthermore, a study by Monakisi reported the results on various ways of administering medicinal plants as follows: “*Steaming*”; “*Lotion*”; “*Enemas*” (syringes) western or (hons) traditional; “*Sprinkles*”; “*Snuffs*”; “*Bathing*”; “*Smoking*”; “*Burning*”; “*Planting of plants or placing*”; “*Lucky charms*”; and “*Oral administration*”, which has six basic methods such “*Emetics*” (self-induced vomiting), “*Drinking*”, “*Sucking*”, “*Chewing*”, “*Gurgling*” and “*Eating*”. All information with regard of the findings by Monakisi about the administration of medicinal plants did not include the Setswana names.

In the North West Province, South Africa, in Mogwase District, a research was undertaken about the use of a traditional medicine called *kgaba* by Van der Kooi and Theobald (2006). The same authors reported that *Kgaba* remedies are commonly believed to cause foetal distress and an increase in caesarean sections. The findings of the study revealed the link between indigenous knowledge within the Batswana people of Mogwase District and ATM.

The findings of the study revealed that *kgaba* remedies, when ingested to pregnant women, do not only help to prevent or solve physical problems but are also perceived as valuable in protecting against the harm that evil spirits could cause during pregnancy (Van der Kooi and Theobald, 2006). According to Van der Kooi and Theobald (2006), experiences with *kgaba* with regard to their preparation and dosage, differed among different people just as it is with the variety of plants used.

Another finding that emerged during the same study is that of a crushed ostrich eggshell, which is perceived as inducing labour. Van der Kooi and Theobald (2006) further explain the perception of the Batswana people on the use of *kgaba* as an important component in the experience of pregnancy and labour. All the indigenous knowledge reported by Van der Kooi and Theobald (2006) about *Kgaba* is an indication of the knowledge and use of medicinal plants by local communities in and around the area of abode.

Community members from areas surrounding the Heritage Park, utilise plants within the Heritage Park for various purposes, including medicinal use (van der Merwea, *et al.*, 2001).



The same authors undertook a study on the use of ethnoveterinary medicinal plants in cattle by Setswana-speaking people in the Madikwe area of the North West Province, South Africa. Madikwe area is one of the neighbouring areas of the Heritage Park. In their study, Van der Kooi and Theobald (2006) found that Setswana-speaking people in the North West Province have a rich heritage of ethno-veterinary knowledge, which includes all aspects of ethnoveterinary medicinal plant use. The information was gathered from members of communities residing in and around areas of Madikwe, which is a neighbouring village within the Heritage Park. Information was gathered using different methods that revealed a vast indigenous knowledge about medicinal plants in the areas of Madikwe.

The literature reveals that such studies have been conducted in other parts of the world, however, in Madikwe District of the North West Province, there are only two studies that have been conducted so far (Van der Kooi and Theobald, 2006) on the use of ethnobotanical plants in pregnant women and the use of ethnoveterinary medicinal plants in cattle. Despite the cultural significance of medicinal plants among communities in the North West Province, ethnobotanical studies have not been conducted. Thus, there is a great need to close this gap. Such studies will heighten awareness, stimulate new thoughts, and generate discussions on the wealth of indigenous knowledge that reside in and with Batswana people of the North West Province.

## **2.5 The role of government in the use of traditional medicines**

Government has a role to play in ensuring that policies that regulate the use of traditional medicine are in place. Furthermore, when traditional medicine is practised as a trade, government has to play a role of ensuring that all is done according to policy and legal framework. The government has to make sure that policies ensure access, safety and efficacy of therapy (South Africa, 2008).

### **2.5.1 The role of Government in the use of traditional medicine in diaspora (outside Africa)**

Traditional medicine (TM) has always maintained its popularity worldwide. In addition, over the last decade, there has been an increasing use of complementary and alternative medicines (CAM) in many developed and developing countries. The safety and efficacy of traditional medicine and complementary and alternative medicines, as well as quality control, have become important concerns for both health authorities and the public (WHO, 2005). Government became increasingly aware that national policy was urgently needed in countries

where traditional medicine was popular and used in primary health care. An example is the Western Pacific Region where only four (4) countries had a national policy on traditional medicine in 1994 and, in 2001, they increased to fourteen (14). Generally, the national policy included a definition of government's role in the development of traditional medicine in the health care delivery system, mission, goals as well as objectives. The integration of traditional medicine into the national health system was considered a means to enable the two systems to effectively work together for the benefit of government, patients as well as consumers. In the United States of America, the budget of the National Centre for Complementary and Alternative Medicine increased from 2 million in 1992 to US\$ 113.2 million in 2003 (WHO, 2003).

As far as safety, efficacy and quality are concerned, governments needed to be involved in a series of activities to ensure the safety and efficacy of traditional medicine. Government also needed to establish a national expert committee, formulate national regulations for herbal medicines, licence the practice of traditional medicine, and also provide support for research. With regard to awareness of the importance of safety and efficacy of traditional medicine among member States, national research institutes for traditional medicines have been established in different countries with regulations on herbal medicines and increased from 50 in 1994 to 70 in 2001 (WHO, 2003). The development of WHO Traditional Medicinal Strategy with its four primary objectives: framing policy; enhancing safety; efficacy and quality; ensuring access; and promoting rational use, was adopted at the Fifty-sixth World Health Assembly in 2003 (WHO, 2003).

The World Health Organisation advised all WHO Member States to develop their own Traditional Medicinal Acts and Policies based on WHO Traditional Medicinal Strategy (WHO, 2003). Thus, Forty five (32%) of the Member States are reported to have a policy on Traditional Medicine / Complementary Alternative Medicine TM/CAM, and 56% of WHO Member States have also reported that they do not have a national policy and indicated that such policies are currently being developed (WHO, 2003, WHO, 2014-2023). Most Member States have recently established their national policy while only five States reported that they had their national policy since 1990. However, 28% of Member States reported that they had issued a national programme on TM/CAM. Seventy-five (53%) of the Member States who responded, reported that they have a national office in charge of TM/CAM. The national office is located within the Ministry of Health in most of the Member States. Sixty-one (43%) of the Member States that responded, reported that they have experts committees for TM/CAM. Finally, out

of all the Member States, 58 (fifty eight) Member States indicated that they had at least one national institute on TM/CAM or herbal medicine (WHO, 2014-2023).

### **2.5.2 The role of government in the use of traditional medicine in Africa**

Government policy on traditional medicine is used worldwide for the prevention, diagnosis, treatment and management of diseases. In sub-Saharan African countries, there is increasing popularity of traditional and complementary medicine (WHO, 2004). People use traditional and complementary medicine because of accessibility, affordability, and they are perceived as safe, and have the potential for treating diseases. With regard to the popularity of Traditional Medicine (TM), the development of regulation and legislation of the herbal medicines market has generally been inadequate (WHO, 2013). This is because the public policy on TM differs significantly due to the diverse priorities of countries and regions in the world. An example is the one of Chinese and Indian governments, where they want to use TM to strengthen primary health care in remote areas (WHO, 2002b).

In Africa, many countries are looking for the best ways to use local TM resources and make TM an integrated part of minimal health care packages. Whereas in Europe, licencing providers and the creation of standards of training and providers for research have become crucial issues. Many sub-Saharan African countries have recognised the importance of the creation of their own regulatory status of traditional medicine (WHO, 2002a). The creation of a national TM policy is important because it helps to define the role of traditional medicine in a national health care system and also by putting mechanisms in place to ensure its availability, accessibility, safety, quality, efficacy and appropriate use. While many of sub-Saharan African countries are recognising and addressing the legal and policy issues around TM and CAM, their efforts vary considerably in scope and approach (WHO, 2005).

An example of Bolivia's regulation and laws are as follows: the regulation of herbal medicine was instituted in 1982, and they are regulated on their own category as over-the-counter medications. There are fifty two (52) registered herbal medicines. A post-marketing surveillance system has been planned. Practice of TM was legally recognised in 1985. TM practitioners must have a government licence, although no registry exists. No official programme exists to integrate TM and conventional medicine (WHO, 2002b). Bolivia's official training and education is as follows: the Ministry of Health established a training programme for TM practitioners at conventional medical schools in 1982. KUSKA, a research



organisation, runs two TM schools. Formal courses, workshops and seminars in TM are available through the government health sector. Other countries such as Ethiopia, Gambia, Kenya, the Netherlands, Philippines, the United Kingdom and Vietnam have their own regulation and laws and also official training and education, except for Ethiopia with no official training and education (WHO, 2001, 2005). In South Africa, there is a draft policy on African Traditional Medicine in South Africa's Government Gazette (2008) of the Department of Health. This draft policy was drafted in 2008 for the institutionalisation of African Traditional Medicine in the health care system of the country.

The South African government became a member of WHO after the drafting of the policy and accepted recommendations made by WHO with regard to the needs for policies and strategies that institutionalised African Traditional Medicine as well as its guidelines in the formation of such policies. South Africa is also a member of the African Union and SADC. Together, they adopted the plan of action of the decade for African Traditional Medicine 2001 to 2010. The World Health Organisation estimated that in 2000, about 25 countries will give their reports with regard to the National Traditional Policy (1).

The World Health Organisation argues that where such policies exist, a sound basis for institutionalisation of Traditional Medicine in national healthcare regulatory and legal mechanisms will be in place to ensure access, safety and efficacy of the therapy (South Africa, 2008). Furthermore, the Government, through the National Department of Health, made interventions towards the official recognition, institutionalisation and empowerment of African Traditional Medicine as indicated in the Government Gazette of the Department of Health (South Africa, 2008):

- The National Drug Policy of South Africa (South Africa, 1996) that recognises the potential role and benefits of available remedies of African Traditional Medicines in the National Health system and the potential role of traditional healers in the formal healthcare sector;
- The Directorate: Traditional Medicine, a new directorate established to manage the work related to Traditional Medicine within the Department of Health;
- The Ministerial Task Team on the New Regulatory Authority that made proposal for the registrations and regulations of African Traditional Medicine;
- The Traditional Health Practitioner Act, 2007 (Act number 22 of 2007), the purpose of which is to establish Traditional Health Practitioners;

- Funding for research and development of African Traditional Medicines to manage and control diseases; and
- Initiated the African Traditional Medicine Week, in line with the Plan of Action on the AU Decade of Traditional Medicine (2001 – 2010) therapy (South Africa, 1996).

In 1986, South African traditional healers formed a National Council consisting of 150 smaller associations. Since then, there has been several attempts to form more inclusive umbrella-type of associations of healers, which have been experiencing mixed successes in as far as representation and sustainability is concerned. One of the goals in the African National Congress' (ANC'S) National Health Plan (African National Congress, 1994) was that every person has the right of access to traditional practitioners as part of their cultural heritage and belief system. This statement has liberated many people who believed in traditional medicine to freely consult their traditional healers. Community-based health traditions are those that seem to be transmitters of this knowledge from generation to generation. This codified knowledge has managed to be expanded globally by different means such as recognised officials and also corresponding policy and financial support.

The large amount of undocumented folk-based knowledge and traditions managed to survive on their own without official recognition, policy and administrative support from government levels (Foundation for Revitalisation of Local Health, 2005). Currently, in South Africa, there are a large number of organisations that regulate and register traditional healers (LeClerc-Madlala, 2002). According to LeClerc-Madlala (2002), the coming of Christian missionaries in South Africa (several centuries ago) marked the beginning of competition between western medicine and traditional healing systems.

World Health Organisation (2002a; 2005).has shown that worldwide, traditional medicine (TM) has been accepted by communities as well as governments as a formal component of health care. Furthermore, the literature has shown that countries that are Member States of WHO, use Government Acts on traditional medicine as advised by WHO to ensure the availability, accessibility, safety, quality, efficacy and appropriate use of traditional medicine.

Furthermore, the literature reveals that not all countries that are Member States of WHO have policies on Traditional Medicine. The literature further reveals that the integration of traditional medicine into the national health system has been considered but not is fully implemented in many countries (WHO, 2005). Countries such as China and India are still dealing with policy

issues on traditional medicine thus, cannot implement integration of traditional medicine into the national health system.

This study reveals that for the countries, whose policies are being implemented, there are significant differences because of the diverse priorities of countries and regions in the world. In Bolivia, there is no official programme to integrate TM and conventional medicine.

In South Africa in general and the North West Province in particular, there are no policies on integration of traditional medicine into the national health system. The creation of a national TM policy is important because it helps define the role of traditional medicine in a national health care system and also by putting mechanisms in place to ensure the availability, accessibility, safety, quality, efficacy and appropriate use of traditional medicine. While many countries in Africa, South of the Sahara are recognising and addressing the legal and policy issues around TM and CAM, their efforts vary considerably in scope and approach (WHO, 2005).

The creation of a national office on IKS is of paramount importance because of the functions that would be carried out from the office. One of the functions of the national office of IKS will be for the consideration of the application for the intent to access IK and IKS and conditions of fair and equitable benefit sharing. Considering the fact that activities of the SADC Region and NEPAD project are gaining momentum, as well as the new policy is opening the opportunity for the framework for collaboration with other counterparts in other parts of Africa (Bugener, 2003).

A united front on problems facing both the region and the continent could be presented as a whole. Problems such as biopiracy, benefit sharing and lack of appropriate recognition of knowledge holders. As well as policy will play an important role and also chart the way forward on how South Africa views the interchange in the context of the contribution of knowledge holders to development (WHO, 2001). Furthermore, the creation of national, regional and international registries of IK would support benefit sharing among industry as well as local communities (Chishakwe & Young, 2003).

Support and benefit sharing has been initiated in India and South Africa. However, the CSIR has reached a holistic agreement with the San community on the sharing of potential benefits derived from an appetite-suppressing drug to be developed from the Hoodia plant. In the interest of all stakeholders' benefits, DST will create a framework to regulate the agreement to



be concluded. Such agreement will be reached in a mutually beneficial manner but not as a matter of doing such in goodwill (Wynberg, 2004).

One of the key elements of a system is to create a positive energy between South Africa's IKS and the South African National System of Innovation, which will in turn, create a legal benefit-sharing framework (WHO 2001 & 2005). There is also a need for the formal amendment of South Africa's Patent Law to formally declare the use of IK or the transfer of material from indigenous use prior art declarations. Failure to make such declarations would result in the loss of patent protection (Wynberg, 2004).

Furthermore, the requirement for all researchers in the field of IK will be the use of Information Transfer Agreements (ITAs) and Material Transfer Agreements (MTAs) that conform to a minimum standard to ensure a basis for future benefit sharing in the absence of a records system. It is also important to consider the facilitation of appropriate private sector participation in generating economic benefits from IK in the historical South African context of conflict and exploitation between indigenous communities and the Apartheid regime.

There are possible strategies that could be used to protect IK from exploitation. Such strategies are: recording of IK by IK holders; minimum standards for benefit sharing; agreement on public domain declaration of knowledge; as well as agreement on certification of IK holders and their rights (WHO, 2001). Given the role of different stakeholders and the establishment of different structures as well as the crosscutting nature of IKS, the policy specifies the different roles that national departments working with IKS will be able to play. Departments such as DTI (IPRs), DoH (regulatory aspects with respect to traditional health practitioners), DEAT (biodiversity, access and benefit sharing), DOE (integration into the curriculum), DAC (culture and heritage aspects related to IKS), DST (innovation and integration with other knowledge systems) and other government departments in the area of IKS (Wynberg, 2004).

## **2.6 Indigenous Biodiversity Conservation (IBC)**

Different authors define biodiversity in different ways. It is, therefore, important to establish the definition of indigenous biodiversity conservation as used in this study. Indigenous biological biodiversity is defined by councils, as a way of safeguarding life supporting capacity (of ecosystems); 'preservation' (of the natural character of the coastal environment, wetlands, rivers, lakes and their margins); and 'protection' (of significant indigenous vegetation and significant habitats of indigenous fauna) (WHO (2013).

This is consistent with Wanjuri (2013) who suggests that indigenous conservation must include the management of nature and of the earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction and the erosion of biotic interactions (known as conservation biology). There are two methods of biodiversity conservation: In-situ conservation, which means the conservation of species within the natural habitat and Ex-situ conservation, which involves the conservation of biological diversity outside of their natural habitat. The biological resources to be conserved comes under several categories such as medicine, food, wood, products and fibres, among others.

### **2.6.1 Indigenous Biodiversity Conservation in diaspora (Outside Africa)**

Humans are viewed as part of the natural world and a belief system. Therefore, stressing respect for the rest of the natural world is of value for evolving sustainable relations with natural-resource base. Human culture and knowledge is critical in natural resource conservation (Oldfield and Alcom, 1991). Abdullahi *et al.* (2013), in their study, discovered that the existing traditional conservation methods among the natives included preservation of sacred landscapes for threatened species, myths and taboos restricting use through dos and don'ts, harvesting methods, spiritual values associated with forests and individual species. As a form of appreciation from the natives for these immense values and threats from changing environment, they indicated approval for the integration of indigenous knowledge with modern forest management practices. Abdullahi *et al.* (2013) further emphasise the need to recognise local knowledge in both content and practice for the continued sustainability of forest biodiversity and conservation strategies.

Berkes (1999) states that the contribution of local communities in the conservation and sustainable use of natural resources is gaining much recognition, especially when coupled with local knowledge associated with the use and conservation of medicinal plants, which have been either codified in ancient scriptures or made to be folk-based. Raj and Ecol (2006) found that Indigenous Knowledge has the potential to contribute to the conservation of biodiversity. According to Boaten (1998), there are trees that were regarded as housing spirits in the Ashanti Region of South Western Ghana.

Community members in the Region were not allowed to cut off these trees without first performing rituals. This was the custom they practised and it had a protective effect on trees such as odum (*Chlorophora excelsa*), African mahogany (*Khaya ivorensis* and tall palm trees

as betene (*Elaeis Guineensis*) and osese (*Funtumia* sp.). There are also shea butter (*Butyrospermum parkii*) and the Dawadawa (*Parkia clappertoniana*) trees, in the Northern savannah zone of Ghana, which are subject to the same traditional protection system. Other conservation methods discovered by Raj and Ecol (2006) are animals that were regarded as sacred and, therefore, not hunted. Also, members of a particular group could not kill an animal that was considered their totem. Furthermore, it was discovered that some pieces of land were regarded as sacred and not harvested but rather set aside for spiritual purposes.

### **2.6.2 Indigenous biodiversity conservation in Africa**

It is important to acknowledge the knowledge of indigenous societies accumulated over a historical period of time. Humans are viewed as part of the natural world and a belief system. Therefore, stressing respect for the rest of the natural world is of value for evolving sustainable relations with natural-resource base. Human culture and knowledge is critical in natural resource conservation (Oldfield and Alcom, 1991). Abdullahi *et al.* (2013) found that existing traditional/indigenous conservation methods among the natives include preservation of sacred landscapes for threatened species, myths and taboos restricting use through dos and don'ts, harvesting methods, spiritual values associated with forests and individual species. As a form of appreciation from the natives for these immense values and threats from the changing environment, Abdullahi *et al.* (2013) indicate approval for the integration of indigenous knowledge with modern forest management practices. These authors further emphasise that for the continued sustainability of forest biodiversity, conservation strategies need to recognise local knowledge in both content and practice.

Abdullahi *at al.*, (2013) found that traditional societies surrounding the Kpashimi forest developed an understanding of their biophysical environment over generations. Their indigenous knowledge and practices are grounded in ethical, spiritual and cultural values that they confer to nature. Majority of respondents in their study indicated that aspects that play a significant role in the conservation of forest biodiversity are royal tradition, taboos and myths, as well as their livelihood. Other traditional conservation practices highlighted were embedded in the harvesting methods, sacred landscapes protection and perception about nature.

An Andean model of linkage with biodiversity is that the base of an Andean's man existence is the land. This model advocates the fact that man is born from the land and for that reason, the land is man's mother. This is contrary to the western philosophy that man is the owner of

the land. In the Andean model, the man and the Andean woman talk to the plants and converse with animals. Before they can plough in the land, they request permission from the land. The native plant is the sister and, therefore, a little animal is a part of him. Man also sleeps in the same room with the plants, speaks with them and takes care of them, turns them around and sings to them. The hills are believed to be the guardian gods, parents and mothers, some males, some females, some husbands, dads and moms (Oviedo *et al.*, 2007).

In South Africa, the contributions of communities in the conservation and sustainable use of natural resources gained much recognition, especially when coupled with the local knowledge associated with the use and conservation of medicinal plants, which has been either codified in ancient scriptures or made to be folk-based (Berkes, 1999). The management of human use of natural resources so that it may yield sustainable flow of benefits from one generation to another can only be achieved through preservation, maintenance, sustainable use and the restoration of the environment (USAID, 1994). Hens (2006) discovered that Indigenous Knowledge has the potential to contribute to the conservation of biodiversity. Moeng's (2010) study shows the contributions of indigenous knowledge on the conservation of biodiversity, where eighty one percent (81%) of traders who were all traditional healers, harvested only few medicinal plants in a specific area in order to allow species regeneration and ensure population integrity.

According to Ellis and Porter-Bolland (2008), the national register of formally protected areas revealed that, by 1995, 5.4% of the land surface of South Africa was under formal protection, comprising a total of 422 areas. Ellis and Porter-Bolland (2008) further explain that areas that were included were the forest or wilderness areas, National Parks and provincial reserves. These areas covered a total of 6.6 million hectares. There were twenty eight (28) International Union for Conservation of Nature (IUCN) Category II protected areas listed, sixteen (16) were under the control of the South African National Parks (SAN Parks), eleven (11) were under the control of Ezemvelo KwaZulu-Natal and one (1) was under the control of the Eastern Cape provincial authority. Since the number of protected areas have dropped, the goal was set in 2003.

The international community converged in 2003, in Durban, for the World Park Congress (WPC) and resolutions were taken and adopted by all signatories. One of the resolutions was the recruitment of land for conservation. All members were mandated to go back to their countries and come up with a strategy of recruiting more land for conservation. The set target



was of 10% with each country to revise the target according to the realities of individual countries. South Africa, as a country, committed to the 8% of land to be conserved and target by 2014 (Matsemela, 2014).

The International Union for Conservation of Nature (IUCN) noted that unlike in the past congresses, delegates at the World Congress of Protected Areas, held in 2003, in Durban South Africa, reflected beyond the traditional approaches and boundaries of the congress (IUCN, 2008). They, accordingly, engaged the Congress Theme: “Protected Areas: Benefits beyond Boundaries”, which endorsed and encapsulated the sentiments of the two patrons of the congress – the former President of South Africa Mr Nelson Mandela and Her Majesty, Queen Noor of Jordan, who urged delegates to celebrate what will go through the annals of history, as one of the most significant conservation achievements of the last century as seen in the inclusion of more than 11% of the earth’s land surface as the footprint of protected areas management system as observed by Sheppard (2008) in IUCN, (2008).

Critical to note was their acknowledgement of concomitant threats that face these protected areas. Thus, delegates at the congress agreed that although the global protected area system must be expanded to avoid extinction of species, reserve benefits and costs are not equally distributed. Global benefits are often greater than local ones, and within countries, reserves may impose higher opportunity costs on the poor, although in some cases, the benefits that the poor derive from these areas exceed limitations imposed on local livelihoods (Robertson and Lawes, 2005).

Therefore, the designation of new reserves that halt the conversion of habitat and extinction of species must be based on sound information of the ecological, socioeconomic, institutional and financial contexts (Brandon *et al.*, 1998; Cowling and Pressey, 2003). Pigram and Wahab (2004) emphasise the need for balance during the process of ecological management of natural resources and the livelihood of local communities. The authors cite an example of iSimangaliso Park Authorities that had to explore sustainable approaches to resource management that would address social justice issues while meeting nature conservation objectives of the country. The need to balance the management of the ecosystem with the people’s livelihood to ensure sustainability has been emphasised. It is, after all, incumbent upon authorities to orient tourism growth towards meeting its conservation and socio-economic objectives.

Indigenous biodiversity in the North West Province constitute the focus of this study. As already indicated, the aim of this study was to document indigenous knowledge on the



conservation and the sustainable utilisation of plants for African Traditional Medicine (ATM) by community members of Molatedi village. Indigenous biodiversity conservation strategies constitute part of the results of the study since the researcher was persuaded to conduct this study as a result of the Heritage Park Project. The Heritage Park Project, is a developmental initiative, geared at establishing a conservation corridor linking Pilanesberg National Park and Madikwe Game Reserve, into a mega nature base tourism anchor project and a primary economic catalyst for the region.

Furthermore, the project aims at setting up a migratory corridor for the Big Five species within the envisaged 167 000 hectare Reserve targeted through the connection of the two Protected Areas over a period of 20 years from its initiation and launch in 2002. The overall objective of the Heritage Park Project is intended to stimulate and promote socio-economic development in the area and instil among the local communities, a culture of conserving the natural and cultural heritage characteristics of this underdeveloped and economically depressed rural area (Boonzaaier, 2002).

It is, therefore, quite clear that the above statement does not involve indigenous conservation strategies in the initiative. If community members were involved, it is not with the inputs of how conservation could be done within the Heritage Park by the communities and the government (management of the park). It could be that the communities were just recipients of information of how the development initiative has to unfold without realising that as communities residing within and also in the periphery of the Heritage Park may have been practising indigenous/traditional biodiversity conservation strategies, which is a part of the results of the study.

## **2.7 The identified key knowledge gaps**

There is a knowledge gap about inventory of ethnobotanical studies in many parts of the world (Cheikhoussef *et al.*, 2011). As much as literature has revealed intense research on ethnobotanical studies, there is still a gap in this field that could not be easily exhausted (Gurib-Fakim, 2006). There are other parts of the world where ethnobotanical studies are lacking, whereas diversity of plants are in abundance (Ladio and Lozada, 2004). With regard to the techniques used to measure ethnobotanical knowledge, literature has also shown that generally, there are few ethnobotanical studies on techniques to measure the ethnobotanical knowledge of communities (Bernstein *et al.*, 2018).

The World Health Organisation (WHO, 2000) states that in all parts of the world, indigenous communities are conscious of the conservation of medicinal plants and are using the most common traditional conservation methods that include preservation of sacred landscapes for threatened species, myths and taboos, restricting use through dos and don'ts, harvesting methods, spiritual values associated with forests and individual species. The shortcoming in this regard is the fact that majority of studies do not explore other permutations to reveal indigenous or traditional methods of conservation based on language, every day activities, observation and ancestral beliefs of communities.

Furthermore, the literature revealed that the origin of the concept of African Traditional Medicine (ATM), from a broad ancient concept, is used worldwide. Literature (WHO, 2000) has shown that not all countries that are Member States of WHO, have policies on Traditional Medicine. Even though there are several studies that have been conducted on ATM, indigenous paradigms, methodologies and approaches have not been considered. There are currently several calls for such studies to take into account indigenous approaches and paradigms. The next chapter focuses on some indigenous philosophical and epistemological underpinnings of indigenous research.

## CHAPTER THREE

### MAPPING INDIGENOUS PHILOSOPHICAL AND EPISTEMOLOGICAL UNDERPINNINGS OF THE STUDY

#### 3.1 Introduction

This chapter provides a insight into the epistemological, physiological and theoretical underpinnings of indigenous research in order to put into context, approaches and methods adopted in the study. Major indigenous components of indigenous research and how they influence indigenous research tools and methods of data analysis are also reviewed in this chapter.

#### 3.2 Conceptual framework

The conceptual framework (Figure 3.1) adopted in this study illustrates the concepts utilised during the research. African Traditional Medicine (ATM) is the key concept in this chapter since it is the main source of production in the chapter. In order for ATM to be produced, local community members play a key role. The success of the indigenous research is dependent on local community members (Nakata *et al.*, 2012). Local communities referred to in this study comprise tribal leaders, traditional healers and knowledge holders and general members of the community.

The most important tool used during research interactions is language. Language is used to mediate the research process, recovering and revitalising, validating indigenous knowledge and the culture of historically marginalised communities (Goduka, 2000). As community members within their culture use their own local language to communicate and interact with their environment, they develop new local concepts. Some new local concepts also develop as a result of the interaction with the environment and particular plants (UNESCO World Report, 2009). Figure 3.1 shows the conceptual framework of the study. African Traditional Medicine is based on indigenous knowledge of the local community as it develops from the culture, beliefs, language, and their relation with the environment (Asante *et al.*, 2017).

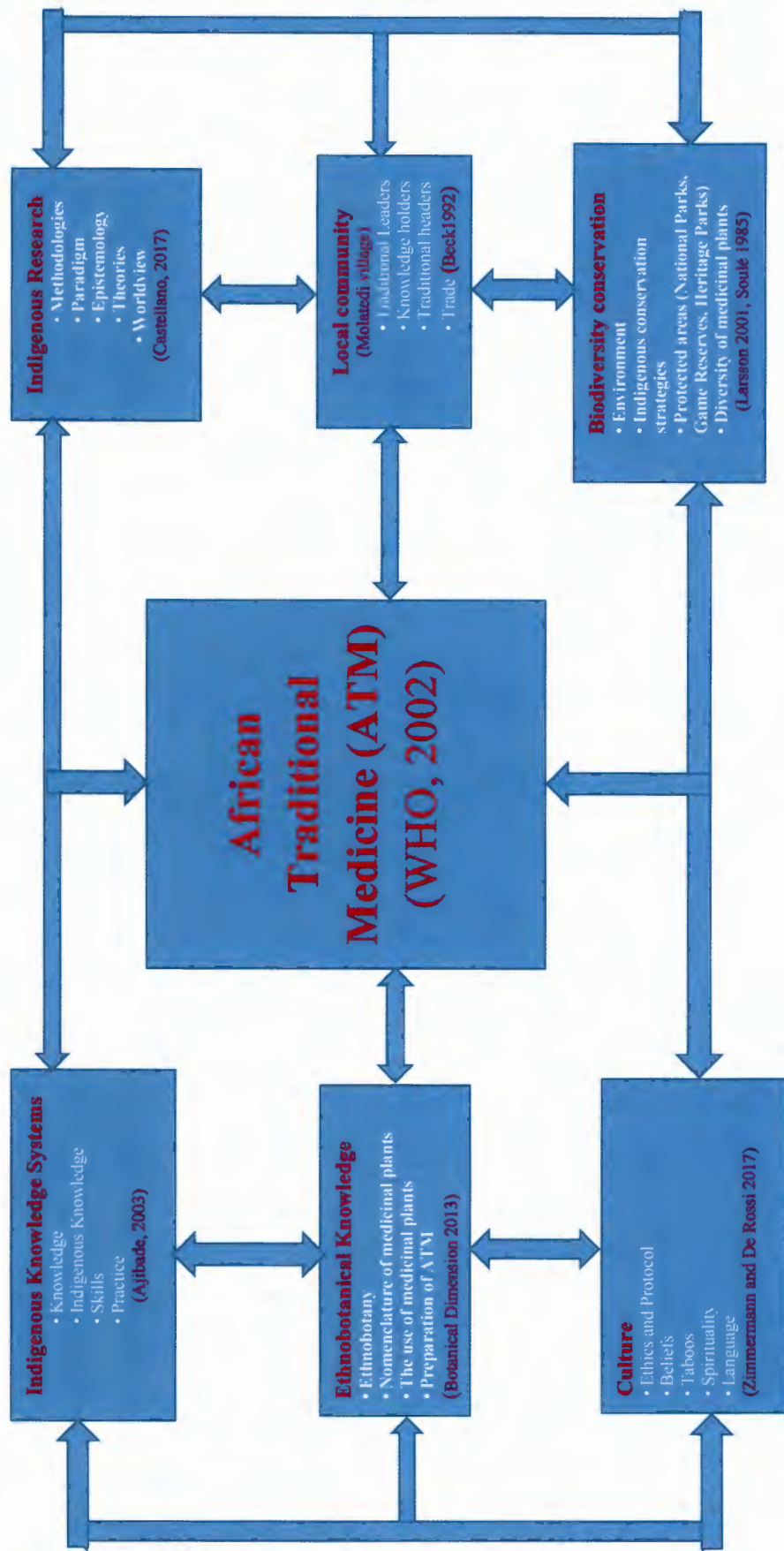


Figure 3.1: A conceptual framework of the study



ATM is also a product of the language of the community. Community members use their local language to produce ATM and also to name ATM. The local language is also governed by cultural norms and values of a particular local community within a specific ethnic group. Every ethnic group has ways of knowing about indigenous knowledge, which eventually, assist in the identification of specific medicinal plants used to prepare ATM. Medicinal plants form part of natural resources within the environment. Such natural resources found in the environment and plays different roles in the lives of humans and animals referred to as biodiversity. Every community member within a specific environment, is influenced by language, beliefs, taboos, ethics and spirituality on how to relate with the environment. Language also (within a particular culture) influences how people of a particular culture relate with biodiversity or nature (Asante *et al.*, 2017). Indigenous research studies involve ethnicity epistemology of a particular ethnic group whereby, the protocols and customs, beliefs, norms, values, culture and language assist in making research decisions. Some of the research decisions on indigenous knowledge or ethnobotanical studies are underpinned by indigenous theories (Woodley, 2002).

The knowledge and preparation of ATM is dependent on the indigenous knowledge of indigenous communities. A research study that needs such information is required to utilize indigenous theories and paradigms such as Afrocentric theory, whereby ideas, concepts, events and personalities are dealt with from the stand point of black people as subjects not as objects (Asante, 2009). Afrocentricity is an indigenous research theory mostly used to underpin indigenous research studies because it touches on the decolonisation of indigenous black people.

Afrocentric theory was also used in this study in order for participants to realise that their knowledge is key to the study and also their opinions are respected as such. Afrocentric theory, during indigenous research studies, opens up for independency on the part of participants as they realise that they are key participants of the study and are respected as such. The *Ubuntu* theory is also another indigenous theory that plays a major role during indigenous research studies. Indigenous research studies in South Africa, mostly involve blacks as participants. Thus, it takes *Ubuntu* for a black indigenous South African to relate with a stranger during the research process. *Ubuntu* plays a role during access to community members. The approach and the respect that the researcher will show during the first meeting with community members will determine the success of the research study. During indigenous research studies, protocol plays an important role and the first traditional protocol to be considered is traditional leaders.

They open all doors for indigenous research processes in the community. When a researcher is conducting a study on traditional medicine, traditional leaders make it possible for the researcher to access community members such as traditional healers and knowledge holders because they are the carriers of indigenous knowledge within the community (Kapfudzaruwa and Sowman, 2009). All members of the community, including traditional healers and knowledge holders, use their accumulated ethnobotanical knowledge to address their ever-changing live situations.

Local community members trade with their ethnobotanical knowledge, skills and daily uses of plants to earn a living out of their environment (Tugume *et al.*, 2016). Community members have an ethnobotanical knowledge because they interact most often with the diversity of medicinal plants. Knowledge is about the names, uses and preparation of ATM using medicinal plants (Yineger and Yewhalaw, 2007). The knowledge system, referred to indigenous knowledge systems, actually develops as the community members continue to engage among themselves using new local concepts (Kujawska *et al.*, 2017). Indigenous research studies require indigenous methodologies such as the Kaupapa Māori methodology, which uses semi-structured interviews, photovoice, drawings and structural questionnaire as the tools for mining indigenous knowledge (Cram, 2009; Pihama, Cram and Walker, 2002; Pipi, 2004; and Smith 1999).

Studies on African Traditional Medicine (ATM) requires the use of indigenous approaches to research. Other approaches such as in-depth interviews, observations and focus group discussions are used to collect data (Song *et al.*, 2014) during indigenous research studies. The local community also utilises their indigenous knowledge to use natural resources such as medicinal plants within their environment to prepare African Traditional Medicine (ATM) for their primary health care (WHO, 2002). Indigenous research takes into consideration, the people's worldview because it is the one that shapes the people's consciousness and also forms the theoretical framework on which the study is based on. The paradigm informs the methodology of the study because it gives space for research perspectives that calls for an inquiry process (Hart, 2010). Theories that inform the choice of the research topic are identified to form the theoretical framework of the study. There are two main premises that the new paradigm of local participation are based on. The first is that local communities need to be involved in the management of protected areas. Then, the second is that these communities must derive benefits from intended conservation initiatives (Benjaminsen & Svarstad, 2010).

Furthermore, there are three main theories that underpin community-based conservation approaches as follows: 1) A move from reductionist perspective to a systems viewpoint whereby components within the environmental system may have nonlinear effects; 2) the socio-ecological framework, which identifies humans as key agents within natural systems; and 3) a move from expert-oriented approaches to people-centred approaches (Berkes, 2004).

Local community members are mostly regarded as those with lack of knowledge on conservation of biodiversity. The contrary is true because research has revealed indigenous conservation strategies used by local communities to conserve biodiversity (Benjaminsen & Svarstad, 2010). When local communities are involved in the establishment and management of protected areas, they bring in their indigenous knowledge to enhance western conservation strategies (Munien *et al.*, 2015). During the process of establishment and initiation of protected areas, such as National Parks, Game Reserves or Heritage Parks, the major critique is lack of integration of indigenous knowledge systems and practices and community consultation as well as western means for biodiversity conservation by government (Munien *et al.*, 2015).

Thus, culture influences how indigenous conservation is done within a particular community. Culture dictates to local communities on how to take care of the environment using taboos, music, arts, beliefs, spirituality and language. Such indigenous conservation strategies are born and formulated based on the language, beliefs, taboos, ethics and spirituality of a particular culture (Garibay-Orijel *et al.*, 2007). The close relationship with the environment enables the local community to extract meaningful health intervention from medicinal plants to prepare African Traditional Medicines (ATM) (Dilshad *et al.*, 2008).

Culture plays significant role in the acquisition and development of ethnobotanical knowledge (Gu, *et al.*, 2014). Culturally, as stated by Garibay-Orijel *et al.* (2007) (for example, harvesting medicinal plants at twelve o'clock midday is a taboo), has inherent benefits in the ethnobotanical knowledge of a local community. Culture influences how ethnobotanical knowledge is gained and used.

All ethnobotanical knowledge gained within a particular culture is subject to ethics and protocols within that culture. When someone trades with ethnobotanical knowledge within a particular culture, he or she has to follow the spiritual, ancestral and ethical protocols of that culture. The language used within a particular culture is to enrich the ethnobotanical knowledge



of the same culture and add value to other cultures (Garibay-Orijel *et al.*, 2007). This relationship also enhances the community's knowledge, skills and daily uses of plants in a particular area that enables the people of the local community to get the most out of their natural environment (Chianese, 2016). Traditional healers and knowledge holders within the local community act as key role players that possess the ethnobotanical knowledge of how to prepare ATM using medicinal plants (Shonhai, 2016). Every member of the local community may possess ethnobotanical knowledge, but they differ in the degree of knowledge. Traditional healers have the knowledge of plant names, uses and preparation of ATM (Semenya *et al.*, 2014).

Local community members are dependent on ATM because of access. Therefore, traditional healers trade with their ethnobotanical knowledge by selling their consultations and ATM to local community members (Ndhlala *et al.*, 2011). Knowing is something that is socially constructed by people. The knowers are beings who are connected to other beings, the spirit of ancestors, and the world around them that which informs them about what they know and how they can know (Kaphagawani & Malherbe, 2000). People who have relationships and connections with each other, the living, non-living and the environment, are able to construct knowledge (Kaphagawani & Malherbe, 2000). They do so by further developing their own understandings and enlarging their perspectives. As they enlarge their perspectives, new meanings are created from their experiences (Thayer-Bacon, 2003). The African perspective views relational epistemology as knowledge that has the connection with knowers. Those are the well-established general beliefs, concepts and theories of people stored in their language, myths, rituals and practices. It is knowledge that is practised at various fields such as medical science, religion and child-bearing, among others (Kaphagawani & Malherbe, 2000).

Relational epistemology draws the attention to the relational forms of knowing as opposed to individual descriptions of knowing, which have dominated Euro-Western theories on ways of knowing for a long time (Thayer-Bacon, 2003). While traditional epistemologies focus on the objects of knowledge, relational epistemologies focus on the subjects or communities as knowers (Thayer-Bacon, 2003). In relational epistemology, knowledge is viewed as something people develop as they have experiences with each other and the world around them. People improve on ideas that have been developed and passed to them by others. Explanation of knowing is informed by multiple connections of knowers with other beings and the environment. Indigenous communities gain their knowledge and understanding of the world



by participating in events and observation of nature (Deloria, 1995). Wilson (2008) and Getty (2010) also add that knowledge comes from the peoples' histories, stories, observations of the environment, visions and spiritual insight. In contrast with postcolonial indigenous relational epistemologies is that knowledge arises out of the people's relationships and interactions with their particular environment. Therefore, this view underscores the rights of formerly colonized and indigenous peoples to construct knowledge according to the self-determination definitions of what they want to know and how they want to know it (Wilson, 2008 & Getty, 2010).

### **3.3 Theoretical framework**

The study is underpinned by three indigenous theories in its approach which were Afrocentric theory (Asante, 1987; 1988; 1990), supplemented by Ubuntu philosophy, and postcolonial indigenous knowledge theory (Mopara, 2007; Pedzisai, 2013) which formed the theoretical framework of the study. The success of this study was as a result of the application of these theories.

#### **3.3.1 Afrocentric theory**

The Afrocentric theory was selected as one of the theories in this study. The reason for choosing the Afrocentric theory is because the study is an indigenous research study which involved black participants from a rural area. This means participants were far from urban towns where most activities take place and where white people live. In most cases, such people look down upon themselves, especially when they perceive other people in relation with white people. Therefore, the Afrocentric paradigm was relevant to this study because it is a revolutionary shift of black Africans in terms of thinking, proposed as a contractual adjustment to black disorientation and lack of agency. Afrocentrist questions the existence of black people in the absence of white people, and asserts the central role of the African subject within the context of African history. Eventually, the Afrocentrist removes Europe from the centre of the African reality and becomes a revolutionary idea since it studies ideas, concepts, events, and personalities, political and economic processes from the stand point of the black people as subjects and not as objects.

They also base all knowledge on the authentic interrogation of the location (Asante, 2009). The study focuses on ethnobotanical knowledge of a black rural community. In this study, the rural community is at the centre of the study and the knowledge base. The Afrocentric approach to

the study assisted the researcher to locate participants in their rightful positions and make them not to be intimidated as they engaged and shared their knowledge. The researcher adopted and affirmed the suitability of the Afrocentric paradigm and also allowed the necessity for an emancipatory and participatory type of research (Owusu-Ansah and Mji, 2013). All participants were free and did not feel intimidated to express their views in their own language. It is the duty of the researcher to encourage all participants and create an environment that gives everyone the platform to express themselves while everyone is listening.

Black African people respect one another in any gathering and always give a hearing when one is speaking. When one person speaks, all attention is focused on the speaker without interjection. Therefore, respect for one another is the primary factor when participants are in a meeting. This is another reason for the choice of the theory. This study also refrained from sticking to research pathways mapped out by Western methodologies.

This does not mean that the researcher negated or denigrated known western methods of conservation used in the study area. The intention of the study was to challenge researchers and African scholars in particular, on the management of the Heritage Park, and to consider alternative methods of conservation and preservation of medicinal plants (Owusu-Ansah & Mji, 2013). Afrocentrists' view on relationships is based on one of their key assumptions, which is the believe that all relationships are based on centres and margins and the distance from either the centre or the margin.

Therefore, the black person is the centre and central in the history of black people. Afrocentrists view black people as agents, actors and participants rather than as marginal on the periphery of political or economic experience (Asante, 2009). The researcher used this paradigm, to ensure that human beings discover that all phenomena are expressed in fundamental categories of space and time. As a result, relationships develop and knowledge increases to an extent that people start to appreciate issues of space and time (Asante, 2009).

Scholars or practitioners of Afrocentric theory also express Afrocentricity as marking. Marking is when a person delineates a cultural boundary around a particular cultural space in human

time. This might be done with the announcement of a certain symbol, the creation of a special bonding, or the citing of personal heroes of African history and culture. When that is done, black people are prepared to act upon the interpretation of everything that is in the interest of black people as historically oppressed populations (Asante, 2009). Afrocentricity is in line with what contemporary philosophers such as Haki Madhubuti and Maulana Karenga, and many others, have articulated in the best way they could and in the best image and interest of African people. Afrocentricity maintains that one can be able to claim the Afrocentric space only if one knows the general characteristics of Afrocentricity as well as the practical application of the field (Asante, 2009). As far as this study is concerned, Afrocentric space is the environment of participants, their area of abode, the location for medicinal plants and their worldview. All what is happening around and within the black person's environment, has an influence in all actions that will be taken. Participants are encouraged to think from their worldview point, think in their own language without any external influence so that the information they give should be original and natural.

Even though the phenomena are active, dynamic, and diverse in the society, the requirement for Afrocentric method is that the scientist should focus on accurate notations and recording of space and time and the best way to apprehend the location of a text is to first determine where the researcher is located in time and space. The parameters for the phenomenon can easily be established once the location and time of the researcher or author is known. Therefore, the value of etymology is in the proper identification and location of concepts. Afrocentrists aim at demonstrating clarity in order to expose dislocations, disorientations and decentness. Among many ways, the simplest way of accessing textual clarity is through etymology.

Afrocentric philosophy as explained by Molefe Kete Asante and Ama Mazama, is a way of answering all cultural economics, political and social questions related to African people from a centred position. Therefore, Afrocentricity cannot be reconciled to any hegemonic or idealistic philosophy. Afrocentricity is opposed to radical individualism as expressed in the postmodern school, it is also opposed to spookism, confusion and superstition. Afrocentricity was chosen in this study because ideas that come from individual participants will eventually be taken as collective information from one community.

As participants give information individually they express themselves as plural, meaning even if "I give this information, it does not belong to me alone. I am not the original source of the information". Another reason why the Afrocentric theory was chosen is because it is opposed

to individualism and embraces pluralism (“We” not “I”). The Ubuntu philosophy was also adopted in the study in order to compliment the Afrocentric theory, bringing the flavour of “I am because we are” within Afrocentricity which considers black people as agents, actors and participants rather than as marginal on the periphery of political or economic experience (Asante, 2009). Information gathered during the study was considered as community information that will benefit all community members.

The Ubuntu philosophy is not selfish, however, embracing this theory became useful when all participants were working together to gather data. It is easy for participants to work together and share information among themselves with respect and Ubuntu. Authenticity happens easily because when one shares knowledge, the other confirms and others support. If the information is new to others, they are able to acknowledge and learn.

### **3.3.2 The Ubuntu philosophy**

The Ubuntu philosophy guided the method of data collection (the process was guided by respect). Respect was key in this study from the first meeting with the traditional administration council, meeting with traditional healers and the dress code during all meetings. Ubuntu philosophy played a vital role during all the research processes.

Since participants in the study were from the Batswana ethnic group, Ubuntu philosophy played a major role during interactions between the researcher and participants. Ubuntu philosophy is derived from the Nguni word, *Ubuntu* meaning “the quality of being human”. Ubuntu runs in the veins of all Africans (“Ubuntu nguntu ngabange abantu” “A person is a person through other persons”). This is an African proverb that reveals a world view that one person owes his/her selfhood to others. This means that all people on earth are first social beings because no man/woman is an island. This finally draws a clear understanding of the theories that underpin the study and key terms and concepts of the title of the study (Bryman, 2001).

Also, within this paradigm, examination of the African reality from the African perspective was done since the African experience was placed at the core. African voices were recognized and reaffirmed with cultural experiences placed at the centre to create a dynamic multicultural approach to research (Mkabela, 2005). The Afrocentric paradigm does not only advocate cultural immersion, indigenization of tools and methods of investigation which could be used by African people to make sense of their own realities, but it can also be used for the



interpretation of data from an indigenous African perspective (Mkabela, 2005). This means that it should be clearly understood that whatever the researcher does, and how the researcher does it, is specific to the culture (a situated response), the problem, and dynamics within a particular context (Kovach, 2012).

Moving from a broad discussion of epistemologies, this study focused on the specific tribal epistemology, which is Molatedi tribal group. This enabled the researcher to put emphasis on how the protocols and customs of Molatedi tribal group assisted in making research decisions (Kovach, 2012). The indigenous methodologies were founded upon indigenous epistemology; thus, they were evident in such frameworks (Kovach, 2012). It is important to note that indigenous knowledge cannot be standardized because they are in relation to place and person (Kovach, 2012). Ubuntu is also the embodiment of language, culture, norms and values of a particular community, which was previously colonised. The study also adopted Ubuntu and Afrocentric theories to supplement the postcolonial indigenous knowledge theory, thus bringing Ubuntu and Afrocentricity flavours within postcolonial indigenous methodologies as it opens space for collaboration between researchers and the researched as well as community participation.

Traditional behaviours are shaped by indigenous epistemology or traditional ways of thinking, creating and conveying knowledge. These indigenous epistemologies are alive and well and are also relevant and useful to the societies to whom they belong. This is because cultures and languages are the store house of indigenous wisdom. The cultural values underpinning these indigenous epistemologies relate to family, respect, interdependence, communal collaboration, deep active caring, consensus and chiefly systems. Indigenous epistemologies is acquired through daily experimental and practice of cultures to fulfil indigenous wisdom (Kovach, 2012).

### **3.3.3 Postcolonial indigenous knowledge theory**

The reason for using postcolonial indigenous knowledge theory in this study is because indigenous knowledge is part of the theory, and carries with it, language and other important cultural aspects that complete a person in itself. For an indigenous research study such as this to be successful, the language of participants should be considered as key. This theory respects the language of participants, thus the reason why it was chosen as one of the theories that underpins this study (Asante *et al.*, 2017). To decolonise the colonised is a yearning desire of South Africans because of the oppression and the concept that western culture is better than other

cultures. This theory liberates the colonised and gives them freedom of expression and acceptance. When framing postcolonial-indigenous research methodologies, indigenous knowledge plays roles such as the embodiment of languages, legends, folktales, stories, cultural experiences of the formerly colonised and historically oppressed; it is also expressed as symbols in cultural artifacts such as sculptures, painting and weaving and in music, dances, rituals and ceremonies such as weddings and worship (Chilisa, 2012).

Postcolonial indigenous knowledge theory utilises postcolonial indigenous knowledge systems to enable the researcher to use new topics, themes, processes, categories of analysis and the mode of reporting and also of dissemination of information that cannot be easily implemented when using conventional research methods. Researchers are able to unveil knowledge that was previously ignored, thus enabling researchers to close the knowledge gap from imperialism, colonisation and subjugation of indigenous knowledge. This theory allows researchers to draw from indigenous knowledge systems and theorise about the methods and research processes from cultural perspectives and values of the colonised 'Other' and historically marginalised. Those marginalised may be because of either race, ethnicity, age, gender, disability or religion (Chilisa, 2012). An example is Moari culture and values, which has been used to craft the Kaupapa Moari and the methodological framework called whanaungata (Bishop, 2008a, 2008b; Smith, 1999).

Furthermore, reclamation of cultural or traditional heritage, a decolonisation of the captive and colonised mind and thought; protection against further colonisation, exploitation, and appropriation of indigenous knowledge; and a validation of indigenous practices and worldviews could be possible by the indigenous knowledge-driven research methodologies. The colonised people could become the source of solutions to the challenges they face. The methodologies of indigenous knowledge-driven research theory could enable research to be carried out in a respectful, ethical ways, which are useful and beneficial to the people. The methodologies also can open space for collaboration between researchers and the researched as well as community participation during all stages of the research process (Chilisa, 2012).

### **3.4 Indigenous philosophical underpinnings**

There are many indigenous underpinnings, however, the following were used in the study: language; significance of ontology in indigenous research; African worldview; and spirituality in indigenous research (metaphysical world).

### **3.4.1 Use of local language**

The use of local language during indigenous research is very important. Language mediates the research process, recovering and revitalising, validating indigenous knowledge and culture of historically marginalised people (Goduka, 2000). Language is one of the most fundamental ways in which people strengthen community wellbeing, reaffirm the sense of belonging and are able to express the culture and sustain the family connection within a community and in a bigger society (Thorpe & Galassi, 2014). Language is able to connect people with their ancestors, history and their knowledge that has been accumulating over a long period of time. It is also through language that people are able to connect with each other in a country and also worldwide and express their worldviews (Thorpe & Galassi, 2014). Language and culture are the storehouse of cultural knowledge and tradition. In a community, indigenous people develop their own special culture in relation with their environment and language (National Indigenous Languages Survey Report, 2005). This is an indication that if the language is lost, everything is lost, intellectual sovereignty is lost, spiritually is lost, the soul, the well being and cultural autonomy, including mental health will all be lost (Zuckermann, 2013). Setswana was used during this study at all stages and all the tools were reported in Setswana.

### **3.4.2 Significance of axiology in indigenous research**

Another relational axiology, which is embedded within the Ubuntu relational ontology principles, is what Smith (1999) wrote about: the rights, regulations and relation with the Maori people in New Zealand. Smith proposed that the researcher, who is using an indigenous framework, needs to interrogate questions of ownership of the research, the interest it serves, the benefit to the researched, and the role of the researched in framing the research, designing the research questions, carrying out the work, writing up the research findings and disseminating the results. Smith's emphasis is actually on respectfully involving the researched as co-participants throughout the research process. According to the Maori culture, respect requires the researcher to begin the research by explaining who they are, where they come from, the purpose of the study and what made them interested in the study (Bishop, 2008a, b; Smith, 1999, 2008). When the researcher takes such an approach, Lavalley, (2009) and Moseley, (2007) say it enables the researcher and the researched to recognise, build, and celebrate respectful relationships and connections they have with each other. This respectfulness also involves developing long-term relationships with the researched.



Relational axiology, from the African perspective, is embedded in the Ubuntu relational ontology principles of 'I am because We are'; relation with people, with the living and the non-living; Spirituality, love, harmony and community building. Emanating from these principles, an ethical framework emerges that emphasises accountable responsibilities of researchers and respectful relationships between researchers and participants and that takes into account the participants' web of relationships with the living and the non-living (Chilisa, 2000).

In addition to what Chilisa said, Wilson (2008) and Weber-Pillwax (2001) discussed relational ontology informed by four principles as follows: accountable responsibility; respectful representation; reciprocal appropriation; and rights and regulations. Weber-Pillwax (2001) further suggests that researchers should interrogate their relations with the researched focusing on: how the methods used in the study help to build respectful relationships between the topic of the study and the researchers; and also between the research and the participants. Ways in which researchers can relate with participants in a respectful manner such that together, they can form strong relationships. The role and responsibilities of researchers in the relationship should be established. The extent to which researchers are responsible in fulfilling their role and obligations towards participants, to the topic and to all indigenous relations should also be considered. Furthermore, the extent of the researcher's contribution or giving back to the relationship, sharing, growth and learning that are reciprocal cannot be ignored. This is a huge responsibility from both parties but greater responsibility lies with the researcher.

The researcher has to observe the ethics of anonymity and confidentiality during the relationship with people. This involves the relational ethical framework, which moves away from the concept of the researched as participants to the researched as co-researchers. This principle of relations with people also requires that co-researchers be trained and empowered so that they can be able to participate in the study with the required skills and be able to execute the study efficiently (Chilisa, 2000). Instead of keeping the co-researchers anonymous, there is emphasis on revealing their names so that the knowledge in the study could be traced to its originators. When moving from the relations with peoples' perspectives, the information imparted, or the story offered would lose its power without knowledge of the teller, and this is the reason why the researched does not want to be anonymous (Chilisa, 2000).

### **3.4.3 The African Metaphysical world**

Africans have their own way of viewing the world. The relational ontology addresses the nature of human beings and how worldviews on being are implicated in the social construction of

realities. Among Africans in South Africa, the Ubuntu worldview expresses an ontology that addresses relations among people, relations with the living and non-living, and a spiritual existence that promotes love and harmony among people and communities. The principle says “I am because we are; we are because I am” (Goduka, 2000). This principle explains the web of connections of people with each other and with the living and the non-living. The direct contrast with Ubuntu is the Eurocentric view of humanity, “I think, therefore, I am,” as expressed by Rene Descartes. This is called monolithic and one dimensional construction of humanity (Chilisa, 2000). The Ubuntu principle considers the group more than an individual without crushing the individual but allows him or her to grow as a person (Senghor, 1966). An African conception of life and reality is in the existence in relation with the self and others (Onyewumi, 1998).

Indigenous people recognise their relation with the environment, which is their spiritual connection. Their relationship with the environment has an implication with the way the research is conducted. They respect the environment, therefore, knowledge construction has to be done in a manner that builds and sustains the environment. This is because indigenous knowledge is held in connection with the land and the environment. When data is collected using interview technique, it is better to conduct interviews in a setting familiar to the researched and relevant to the topic of the research. When this is done, the researched is able to make a connection with the environment and the space where the construction of knowledge takes place.

#### **3.4.4 Spirituality in indigenous research (the Metaphysical world)**



A relational existence that is spiritual and promotes love and harmony, explains the I/We relationship as an organic relationship between people, and when they see each other, they also recognise themselves and God. We / ourselves and God, this is the relationship guided by agape, a Greek principle for unselfish and altruistic love (Goduka, 2000). Agape does not discriminate but rather, embraces everyone for their sake. It springs from the needs of other persons. It is the willingness to sacrifice in the interest of mutuality and a willingness to go to any length to restore community (King, 1958).

The relations with the cosmos is one’s internal sense of connection to the universe. This may mean one’s personal connection with the higher being. This is called spirituality, which means connection to the cosmos such that any exercise that increases connection or builds relationships, is spiritual and ceremonial in nature. Recognition of spirituality allows

researchers to explore the interconnection between the researched's experience of the sacred and the potential aspect of research. Knowledge is also regarded as a sacred object, and seeking knowledge is a spiritual quest that may begin with a prayer or a ceremony. Knowledge can thus, come through prayer as a way people connect themselves with those around them, the living and the non-living (Pelletier, 2003).

Another relation with the cosmos is an illustration. An example is how participants' relation with the cosmos became part of the research process that informed the construction of knowledge. Getting entry into the setting and conducting a research interview may be a challenge. If one does not offer a beer or tobacco to a participant before conducting a research, they do not talk. When a researcher asks to speak to someone and requests to conduct an interview, the researcher, in some instance may have to reach out to participants by extending a hand with either tobacco or beer. This is regarded as a symbol of respect for their ways in some cultures (Chilisa, 2000). The third and fourth world communities have resisted instructions since the colonial period. They have largely ignore the resistance because in essence, it questions the validity of colonial research-built theories. Whereas, culturally, once one brought tobacco, key participants responded positively to the interviews saying "you have shown respect to their ways by offering tobacco or beer". The lesson learned out of this scenario is that, without offering culturally sensitive means of building reciprocity, researchers may end up with empty findings (Chilisa, 2000).

### **3.4.5. The use of indigenous research paradigms, designs and methodologies**

#### **3.4.5.1 Indigenous research paradigms**

##### **3.4.5.1.1 Positivist paradigm**

Positivism is the most dominant research paradigm of the past century, and has been used by more recent paradigms as a marker to differentiate themselves. Positivism is based on a realist, foundationalist epistemology (Guba and Lincoln, 1999), and views the world as existing independently of new knowledge of it. According to Denscombe (2002), Positivists believe that as much as there are patterns and regularities, causes and consequences, in the social world, they are there in the natural world. The emphasis of positivists is on the explanation in social research as opposed to understanding, whereas many believe that the real purpose of explanation is prediction (Rubinstein, 1951). It also places emphasis on empirical theory in the production of knowledge and rejects normative questions such as question of values and



believes that social science can be value free. Positivists show an aversion to metaphysics and also seek objectivity in research (Marsh and Furlong, 2002). During the 20<sup>th</sup> century, the research approaches and procedures in social sciences were rooted in the positivist paradigm. This is a concern because the investigating phenomena are de-contextualised, observable and measured using the objective methods within the quantitative approach (Goduka, 2012). This approach restricts the possibility of gaining knowledge of what can be known by using other research worldviews, paradigms and approaches, which include constructivism, qualitative approach, participatory research paradigm and indigenous-based scientific methods (Lavallée, 2009). Positivist paradigm knowledge is the result of Western-based science and is associated with its ontological, epistemological, axiological, methodological and rhetorical assumptions (Mack *et al.*, 2005). This is the reason why Goduka, (2012) proposed a shift from positivism to an indigenous –based scientific approach.

#### **3.4.5.1.2 Post-Positivism (Critical Realism) Paradigm**

Post-Positivism is a research paradigm between both positivism and interpretivism, thus the reason why it is referred to as realism. Both positivism and parts of post-positivism share a realist, foundationalist epistemology, but positivism tends towards empirical realism (Sayer, 2000). In line with positivism, the critical –realists approach believes that social science can use the same methods as natural science regarding casual explanations, it is also important that they move away from them by adopting an interpretive understanding (Sayer, 2000). As the critical realists straddle between positivist and interpretivist paradigms, it also seeks not only to understand but to explain the social world.

Critical realists explain that social change and conflicts in society are not always apparent or observable, but rather, when the characteristics of objects, events, or social relations are perceived, they rarely reveal everything (Neuman, 2000). Furthermore, critical realists believe in a 'structured' or 'stratified' reality, which requires a 'depth ontology' and the interpretation of causal links not always observable in order to offer a fuller explanation of an event, object and social relations, among others (Hay, 1995). According to Hay (1995), all human agency occurs and acquires meaning only in relation to already preconstituted, and deeply structured settings. Critical realists, as much as they acknowledge that interpretive understanding is an important feature of social science, they also realise that the objects and structures in society are understood to have causal powers. Therefore, they use the same casual powers to make causal statements and identify causal mechanisms, in contrast to interpretivists (Sayer, 2000).

Since it is very clear that critical realism is compatible with a wide range of research methods, it suggests that the choice of method to employ for a study should depend on the nature of the object of study and the objective of what to learn about (Sayer, 2000).

#### **3.4.5.1.3 Interpretivism Paradigm**

Interpretivism is an umbrella term that covers a very wide range of perspectives in the human sciences. It is important that positivism should be used, together with interpretivism because interpretivism is able to take care of as a response to the over dominance of positivism. Many authors prefer to outline positivism and interpretivism, together as binary poles between the host of social research because they can be seen as opposites: positivists seek objectivity while interpretivists believe in subjectivity (Williams and May, 2000). Since positivists are fond of modelling their research on the natural sciences while interpretivists sees a clear distinction between the natural and the social world, thus the methodology and methods of gathering data needed should be more in tune with the subjects of the study. Therefore, the researcher should take note that even though the demarcation between the reseach paradigms is not so clear, approaches that draw on both positivist and interpretivist paradigms cannot be combined. The positions of interpretivists in contrast to positivism and realism, are based on an anti-foundationalist epistemology, and subscribe to the view that the world does not exist independently of the people's knowledge. Interpretivists believe that the world is socially constructed through the interaction of individuals and that there is no clear cut separation of 'fact' and 'value' as the positivists claim (Williams and May, 2000).

The interpritivists emphasise understanding and do not believe in relying on mere observation for understanding social phenomena. Interpritivists see the social and natural sciences as being distinct from one another, which is in contrast with what positivists believe. Therefore, interpritivists believe that the social world needs to be studied from within and with methods different from those used in the study of natural sciences. Interpritivists percieve social phenomena as not existing independently of researchers. Researcher are inextricably part of the social reality being researched, and are not 'detached' from the subjects they are studying (Williams and May, 2000). Interpretivists, in general, do not strive to establish causal explanations in the social world, as their emphasis is on understanding. Therefore, researchers in this paradigm tend to place emphasis on meaning in the study of social life and emphasise the role of language in constructing 'reality'. The researcher stresses the meanings given to the world in which those studied live (Williams and May, 2000).

### **3.4.5.2 Indigenous research designs**

#### **3.4.5.2.1 Triangulation or concurrent mixed methods design**

In mixed methods research, triangulation design is used to refer to quantitative and qualitative data merged by the researcher in the analysis. However, triangulation in qualitative research is used to draw evidence from different sources or different participants to develop a code or a theme. As this study adopted a mixed method design, triangulation was used because one approach cannot be sufficient by itself to capture the trends and details of the issue, therefore studies such as this can be successful when more than one approach is used for data collection. (Cresswell, 2013; Ivankova *et al.*, 2006).

#### **3.4.5.2.2 Exploratory mixed method design**

This is when the researcher seeks to explore first qualitatively and then to test this exploration with a large quantitative data. This study also adopted the sequential exploratory design because the qualitative, data was collected and analysed first, while the quantitative numeric data was collected and analysed second in sequence, and helps explain, or elaborate on the qualitative results obtained (Cresswell, 2013; Ivankova *et al.*, 2006)

#### **3.4.5.2.3 Embedded mixed methods design**

This method is used to enhance a larger data set with a smaller, more focused data set. For example, an investigator might conduct an experiment and within that experiment, collect qualitative data that provides information as to how participants experienced the intervention. Embedded mixed methods design was not found to be relevant to the methods used in this study.

### **3.4.5.3 Indigenous research methodologies**

#### **3.4.5.3.1 Mixed method transformative**

Chilisa and Tshenko (2014) suggest that researchers should use an approach that uses an indigenous research paradigm that seeks to integrate multiple ways of knowing and seeing the world, multiple standpoints and multiple values. The method is involved in the promotion of multidirectional lending and borrowing of knowledge systems between dominant and marginalised cultures. The indigenous mixed method approach starts with a change of the mind-set.



It problematises, critiques, and challenges the marginalisation and exclusion of the ways of knowing and seeing the world of marginalised communities (Chilisa and Tsheko, 2014).

Mixing can take the process of indigenisation whereby, researchers invoke indigenous knowledge. The invoked indigenous knowledge informs ways in which concepts and new theoretical frameworks for research studies are defined, new tools of collecting data are developed and the literature base broadened. All these are such that there should not be any dependency on written text only but also on the vast unwritten text of formerly colonised and historically disadvantaged people. The indigenous mixed method approach is from a point of view where different voices are invited to participate in a dialogue that embraces all cultures and promotes social validity of research studies.

Therefore, from this perspective, there cannot be an indigenous research without mixed methods (Swadener and Mutua, 2008). This means both qualitative and quantitative approaches are indigenised. The methods within the epistemologies of marginalised communities and the tools to build relationships between people, space, time and the environment are used. The data collected during an indigenous mixed method approach requires that it reaches and draws from the past, occupies and informs the moment and also projects into the future. Indigenous methods such as of naming, storytelling, yarning, and talking circles throughout the research process should make sure that the spiritual, historical, social and ideological aspects of the research phenomena are pushed to the centre of the entire research process (Chilisa, 2012; Viruru & Cannella, 2006).

Since the distinct philosophical assumptions of an indigenous lens are given, recognition is at combining data collection through well-established qualitative methods with data emanating from an indigenous paradigmatic lens in a single study or multiphase study (Chilisa, 2012; Viruru & Cannella, 2006). Also, recognition of indigenous mixed methods is at a quantitative level and is informed by the relational sets of practices aimed at building relationships to promote collective actions and social changes. It is driven by indigenous research protocols and uses a combination of indigenous data collection tools and other qualitative and quantitative methods. What follows is the description of how mixed methods were employed in order to promote relevancy and usefulness of the research to the researched (Chilisa, 2012; Viruru & Cannella, 2006).

This study has gone completely mixed method transformative. As Swadener and Mutua (2008) clearly state that there cannot be an indigenous research without mixed methods, Chilisa

(2000) also indicated all the approaches necessary for the indigenous studies that this study also adopted. The indigenous paradigms, indigenous protocols, relational set of practise and all aspects required as stated by the mixed method transformative.

#### **3.4.5.3.2 Kaupapa Māori methodology**

The Kaupapa Māori methodology uses semi-structured interviews, photovoice, drawings and structural questionnaire as the tools for the mining of indigenous knowledge. Kaupapa Māori focuses on the Māori and also upholds the mana and the integrity of participants. It also focuses on the concern and the needs of the Māori (Cram, 2009; Pihama, Cram and Walker, 2002; Pipi, 2004; Smith, 1999). Kaupapa Māori is able to avoid the binary trap of western epistemologies that challenges the knowledge from a compliance-driven medical model framework (Walker, Eketone and Gibbs, 2006). What is key to the methodology is that it is able to tailor a research practice to the needs and aspirations of participants, especially when there is genuine engagement with the community as a partnership for research which is “by, with and for” Māori. Kaupapa Māori is described as both a theory and an analysis of the context of research involving Māori (Smith, 1999).

Kaupapa Maori Research (KMR) is guided by a number of principles and is also described as both a theory and an analysis of the context of the research, involving Maori, with the approaches to research explained as being by Maori and/or for the Maori (Smith, 1999). The method allows the researcher to capture a broader, in-depth range of experiences than would have been possible from a single method. Similar to mixed method transformative, Kaupapa Maori method is able to capture a broader and in-depth range of information of the indigenous study. Therefore this study learn from this method how to capture as much as possible a range of information from the participants whilst upholding the integrity of the participants.

### **3.5 The study setting**

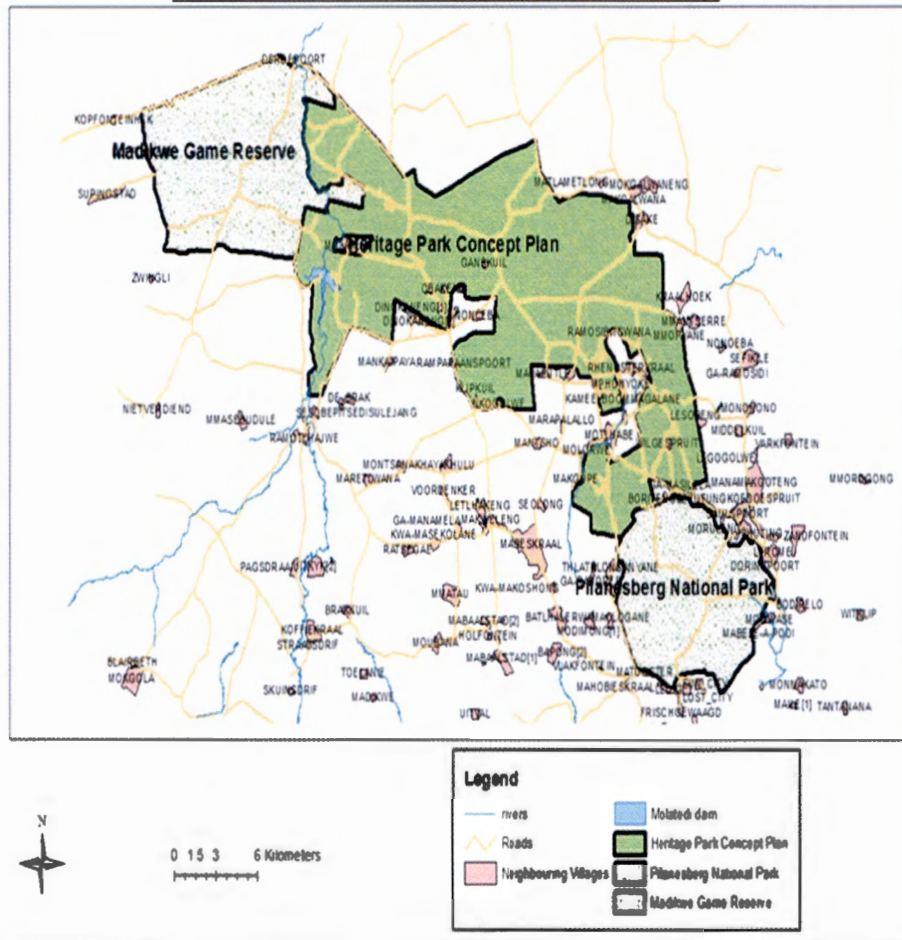
#### **3.5.1 Location of the Heritage Park**

The study was conducted within a Heritage Park, a location which starts directly North West of Pilanesberg National Park in Moses Kotane Local Municipality and follows through a North Eastern direction to skirt the villages lying in the North which include Motlhabe, Kameelboom and Magong before curving to the westerly direction in an ever widening band that eventually incorporate the Dwaarsberg Mountain Range before joining Madikwe Game Reserve and

Molatedi Village in the Moses Kotane Local Municipality (Figure 3.2). (Boonzaaier, 2002). This Heritage Park is a conservation corridor initiative, also known as a Central Corridor Area (CCA) between Madikwe Game Reserve and Pilanesberg National Park (Figure 3.1).

The Heritage Park Project, is a development initiative geared at establishing a conservation corridor linking Pilanesberg National Park and Madikwe Game Reserve, into a mega nature base tourism anchor project and a primary economic catalyst for the region. Furthermore; to set up a migratory corridor for the Big Five species ( Epps, 2007), within the envisaged 167 000 ha Reserve targeted through the connection of the two Protected Areas over a period of 20 years from its initiation and launch in 2002. The overall objective of the project is intended to stimulate and promote socio-economic development in the area and to instil amongst the local communities a culture of conserving the natural and cultural heritage characteristic of this underdeveloped and economically depressed rural area (Boonzaaier, 2002)

The Heritage Park is therefore a flagship project by Government straggling two local municipalities Moses Kotane and Ramotshere Moilwa (Figure 3.3). The local Municipalities are by Local Government Municipal boundaries under Bojanala District Municipality and Ngaka Modiri Molema District Municipality subsequently (Figure 3.3). The project from a Traditional Authority Management perspective encompasses a number of villages belonging to a number of traditional leaders (Dikgosi's) of all the villages through which the Heritage Park conservation corridor is targeted to pass through. Amongst all the villages only one village in the periphery of Madikwe Game Reserve will form and enclave village when the project life span winds-up (Boonzaaier, 2002).



**Figure 3.2:** The Heritage Park Concept Plan as conceived Envisaged after completion of the project (Source: NWPTB, 2013)

The Heritage Park links the existing 62,000 ha (152,205 acre) Madikwe Games Reserve (MGR) with the 49,000 ha (121,082 acre) Pilanesberg National Park, to form a 275,000 ha (679,540 acre) nature based tourism anchor project and economic catalyst (Figure 3.2). The latitudes: 24°44'00" to 25°02'30" S and longitudes: 36°35'45" to 27°02'15" E (Stalmans & De Wet, 2003) as in (La Grange, 2010). The project runs through a number of villages of which Molatedi villages is one of them, to connect Pilanesburg National Park and Madikwe Game Reserve. These villages are found within the following two local municipalities, Moses Kotane and Ramotshire Moilwa located under the following two district municipalities Bojanala and Ngaka Modiri Molema (Figure 3.3).

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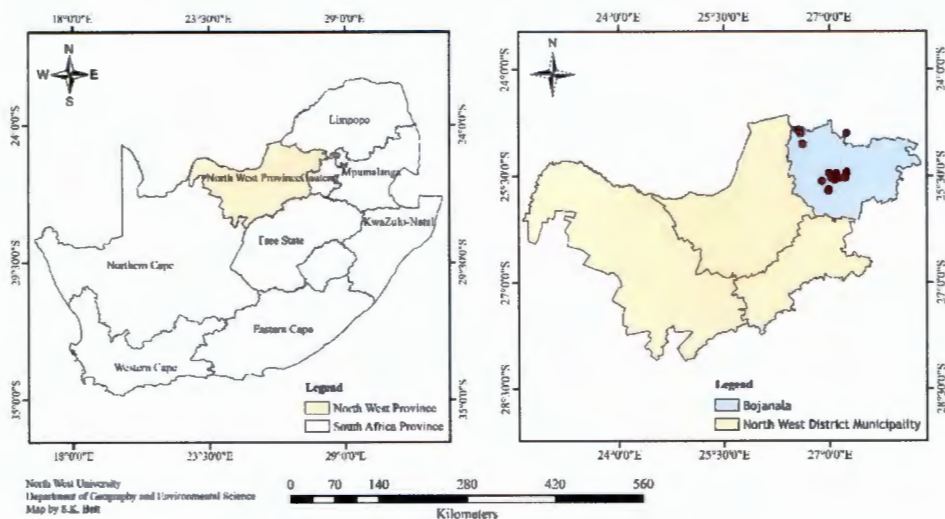
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**Figure 3.3:** Municipalities of the North West Province of South Africa (Source: Boundaries [Shapefile]. Municipal Demarcation Board. 2016. Retrieved from <http://www.demarcation.org.za/site/shapefiles>).

### 3.5.2 Location of Molatedi village

The location of the study is Molatedi village in Bojanala district municipality in the North West Province of South Africa (Figure 3.4). Molatedi village is within the Heritage Park which is characterised by the general population of 1201 black South African distributed as 326 kids, 85 teenagers, 320 youth, 218 adults and 342 senior citizens (Table 3.1) (Stat SA, 2011). The household size ranges from five (5) family members to eight (8) and most of the family members are living in the cities because they are working as bread winners. Majority of the community are not employed and mostly a household is dependent on the income of one members of the family. The spoken language in Molatedi is Setswana with different ethnic groups and Batlokwa of chief (kgosi) BFM Matlapeng is a dominant group.



**Figure 3.4** The map locating Bojanala District municipality in the North West Province of South Africa

**Table 3.1:** Age distribution of the population of Molatedi village

Population	Age (years)	Males		Females		Total
		Frequency	Percent	Frequency	Percent	
Kids	0 – 13	157	28	169	26	326
Teenagers	14 – 17	48	9	37	6	85
Youth	18 - 35	127	23	102	16	320
Adults	36 – 54	97	18	121	19	218
Senior Citizen	55+	123	22	218	18	342
<b>Total</b>		<b>553</b>	<b>100</b>	<b>647</b>	<b>100</b>	<b>1201</b>

Source: (Stat SA, 2011)

There are many affected and interested parties to the Heritage Development Initiative (HDI). These include; the North West Parks and Tourism Board (as a Provincial Protected Areas Management Authority and lead agent in the development of the Heritage Park), various tribal authorities (Bakgatla-ba-Kagafela, Barokologadi, Batlokwa ba Molatedi, two local and two district municipalities, all the mining houses in the Corridor, Madikwe East Land Owners Association (MELOA), Baruakgomo and the Friends of the Heritage Park. The inhabitants of the areas around the Heritage Park are the Bakgatla-ba-kgafela, under supervision of Chief N.J.M. Pilane (Boonzaaier, 2002). The inhabitants of villages around the Heritage Park which includes among others Dinokaneng, Obakeng, Molatedi, Mankaipa, De-Brak, Welvirdiend,



Welgevaal, Goedehoop, Sebege, Mokgalwaneng, Kameelboom, Mapaputle, Vlaakplaas, Magong, Ramoshibitswana, Disake and Matlametlong villahes(Boonzaaier, 2002). The greater part of the land in and around the heritage park is used for cattle grazing and a smaller part for ecotourism, dry land crop production and mining. According to PPC (2009), 39% of the area is a trust land owned by the state and 21% is private land and less than 1 % is tribal land. Part of the land approximately a third is privately owned by a cement company called Pretoria Portland Cement Company Limited (PPC), where they have a limestone quarry and a cement plant, known as the Dwaalboom facility , which was completed in 1984. The area is characterized by thick bush encroachment as a result of degradation cause by overgrazing in the past (La Grange, 2010).

Protected areas as conservation initiatives often present a contradiction as a development initiative. Their establishments often results in eviction or fencing out local communities from what use to be their natural heritage that sustains their livelihoods. This includes communities being denied the rights of use of plants for different purposes such as medicinal, consumptive, fire wood and much other such use (Cunningham, 2014). Wildlife corridor's and connectivity initiatives are already an active part of natural resource management (NRM) (Hannah Parris; et al, 2011). Accordingly these wildlife corridors and connectivity initiatives constitutes part of Protected Areas Expansion and Development programs in biodiversity conservation management. The systematic biodiversity principles as encapsulated in the National Protected Areas Expansion and Development Strategy (2009) dictate that the following three principles should underpin the implementation strategy:

- The need to conserve a representative sample of biodiversity pattern, such as species and habitats (the principle of representation);
- The need to conserve the ecological and evolutionary processes that allow biodiversity to persist over time (the principle of persistence);
- The need to set quantitative biodiversity-based targets that tell us how much of each biodiversity feature should be conserved in order to maintain functioning landscapes. These targets should ideally be based on best available science, rather than on arbitrarily defined thresholds (such as 10% of all features).

In spite of the above principles Protected Area Expansion remains an inherently contradictory phenomenon. Precisely because whilst it advocates for biodiversity conservation management as a measure of sustainable development, at the same time this virtuous initiative tends to be

perceived by local communities as a measure of denying them the right of use of natural resource heritage necessary for their livelihoods. The Heritage Park Development (HPD) as a conservation corridor seem to be plagued by similar perceptions consistent to those popular to many local communities living in the periphery of these identified Protected Areas.

### **3.5.3 Vegetation of the Heritage Park**

The Heritage Park is situated in the Savanna Biome (important biome throughout Africa), which is characterised by a grassy ground and distinct tree layers (Rutherford and Westfall, 1994). The area is also characterised by three environmental factors that play the most important role in the vegetation composition as follows: low precipitation; fires; and grazing. The low precipitation prevents the upper layer from dominating while grazing keeps the grass layer dominant (Low and Rebelo, 1996). The factors mentioned above makes the vegetation suitable and good for grazing and where there is deeper soil, it becomes suitable for crop production and also suitable for the cultivation of subtropical fruits (Low and Rebelo, 1996).

Acocks (1988), in the former classification, divided the Savanna biome into 12 subtypes, and the study area falls in the Other Turf Thornveld, Mixed Bushveld and Sourish Mixed Bushveld. Other Turf Thornveld is found on turf soil and is characterised by *Acacia* species. Mixed bushveld is found on shallow sandy soil and is characterised by more broad-leaved tree species, such as *Combretum* species, *Terminalia sericea*, *Sclerocarya birrea* and *Burkea africana*. It is a combination of sweetveld and sourveld (Acocks, 1988).

### **3.5.4 Land use in the Heritage Park**

The greater part of the land in and around the Central Corridor Area (CCA) is used for cattle grazing while a smaller portion is used for ecotourism, dry land crop production and mining. Thirty nine percent (39%) of the study area is trust land owned by the state, 21% is private land while less than 1% is tribal land. Part of the land (approximately a third) is privately owned by a cement company called Pretoria Portland Cement Company Limited (PPC), where they have a limestone quarry and a cement plant, known as the Dwaalboom facility, which was completed in 1984 (PPC, 2009). The area is characterised by thick bush encroachments as a result of degradation and overgrazing (la Grange, 2010).

### **3.5.5 Soil in the Heritage Park Corridor**

Soil plays a major role in the development of the type of vegetation of every environment since there are different types of soils. Certain vegetation thrives better in a particular soil than in another. There is a strong relationship between the soil and the types of vegetation (Venter & Gertenbach, 1986; Morris, 1972). The soil in the Heritage Park area varies from deep red and black clay soil. It is formed from weathered rocks (Rensburg soil form) to weakly developed shallow sandy soil (Rutherford & Westfall, 1994; Low & Rebelo, 1998; Mucina & Rutherford, 2006) as in la Grange (2010).

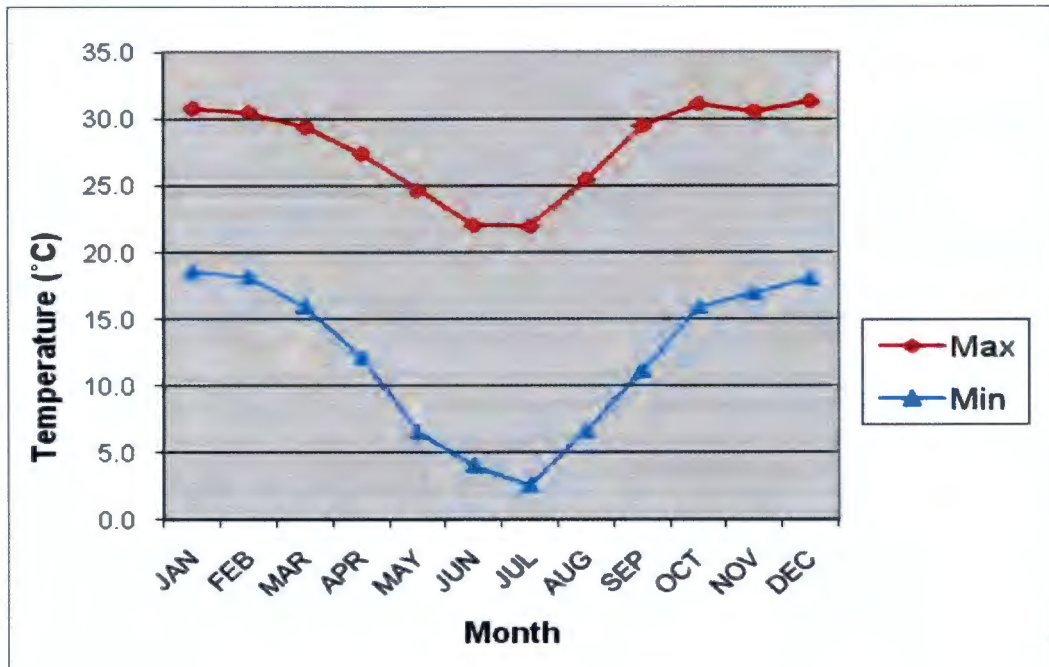
### **3.5.6 Topography of the Central Corridor Area**

The Central Corridor Area (CCA) is the central part of the corridor between Madikwe Game Reserve and Pilanesberg National Park (Figure 3.1). There are mountains and smaller hills in the area, which includes a part of the Dwarsberg Mountains, Tweneng, the hills at Ramosibitswana and some smaller hills around the area. There are no permanent rivers in the CCA and covers approximately 90 000 hectares (Stalmans and De Wet, 2003). The altitude of the area varies from 1 000 to 1 334 m above sea level (Stalmans and De Wet, 2003).

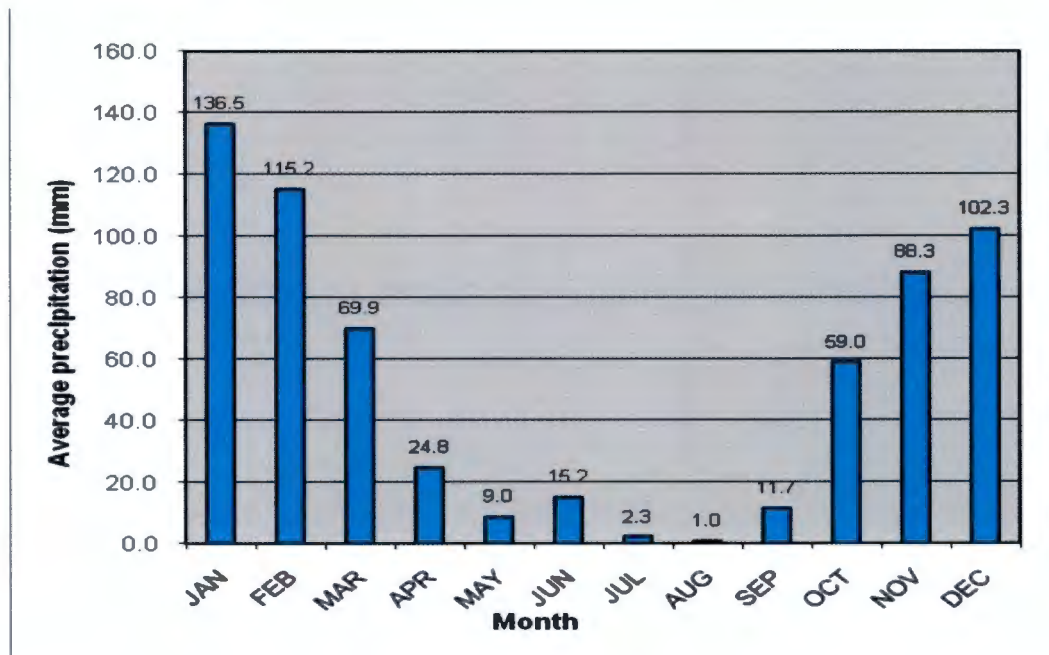
### **3.5.7 Climate**

The study area experiences summer rainfall (Rutherford & Westfall, 1994). Rainfall and temperature data were obtained from Thabazimbi, which is 60 km from the study area and Pilaneberg, situated 15 km from the study area respectively. Data was obtained from the South African Weather Services (2010). The average monthly minimum and maximum temperatures are given for 2000 to 2009 in Figure 3.4. Temperatures are the highest from October to March, which are also the months with the highest precipitation (Figure 3.5). Average minimum and maximum temperatures for January 2000-2009 were 19°C and 31°C and for July 2000-2009, temperatures were 3°C and 22°C (South African Weather Services, 2010). Total annual precipitation varied between 440 and 970 mm, with an average of 632 mm for the past 20 years (1990-2009) (Figure 3.6).

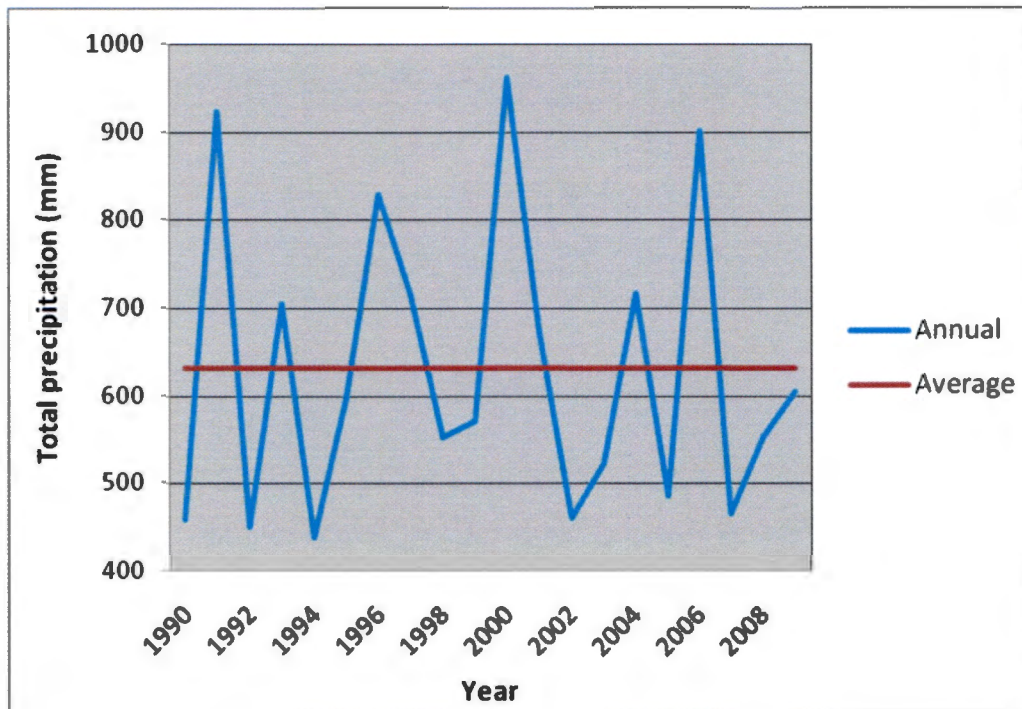




**Figure 3.4:** Average monthly minimum and maximum temperature for the years 2000 to 2009 as measured in Pilanesberg (South African Weather Services, 2010)



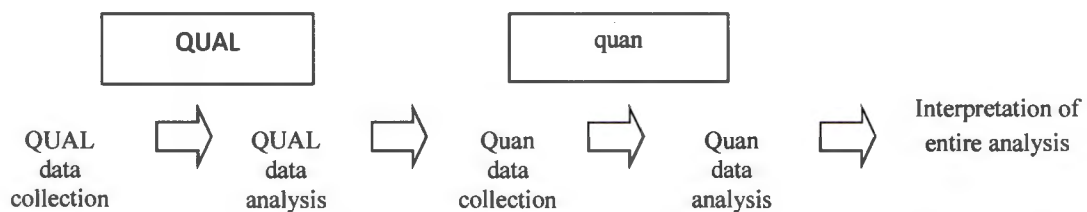
**Figure 3.5:** Mean monthly precipitation for the years 2000 to 2009 as measured in Thabazimbi (South African Weather Services, 2010)



**Figure 3.6** Total annual precipitation for the years 1990 to 2009 as measured in Pilanesberg (South African Weather Services, 2010)

### 3.6 Research design and approach

The study adopted a QUAL-quan mixed method design, and to answer the research question, a mixed method sequential exploratory design as described by Creswell (2013) was used. This design is characterised by the collection and analysis of qualitative data in chapter 4 followed by the collection and analysis of quantitative data in chapter 5 that builds on the results of the initial qualitative results. Finally the products of the two analysis are interpreted (Creswell, 2013).



(Key - QUAL – Qualitative, quan – Quantitative) (Cresswell, 2013)

**Figure 3.7:** Mixed method sequential exploratory design

The rationale for using a mixed design in this study was that neither qualitative nor quantitative methods are sufficient by themselves to capture the trends and details of the issue, namely the indigenous knowledge of utilizing and conserving medicinal plants within the Heritage Park of the Molatedi village community in the North West Province in South Africa. When used in combination, qualitative and quantitative methods complement each other and provide a more complete picture of the phenomenon under study. In a sequential exploratory design (Figure 3.7), the qualitative, text data is collected and analysed first, while the quantitative numeric data is collected and analysed second in sequence, and helps explain, or elaborate on the qualitative results obtained in the first phase (Cresswell, 2013; Ivankova *et al.*, 2006).

### **3.7 Concluding remarks for the chapter**

This chapter mapped the indigenous philosophical and epistemological underpinning of the study and provided the synthesis of the major epistemological issues and principles that underpinned the study such as language, significance of axiology in indigenous research, African worldview and spirituality in indigenous research (Metaphysical world).

The chapter has also provided a platform that indicates the relationship between indigenous theories, methodologies and indigenous research designs. It also highlighted the importance of the researcher in understanding the relationship of the community and the environment. Furthermore, the chapter mapped out the study setting by providing the location, GPS coordinates, study size, climate, vegetation, soil, biodiversity, number of villages within the Heritage Park, as well as the characteristics of Molatedi village. It was crucial for the researcher to understand the indigenous philosophical and epistemological underpinnings of the study in order to utilize the relevant methods for data collection and be able to relate with indigenous community members during the study. The application of indigenous theories and methodologies enhanced the documentation of indigenous knowledge with regard to utilizing and conserving medicinal plants in the next chapter.



## CHAPTER FOUR

### DOCUMENTATION OF INDIGENOUS KNOWLEDGE FOR UTILISING AND CONSERVING MEDICINAL PLANTS BY THE MOLATEDI VILLAGE COMMUNITY

#### 4.1. Introduction

This chapter documented the indigenous knowledge of utilizing and conserving medicinal plants within the study area. African communities have the heritage of culture and knowledge as a natural resource to conserve biodiversity (Oldfield and Alcom, 1991). Rural communities use different traditional ways of utilizing and conserving medicinal plants within their ethnic groups (Abdullahi, *et al.* 2013; Maluleka and Ngulube 2017). Amongst the many different traditional conservation strategies they have natural way of preserving sacred landscapes, and threatened species (Abdullahi, *et al.*, 2013).

Raj and Ecol (2006) found that indigenous knowledge has the potential to contribute to the conservation of biodiversity. According to Boaten (1998), there are trees which were regarded as housing spirits in the Ashanti Region of South Western Ghana. Community members in the Region were not allowed to cut off these trees without first performing rituals. This was the custom they practised and it had a protective effect on trees such as odum (*Chlorophora excelsa*), African mahogany (*Khaya ivorensis*,s and tall palm trees as betene (*Elaeis Guineensis*) and osese (*Funtumia sp.*). There are also shea butter (*Butyrospermum parkii*) and the Dawadawa (*Parkia clappertoniana*) trees, in the Northern savannah zone of Ghana which are subject to the same traditional protection system.

The indigenous utilisation of medicinal plants always informed the indigenous conservation of such a medicinal plant. When an indigenous member of the community harvested a medicinal plant, they always observed the indigenous conservation aspect of the particular plant for the purpose of sustainability (Boaten, 1998). According to Rankoana (2016), community members in rural areas have developed a selective management method to sustain plant resources. Among the many indigenous conservation methods, the most common are restrictions on the cutting of green plants, harvesting of some species during certain seasons, the exclusive harvesting of the leaves of certain plant species and also the collection of lateral roots from medicinal plant species. According to Mowforth and Munt (2015) sustainable environmental

conservation is a very important component that underlines local people's need for their survival. Therefore, taboos were used in the Melagasy's spiritual cosmology for sustainability. Local community members have a strong believe in taboos. The taboos and the cultural norm, values and standards plays a vital role in the sustainable utilization and indigenous conservation of medicinal plants of the local communities.

#### **4.2 The Rationale of the chapter**

The rationale for this chapter of the study was that the documentation of indigenous knowledge for utilizing and conserving medicinal plants by the molatedi village community is needed so that the knowledge can be preserved. Molatedi community have a long history of medicinal plant usage for medicinal purposes, therefore documentation is required so that the medicinal plants can be conserved and be used sustainably. The current investigation of this chapter and the information gathered will fill some of the gaps in indigenous knowledge related to the use of medicinal plants and their conservation

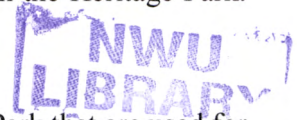
#### **4.3 Objective of the chapter**

The specific objectives of the study were to: document the indigenous knowledge associated with the utilization and conservation strategies of medicinal plants within the Heritage Park. The study was guided by the following questions:

- What is the knowledge of plant species found in the Heritage Park that are used for ATM by resdints of Molatedi village?
- How are the medicinal plants used to prepare ATM by traditional healers in Molatedi village?
- How is indigenous knowledge used by the community of Molatedi village to conserve medicinal plants in the Heritage Park?

#### **4.4 Significance and justification of this chapter**

The findings from and recommendations of this chapter will help to guide in drawing sustainable utilization and conservation management strategies and policies of medicinal plant within the Heritage Park. This chapter could contribute to the body of knowledge the information on names, uses and conservation of medicinal plants within the Heritage Park. It may also assist to close an existing knowledge gap between the traditional knowledge and the western knowledge on the use and conservation of ATM.



## **4.5 Methodology of the chapter**

The study used an exploratory mixed method design which is a QUAL- quan approach. Other various approaches such as in-depth interviews, observations and focus group discussion methods were used during data collection.

### **4.5.1 Target population for the chapter**

The study targeted two populations from the study area presented in chapter 3, to address two major aspects of the objective of the study which are the “utilization” and “conservation” of medicinal plants. The first target population was the traditional healers (key informants) and the second target population was the knowledge holders as follows.

#### **4.5.1.1 Traditional healers**

All traditional healers in Molatedi village recognised and accepted by Molatedi Traditional Council and community members constituted the target population for indigenous utilisation of medicinal plants. It was very important and crucial that traditional healers who participated in the study be those recognised and accepted by the chief and the community since there is anecdotal information in Molatedi village that some traditional healers are not acknowledged and accepted by the chief of Molatedi, together with his Traditional Council and community members. Thus, the researcher was made aware of such traditional healers and that they should not form part of the target population. The researcher first met with members of the Molatedi Traditional Council at the tribal office to ask for permission to conduct the study in the village (Figure 4.6). After permission was granted, the traditional healers were arranged, organised and gathered at the tribal office by members of Molatedi Traditional Council to be presented to the researcher.

During the presentation, only ten (10) traditional healers were present at the tribal office and were presented as the target population of traditional healers in Molatedi village (Figure 4.7). Later, members of the Molatedi Traditional Council left the researcher to interact with the traditional healers. As the researcher interacted with the traditional healers, explaining the purpose of the meeting, two (2) traditional healers indicated that they were ‘born again’ and could not participate in the research process since they had forgotten all information about traditional medicine. Only one (1) of the traditional healers did not have interest in sharing information with the researcher and decided to pull out. The researcher was left with only seven

(7) traditional healers, who were interested and willing to take part in the study. Due to the number of traditional healers who were willing to participate (which was seven (7) traditional healers), they all became the final target population.

#### **4.5.1.2 Indigenous Knowledge holders (IKH)**

Knowledge holders within Molatedi community constituted the target population for indigenous conservation strategies. They were identified by the Traditional Administration Council through the Traditional Administration Council Headman (Mr K.K Matlapeng). The Knowledge holders were invited at the tribal office for a learning cycle meeting (Figure 4.1) by both Mr K.K. Matlapeng and the Traditional Administrator, Mr Dirang Matlapeng. Some were invited from their homes through home visits while others were called telephonically. Nine members were willing and able to attend the meetings.

#### **4.5.2 Sample size and sampling procedure**

##### **4.5.2.1 Traditional healers**

The sample consisted of seven (7) traditional healers who were willing to participate in the study. Due to unforeseen circumstances, by the time of data collection, two (2) of the traditional healers among the seven had health challenges and could not participate in the data collection process. Consequently, only five (5), four (4) females and one (1) male traditional healers participated in the in-depth interviews. The following are the name codes of the traditional healers (SPM, LM, MM, TS and AM).

##### **4.5.2.2 Knowledge holders**

The sample size for the learning cycle (focus group discussions) was determined by the availability of both traditional healers and knowledge holders. Nine (9) participants consisting of traditional healers and knowledge holders availed themselves during focus group discussion meetings at the tribal office. This was a group that constituted a sample size for the focus group. Focus group discussions were held in order to address objective three of the study and was done after responding to objectives one and two.





**Figure 4.1:** A learning circle (focus group discussion) in progress at the tribal office Lapa (Thatch roof)

### **4.5.3 Data collection tools**

#### **4.5.3.1 Semi-structured questionnaire**

A semi-structured questionnaire with closed and open-ended questions were used to collect data as well as face-to-face in-depth interviews with traditional healers (key informants) during field excursions (Appendix 1). The questionnaire was divided into different sections as follows: Section A focused on the demographic characteristics of participants (gender, age group, level of education and number of years involved in traditional healing); Section B solicited information on the geographical area and time for collection of medicinal plants; Section C focused on indigenous protection and conservation methods of medicinal plants; and Section D solicited information on medicinal plants Biodiversity use and preparation.

During the interviews, the researcher captured participants' responses using a digital voice recorder. A field guide was used to capture information that could not be captured by through the questionnaire. Additional information was recorded into a diary or log book. Geographical positioning system was used to capture the coordinates of the location of medicinal plants. A photographical camera was also used to take pictures of medicinal plants as well as indigenous conservation strategies. Demonstrations of indigenous conservation practices by traditional healers were also captured. Participants observation were also used to enhance understanding of the data.



Samples of medicinal plants were collected for the preparation of herbarium specimens. A specimen plant presser to prepare herbarium specimens were used during data collection. The herbarium voucher template from the South African National Botanical Institute (SANBI) was used to record all information needed for herbarium specimens. Information such as habitat of the plants (Trees, Shrubs and Herbs), specimen number, the roots, leaves and rhizomes of plants were rescored on the herbarium voucher. Herbarium specimens were transported to the NWU where they were kept in room temperature to dry. The dried herbarium specimens were taken to SANBI for identification.

#### **4.5.3.2 Interview guide**

A learning cycle (focus group discussion) was conducted at the tribal office Lapa (Thatch roof) (Figure 4.1). An interview guide written in the language of participants (Setswana) with open-ended questions was used to facilitate discussions during the learning cycle (focus group) (Appendix 2). Knowledge holders and the researcher sat in a semi circle pattern during the meetings (Figure 4.1). The researcher asked a question which was responded to by knowledge holders one after the other. The researcher facilitated the discussions such that each participant was given ample time to explain his or her response. All knowledge holders were encouraged to speak out their knowledge and opinions without intimidation.

#### **4.5.4 Data collection procedures**

An interview guide was used for data collection and was validated during a pilot study. At the beginning of the data collection process, participants were requested to sign the consent form if they agreed to participate in the study. An information letter was read to participants explaining the aim of the study. Participants were also made to sign a non-disclosure agreement form as agreement between the researcher and participants that the researcher will not disclose information given without the agreement of participants.

##### **4.5.4.1 In-depth interviews with traditional healers (TH)**

Data was collected through face-to-face in-depth interviews using a questionnaire and an interview guide to probe further while in the forest with traditional healers (key informants). During the field excursions, traditional healers were able to demonstrate and even point out practical examples of conservation methods at the natural habitat. Both qualitative and

quantitative data were collected using in-depth interviews and recorded in a diary and also captured in a digital recorder. After data collection, the discussion continued during meals and the traditional healers were able to explain in detail what was observed during the field work. The researcher was also able to ask thought-provoking questions by using the interview guide, which also helped traditional healers to be able to give out more indigenous knowledge and information which could otherwise not have been accessed. Information on the local Setswana name, the parts used and preparation of medicinal plants were recorded in the space provided in the questionnaire sheet. Samples of medicinal plant species were collected and Herbarium Specimens prepared for submission to the South African National Biodiversity Institute (SANBI) for identification. During data collection, different conservation strategies were demonstrated by traditional healers.

#### **4.5.4.2 Learning cycles (Focus group discussion) with knowledge holders (KH)**

Data from the learning cycles (focus group discussions) was obtained through open discussion interviews between the knowledge holders and facilitated by the researcher. During the learning cycle, each participant was given time to explain and demonstrate their knowledge on every question. The facilitator (researcher) used probing questions to expand questions that were not clear to participants and also to evoke deeper meaning and understanding of the phenomenon under discussion. A digital voice recorder and diary were used to capture information during the discussions. A digital camera was used to take pictures as the knowledge holders demonstrated their indigenous conservation strategies. Informal discussions continued during meals to capture information that could have been left out during the learning cycles. All participants were free and willing to share knowledge and opinions.

#### **4.5.5 Data analysis**

Quantitative data (demographic data) was analysed using descriptive statistics by calculating the percentage distribution on an excel spread sheet. Qualitative data was also analysed using thematic analysis. The researcher first listened to the information from the qualitative data collected using a digital recorder. Data from both the voice recorder and the records from the diary were transcribed into the text files. The data was cleaned by repeated reading to pick out errors. Member checking was done by reading the text files to some participants to validate the information. During member checking, additional information was given. The researcher read through the texts repeatedly to pick out common trends which were categorised into themes.

Other emerging themes were also identified. The themes were later assigned technical language used in indigenous conservation. The GPS coordinates for each plant species collected was used to develop a map of the distribution of species within the study area.

#### **4.5.6 Ethical Considerations**

Throughout the research process, the researcher took the responsibility to protect the rights of all human subjects. The researcher received ethics approval certificate of project from the ethics committee of the Faculty of Natural and Agricultura Sciences, North-West University, Mafikeng Campus before going to the field (Appendix 10). The certificate was followed by the letter from the department of Indigenous Knowledge Systems (IKS) to be presented to the village chief (Appendix 9). After the approval from the University, the researcher sought to meet with the chief and the Traditional Administration Council of Molatedi village to ask for permission to conduct the study. After the permission was granted, the researcher was introduced to the traditional healers of Molatedi village.

Before collecting data, all participants were required to sign a consent form after they had agreed to participate in the study (Appendix 4). Participants were also informed of the rights to anonymity and confidentiality and both the researcher and participants were requested to sign a non-disclosure form (Appendix 5). This was because the use of photographs and/or videos required a signed release and full disclosure of their purpose between the researcher and participants.

All confidential data was kept secured under lock and key and preferably retained without identifying information (Given, 2008). During data collection, all the participants and research assistants were given the same fair and equal treatment by the researcher. The researcher took into consideration the protection and safety of all participants by ensuring that all of them were wearing protective clothes and boots or closed shoes every time during data collection in the field.

It was also the prerogative of the researcher to carry along a first aid kit all the time during data collection so as to help participants in case of injury before they could be taken to the clinic (Burns & Grove, 2005). Participants were allowed to be excused at any point of the research process if they were not comfortable with the process. During the study, pictures of different scenarios were taken to ensure trustworthiness. The researcher observed all the cultural protocols of Batswana people according to the tradition of Molatedi village. The first level of

traditional protocol observed by the researcher was the meeting with the chief of Molatedi village and his traditional administration council in a constituted tribal meeting (Figure 4.2).



**Figure 4.2:** The researcher in a constituted tribal meeting with Kgosi BFM Matlapeng of Molatedi village and his Traditional Administration Council requesting permission to conduct the study

The traditional administration council consists of six (6) Clans (Dikgoro) (Figure 4.3). The first clan (kgoro ya kgosing) consists of three men who are all the uncles of the chief and among the uncles, is a head leader of all the clans of Molatedi village, Rre K.K Matlapeng. This is the first line of protocol in Molatedi village that needs to be given due respect before the researcher can talk to any member of the village.

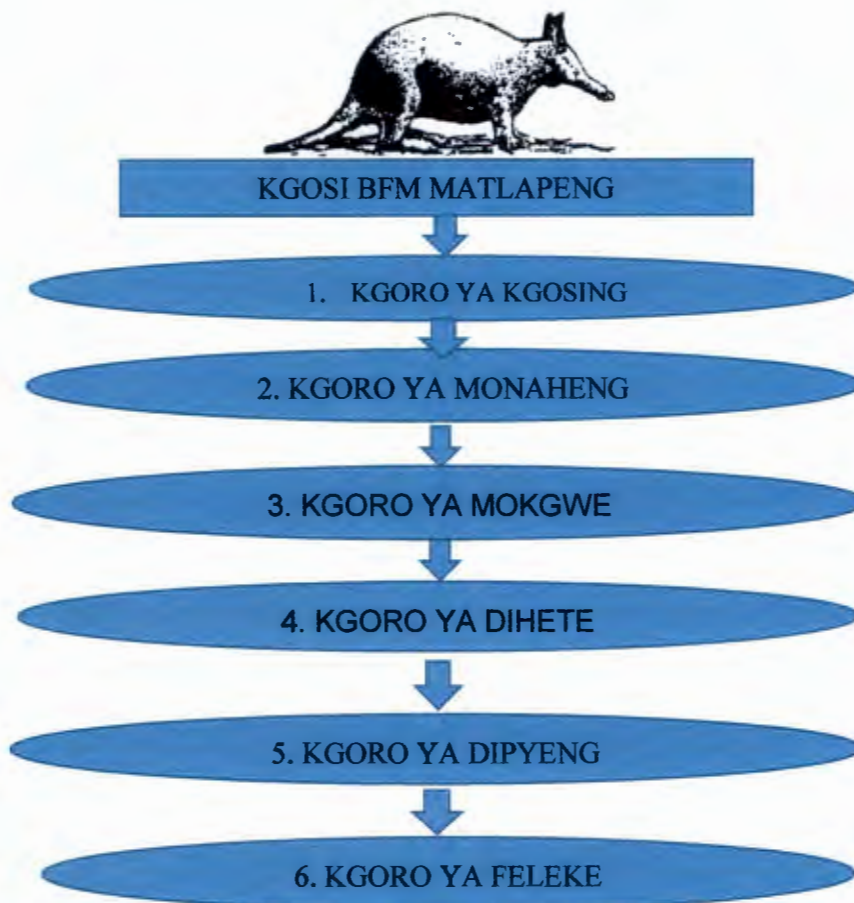
After the chief granted the researcher permission to conduct the study in Molatedi village, the head leader of the council organised a meeting between the researcher and traditional healers (Figure 4.4). The meeting with the traditional healers was the second level of traditional protocol the researcher had to follow during the research study. The third level of traditional protocol to be observed by the researcher was the dress code during the meetings at the tribal office. The fourth level of traditional protocol was time for the meetings with the traditional healers for collection of medicinal plants. According to the traditional healers, it is also important for the researcher to note that entry into the forest is entry into the space/location and environment of ancestors.



BATLOKWA BOO KGOSI BA GA MATLAPENG

TRADITIONAL ADMINISTRATION

COUNCIL



**Figure 4.3:** A totem and six clans (*dikgoro*) of the Batlokwa boo Kgosi BFM Matlapeng Traditional Administration Council

Therefore, the time of entry is very important for both ancestors and traditional healers. At twelve noon (12 hours - midday), when the shadow of a person is within that person, and no one is able to see his or her shadow, ancestors do not expect any person within the forest at this time. This is one of the protocols the researcher had to respect and adhere to.





**Figure 4.4:** The first meeting between the target population of traditional healers and the researcher requesting their participation in the study

Traditional healers explained their relation with ancestors about the knowledge of medicinal plants in their possession. It was, therefore, important for the researcher to follow the dictates of the traditional healers when in the space and environment of the ancestors. During the first meeting, when the researcher was requesting the traditional healers' participation in the study (Figure 4.4), the traditional healers explained the relationship they have with their ancestors. The researcher acknowledged the relational ontology that exists between traditional healers and ancestors.

As the researcher continued the discussions with traditional healers, an ontological relationship develop among them. The researcher also showed respect towards the traditional healers and the ancestors of the traditional healers since that also had an effect in the collection of data. If the traditional healer did not follow the instructions of the ancestors, for example, when it is not the right time to collect medicinal plants (i.e. 12 midday) the traditional healer requested the researcher to throw a silver coin on the ground in the forest before entry and collection of medicinal plants.

This was a request for the ancestors to it was brighten medicinal plants (*kgantshetsa*). If this ritual was not done, the ancestors would hide the medicinal plants for the traditional healers not be able to see them. This was a simple instruction from the ancestors for both the researcher and the traditional healer to obey. It is very important for traditional healers to obey the instructions from the ancestors for the research to be successful. All protocols were observed and this enabled the researcher to collect data. It was part of protocol and an indication of

respect for authority for the researcher to keep to the time set by the traditional administration council. The time for the meeting with the traditional administration council committee was of great importance. The researcher's entry into the village was determined by her behaviour in the presence of the chief and the traditional administration council committee. The manner in which the researcher explained the reasons for conducting the study in the village also determined whether the permission would be granted or not. This was the greatest part of the research protocol, as it determined the chief's agreement or refusal to permit the researcher to conduct the study in his village.

A token of appreciation (an offering in the form of food parcels) was given any time the researcher had meetings with participants and also the traditional administration council. Culturally, it is of paramount importance that the researcher should show appreciation at every level when having an encounter with the chief (Kgosi), traditional elders and participants. An appreciation could be done by giving offerings such as food parcels, traditional ornaments and any small offering as a token of appreciation (Figure 4.5). This form of offering represents respect and appreciation for the knowledge being shared. It is uncultured and also embarrassing as a researcher to spend the whole week every day from morning until afternoon on a hot summer day in the forest with traditional healers collecting medicinal plants and then at the end, one just says 'thank you'.

There are different ways of showing respect and appreciation of knowledge shared according to different cultures. It is, therefore, important for the researcher to ascertain the nature of an offering, considering the cultural background of the community before the visit to the village. The Batswana ethnic group have embraced a culture of offering a token of appreciation even if it is a small token because they have a saying that "*sejo sennye ga se fete molomo*" meaning "even if food can be how small, it can be shared among all present". Furthermore, Batswana people become excited to receive visitors and also have a saying when they see a visitor coming "*Moeng etla re je ka wena*", which simply means "visitor come so that we can eat". Batswana people will not ask for an offering but they have an expectation when a visitor comes. It is, therefore, upon the researcher to know and to offer with understanding. This practice also exists among other cultures (Struthers, 2004).



**Figure 4.5:** Participating traditional healers receiving food parcels as a token of appreciation

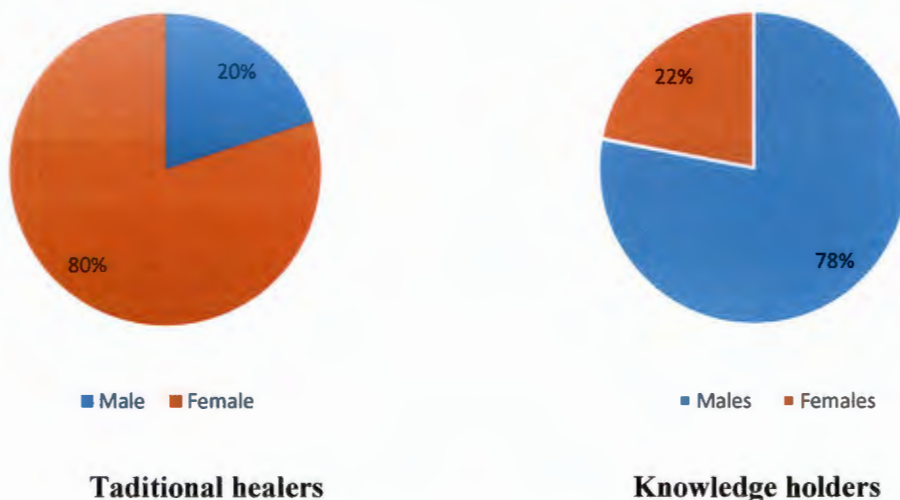
## **4.6 Results**

### **4.6.1 Demographic characteristics of traditional healers and knowledge holders**

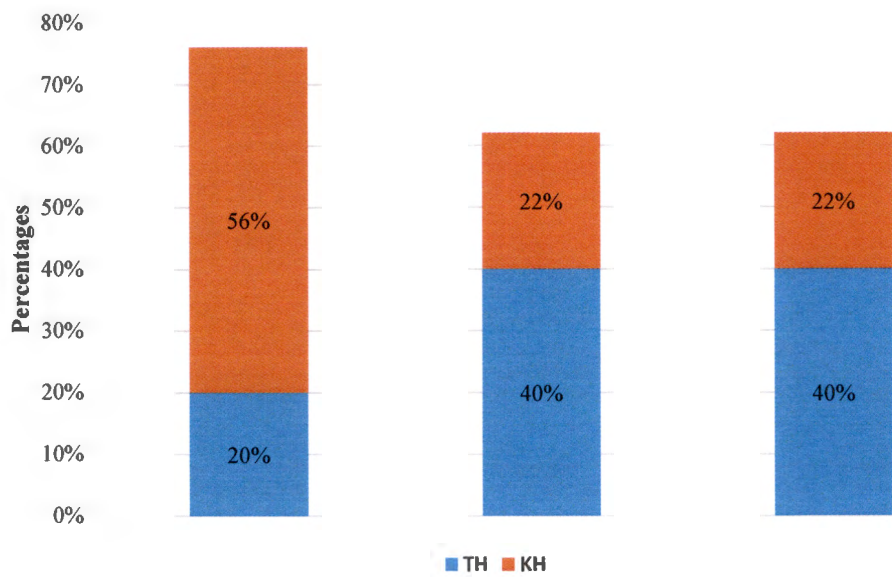
The results revealed that 80% (traditional healers) of the participants were females and 20% (traditional healers) were males (Figure 4.6), and 78% of knowledge healers were men and 22% of knowledge holders were females (Figure 4.6). Furthermore, with regard to the distribution of traditional healers according to age group, 56% were Knowledge Holders and they are less than 40 years (youth) (Figure 4.7). The Traditional Healers were 40% between 41-60 (adults) and also 40% who were 60 years + (senior citizens).(Figure 4.7) while among knowledge holders, majority were the youth (Figure 4.7). It was also evident from the study that almost all traditional healers had primary and high school levels of education (Figure 4.8). Traditional healers should be regarded as doctors just the same way as western medical doctors. Both have been to school to study and are both practising in their fields, doing the same duties in different contexts. It is, therefore, important that traditional healers be respected as western medical doctors. Most of traditional healers quit formal school after realising their calling as traditional healers. During the interviews, traditional healers responded to the question about their level of education as follows: (AM) said she had to leave formal school at primary level due to the calling of helping people with medicinal plants. LM also indicated that she became a traditional healer when she was at high school and had to leave school to continue with traditional healing school. However, TS indicated that she never attended school in her life



because she started working on the farms when she was still young. The results also indicate that majority of traditional healers have long been practising traditional healing (Figure 4.9). PSM said she had been a traditional healer for more than fifteen (15) years, and that stopped her schooling at primary level because she had to go to the traditional healers' school. PSM and AM indicated that they have practising traditional healing for the past 20 years. It was also clear that new-comers in the field of traditional healing were also in the majority (Figure 4.9). MM and LM indicated that they have been practising as traditional healers for ten (10) years and less, whereas those who have been in practice for 15 - 19 years were in the minority (Figure 4.9). PSM indicated that she has been a traditional healer for more than twenty years (20 years). Thus, it was evident from the findings of the study that in Molatedi village, it is a common understanding that once a traditional healer qualifies as a traditional healer, he or she does not continue with formal education. All traditional healers in Molatedi village, who participated in the study did not further their formal studies above high school after their qualification as traditional healers.

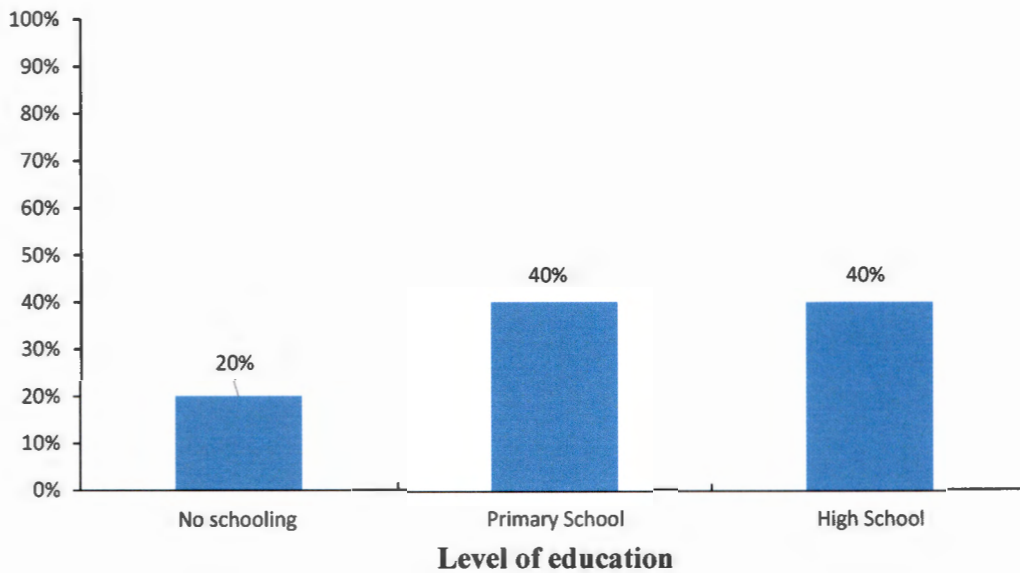


**Figure: 4.6:** Distribution of gender amongst the participating traditional healers and indigenous knowledge holders of the study

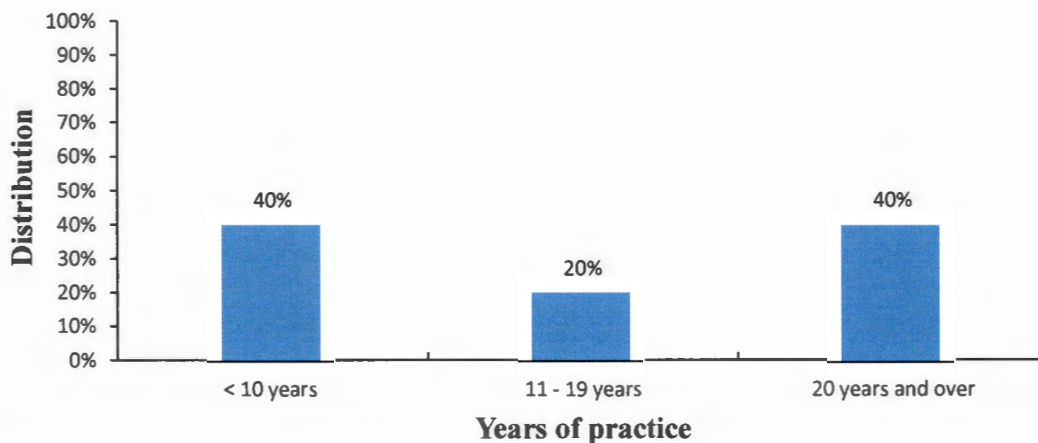


**Figure 4.7:** Distribution of age group amongst participating traditional healers (TH) and Knowledge holders (KH)





**Figure 4.8** Educational level distribution of the traditional healers



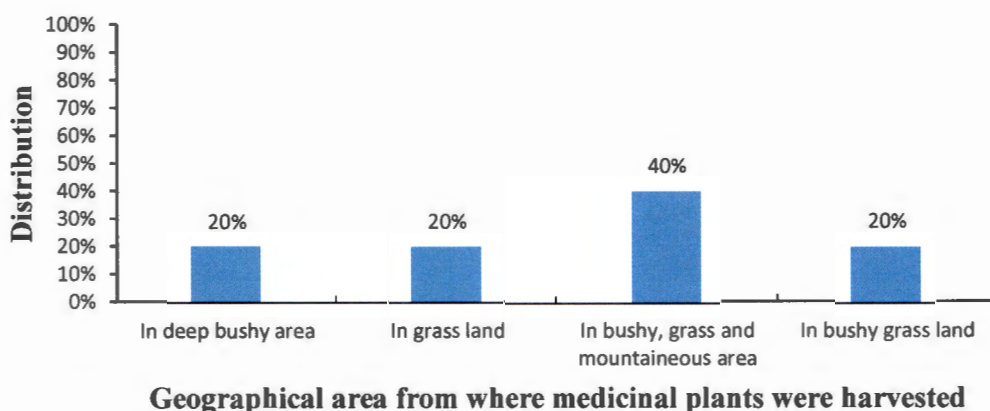
**Figure 4.9:** Number of year of experience as a traditional healer

#### **4.6.2 Geographical area, time and methods of harvesting medicinal plants by participants in Molatedi village**

The results showed that MM harvest medicinal plants in a bushy thick forest because she believes that in such bushy thick forest, people do not walk freely and, therefore, medicinal plants harvested in such areas do not have darkness (sefifi) from the people walking over the plants. P3 further explained that darkness (sefifi) comes upon a medicinal plant that has been

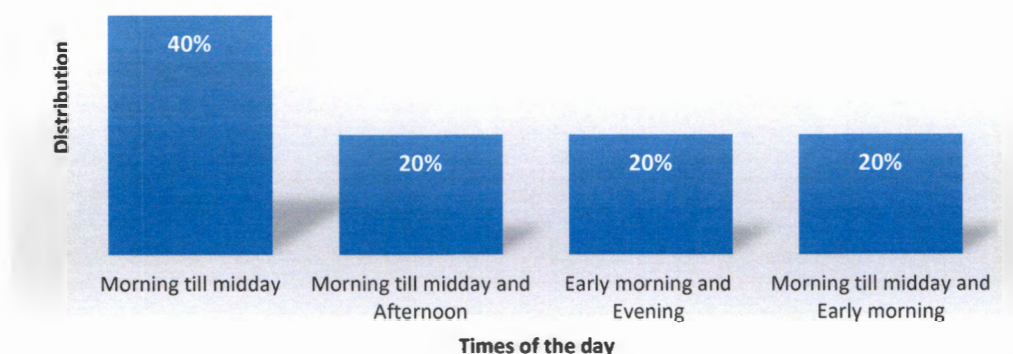
crossed over by the people as they walk in the forest. Thus, the study revealed that 40% of medicinal plants are harvested in geographical areas that are bushy, grassy and mountainous. However, other geographical areas are less harvested for medicinal plants because they are grassy or bushy (Figure 4.10). LM and MM also acknowledged that other medicinal plants can only grow in a particular area as captured in the excerpt below:

I harvest medicinal plants in a bushy thick forest because people do not walk free in those areas (MM). I also like mountain areas because most of the shippers like grazing their animals up the mountain so people and animals do not cross over the medicinal plant (AM). I like going deep in the bushy area because most people avoid to enter the bushy area and, therefore, medicinal plants deep in bushy areas are not crossed over by people (TS). I collect most medicinal plants in grass land because that is where they grow (LM). They cannot grow in rocky mountain areas (PSM).



**Figure 4.10:** Geographical areas where medicinal plants were collected

Furthermore, the study revealed that most of participants harvest medicinal plants in the morning until midday (40% of participants). PSM and LM indicated that they harvest medicinal plants during the morning until midday. MM indicated that she may harvest in the morning until midday and also in the afternoon (Figure 4.11). AM emphasised that traditional healers should respect the time for harvesting medicinal plants such that if they go in the morning and the time for harvesting lapses, they will go again in the afternoon at three o'clock.



**Figure 4.11:** Periods of the day used by traditional healers to harvest medicinal plants

The study further revealed that majority (40%) of participants harvest medicinal plants by cutting the leaves, the entire plants, and digging the roots, whereas others harvest medicinal plants by cutting either the leaves only, branches only or roots only (Table 4.1). LM explained that she cuts the leaves if she needs them, or the entire plant, or digs the roots, depending on the plants used and parts needed. MM also added in agreement with LM that she cuts the part that is needed to prepare a medicine. Furthermore, TS alerted everyone that she does not come to the forest to harvest only one medicinal plant, but she harvests different types that she will need to use to prepare different medicines. AM in agreement with all traditional speakers, maintained that traditional healers cut or dig different parts such as leaves, bulbs, roots and entire plants according to the needs and the type of medicine to be prepared.

**Table 4.1: Methods used by traditional healers to harvest medicinal plants**

<b>Method of harvesting</b>	<b>Frequency</b>	<b>Distribution (%)</b>
Cut the leaves only and dig the roots	6	20%
Cut the leaves only, cut the entire plant and dig the roots	14	47%
Dig the roots	6	20%
Cut the branches only and cut the leaves only	6	20%
<b>Total</b>	<b>30</b>	<b>107%</b>

Table 4.2: Traditional healers' knowledge of medicinal plants in the Heritage Park Corridor

No.	Tswana name	Scientific Names	Family	Part(s) use and uses (treatment)	Methods of Preparations	Location & Habitat	Name Code	GPS
1	Mojeremeane	<i>Elaeodendron transvaalense</i> (	Celastraceae	<b>Barks:</b> <input type="checkbox"/> Cleanse the blood	<b>Infusion of the bark:</b> Grind barks into small granules and brew with cold water. for 4 to 5 hours and drink.	Molatedi ko Ntsweng, Red sandy soil	PSM	S 24° 51' 022'' E 26° 30' 254''
2.	Moselesele	<i>Dichrostachys cinerea</i>	Fabaceae	<b>Roots:</b> to treat a toothache. <b>Leaves:</b> to stop vomiting	<b>Decoction of the roots:</b> Boil the roots until it stop foaming and settles. Gurgle with the water and not swallow. <b>Infusion of leaves:</b> Grind the leaves into powder and brew with cold for 5min and drink to stop vomiting.	Molatedi ko Ntsweng	LM and TS	S 24° 86' 919'' E 26° 59' 023''
3.	Motswere	<i>Asparagus suaveolens</i>	Asparagaceae	<b>Leaves:</b> to treat cough and baby fontanel	<b>Decoction of roots:</b> Boil the leaves in water drink to treat cough. <b>Burning:</b> Dry the leaves and burned into smoke and exposed the baby to the smoke to inhale to treat the baby fontanel.	Molatedi ko Ntsweng	PSM	S 24° 51' 165'' E 26° 58' 998''
4	Mosunyana	<i>Fabaceae</i> sp.	Fabaceae	<b>Roots:</b> to treat baby fontanel (Tlhogwana)	<b>Smoking of roots:</b> Dry the roots and burned into smoke. The baby is exposed to inhale the smoke to treat baby fontanel.	Molatedi ko Ntsweng	PSM & TS	S 24° 86' 020'' E 26° 58' 998''
5	Mosiama/Mosimama/Kganya	<i>Kleimia longiflora</i>	Asteraceae	<b>Whole Plant:</b> to Cleanse bad luck. <b>Roots:</b> To treat loose tooth.	<b>Infusion of whole plant:</b> Cut the whole plant and put in water for for bathing bad luck. From the grave yard traditional healer wash hand before entering their Ndombbo. <b>Decoction:</b> Boil the roots and gurgle with the water to treat loose tooth.	Molatedi ko Ntsweng	LM, TS, PSM, AM & MM	S 24° 87' 029'' E 26° 59' 045''
6	Moologa	<i>Croton gratissimus</i>	Euphorbiaceae	<b>Roots, leaves and barks:</b> to treat sores and flue (Diso) inside and outside the body.	<b>Decoction of roots:</b> The roots, leaves and barks are cut into small pieces and boil in water. After cooling the patient drink the water to treat sores and flue.	Molatedi ko Ntsweng	PSM and MM	S 24° 51' 152'' E 26° 30' 339''
7	Mmabatsane/Sebatsane	<i>Tragia dioica</i> Sond.	Euphorbiaceae	<b>Roots:</b> Heal sores (Diso)	<b>Decoction of the roots:</b> Boil the roots until the water stop foaming and settles. After cooling drink to treat sores	Molatedi ko Ntsweng	LM, TS, PSM, AM & MM	S 24° 51' 156'' E 26° 30' 328''
8	Tlhokamatsh waro	<i>Asparagus suaveolens</i>	Asparagaceae	<b>Roots:</b> treat sores inside the body.	<b>Decoction of the roots:</b> Boil the roots cuts into small pieces with water. After cooling give the patient	Molatedi ko Ntsweng	LM	S 24° 86' 967'' E 26° 59' 017''
9	Mothata	<i>Pappea capensis</i>	Sapindaceae	<b>Bucks:</b> Heals the private parts and Strengthen manhood	<b>Decoction of the bucks:</b> Boil the bucks until the water stop foaming and settles. After cooling drink to treat the private parts and also strengthens manhood.	Molatedi ko Ntsweng	LM	S 24° 51' 007'' E 26° 30' 250''



Table 4.2: Traditional healers' knowledge of medicinal plants in the Heritage Park Corridor

No.	Tswana name	Scientific Names	Family	Part(s) use and uses (treatment)	Methods of Preparations	Location & Habitat	Name Code	GPS
10	Mosetha	<i>Peltophorum africanum</i>	Fabaceae	<b>Bucks:</b> treat <input type="checkbox"/> sickness that came as a results of dead spouse(e fodisa boswagadi)	<b>Infusion of barks:</b> The barks are grinded into small granules and put in a container with cold water. The mixture is left to brew for 4 to 5 hours and it ready for drinking. This mixture is taken after the death of a spouse. Treat sickness related to the death of a spouse (Boswagadi).	Molatedi ko Ntsweng	LM	S 24° 51' 011'' E 26° 3' 210''
11	Mohubu	<i>Cyphostemma</i> sp.	Vitaceae	<b>Roots:</b> <input type="checkbox"/> Cleanse bad luck	<b>Infusion of roots:</b> Grind the roots pour in water and bath to cleanse bad luck	Molatedi ko Ntsweng	PSM	S 240 51' 019'' E 26° 30' 267''
12	Mokgalo	<i>Ziziphium mucronata</i>	Rhamnaceae	<b>Leaves:</b> treat <input type="checkbox"/> boil/apses.	<b>Powder:</b> Grind the leaves into powder and mix with brown sugar. Soften the Sunlight with water and mix with sugar and leaves to make a paste. Place the paste on a brown paper and cover the boil.	Molatedi ko Ntsweng	LM, TS, PSM, AM & MM	S 24° 86' 967'' E 26° 59' 017''
13	Mogaga	<i>Drimys altissima</i>	Hyaceinthaceae	<b>Bulb:</b> Discipline, cleans village and gives luck <b>Leaves:</b> treat <input type="checkbox"/> aching ear	<b>Infusion of a bulb:</b> Cut the bulb into small pieces and put them in water and bath the patient. <b>Baking the leave:</b> Bake the leave on fire until is warm and them cut the leave and squeeze the warm juice from the leave in the ear of a patient.	Molatedi ko Ntsweng	LM, TS, PSM, AM & MM	S 24° 86' 954'' E 26° 59' 010''
14	Mosokela-tsebeng	<i>Sansevieria aethiopica</i> Thumb.	Asparagaceae	<b>Bucks:</b> reat <input type="checkbox"/> hiccup.( fodisa Kgodisa)	<b>Powder:</b> Grind the bark into powder and give the patient powder to eat it as dry powder and thereafter he or she can drink water	Molatedi ko Ntsweng	PSM & TS	S 24° 51' 018'' E 2°6 30' 262''
15	Mosita-Tlou	<i>Mundulea sericea</i>	Fabaceae	<b>Roots:</b> Heals <input type="checkbox"/> abscesses/boil	<b>Decoction of the roots:</b> Boil the roots until the water stop foaming and settles. After cooling drink the water to treat abscesses/boil	Molatedi ko Ntsweng	AM	S 24° 50' 757'' E 26° 27' 612''
16	Motlhagala	<i>Hibiscus micranthus</i>	Malvaceae	<b>Roots treat</b> <input type="checkbox"/> blood related diseases and <input type="checkbox"/> dizziness and leaves treat <input type="checkbox"/> baby fontanel.	<b>Decoction of the roots:</b> Boil the roots until the water stop foaming and settles. After cooling the patient can drink water to treat blood related diseases and dizziness. <b>Infusion of leaves:</b> Grind the leaves into powder, place a small amount of powder add a teaspoon water and give to the baby to drink. Put the remains on the baby fontanel.	Molatedi ko Ntsweng	AM, PSM, TS	S 24° 86' 967'' E 266 59' 017''
17	Lesitlwane	<i>Lycium</i> sp	Solanaceae			Molatedi ko Ntsweng		



Table 4.2: Traditional healers' knowledge of medicinal plants in the Heritage Park Corridor (Cont.)

No.	Tswana name	Scientific Names	Family	Part(s) use and uses (treatment)	Methods of Preparations	Location & Habitat	Name Code	GPS
18	Mongana	<i>Senegalia mellifera</i>	Fabaceae	<b>Branches and roots:</b> treat <input type="checkbox"/> toothache	<b>Decoction of the roots and branches:</b> The roots and branches are cut into small pieces and put in a container with water and allow it to boil until the water stop foaming and settles. For toothache one will gargle with the water and not swallow.	Molatedi ko Ntsweng	PSM	S 24° 86' 954'' E 26° 59' 010''
19	Mosukujwane/ Thobega	<i>Lippia scaberrima</i>	Verbenaceae	<b>Whole plant:</b> treat <input type="checkbox"/> high Blood pressure. <b>Leaves:</b> <input type="checkbox"/> gives tea flavour.	<b>Decoction of the whole plant:</b> The whole plant is cut into small pieces and put in a container with water and allow it to boil until the water stop foaming and settles. After cooling the patient can drink to treat high blood pressure. <b>Decoction of the leaves:</b> The leaves are put in tea to give tea a flavour.	Molatedi ko Ntsweng Growing in flat sandy soft loose soil in open sunny area. Small good smelling green leafy shrub about 20 cm long.	AM	S 24° 87' 280'' E 26° 56' 735''
20	Thotsana baba	<i>Barleria</i>	Acantheceae	<b>Whole plant:</b> Treat <input type="checkbox"/> sores in children	<b>Decoction of the roots:</b> Boil the roots until the water stop foaming and settles. After cooling the decoction is given to a child to treat sores.	Molatedi ko Ntsweng where there is clay soft soil in a bushy area	PSM	S 24° 87' 280'' E 26° 56' 735''
21	Lefye/ Leshwe	<i>cf. Pentarrhinum insipidum</i>	Apocynaceae	<b>Whole plants:</b> <input type="checkbox"/> Heals running stomach	<b>Decoction of the whole plant:</b> Boil the plant until the water stop foaming and settles. After cooling drink to treat running stomach.	Molatedi ko merakeng where there is clay soft soil in a bushy area	PSM	S 24° 87' 915'' E 26° 59' 027''
22	Selaole	<i>Cf Lantana sp</i>	Verbenaceae	<b>Whole plants:</b> treat <input type="checkbox"/> Broken parts of the body and also <input type="checkbox"/> itching eyes.	<b>Powder and Roast:</b> Grind the roots and fry in fire until brown/black then grind again in to powder and mix with Vaseline then apply to the broken part of the body for three days without bathing. <b>Decoction of leaves:</b> Leaves are mixed with More wa ditonki boil in water and allow to simmer. Put droplets in the eye to treat painful eyes.	Molatedi ko Morakeng where there is clay soft soil in a bushy area	PSM	S 24° 86' 975'' E 65° 59' 012''

Table 4.2: Traditional Healers' Knowledge of medicinal plants in the Heritage Park Corridor (Cont.)

No.	Tswana name	Scientific Names	Family	Part(s) use and uses (treatment)	Methods of Preparations	Location & Habitat	Name Code	GPS
23	Segope	<i>Clematis</i> sp	Rhainculaceae	<b>Roots and Leaves:</b> <input type="checkbox"/> Protect the field of crops. (Go thaya tshimo ya dijalo e.g. mabele). Heals <input type="checkbox"/> boil/abscess	<b>Decoction of roots:</b> The roots are mixed with the roots of modikasope and boil them. After cooling give the patient to drink to treat boil. <b>Make crowns</b> with the whole plant and put crowns at the corners of the field to protect the field from birds that eat crops.	Molatedi ko Morakeng where there is clay soft soil in a bushy area	PSM	S 24° 87' 029'' E 26° 59' 045''
24	More wā Tonki /Moroto wa Tonki	<i>Schkuhria pinnata</i>	Asteraceae	<b>Roots:</b> Treat <input type="checkbox"/> stomach ache	<b>Infusion of roots:</b> Grind the roots into small granules and put in a container with cold water. The mixture is left to brew for 4 to 5 hours and it will be ready for drinking to treat stomach ache	Molatedi ko Morakeng le ko Ntsweng	PSM, MM & TS	S 24° 85' 541'' E 26° 49' 281''
25	Lesitlwāne	<i>Asparagus suaveolens</i> [1]	Asparagaceae	<b>Roots: treat</b> <input type="checkbox"/> Dizziness	<b>Decoction of the roots:</b> Boil the roots until the water stop foaming and settles. After cooling the patient can drink water to treat blood related diseases and dizziness.	Molatedi ko Morakeng from the black clay soil under the trees	TS	S 24° 86' 967'' E 26° 59' 017''
26	Ditantanyane	Crabbea acauli N.E.Br	Acanthaceae	<b>Roots: treats</b> <input type="checkbox"/> Belly button for children(khujwana)	<b>Decoction of the roots:</b> Boil the roots cuts into small pieces with water After cooling give the patient to drink.	Molatedi ko Morakeng from the black clay soil	TS & PSM	S 24° 85' 541'' E 26° 49' 281''
27	Sekgalofatshe	<i>Ziziphus cf. zeyheriana</i>	Rhamnaceae	<b>Roots:</b> <input type="checkbox"/> Cleanse the blood of the waist for both men and women	<b>Decoction of the roots:</b> Boil the roots cuts into small pieces with water After cooling give the patient to drink.	Molatedi ko Morakeng from the black clay soil	MM	S 24° 86' 905'' E26° 59' 032''
28	Madi a phalana	<i>Kohautia</i> sp.	Rubiaceae	<b>Roots:</b> <input type="checkbox"/> Cleanse women to fall pregnant (Barrenness). <input type="checkbox"/> Help men to be strong sexually.	<b>Decoction of the roots:</b> Boil the roots cuts into small pieces with water After cooling give the patient to drink.	Molatedi ko Morakeng from the black clay soil	MM	S 24° 86' 905'' E26° 59' 032''
29	Moroθhothebe	<i>Artemisia Tridentata</i>	Asteraceae	<b>Whole plant: Treat</b> <input type="checkbox"/> stomach ache and <input type="checkbox"/> eyes	<b>Decoction of the whole plant:</b> Boil the whole plant in water. After cooling drink to treat stomach ache. Wash the eyes with water to treat painful eyes.	Molatedi ko Morakeng from the black clay soil	TS	S 24° 87' 019'' E 26° 5' 597''
30	Mābala mantisi	<i>Aloe zebrine</i>	Asphodelaceae	<b>Leaves:</b> Treat <input type="checkbox"/> blood disease. <input type="checkbox"/> Treat sores on the skin	<b>Decoction of the leaves:</b> Boil the leaves until the water stop foaming and settles. Give the patient to drink to treat blood related diseases and sores on the skin.	Molatedi ko Morakeng from the black clay soil	LM, TS, PSM & MM	S 24° 87' 280'' E 26° 56' 351''

**Table 4.2: Traditional healers' knowledge of medicinal plants in the Heritage Park Corridor (Cont.)**

Tswana name	Scientific Names	Family	Part(s) use and uses (treatment)	Methods of Preparations	Location & Habitat	Name Code	GPS
31 Toroko	<i>Opuntia</i>	Cactaceae	<b>Leaves:</b> treat <input type="checkbox"/> Sugar diabetes	<b>Decoction of the leaves:</b> Boil the leaves until top foaming. The mix the with other plants that treat sugar diabetes	Molatedi ko Morakeng	LM	S 24° 87' 054'' E 26° 58' 982''
32 Mokgopa	<i>Aloe marlothii</i>	Asphodelaceae	<b>Leaves:</b> treat <input type="checkbox"/> high blood pressure	<b>Decoction of the leaves:</b> Boil the leaves until the water stop foaming and settles. After cooling the patient can drink to treat high blood pressure	Molatedi ko Morakeng from the black clay soil	LM, TS, PSM, AM & MM	S 24° 51' 155'' E 26° 30' 322''
33 Seboka	<i>Tavaresia barklyi</i>	Apocynaceae	<b>Leaves:</b> <input type="checkbox"/> Cleanse the yard <input type="checkbox"/> from bad luck/spirits	<b>Infusion of the leaves:</b> The leaves are cut into small pieces and put in a container with water. The mixture is used to cleanse the yard.	Molatedi ko Morakeng from the black clay soil	LM	S 24° 90' 179'' E 26° 54' 643''
34 Sekanama	<i>Ornithogalum tenuifolium</i>	Hyacinthaceae	<b>Bulb:</b> Treat <input type="checkbox"/> blood related diseases	<b>Decoction of Bulb:</b> Boil the bulb and allow to cool and the patient drink to treat blood related diseases.	Molatedi ko Ntsweng From red clay soil	LM	S 24° 87' 253'' E 26° 58' 943''
35 Moretologa wa poo/Seretologa sa Poo	<i>Ximemia caffra</i>	Capparaceae	<b>Roots and Barks:</b> <input type="checkbox"/> Treat ulcers, the fast heart beat (Moriti wa letsele, setshwafo). <input type="checkbox"/> It reverse sickness that has been difficult to heal.	<b>Decoction of roots and barks:</b> Grind the roots and barks and boil them in water. After cooling drink to treat ulcers, the fast heart beat (Moriti wa letsele le go tlhabela setshwafo) and to reverse sickness.	Molatedi ko Ntsweng From red clay soil	PSM	S 24° 87' 280'' E 26° 56' 735''
36 Mositsana	<i>Elephantorrhiza elephantina</i>	Fabaceae	<b>Roots:</b> treat <input type="checkbox"/> blood related diseases. <input type="checkbox"/> Baby fintanela (E thusa bana kokwana)	<b>Decoction of roots:</b> Boil the roots until the water stop foaming and settles. After cooling drink to treat blood related diseases. <b>Powder:</b> Grind the roots into powder and blow the powder at the baby's buttocks.	Molatedi ko Ntsweng From red clay soil	PSM	S 24° 87' 280'' E 26° 56' 735''
37 Lenyetsane	<i>Chamaesyce</i>	Ephobaceae	<b>Whole plant:</b> Heals <input type="checkbox"/> ancestors burns (Mollo wa Badimo) and wounds.	<b>Powder:</b> Grind the whole plant into powder and apply the powder on the wound to treat ancestors burns (Shingles) "Mollo was Badimo"	Molatedi ko Ntsweng From red clay soil	PSM	S 24° 51' 152'' E 26° 30' 339''
38 Thagaraga	<i>Rhoicissus tridentate</i>	Vitaceae	<b>Roots:</b> <input type="checkbox"/> Give luck	<b>Infusion of roots:</b> The roots are grinded into small granules and put in a container with cold water. The mixture is left to brew for 4 to 5 hours and it ready for bathing to give luck.	Molatedi ko Ntsweng From red clay soil	PSM	S 24° 87' 280'' E 26° 56' 735''



#### 4.6.3 Plant use and preparation of ATM among the traditional healers of Molatedi village

Thirty eight (38) medicinal plants were collected and submitted to the South African National Botanical Institute (SANBI) for identification for a period of one month (Table 4.2). The results from SANBI came with the identification of family and scientific names. The local vernacular names, scientific names and family names were recorded (Table 4.2). The various uses and methods of preparations for each species were also recorded (Table 4.2). In most cases, participants (LM, TS, PSM, AM, and MM) were in agreement with the uses, preparations and conservation of medicinal plants. Participants were in agreement with species that are mostly dominant and commonly used in the Molatedi village as follows: *Drimia altissima* (Mogaga), *Ziziphus mucronata* (Mokgalo), *Aloe marlothii* A. Berger (Mokgopa), *Mundulea sericea* (Willd) A. Chev. (Mosita Tlou), *Peltophorum africanum* (Mosetlha), *Schkuhria pinnata* “More wa Tonki”, *Kleinia longiflora* (Mosiama), *Aloe zebrine* (Mabala mantsi), *Tragia dioica* Sond. (Mmabatsane), *Sansevieria aethiopica* Thunb. (Mosokela tsebeng) and *Sansevieria aethiopica* *Crabbea acauli* N.E.Br (Ditantanyane) (Table 4.2).

The study revealed that all thirty eight (38) medicinal plants collected could treat forty nine (49) diseases, including addressing difficult situations. Furthermore, other findings revealed that all thirty eight (38) medicinal plants belonged to twenty (20) different families, and the common ones were: *Fabaceae* with five (5) medicinal plants; *Asparagaceae* with four (4) medicinal plants; and *Asteraceae* with three (3) medicinal plants. Traditional healers used five (5) different preparation methods as follows: thirty nine percent (39%) of medicinal plants were found to treat more than one disease; twenty one percent (21%) were found to treat blood-related diseases, eighteen percent (18%) were reported to treat baby-related diseases; thirteen percent (13%) were found to treat; while 13% were found to treat only one disease (Table 4.2).

Participants (TS, PSM and MM) indicated that they use *Aloe zebrine* (Mabalamantsi) to treat blood-related diseases, including sores on the skin” (AM, PSM and MM). PSM further explained how the medicine was prepared. LM also indicated that she used the barks of *Elaeodendron transvaalense* (Burt Davy) R.H.Archer (Mojeremane) to cleanse the blood while MM agreed with LM. The study found that *Aloe Maarlothi* A Berger (Mokgopa) is a well-known species in Molatedi village and all participants use it to treat high blood pressure (PSM, LM, MM, TS and AM). During the survey, participant TS explained how the roots of *Ziziphus cf. zeyheriana* Sond (Sekgalofatshe) are used to cleanse the blood of the waist for both men and women. Another species identified by TS as a treatment for blood-related diseases

and dizziness and that the leaves of the same species treat baby fontanel was *Lycium sp* (Lesitlwane). It was revealed that traditional healers mostly specialised in medicinal plants that treat blood-related diseases (Table 4.4). AM explained how she uses the entire plant of *Lippia scaberrima* (Mosukujwane/Thobega) to treat high blood pressure. TS also recalled that she uses the roots of *Ziziphus cf. zeyheriana* Sond (Sekgalofatshe) to cleanse the blood of the waist for both men and women. AM was also reminded that in addition to *Lippia scaberrima* (Mosukujwane/Thobega), she also uses the bulb of *Ornithogalum tenuifolium var. tenuifolium* (Sekanama) to treat blood-related diseases and the roots of *Elephantorrhiza elephantine* (Burch) Skeels (Mositsana) to treat blood-related diseases. Participants with passion and willingness, each explained how they use medicinal plants to prepare traditional medicine (Table 4.2) as captured in the excerpts below:

PSM: I use the leaves of (Mabalamantsi) *Aloe zebrine* to treat blood diseases, including sores on the skin. (TS) added as follows: I also use (Mabalamantsi) *Aloe zebrine* for the treating all blood-related diseases. TS further explained how she prepares a decoction by boiling the leaves of (Mabalamantsi) *Aloe zebrine*. "I also boil the leaves of (Mabalamantsi) *Aloe zebrine* said MM, when a man has a problem with the waist to cleanse the blood with Mabalamantsi. The barks of Mojeremane also cleanse the blood. (PSM) The roots of Lesitlwane *Lycium sp* treat blood-related diseases and dizziness and leaves treat baby fontanel. (TS) The leaves of *Aloe Maarlothi A Berger* (Mokgopa) treat high blood pressure. (MM). "Yes I agree" said PSM. I use *Aloe Maarlothi A Berger* (Mokgopa) to help men with blood-related diseases (TS). Every traditional healer has knowledge and understanding of *Aloe Maarlothi A Berger* (Mokgopa) as a medicine to treat blood (LM). The roots of *Ziziphus cf. zeyheriana* Sond (Sekgalofatshe) cleanse the blood of the waist for both men and women. (TS).

The discussion became interesting as traditional healers exchanged information among themselves, showing mutual relationship and understanding of their roles as traditional healers in Molatedi village. It was clear that most of traditional healers in Molatedi village had a good working relationship. They did not hide information from each other and respected each other's knowledge and were willing to learn from one another. They displayed team spirit, which is an indication of the perception they carry about their duties as traditional healers in the village. The perception was that they are additional healers in the community to help community members and not to compete with each another.



**Table 4.3: Medicinal plants used to treat blood-related diseases**

No.	Setswana Name	Scientific name	Family	Use
1.	Mabalamantsi	<i>Aloe zebrine</i>	Asphodelaceae	Leaves treat blood-related diseases, including sores on the skin
2.	Mok-gopa	<i>Aloe marlothii</i> A. Berger	Asphodelaceae	Treats high blood pressure
3.	Lesitlwane	<i>Lycium sp.</i>	Solanaceae	Roots treat blood-related diseases and dizziness
4.	Sekgalofatshe	<i>Ziziphus cf. zeyheriana</i> Sond	Rhamnaceae	The roots cleanse the blood of the waist for both men and women
5.	Tlhok-amathwaro	<i>Asparagus suaveolens</i> Burch. [1]	Asparagaceae	The roots treat dizziness and blood-related diseases
6.	Mosukujwane	<i>Lippia scaberrima</i>	Verbenaceae	Whole plant treats high blood

**Table 4.4: Medicinal plants used to treat babies-related diseases (Pediatric diseases)**

No.	Setswana name	Scientific name	Family	Parts uses and the treatment
1.	Motswere	<i>Asparagus suaveolens</i> Burch. [1]	Asparagaceae	Leaves: to treat cough and baby fontanel
2.	Mosunyana	<i>Fabaceae</i> sp.	Fabaceae	Roots: to treat baby fontanel ( <i>Tlhogwana</i> )
3.	Lesitlwane	<i>Lycium</i> sp	Solanaceae	Leaves treat baby fontanel
4.	Thotsana Baba	<i>Barleria</i>	Acantheceae	Whole plant treats sores in babies
5.	Ditantanyane	<i>Sansevieria aethiopica</i>	Acanthaceae	Roots treat baby belly button ( <i>khujwana</i> )
6.	Mositsana	<i>Elephantorrhiza elephantina</i>	Fabaceae	Roots treat baby aching stomach (e alafa bana kokwana)



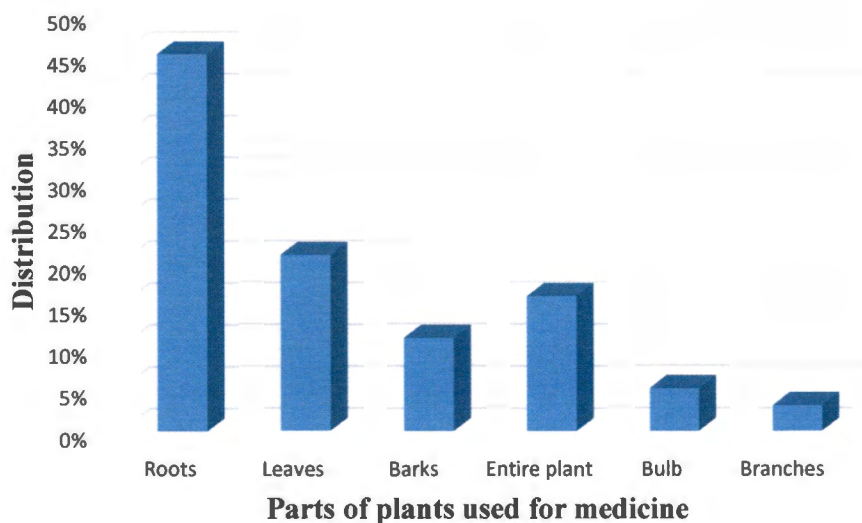
Furthermore, during the survey, six (6) medicinal plants that treat babies-related diseases were also collected (Table 4.4). Participants freely gave information on the names, uses and preparations of traditional medicines for babies (Table 4.4). The study further revealed that there were medicinal plants with more than one name. MM indicated that Batswana people give names to medicinal plants according to the use or its uses and how it is administered. PSM, in agreement with MM, said that (Mosiama e a siamisa) meaning it corrects the wrongs, mistakes or problems. The function is (go siamisa) to correct. LM also indicated that she remembered the other name, which is *Kganya* to brighten. Furthermore, LM maintained that the function of *Kganya* was to remove darkness (sefifi) in the life of a person or the spirit of death after the death of a spouse. PSM added and maintained that *Kganya* (Table 4.5) was also used to clean the house for bad luck. TS further explained that for bad luck, one should put the plant cuts in water and soak a small broom in the water and take it out and sprinkle in the house to cleanse darkness from the house, bath or wash hands after the funeral to remove the spirit of death. TS explained that as traditional healers, when they come from the funeral, they wash hands with water mixed with *Mosiama* before they enter the 'Ndombo' (surgery)" to remove darkness (sefifi). AM indicated another use of *Mosiama* (Table 4.5) by maintaining it is used to treat tooth ache (roots are cooked and gurgled with water).

PSM indicated that *Mmabatsane* (*Triglochin dioica Sond*) (Table 4.5), also known as *Sebabatsane*, is an example of a medicinal plant with more than one name that is used to treat sores. More names were mentioned as the data collection process continued. TS mentioned *Mosukujwane* (*Lippia scaberrima*) (Table 4.5) as a medicinal plant to treat high blood pressure. AM maintained it is also called *Mosunkwane* or *Thobega* (Table 4.5) and its leaves are used in tea for mint flavour. *Schkuhria pinnata* (*More wa Tonki*), also known as (*Moroto wa Tonki*) (Table 4.5), was mentioned by PSM as used to treat stomach ache.

**Table 4.5: Medicinal plants with more than one name**

More than one setswana name	Scientific name	Family	Use
Mm abatsane/ Se̱babe̱tsane (2)	<i>Trigla dioica</i> Sond	Euphorbiaceae	Heals sores
Mosimama/Mosiama/Kganya (3)	<i>Kleinia longiflora</i>	Asteraceae	Removes bad luck, treats loose tooth
Lefye/Leshye (2)	cf. <i>Pentarrhinum insipidum</i>	Apocynaceae	Heals running stomach
Mosunkwane/Mosukujwane/Thobega (3)	<i>Lippia scaberrima</i>	Verbenaceae	Treats high blood, leaves are used for mint flavour
Moroto wa Tonki/More wa Tonki (2)	<i>Schkuhria pinnata</i>	Asteraceae	Treats stomach ache

The study also revealed that all parts of the plants are used for the preparation of traditional medicine, however, parts that are mostly used were the roots (Figure 4.12). Almost all participants indicated the roots are used in the preparation of most traditional medicines. Thus, the study revealed that the roots had the highest score of 45% as the mostly used part to prepare traditional medicine, followed by the leaves with a score of 25%, the whole plant with a score of 15%. Parts that were the least used for the preparation of traditional medicine are branches with a score of 5% (Figure 4.12). PSM explained that she boils the leaves of Motswere in water and allows it to cool and after cooling, she gives her patients to treat cough. PSM indicated that she dries the leaves of the same Motswere plant and burns them with coal fire and exposes the baby to inhale the smoke to treat baby fontanel. AM concurred PSM and maintained that as traditional healers, they use most of the different plants to treat the same disease. Each participant was willing to share their knowledge on the parts they use and how they prepare the medicinal plants.



**Figure 4.12: Different parts of plants used for traditional medicine**

Participants (traditional healers) were happy and willing to also share the preparation methods on how to prepare traditional medicine. PSM explained in full, all the steps to be taken when a traditional medicine is prepared by Botswana traditional healers. As PSM continued with her explanation, all other participants nodded their heads in agreement. PSM further indicated that most of the medicines are prepared out of the mixture of more than one medicinal plant, for example, the leaves of Selaole are mixed with the leaves of More wa Tonki and boiled in water

and allowed to simmer and then droplets from the decoction are put in the eyes to treat itching eyes. LM also explained how she mixes the leaves with cold water (infusion) for few minutes to allow the mixture to brew (go tlhabega). The study also revealed that the preparation of traditional medicine, using leaves mostly was by mixing the leaves with cold water for few minutes and allowed to simmer or to brew the leaves (infusion). All traditional medicines that have been boiled in water (decoction) or mixed with hot water, are taken by a patient after cooling. The study also revealed five (5) methods used by participants to prepare or administer traditional medicine. Participants were able to explain the methods they use to prepare traditional medicine. These methods are commonly used in Molatedi village but are not documented. The common methods as explained by participants were as follows: (1) Decoction: Boiling (Ditlhathego); (2) Infusion: Brewing (Go tlhabega); (3) Grinding into Powder: (Go sila go nna Bopi); (4) Burning into smoke (Go fisa go fitlha e nna musi); and (5) Warm and squeeze (Gamola matute a a thuthafetseng).

#### **4.6.4 Methods used by Traditional Healers (TH) and Indigenous Knowledge Holders (IKH) (to prepare traditional medicine from plants**

##### **4.6.4.1 Decoction (*Ditlhathego*)**

Traditional healer (AM) agreed with PSM and explained how traditional healers of Molatedi village prepare (*ditlhathego*) decoction (Figure 4.13). AM indicated to the researcher that, as traditional healers, they use a container or pot that is only used for cooking traditional medicine (Figure 4.14) and not a pot that is used to cook food (Figure 4.16). PSM added and maintained that traditional medicines are not prepared on the same fire with pots that are cooking food (Figure 4.15) or using the fire where people are sitting to warm themselves. PSM further explained that in order to avoid heaviness (*megato*) from people coming onto the traditional medicine, traditional medicine is prepared on a separate fire (Figure 4.13). AM interjected and explained that these heaviness (*megato*) from people affects traditional medicine by oppressing its healing powers such that they may not be effective or not function at all.

PSM explained further that after taking care of a pot and fire to cook traditional medicine, depending on the part used for example, the roots, they may either be ground or cut the roots into small pieces and put them in a container/pot and water added until the parts are covered. The container or pot is then put down on the ground or on a zinc plate (Figure 4.14), not on a stand called three-legged stand “*drie foot*” (*Matshego*) (Figure 4.15). PSM further explained



that the fire to cook traditional medicine is made around a container by one person (traditional healer), who will keep an eye on the fire and the container. PSM indicated that when the fire goes down, the traditional healer will add some wood and make sure that the fire must not have big flames. AM indicated that when the water in the container starts boiling and foaming and pours out of the container, the traditional healer knows that the container and the foam should not be tempered with. The researcher asked the reason for this procedure, and AM indicated that when the foam pours out of the container, there is a significant meaning that the sickness is pouring out (*e tshololola bolwetse*). The container and the foam must be left to pour out until it settles (*go tibela*) down and stops pouring out. The container is then removed from the fire and the decoction allowed to cool before drinking.

The mixture can be taken warm or cold and remaining decoction could be stored in a bottle or another container but should not be covered. PSM provided reasons why the container is not covered with traditional medicine when on the fire. PSM further explained that according to traditional healings, the container with cooked or boiled traditional medicine (*ditlhathego*) is not supposed to be covered (Figure 4. 13). If the contained or pot is covered, it is an indication that the sickness is covered into the traditional medicine and the traditional medicine will no longer be able cure the illness. To avoid contamination and dust, the container is kept far from dust and contaminations. PSM further indicated that the roots and cuts that remain in the container could still be useful. AM also indicated that the roots are dried and stored for future use. AM maintained that the roots are cooked several times until they are no longer strong (*ditiologa*) and could be discarded. AM closed the discussion by emphasising the fact that all the decoctions, be they leaves, barks, or the whole plant, are prepared in the same manner.



**Figure 4.13:** A decoction of traditional medicine for men and women (*Ditlhathego*)



**Figure 4.14:** A separate pot and fire place prepared only for cooking traditional medicine



**Figure 4.15:** A three legged stand “*drie foot*” (*Matshego*) on a fire place to cook food



**Figure 4.16:** A separate fire place and a pot on a three legged stand “*drie foot*” (*matshego*) and a woman preparing food

#### 4.6.4.2 Preparation of an infusion (*Go tlhabega*)

The study also revealed that decoctions were a common method used by traditional healers in Molatedi village. Infusion is another method used to prepare traditional medicine. It consists of brewing (*go tlhabega*) part(s) of medicinal plant species. All participants (LM, TS, PSM, AM and MM) agreed on the same process of infusion and (PSM) explained the process of infusion as follows:

Some medicinal plants could be placed in cold water for some hours and be ready to be given to a patient. The leaves, barks or roots, depending on the part of plant you use, is cut into small or ground into powder and placed in a container and water poured that will cover the parts of the plant. The mixture is left for some minutes or hours to brew. It can be 4 to 5 hours and it will be covered with a cloth to avoid contamination. After 4 to 5 hours, the medicine will be ready to be given to a patient. Then, the medicine is stored the same way as the one which was boiled. The leaves, roots or barks will be used several times until they are no longer strong and will be discarded. Some of the medicine is used to bath or wash hands, therefore, we mix them and leave them for few minutes like 4 to 5 minutes and wash hands or bath.

Some participants indicated that they use medicinal plants to authenticate what PSM indicated about the process of infusion. PSM revealed as follows:

When I prepare an infusion of the barks to treat high blood, I grind the barks of *Elaeodendron transvaalense* (Burt Davy) R.H.Archer (Mojeremane) species into small granules and put the granules in a container with cold water and leave it to brew for 4 to 5 hours and, thereafter, the mixture will be ready for drinking (PSM).

In agreement with PSM, LM used another example to explain how *Kleinia longiflora* (Mosiamama) (Figure 4.22) infusion was prepared as medicine to remove darkness “*sefifi*”, resulting from the death or as a result of attending a funeral. Batswana people believe that when a person attends a funeral, the spirit of death, which is darkness, envelopes that person and, after the funeral, the person has to cleanse the darkness. LM further explained that traditional healers wash their hands with *Kleinia longiflora* (Mosiamama) infusion to remove the spirit of death, which is darkness before they could enter their traditional chemist (*Ndombo*) as follows:

I cut the whole plant of *Kleinia longiflora* (Mosiama) into small pieces and put them into a bath tumbler and add cold water. The infusion is prepared an hour before the people arrive from the funeral. The bath tumbler, with *Kleinia longiflora* (Mosiama) infusion, is placed at the gate so that people can wash their hands before entering into the yard. The traditional healers will also wash their hands before entering their traditional chemist (*Ndombo*).

Participants emphasised the use of *Kleinia longiflora* (Mosiama) as captured in the excerpts below:

When people come from the funeral/grave yard, they wash hands with water mixed with *Kleinia longiflora* (Mosiama) to remove bad luck and darkness (LM, TS, PSM, MM and AM) (Table 4.3).

Both LM and TS expressed the same sentiments about the use of *Dichrostachys cinerea* (Moselesele) as follows:

I cut the roots of Moselesele into small pieces and put in a container with water and allow water to boil until the water stops foaming and settles. After cooling, I give to my patients to gargle with water and not swallow to treat toothache (LM). I use leaves of the same Moselesele to stop vomiting. I grind the leaves into powder and place the powder in a container and pour cold water and stir and allow the mixture to brew for 5 minutes, then it will be ready for drinking to stop vomiting (TS). I cut the roots of *Kleinia longiflora* (Mosiama) into small pieces and boil them in a container. TS indicated that after cooling, she gives to patients to gargle with water and not swallow for *longiflora* (Mosiama) to stop vomiting (TS).

#### **4.6.4.3 Grinding into powder (*Go sila go nna Bopi*)**

Grinding into powder is another method of preparation of traditional medicine in Molatedi village. The study revealed that traditional healers in Molatedi village grind some of the medicinal plants parts and give them to their patients as powder to treat some of diseases. PSM and TS separately explained the process of grinding into powder as follows:

I grind the bark of Mosita-Tlou into powder and give the powder to the patient to eat it as dry and, thereafter, he or she can drink water to treat hiccup (PSM and TS). I grind the whole plant of Lenyetsane

plant into powder and apply the powder on the wound to treat ancestors burns (Shingles) Mollo was Badimo (SPM).

#### **4.6.4.4 Burning into Smoke (*Go fisa go filha e nna musi*)**

The fourth preparation method identified in the study was burning a part of the medicinal plant with coal and inhaling the smoke as medicine. The patient is exposed to smoke with the whole body or the patient will inhale the smoke. PSM and TS supported each other about the preparation of *Fabaceae sp* (Mosunyana) as follows:

I dry the roots of Mosunyana medicinal plant and burn into smoke, then I expose the whole body of the baby to smoke until the baby sneezes. It means the baby has inhaled the smoke to treat baby fontanel (PSM and TS).

#### **4.6.4.5 Warming and squeezing (*Gamola matute a a thuthafetseng*)**

Warming a part of the medicinal plant on coals was the fifth preparation method discovered during the study. Traditional healers in Molatedi village warm some parts of the plant to prepare them for use as traditional medicine. LM and MM explained with passion how they administer *Sansevieria aethiopica Thunb* (Mosokela tsebeng) to patients as follows:

I bake the leave of Mosokela tsebeng on fire until it is warm and then I cut the leaves and squeeze the warm juice from the leaves into the ear of a patient to treat a painful ear. LM indicated that the juice should not be too hot but just warm enough to be able to flow in the ears of a patient.

#### **4.6.5 The protection and conservation of medicinal plants**

The researcher also sought to establish how often community members of Molatedi village protect and conserve medicinal plants. Participants responded as follows:

I do not dig medicinal plants from June to September, because these are the winter months (MM willingly, with a smile explained). It is the time for plants to rest so that they can grow again in summer (SPM added with a smile). The plants are sick in September. It is called “Lwetse” in Setswana”(DM added). As traditional health practitioners, together with traditional leaders, we teach and tell others not to collect medicinal plants and export them (MM seriously added). We also do not teach foreigners (Batswantle) our medicinal plants (SPM added while laughing). I dig



medicinal plants from the forest and plant them at home so that I should not go back to the field several times to disturb the other medicinal plants (JS willingly continued to explain). Every time I dig any medicinal plant, I make sure that I partly cover the remaining roots so that it may not be choked by the sun (MJM proudly explained). The main reason is that medicinal plants are not supposed to be collected during winter months (SM confidently explained). I protect the medicinal plant by not cutting them in winter months but during summer months when they are ready for use (MM). I protect the medicinal plant every time I go to the bush to collect medicinal plants (KP). I cut a branch or dig a root and plant it at home so that I avoid disturbing the natural forest every time when I need a medicinal plant (SPM).

Participants were proud, willing and confident to share information with regard to their indigenous knowledge on the protection and conservation of medicinal plants. Participants showed a common understanding of indigenous protection and conservation of medicinal plants. Participants believed and understood the names of the months and seasons of the year plays as well as the important role in which they relate to the plants generally and with medicinal plants specifically. Thus, it was revealed that among indigenous conservation strategies, the most common themes that emerged were *restrictions on the cutting of green plants, harvesting of medicinal plants during certain seasons for example, winter season, the exclusive harvesting of the leaves of certain plant species* and also *the collection of lateral roots* from medicinal plant species, the barking, partial ring-barking, restricted time for harvesting.

The study found that the major reason for protecting and conserving medicinal plants was to make sure that they were available when needed as captured in the following excerpts:

I conserve the medicinal plant for future use by the next generation (MM)...Because they still need to be used by the next generation on different ailments (PSM). So that the plants should not be extinct (LM). I conserve the medicinal plants in winter by not collecting them so that in summer, they will be available and in a good shape to be collected (MM). For future use (JS). So that the medicinal plants may not be extinct (KP).

Two main reasons were identified for the protection and conservation of medicinal plants as follows: protection for future use; and also to avoid extinction of medicinal plant species. Furthermore, the study revealed that the elderly and those with knowledge on protection and conservation of medicinal plants, take it upon themselves that every child who grows in the village abided by the rules and regulations taught at his or her home. The study also revealed

that it is a norm in Molatedi village that if an elderly person found a young person doing something contrary to the norm, he or she must reprimand and advise the young person immediately. Furthermore, it was found that the teaching about indigenous knowledge was an ongoing informal process that took place anywhere where knowledge holders meet those without knowledge. The study also found that the Chief (*Kgosi*), community members, traditional healers and any elderly person with indigenous knowledge could use every opportunity available to teach children about taboos (*meila*) to be avoided in the Setswana culture in particular, and about medicinal plants in general. Avoiding these taboos (*meila*) could be related to how one behaves when interacting with medicinal plants in nature. Examples are all the conservation strategies mentioned above and reasons to conserve medicinal plants as explained above. PSM confidently explained the roles of elderly people and children as follows:

Children listen and take advice of elderly people such as the Chief (*Kgosi*), traditional healers and any elderly person with knowledge on how to behave towards the plants. The elderly people in the village and at homes, teach the children the taboos (*meila*) to be avoided in the Setswana culture as a Motswana child or person (LM with a serious face added). We were taught how to behave when we see medicinal plants that have been cut (MM with a smile added). Yes, also not to cut certain plants as fire wood even if the plants may be dry (JS added). True, we were even told that it is dangerous and we could not ask the type of danger because it was just emphasised that we will be in trouble with the ancestors if we go against the law. We grew up respecting the ancestors without any understating of who they are. (PSM with emphasis added). Examples are all the conservation strategies mentioned and reasons to conserve the medicinal plants as explained. Before digging medicinal plants, we report to the chief (*Kgosi*) or headman because it is his area so that we get permission to dig the medicinal plants. We do not dig without permission (LM). During the months of June, until September, we do not pick the medicinal plants (MM). I do not cut any medicinal plant that has already been cut (SM). I tell the community members about medicinal plants that must not be cut off randomly and in every season (MJM).

Participants gave information that revealed their understanding of the ways of monitoring the protection and conservation of medicinal plants. Participants were serious and willing to share the information. Furthermore, traditional healers ensured that all instructions from ancestors regarding protection and conservation of medicinal plants were executed without fail. Example

of such instructions was that they monitored that harvesting was done at the right time and season. The study revealed that knowledge holders carried the same sentiments as traditional healers and also applied similar methods of conserving medicinal plants such as teaching the children and community members how to take care of medicinal plants when they cut or dig them from the forest. During the learning cycles, KP indicated as follows:

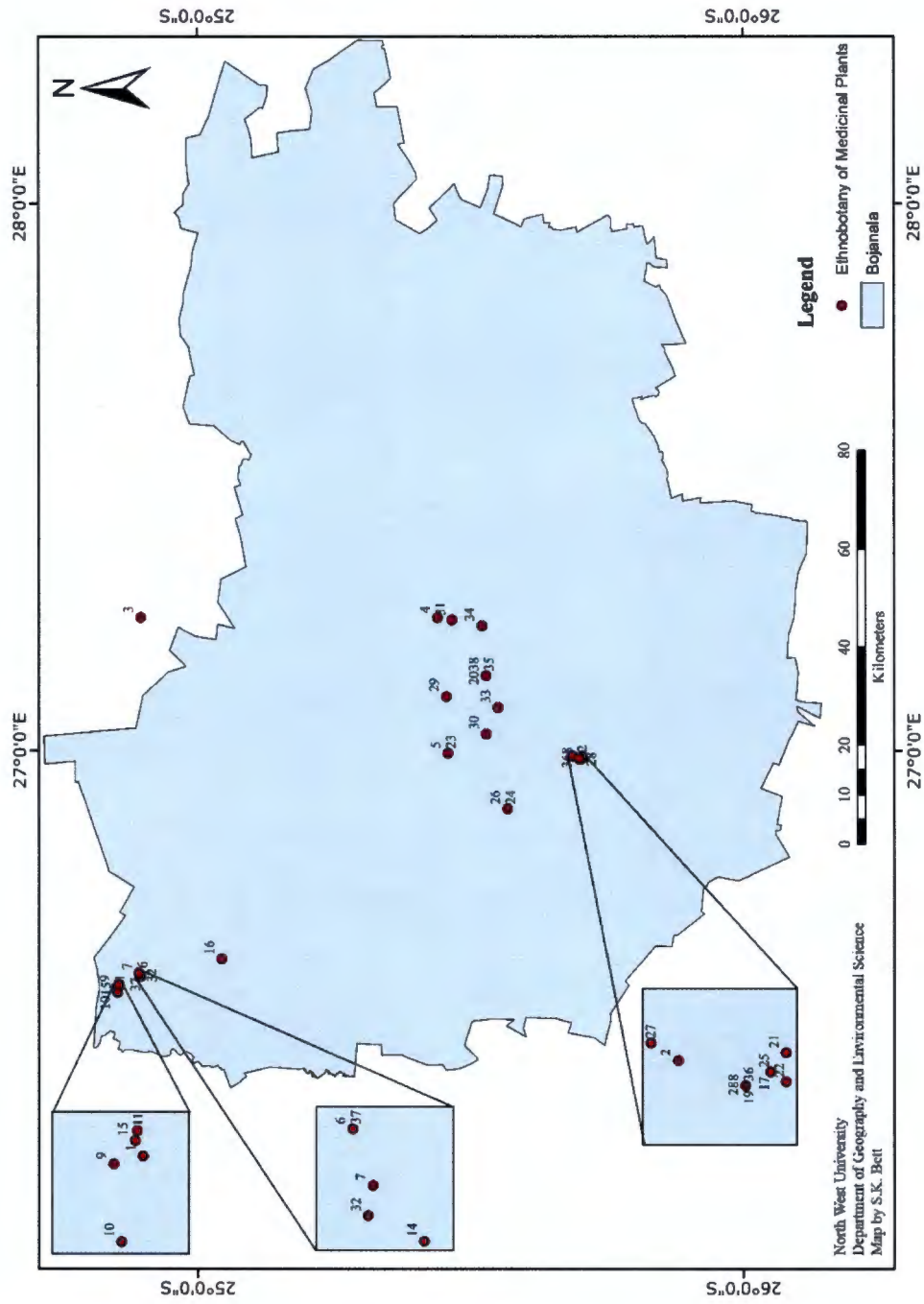
I do not dig or cut all the entire medicinal plant from the ground. I leave a portion so that it can continue growing (KP). I do not dig the medicinal plant after midday (JS). I protect small medicinal plants by covering them with small rocks (MM). I protect small medicinal plants from animals and for people not to walk on them and break them (LM). I protect and conserve the remaining roots of small plants until they grow to be ready to be cut off for use (SPM). I do not dig medicinal plants that have been freshly dug (MJM). I do not dig the whole plant without leaving any roots (SM).

#### 4.6.6 Distribution of medicinal plants within the study area

Figure 4.17 shows the distribution of medicinal plants in the study area. Most of the medicinal plant species are clustered in one area such that they are not visible in the map. The clusters that are visible on the map are medicinal plants (1) *Elaeodron transvaalense*, (9) *Papea capensis*, (10) *Paltophorum africanum*, (11) *Cysphostemma*, and (15) *Mundulea sericea* which are clustered in one area of a red sandy soil at the site called Ntsweng in Molatedi village. The reason for these plants to be in this area might be that they thrive well in the red sandy soil compared to a black soil. However the bare patches within the area were mostly covered by solid big and small smooth rocks.

This is the reason why the area is called (*Ntsweng*) meaning smooth solid rocks (granites). Therefore one may also speculate that the topography is due to natural disaster which contributed to the distribution of the plant species in this part of the location of the Heritage Park. Also closer to the same cluster were other cluster of medicinal plants (6) *Croton gratissimus*, (7) *Tragia dioica*, (14) *Sansevieria aethiopica*, (32) *Aloe marlothii*, (37) which were also influenced by the same geographical forces and eventually the vegetation clustered in one area and the other areas were covered with big and small smooth solid rocks (granites). The other medicinal plants (2) *Dychrostachys cinerea*, (8) *Asparagus suaveolens*, (17) *Lycium*, (19) *Lippia scaberina*, (21) *cf Pentarrhinum insipidum*, (22) *cf Lantana sp*, (25) *Asparagus suaveolens*, (27) *Ziziphu cf zeyheriana* and (28) *Kohautia sp* were clustered at the farm site where the habitat is of soft black clay soil. This area is characterised by bare patches of lands

where the farmers have made kraals for their animals. There are also scattered residential areas where the farmers have build their small farm houses. The distribution of medicinal plants and other plants in this area might be due to human and animals disturbance. The species might have failed to disperse to other areas and therefore concentrated in one area. This area is also used by the farmers to graze their animals and therefore degradation might have happened due to overgrazing. The area is also characterised by black soft clay soil. That is good for crop farming and might also be that some of the medicinal plant coulf not grow and survive in the black clay soil area.. Some of the farmers practise crops and animal farming. In this areas there is much human and animal activities taking place



**Figure 4.17:** Map showing the distribution of medicinal plants identified in the study area



Figure 4.18 shows the distribution of medicinal plants in the study area. Most medicinal plant species are clustered in one area such that they are not visible in the map. Clusters that are visible on the map are (1) *Elaeodron transvaalense*, (9) *Papea capensis*, (10) *Paltophorum africanum*, (11) *Cysphostemma* and (15) *Mundulea sericea*, which are clustered in one area of a red sandy soil at a site called Ntsweng in Molatedi village. However, the bare patches within the area were mostly covered by solid big and small smooth rocks. This is the reason why the area is called *Ntsweng* (meaning solid smooth rocks). Thus, it could be concluded that the topography is due to natural disasters that have contributed to the distribution of the plant species in this part of the Heritage Park. Also closer to the same cluster, were other clusters of the following medicinal plants: (6) *Croton gratissimus*; (7) *Tragia dioica*; (14) *Sansevieria aethiopica*; and (32) *Aloe marlothii* (37), which were also influenced by the same geographical forces and eventually the vegetation clustered in one area while other areas were covered with big and small solid rocks.

Other medicinal plants (2) *Dychrostachys cinerea*, (8) *Asparagus suaveolens*, (17) *Lycium*, (19) *Lippia scaberina*, (21) *cf Pentarrhinum insipidum*, (22) *cf Lantana sp*, (25) *Asparagus suaveolens*, (27) *Ziziphu cf. zeyheriana* and (28) *Kohautia sp* were clustered at the farm site where the habitat was of soft black clay soil. This area is characterised by bare patches of lands where farmers have made kraals for their animals. There are also scattered residential areas where farmers have built their small farm houses. The distribution of medicinal plants and other plants in this area could be due to human and animal disturbance. The species might have failed to disperse to other areas and, therefore, concentrated in one area. This area is also used by farmers to graze their animals and, therefore, degradation might have happened due to overgrazing. The area is also characterised by black soft soil. This is good for crop farming. Some farmers practise crops and animal farming. In these areas, there is much human and animal activities taking place.

#### **4.6.7 Indigenous strategies used by the Molatedi community to conserve medicinal plants**

The study identified nine (9) indigenous conservation strategies that the community of Molatedi use to conserve medicinal plants. 1. Restricting the harvesting seasons (*Mariga*) 2. Restricting the harvesting time during the day (*Sethoboloko*), Partial harvesting which are: 3 Partial cutting of leaves (*Maremo*), 4. Partial cutting of barks (*Phalola*), 5. Partial digging (*Maepo*), 6. Stone protection (go tshegola pheko), 7. Conservation through cultivation ( go jala setlare sa kwa nageng mo tshingwaneng fa gae), 8. Dried plants in bottles storage (*Go omisa le go boloka mo*

*mabotlolong*), 9. Ancestral /Spiritual beliefs (*Di tumelo tsa se mowa*). Each of these strategies will be explained as follows:

#### **4.6.7.1 Restricting the harvesting seasons (*Mariga*)**

Traditional healers in Molatedi village harvest medicinal plants during certain months of the year only. These were periods which harvesting of medicinal plants were prohibited within the Batswana culture (who are residing in Molatedi village located in the Heritage Park). Participants readily and with excitement, explained the reasons why they do not use particular months to harvest medicinal plants. It was interesting to discover that those were the months actually when plant species were still fertile. Winter months, which according to (PSM), run from June until September, are the months prohibited by ancestors from harvesting medicinal plants because the plants are dead. It is interesting to know that September in Setswana is called *Lwetse*, which means sickness. *Lwetse*, according to MM, was given to this month from time in memorial (*go tswa ga Lowe*) to explain that this is the month when plants “medicinal plants” are sick and must not be used to prepare traditional medicine. According to MM, traditional healers must obey and follow instructions in order to avoid a situation of lack of medicinal plants when required. MM further suggested that traditional healers should harvest enough medicinal plants during summer and store them for the winter season. Participants KP and JS agreed with other participants and emphasised that the elders and ancestors taught them that from June to September, plants are dark and dead (*di fifetse ebile di sule ka jalo ga di epiwe*) and, therefore, cannot be harvested. Participants had similar views regarding the restricted harvesting months as captured in the following excerpts:

With confidence, SPM expressed her understanding on the restricted months of harvesting and said, “I harvest medicinal plants throughout the year except from June until September, because in September, the plants are dead and cannot heal any sickness. This view was supported by MM who also expressed the same sentiments and further gave meaning to September month as follows: This is the reason why September is called *Lwetse* (*sickness*), it means the plants are sick in September and cannot be used to treat diseases. They were both supported by LM who brought in the ancestral belief, showing that what they say is based on their belief in the ancestors and also what their grandparents taught them. The month of June is the beginning of winter months until September when the plants are said to be sick. We were, therefore, advised by ancestors not to harvest medicinal plants during these months. That is why we harvest enough medicinal plants during summer months and store them to be used also in winter months LM.

SPM added with excitement and charisma “Yes the ancestors and our elders said during these season of the four months from June to September, the plants are dark and dead (*di fifetse ebile di sule, ga di epiwe*). SPM and JS also gave their own contribution towards the discussion and said: “This time, the plants are dull and, therefore, harvesting medicinal plants is prohibited” (SM). Those were the winter months, which were June, July, August and September.

#### **4.6.7.2 Restricting the harvesting time during the day (*Sethoboloko*)**

There are restricted timeframes that ancestors do not allow the harvesting of medicinal plants. Participants, in one voice, indicated that ancestors allowed them to harvest medicinal plants in the morning until twelve o’clock (midday). PSM exclaimed that they must be out of the forest before twelve o’ clock (midday) and was supported by MM and JS. Twelve o’clock is the time for ancestors (exclaimed KP), and therefore, we must be out of the forest. MJM explained that they were able to measure the time by using their shadows (Figure 4.18). Midday, according to the traditional healers of Molatedi village, is when one can no longer see his/her shadow. The study revealed that Molatedi traditional healers use the shadow to measure the time of the day.

According to the traditional healers, when one does not see his or her shadow during the day, it is an indication that his or her shadow has gone within the body. Midday is determined by using the shadow instead of using the clock. Thus, it is of paramount importance for traditional healers to keep observing the shadow as they collect medicinal plants. This is also very easy to observe because the shadow plays an important role when harvesting medicinal plants. It is another way of giving medicinal plants a chance to breathe when it is hot, especially on a hot summer day, which is automatically an indigenous conservation method observed to respect the ancestors as captured in the excerpts below:

I do not dig all the entire medicinal plant from the ground (PSM). I leave a portion so that it can continue growing (PSM). I do not dig the medicinal plant after midday (LM). My shadow should not fall onto the medicinal plants that I am digging, because after digging, my shadow remains in the hole and it can be used against me by naughty people (PSM). We take care of the shadow during harvesting of medicinal plants because it tells us the time to stop and leave the forest, which is twelve midday (JS). Ancestors do not allow anybody to harvest medicinal plants during midday, because it is time for them to take care of the forest (LM). We respect the ancestors,

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therefore, we do not do anything contrary to what they say (PSM). If we disrespect ancestors and continue to look for medicinal plants, you will not see them, because ancestors will hide all medicinal plants even when you look for them from the place you are familiar with, you will not see them (AM).

SPM indicated that another time for harvesting medicinal plants was in the morning. SPM further added that the morning is referred to as the start time to harvest medicinal plants after sunrise. Speaking as an authority in the area of harvesting medicinal plant, JS indicated that the acceptable morning of traditional healers in Molatedi village was between eight and nine o'clock. Other participants agreed with her. SPM indicated that between eight and nine in the morning, until twelve midday, there were three hours to do enough harvesting. MM explained, while demonstrating by the shadows of JS (Figure 3.18) that as long as one saw the shadow when harvesting medicinal plants, it was an indication that one was still on time. SPM further explained that when the shadow became small, it was an indication that it was late and time to walk out of the forest because it was soon going to be midday. The biological significance of this important practice is that whilst not harvesting the medicinal plants during midday. The plants are conserved and protected from been cut off when is sunny and transpiration rate is high during the hot summer day. KP further explained that ancestors also allowed the harvesting of medicinal plants in the afternoon (from three until five o'clock, before darkness). JS added that ancestors did not allow the harvesting of medicinal plants at midday. DM also added that midday was time for ancestors to move in the forest and they did not want anyone harvesting medicinal plants during that time of the day. LM, in agreement with MM, indicated that ancestors were taking care of the forest from midday. MM further explained that this was an ancestral /spiritual belief (*Meila*) that traditional healers should abide by and, as a result, it was an indigenous way of conserving medicinal plants as plants were given a chance to rest during this time of the day.

The study also revealed that the shadow of a person who is harvesting medicinal plants has an effect on the medicinal plant and also on the harvester. MJM explained that when harvesting medicinal plants, one should make sure that the shadow is not cast over the plant that is being harvested, because it obfuscates, obscures and overshadows the medicinal power of the plant in question. Thus, the medicinal plant will be powerless and would not perform the healing function. MJM further explained that if the medicinal plant is harvested over a shadow, the shadow remains in the hole after harvesting, and the harvester would become vulnerable to those in competition and rival to them because the shadow can be harvested from inside the

hole and be used against them. To this end, precautionary measures should always be observed and upheld to ensure that the shadow is never overcast to the plant being harvested as captured in the excerpts below:

Harvesting of medicinal plants must happen early in the morning (SPM). When you can still see your shadow, in the morning, it is the best time to harvest medicinal plants (MM). When your shadow becomes small, walk out of the forest because it will soon be midday as the shadow enters your body and can no longer be seen (JS). When the shadow overcasts the medicinal plants that had to be dugged, it becomes dangerous, because your shadow will remain in the hole after you left the area (MM). It is dangerous because this shadow can be used against you by naughty people who are witches (LM). The shadow can be seen in the morning before midday and in the afternoon after midday (JS). This is how we check the correct time to harvest medicinal plants (MM).



**Figure 4.18: A human shadow indicating the correct time for harvesting medicinal plants.**

#### **4.6.7.3 Partial harvesting of parts of the medicinal plant (*Go epa o sadisa*)**

The study revealed three (3) partial harvesting conservation strategies practiced in Molatedi village as follows:

##### **4.6.7.3.1 Partial cutting of leaves (*Maremo*)**



TS provided an explanation for *maremo*, which means partial cutting of branches and or leaves of medicinal plants (Figure 4.19). MM demonstrated by showing the leaves of *aloe zebrine* (Mabala mantsi) (Figure 4.19), to show the signs of recent cuts. MM further explained that when a traditional healer notices a medicinal plant that has been partially cut, he or she will pass the plant to look for another one. PSM laughed as she explained that such plants have lost the healing powers to the first person who cut the plant, and therefore, could not be used by another traditional healer again. This belief allows the plant not to be abused but to heal during the process and sustained for future use. Participants showed understanding of the conservation strategy as captured in the excerpt by TS as follow:

The plant shows the signs of (*maremo*), which means partial cutting of branches and or leaves of medicinal plants and, therefore, cannot be harvested until the leaves grow. She was supported by MM who indicated that the leaves of *aloe zebrine* showed the signs of recent cuts, therefore, it could be used. MM maintained that "when I notice a medicinal plant that has been partially cut, I pass it to look for another one". PSM indicated as follows: "Yes, it is best when you pass and look for another plant because such plants have lost the healing powers to the first person who cut the plant, and, thereof, cannot be used by another traditional healer again."



**Figure 4.19: *Aloe zebrine* “Mabala mantsi picture” showing a conservation strategy called partial cutting of leaves (*Maremo*)**

#### **4.6.7.3.2 Partial ring barking of the plant (*Phalola*)**

PSM indicated that when a portion of a tree bark is cut off from one side, it is known as (go phalola) partial cutting of barks to prepare traditional medicine (Figure 4.19). LM added by explaining that the partial cutting must be done on the side facing the sun (eastern side). AM further explained that if all the barks have been removed on the eastern side of the tree trunk,

then the tree will be left undisturbed until the tree recovers. TS concluded by indicating that the process of allowing the tree trunk to recover undisturbed also gave the plant the opportunity to grow undisturbed. This is how the Batswana people of Molatedi conserve medicinal plants as captured in the excerpts below:

A portion of a tree trunk is cut off (*phalola*) to be used to prepare traditional medicine (PSM). The partial cutting must be done on the side facing the sun (eastern side) (LM). If all the barks have been removed on the eastern side of the tree trunk, the tree will be left undisturbed until it recovers (AM). The tree trunk is allowed to recover undisturbed and this will also give the plant the opportunity to grow undisturbed (TS).



**Figure 4.20: Partial barking (*Phalola*) of *Asparagus suaveolens* Burch [1] (Motswere) as a conservation strategy**

#### **4.6.7.3.3 Partial digging of the medicinal plant (*Maepo*).**

LM indicated that when traditional healers notice that digging has occurred around a particular plant (Figure 4.20), they do not dig but rather go to look for another medicinal plant of its kind. The reason is the same as above (that such plant has already lost the healing powers to the first digger, MM). This belief system serves also as a conservation strategy as it allows a plant time to recover without disturbance. The traditional healer (PSM) explained further that when a plant has been cut, it is regarded as wounded, and needs time to heal. The study revealed that



traditional healers in Molatedi village regard medicinal plants as living organisms, thus, they respect them as much as they respect human beings. AM also maintained that when a plant is left to heal, it is protected from extinction.



**Figure 4.21: Partial digging (*Maepo*) of *Artemisia tridentata* (*Morothothobe*) as a conservation strategy**

#### **4.6.7.4 Stone protection of small medicinal plants (*Go tshegola pheko*)**

Traditional healers and knowledge holders in Molatedi village indicated that they take care of big and small (shrubs) medicinal plants equally. In as much as they protect big trees by not cutting the parts randomly without taking precautionary measures, they do the same with small shrubs. According to PSM, the indigenous method of conservation called *go tshegola pheko* (stone protection of small medicinal plants) (Figure 4.21), is mostly used to protect and conserve small plants (shrubs) that have lost their leaves (*tse dikgonosetseng*) from external factors such as animals and humans.

MM further explained the function of stones that are placed around shrubs that have lost their branches and leaves. JS added with excitement and in agreement with PSM that plants that have lost their branches (*tse di kgonosetseng*), needed to be protected from animals and human beings who may walk on them and destroy them completely. The stone protection method

serves as indicators (*go lepa/go kaa*) for traditional healers to be able to locate the shrub in future when it has grown leaves and branches. As often as the traditional healers goes to the forest to harvest medicinal plants, they check those shrubs that have been protected by stones. Once the shrub shows a branch and leaves protrusion through the stone, they remove the stones to allow the plant freedom to grow. This also indicates the relationship that exists between plants and traditional healers. Participants also demonstrated an understanding of what they do when they protect the shrubs using stones. Each participant demonstrated the responsibility and commitment they have towards the plants and in particular, medicinal plants. JS indicated that he does not harvest parts of a shrub and left without taking the responsibility of protecting the shrub that has now lost its shoots as indicated in the excerpt below:

I always protect small plants with stones after cutting its branches and leaves to protect them from animals and human beings who may walk on them and destroy them completely (KP). She further elaborated and said: “The stones serve as indicators for future identification of the same shrub (*go lepa kgotsa go kaa*), PSM indicated as follows: “We protect small plants without branches and leaves (*tse di kgonosetseng*)”. MM agreed with P1 and said: “Yes, it is important to protect small plants without branches (*tse di kgonosetseng*) with stones because as soon as the shoots develop, we remove the stones to allow the shrub to grow undisturbed.”



**Figure 4.22: Stone protection (*go tshegola pheko*) of small medicinal shrubs as an indigenous conservation strategy (the arrow pointing at a small medicinal shrub)**

#### **4.6.7.5 Conservation through cultivation (*go ntsha setlhare kwa nageng o se jale mo tshingwaneng fa gae*)**



Conservation through cultivation is a conservation strategy that was identified in the study during a discussion in the field about the medicinal plant called *Kleinia Longiflora* (mosiama). PSM explained that *Kleinia Longiflora* (mosiama) could be taken from the field and planted at home (garden) since it is often used by traditional healers to wash their hand when they come from funerals before they enter their traditional pharmacy (ndombo). PSM invited the researcher to her home to see where she planted Mosiama in a home garden (Figure 4.22). LM added that the medicinal plant could be harvested by roots from the field and planted in a home garden. AM emphasised that this process should be done during the rainy season because enough rain will give the medicinal plant the opportunity to grow. TS added by maintaining that “If the plant can be harvested in the dry season, it will never survive in home gardens. MM also added by giving the advantages of taking the medicinal plant from the field and planting it in a home garden in order to avoid going to the field repeatedly to collect the same medicinal plant and also to give the plant species in the forest, an opportunity to grow without disturbance by humans.



**Figure 4.23: Cultivation of *Kleinia longiflora* (Mosiama) within a home backyard garden as a conservation strategy (*go ntsha setlhare kwa nageng o se jale mo tshingwaneng fa gae*)**

#### **4.6.7.6 Preservation through storage of dried medicinal plant parts (*Go boloka dikarolo tse di omisitweng*)**

The study revealed that in the homes of traditional healers, there were traditional chemists/pharmacies (*Ndombo*), where they stored traditional medicines. As the discussion



continued in one of the homes of a traditional healer, PSM explained that different parts of medicinal plants were dried and stored either as ground powder or just dry parts in labelled plastic packages or bottles for future use (Figure 4.23). LM emphasised that the parts of medicinal plants were dried before storage to avoid moulding. MM also added that as traditional healers, they must always have medicinal plants in store for their consultations. He further explained that during the harvesting period, they harvest enough medicinal plants and store them for future use, especially during the winter seasons when they are not allowed to harvest. PSM explained that during the harvesting season, many plants are wounded and, therefore, during winter, they heal. Thus, they must be given the chance and space to heal. TS further maintained that as traditional healers, they also provided plants in the field with an opportunity to grow without disturbance. LM emphasised that during winter, most of the plants become dead and are invisible.



**Figure 4.24: Dried parts of medicinal plants stored in different plastics, bottles, plastic containers and also hanging in the open in a traditional pharmacy (*Go boloka tse di omisitweng*)**

#### **4.6.7.7 Obtaining permission from ancestors before entering the forest (*Go bona tetla ya badimo pele o ka tsena ka sekgwa*)**

The study revealed that traditional healers in Molatedi village believe and adhere to ancestral instructions without fail. Furthermore, the study revealed that the medicinal practices of participants were anchored on ancestral and spiritual belief systems. The study also revealed that participants' ancestral belief system has a positive impact on the conservation of medicinal plants. SM indicated that all activities of harvesting medicinal plants in the field were governed by their ancestors. This is a clear indication that ancestors play a role in the conservation of medicinal plants in Molatedi village. PSM and MM emphasised that is important to consider

the instruction of ancestors when harvesting medicinal plants. MJM maintained “You cannot avoid the instruction of ancestors because you will not succeed in what you want to do until you acknowledge them and follow their instructions.” JS added, “Yes, for example, if you ignore the harvesting time and go harvesting at midday (*sethoboloko*), to collect medicinal plants, you will not see any medicinal plant because the ancestors will hide them from you.” LM explained that the ancestors will hide the medicinal plants from any person who decides to enter the forest at midday to harvest medicinal plants without first verbally requesting for permission from the ancestors and also giving a silver coin money (*sekgantsho*). PSM indicated that midday is the time for ancestors to walk in the forest, thus, no one is expected to be in the forest, especially with the aim of harvesting medicinal plants.

During the discussions, all traditional healers and knowledge holders indicated that they did not do anything contrary to the instructions of ancestors. KP emphasised that ancestors were the main source of their knowledge and they gave them all the respect as captured in the excerpts below:

If I arrive late at the forest and I am under pressure to harvest a medicinal plant, I must first verbally ask permission from the ancestors (PSM). Interjecting, PSM (with a serious face) maintained “Yes, we must give “*Sekgantsho*” to ask permission” (KP). “*Sekgantsho* is a silver coin that must be given in order to brighten the medicinal plants”. (PSM) “*Sekgantsho*” is thrown on the ground in the forest before one can enter to harvest medicinal plants. (PSM). JS indicated as follows: “Yes, once “*sekgantsho*” is paid, you are free to harvest the medicinal plant because you have respected the ancestors”.

It was further revealed that the participants respect traditional protocols such that they could not go to the field and harvest medicinal plants without asking for permission from the tribal authorities (who are the chief and the traditional administration council). Participants (traditional healers) indicated that they believe and in the knowledge and understand that what they have and know about African traditional medicine is from their ancestors. The study also revealed that traditional healers in Molatedi communicate with the ancestors in different ways, including speaking out, dreams and visions. PSM indicated that if a traditional healer is under pressure to harvest medicinal plants during the restricted hours, he or she will have to give to the ancestors, a silver coin (*Sekgantsho*). PSM further explained that *Sekgantsho* is administered while standing outside the forest and the silver coin (*Sekgantsho*) thrown on the

ground in the forest as a gift to the ancestors while verbally asking for permission to enter the field and harvest medicinal plants. Once the *sekgantsho* process is done, LM<sup>1</sup> maintained that as a traditional healer, one believes that the ancestors heard you and have accepted the gift of a silver coin (*Sekgantsho*), therefore, one can walk in confidently with no fear in order to harvest medicinal plants.

During meals, the researcher continued to ask the participants some thought-provoking questions. The traditional healers were very comfortable and provided answers to all the questions asked. One of the questions from the researcher was about the process of becoming a traditional healer. The response below is an excerpt from participants:

I became a traditional healer after a long sickness that landed me in the hospital. I was admitted and the doctors at the hospital could not diagnose my illness. One day, as I was still at the hospital, I had a dream. In my dream, I was talking to my ancestor. I did not know the person I was talking to. At that time, my body was painful. The ancestors said I will be discharged the next day and I should go to my grandmother's house. The next day, I was discharged and I went straight to my grandmother's house. I told my grandmother my dream and she understood and took me to a traditional healers' school. I was taught how to become a traditional healer and my body was healed. I had to continue for a period of a year at the traditional school, since I could not proceed with my high school. After I completed from the traditional school, I could no longer go back to school because of traditional healing work that demanded more of my time.

According to the participant above, it is very clear that becoming a traditional healer was a dynamic and great experience. It is a process that involves the ancestors, going to a traditional healing school and or also being mysteriously sick such that it becomes impossible to be diagnosed. The story shared by the participant above, is the experience of most of traditional healers before they fully accept the calling of becoming traditional healers.

#### **4.7 Discussion**

Traditional healers and knowledge holders in African countries follow the same methods with some slight difference when they prepare traditional medicines. Parts of the medicinal plants are either boiled or brewed and are mostly used for the treatment of similar diseases such as babies' diseases, men, women, blood-related diseases or general illnesses. An example is about

Shai-Mahoko (1996) who discovered the indigenous healers in the North West Province, who are able to treat baby's diseases such as *tlhogwana*, *ditantanyane*, *measles*, *whooping cough* and *kwashiorkor*.

Traditional healers have particular medicinal plants that they mostly use, especially medicinal plants from the same family. In most African countries, the family that seems to be common and also with majority of medicinal plants used for traditional medicine is the Fabaceae. Medicinal plants from this family are used to prepare traditional medicines for blood-related diseases. The findings in this study are similar to those of Tugume *et al.* (2016) with regards to the Fabaceae family. There was also mutual agreement among traditional healers in the community concerning a particular medicinal plant used and also the disease it could cure. Similarly, participants of the study by Heinrich *et al.* (1998) shared the same sentiments with regard to the treatment of high blood pressure, which was also the same with participants of Molatedi village about *Aloe zebrine* (Mabalamantsi), used to treat blood-related diseases. The high utilisation of the roots by the Molatedi community could be attributed to the nutrients that are mostly stored in the roots and the belief system that is prevalent among Batswana communities about the common dialect regarding traditional medicine (*di tswa mmung/mobung*), meaning those that are found underground. When Batswana people speak among themselves about traditional medicine, they use the dialect (*di tswa mmung/mobung*) and anyone who is Motswana, will understand that this refers to traditional medicine.

The preference of roots by Molatedi community members to other plant parts could be due to high accumulation of nutrients and ingredients from the soil. This could be damaging and also make species vulnerable to overexploitation. Thus, members of Molatedi village, conscious of such vulnerability and overexploitation, developed among themselves, indigenous conservation strategies to conserve such plants as indicated in the results. Maluleka and Ngulube (2017) also noticed that traditional healers in the Limpopo Province use conservation methods such as keeping the herbs in containers for future use. Cunningham (1996) noted the relationship between the parts of the plant collected, the collection method and the impact on the harvested plant, which was also observed among members of Molatedi village. Furthermore, members of Molatedi village are also aware that small medicinal plants, such as herbs and shrubs may be faced with the danger of the entire plant being uprooted, and that would be the total destruction of the plant. Hence, they also developed a conservation strategy for such plants, not to be uprooted. Parts that are used for traditional medicine for such herbs and shrubs are mostly the leaves and branches. The remaining parts of the shoot and roots are



protected by sand and stones as a conservation strategy until new leaves develop in the next season.

Traditional healers in Molatedi village mostly use two methods to prepare traditional medicine. There are basic steps to be followed as indicated in the results and they either boil or brew the parts of the plant. They also differ slightly in the administration and preparation of traditional medicine, but mostly, they share a common ground as far as the treatment is concerned. There is also a common understanding among traditional healers and community members regarding where traditional medicine is prepared and who should prepare the traditional medicine. Preparation of traditional medicine is done on a separate fire and is prepared by one person or the traditional healer.

The results also reveal that members of Molatedi village are conscious of their environment and all medicinal plants within the area. All indigenous conservation strategies identified in the study are a clear indication that community members of Molatedi village understand the importance of conservation and also practise conservation strategies. Most studies failed to show indigenous conservation strategies used by local communities to conserve medicinal plants within their areas. Therefore, Molatedi village stands out as the village that practises indigenous conservation strategies within the environment for sustainable utilisation. The study revealed that most indigenous conservation activities are embedded within the culture of community members such that it is not an effort to practise but rather a way of life.

Mowforth and Munt (2015) emphasised the importance of sustainable environmental conservation as a component that underlines local people's need for survival. Thus, taboos were used in the Melagasy's spiritual cosmology for sustainability. Local community members have a strong believe in taboos. Likewise, community members of Molatedi also believe in taboos that are mostly connected with their ancestors. These taboos put some particular restrictions that positively impact on the conservation aspect of medicinal plants. Taboos such as refraining orders from collecting medicinal plants when one is menstruating or has had sexual intercourse, is part of the culture of the community. Restriction times and periods for harvesting medicinal plants in Molatedi village as well as the ancestral belief systems are also part of the culture of Molatedi. Therefore, no person is forced to follow these instructions because all such taboos have a positive impact on allowing medicinal plants, space to grow undisturbed.

Community members of Molatedi have belief systems that contribute to the conservation of medicinal plants. Generally, in Molatedi village, there is a believe that when one is harvesting

medicinal plants and comes across a medicinal plant that showed signs of been collected by another n'anga (traditional healer), he or she should be avoid such plant. It was believed that when a n'anga (traditional healers) used a plant that had been cut off by another traditional healer to treat a patient, the patient's disease will be transferred into that plant. Thus, when another *n'anga* (traditional healer) subsequently used the same plant to treat another patient, the disease of the previous patient would be transferred to the new patient. Because of this belief, traditional healers do not cut any medicinal plant that shows signs of having been harvested, thus an advantage for the medicinal plant to have a chance to recover from the effects of collection (Mavi and Shava, 1997). The most important part of the process of conducting an indigenous study has to do with the traditional protocols to be observed. If a researcher misses out during the process of observing traditional protocols, it might contribute negatively to the research study. There are external factors that have an impact on traditional protocols such as age. Mostly, elderly researchers may not find it difficult to follow traditional protocols while younger researchers may falter in some areas due to age. This might be a serious offence and may not sit well with traditional leaders and participants. Participants in indigenous studies are usually elderly people with low levels of education or no education at all. When a researcher is working with such participants, he or she should be careful and not behave in a condescending manner towards participants such that they may realised. As the owner of the knowledge, they deserve unlimited respect and honour for sharing their knowledge.

When participants share their knowledge, they do not follow any particular process. It is, therefore, incumbent upon the researcher to allow the information to flow without disturbance and capture as much as possible, using different tools, which will not interfere with the flow of the discussion. When participants are not intimidated, they freely share more information even that which is not part of the questionnaire. Such information becomes helpful for the researcher to realise the limitations of the study.

#### **4.7 Conclusion**

The study has shown that the TH and IKH within Molatedi village know the names of medicinal plants and have mastered their uses for medicine used to treat human diseases and ailments. Furthermore the study has shown that TH and IKH in Molatedi village have the knowledge about the conservation of medicinal plants, such that when they harvest medicinal plants, they used different indigenous conservation strategies to conserve these medicinal plants. The researcher also observed that the TH and IKH have a relation with the ancestors because they claim that their knowledge was acquired from their ancestors. The study has also shown that

the TH and IKH know different methods of preparation of medicinal plants. The researcher have established the existence of indigenous knowledge of medicinal plants within a few key stakeholders in the village, but critical to note is that, is also important to know how well the rest of the community know about these plant species. Therefore the next chapter's focus is to determine which group amongst the youth, elders and senior citizen have more ethnobotanical knowledge

## CHAPTER FIVE

# COMMUNITY ETHNOBOTANICAL KNOWLEDGE OF MEDICINAL PLANTS FOUND WITHIN THE HERITAGE PARK IN THE NORTH WEST PROVINCE

### 5.1 Introduction

In the previous chapter, it was revealed that traditional healers and knowledge holders have ethnobotanical knowledge of medicinal plants, thus it is important to understand if community members in Molatedi village have ethnobotanical knowledge of medicinal plants. Furthermore, it is important to determine in which age group within the community, where such knowledge reside. There are different methods that could be used to determine the ethnobotanical knowledge of community members, however, in this chapter, a rapid and simple method is examined in order to provide information on the Ethnobotanical Knowledge Index (EKI) of community members.

### 5.2 Review on the acquisition of ethnobotanical knowledge

According to Samar *et al.* (2015), ethnobotany is the study of how people of a particular culture and region make use of indigenous plants. It is the science which studies the relationship between a given society and its environment, in particular, the plant world (Ishtiaq *et al.* 2013). Tondo *et al.* (2015) posit that while all people of the world are investing in their environments, their decisions, and actions are mediated by culturally constructed values, beliefs and priorities.

Ethnobotanical knowledge, as defined by Raymond *et al.* (2010), is the subset of indigenous knowledge that includes knowledge and beliefs handed down through generations by cultural transmissions and which is related to human environmental interactions. Local ethnobotanical knowledge is important for health and nutrition, particularly in rural low-resource settings (Samar *et al.*, 2015). In this case, a reservoir of ethnobotanical knowledge concerning wild resources can serve as a reservoir of resilience for an entire community (Cassandra and Pieroni, 2015). Since culture is a critical determinant of human behaviour and health (Thurston and Vissandjée, 2005), the intergenerational transmission of knowledge regarding the use of available plant resources becomes important, especially in the context of culture and economic transitions assisted with globalisation, which threatens such knowledge (Sewdass, 2014).

Ethnobotanical knowledge has been linked to indigenous knowledge (IK) and can be operationally defined as the knowledge, innovation, and practices which are an integral part of



the culture, history and identity of a particular indigenous people and local communities around the world (Kefalew and Sitayehu, 2017). Kefalew and Sitayehu (2017) adopted an anthropological perspective to equate ethnobotanical knowledge to indigenous knowledge (IK) and stress how highly diverse and dynamic it is.

Researchers such as Boyd and Richerson (1985) and Cavalli-Stofa and Feldman (1981), found that the acquisition of ethnobotanical knowledge follows different forms of social learning; a form of social learning such as oblique transmission, which involves the transfer of information from one generation to another, through children copying adults who are not their parents. Another form of social learning is a vertical transmission, which involves the transfer of information from parents to children. The two forms of social learning explained above, refers to the children's acquisition of ethnobotanical knowledge. An example is that of the results of the study of Dickinson (2010) where younger participants indicated that they acquired their knowledge by watching their fathers (i.e. vertical transmission) and older relatives (oblique transmission) using medicinal plants around the home and also with their livestock.

The World Health Organisation (2015) maintains that ethnobotanical knowledge can also be accumulated or acquired through social relations. However, very little is mentioned about acquisition and accumulation thereof. In furtherance of the transmission of ethnobotanical knowledge from parent to child, Martinez-Rodriguez (2009) argues that mothers contribute more strongly towards children's ethnobotanical acquisition, regardless of their sex (this is also referred to as vertical transmission). Furthermore, the results of Martinez-Rodriguez (2009) reveal that there is a strong influence of household and age in children's learning about plants whereas, gender does not show a strong relationship with ethnobotanical knowledge acquisition among children.

Hewlett and Cavalli-Sforza (1986a), in agreement with Ohmagari and Berke (1997), support the results of Martinez-odriguez and maintain that "during the acquisition of ethnobotanical knowledge, naming is an easier and initial ability, while practical knowledge such as uses of the plants, require a higher participation and interest in order to learn". De Beer and Van Wyk (2011) also found that the acquisition of ethnobotanical knowledge of plants follow a predictable progression from young to old people. Furthermore, De Beer and Van Wyk, (2011) found that the youth and children learn names and recognise edible plants first and as they communicate about them. Sankaranarayanan *et al.* (2010) state that lack of interest on the part of the younger generation, is causing a decline in traditional knowledge. Setalaphruk and Price (2007) affirm concur with Martinez-odriguez and maintain that the acquisition of

ethnobotanical skills (knowledge use) is not always acquired at the same time as in other cases but might continue during adulthood. Participants in Dickinson's (2010) study revealed that they also learned about medicinal plants through observation of relatives. As they visited different villages, they also observed how others use similar plants and experimented with different cures. Dickinson (2010) found that participants with the most detailed ethnobotanical knowledge were older people and that knowledge was no longer passed from elders to the younger generation in the same extent as it was in the past. De Beer and Van Wyk (2011) observed that curious individuals interested in plants become observant and are able to know many species without necessarily learning their names.

The dimensions of knowledge are critical for many researchers. It is argued that local ecological knowledge, including ethnobotanical knowledge, is better understood as a complex system that might include a system of classification (Berlin, 1992). Reyes-García *et al.* (2007) also emphasise the importance of differentiating between specific domains of knowledge for comparative purposes. It is believed ethnobotanical knowledge emerges from interactions of a given cultural or society with a local biophysical environment (Warren and Rajasekaran, 1993). Brookfield and Padoch (1994) and Turner *et al.* (2000) state that is not only indigenous people or only developing countries that possess ethnobotanical knowledge. Indigenous groups also possess ethnobotanical knowledge that is developed through generations of interactions with the local environment. Barrera-Bassols and Toledo (2005) and Pieroni *et al.* (2004) also maintain that ethnobotanical knowledge has also been found among non-indigenous groups such as farmers.

Another debate that is ongoing among researchers has to do with the importance of ethnobotanical knowledge for rural people in industrialised countries (Agelet and Valle's 2001; Pieroni *et al.*, 2004). Thus, most studies that measure individual ethnobotanical knowledge have been conducted among indigenous populations (Reyes-García *et al.*, 2007). The attention has been more to the measure of ethnobotanical knowledge of indigenous peoples than to those of non-indigenous people (Reyes-García *et al.* (2007). In their study on the measuring of individual ethnobotanical knowledge, Reyes-García *et al.* (2007) found that only two studies had a mixed samples comparing the ethnobotanical knowledge of indigenous and non-indigenous peoples of the same area. Researchers have also paid less attention to other variables when selecting study samples for ethnobotanical knowledge (Reyes-García *et al.*, 2007). Previous studies (Bagossi *et al.*, 2002; Boster, 1986; Caniogo and Siebert, 1998) indicate that

ethnobotanical knowledge is distributed across age and sex groups or according to the number of years spent as a resident in the community (Guest 2002; Nyhus *et al.*, 2003).

However, there has been an increase in studies measuring individual levels of ethnobotanical knowledge. These studies differ in the concepts and methods of data collection and data analysis. These different methods and data analysis techniques used to measure ethnobotanical knowledge include the following: Some of the authors (Atran *et al.*, 2002) have used cognitive methods such as free lists to measure theoretical knowledge by asking people about their domain of interest. Other scholars such as Godoy *et al.* (1998), used the objective botanical test to measure practical knowledge, Zager and Stepp (2004) used transect surveys, Begossi (1996) used specimen identification, while Ticktin and Johns (2002) used self-reports to assess individual ethnobotanical skills. To test ethnobotanical skills, researchers asked informants to identify specimens either in the field, in voucher, in pictures or the researcher directly observed informants' abilities in using the skills.

Disease consensus by Andrade-Cetto *et al.* (2006), analyses the agreement between multiple informants who have knowledge of medicinal plants to treat one particular disease (this is not done between several diseases that are related). The interaction effect by Johns *et al.* (1990), is used to determine plants in an ethnobotanical survey with a highest medical potential. The quantitative cross-cultural system by Lewis (1998) was also designed as a system that allows for quantitative cross-cultural comparisons of the treatment of medicinal plants. The residual value by Moerman (1991) and Kapur *et al.* (1992), which came out from quantitative ethnobotany, targeted medicinal plants, using the residual value in a medical species to show how different cultures actually use rational (non-random and empirical) approaches in emphasising certain taxa for their herbal remedies, with focus on plants showing certain growth habits and ecology or even in certain active plant families.

Quantitative ethnobotany by Theilade *et al.* (2007) was used to estimate use-values for tree species found in the study area, including the free listing technique. The results of Theilade *et al.* (2007) revealed that generally, livestock owners have more knowledge on uses, measured as the number of species mentioned as useful in a given category. Poteete and Ostrom (2004) found that inferences that could be drawn from empirical analyses of individual ethnobotanical knowledge, are limited by lack of conceptual consistency and comparable data, which hinders comparability across studies. Reyes-García *et al.* (2007) focused on studies that measured ethnobotanical knowledge of lay people and not specialists.

Informant consensus, initially developed by Friedman and colleagues (1986) and Trotter and Logan (1986), later adapted by other authors (Johns, *et al.*, 1990; Phillips and Gentry, 1993b), is used to evaluate the individual's answers by comparing it with information collected from a group of local experts, not with the whole group. What is measured through this method is the degree of agreement between informant's answers, which also indicate the importance of a given use of a plant. This simply means that a plant, that is more frequently cited, shows it is more important in terms of usage than a plant that is less frequently cited. Cultural consensus analysis by Romney and colleagues (1986) does not rely on the frequency of responses but rather uses the factor analysis to weigh the responses given by informants who agree with each other more often. With cultural consensus analysis, an accurate culturally "correct" answer if the assumptions of the techniques are met, can be determined. On the other hand, cultural consensus analysis can also indicate that there is lack of consensus in a particular domain and, therefore, demonstrate a large intra-cultural variation within ethnobotanical knowledge.

The Shannon's Index and Simpson Index by Stepp (1999) and Begossi (1986) are indices which examine the richness and evenness of species as a measure of biological diversity. These indices were originally developed to quantify information but Stepp (1999) and Begossi (1986) suggested that they be used to look at ethnobotanical knowledge. Even though the suggestion is made, the method is limited because it can only allow for the analysis of local biological resources inventories, but cannot allow for the analysis of other types of knowledge that are less easily quantified such as relations between different species. Different theoretical goals of authors determine the differences in methods and concepts of measuring individual ethnobotanical knowledge (Reyes-Garci'a *et al.*, 2007). Most quantitative ethnobiology studies have interest on the importance of plants, cures, the ecosystems and animals for specific cultural groups.

Trotter (1981) was interested in home remedies and, therefore, analysed a large sample focusing on the occurrences of folk remedies in the data to determine the characteristics of the ethnopharmacological resource in use in Mexican American communities. Whereas, Ngokwey (1995) was interested in analysing the popular notions and practices concerning home remedies and pharmaceutical drugs in Feira. Heinrich *et al.* (1998) conducted a cross cultural study in which they examined the use of medicinal plants in five groups in Mexico. In this cross cultural study, Heinrich *et al.* (1998), calculated the relative importance of a given medicinal plant within a culture.



Meanwhile, Bennett and Prance (2000), in their discussion of related disease systems, derived important values of their species from the number of body systems on which medicinal plants species work and the number of pharmacological actions attributed to it. According to Carvalho and Frazão-Moreira (2011), local knowledge and local communities' participation to protected areas design, management and maintenance is important. Furthermore, Carvalho and Frazão-Moreira (2011) confirm that local knowledge provides new insights and opportunities for sustainable and multipurpose use of resources and offers contemporary strategies for preserving cultural and ecological diversity, which are the main purposes and challenges of protected areas. Carvalho and Frazão-Moreira (2011), also believe that to be successful is to make people active participants, not just integrate and validate their knowledge and expertise, because local knowledge is also an interesting tool for educational and promotional programmes.

The World Health Organisation estimates that about 70-95% of the world's population in developing countries mainly rely on plants for primary health care (WHO, 2011). Coleman (2013) maintains that throughout the world, medicinal plants have been accepted by communities as well as governments as a formal component of a health care system. About 70% of South Africans regularly use traditional medicines, which originate from medicinal plants (De Wet *et al.*, 2010). There are an interesting statistics in Kwa Zulu Natal, indicating 6 million indigenous medicine consumers and 27 million in South Africa. Families spend 4 to 6% of their annual income on indigenous medicines and services. More than 4 500 tonnes of plant materials are traded annually at the value of R62 million.

In the North West Province of South Africa (in Madikwe District), only two studies by Van der Kooi and Theobald (2006) on the use of ethnobotanical plants in pregnant women and the use of ethnoveterinary medicinal plant in cattle have been conducted so far. There is need to conduct more ethnobotanical studies in this area. From the two studies conducted so far, it is evident that such knowledge is required in the North West Province. Molatedi is one of the villages in the North West Province and communities in rural areas of the North West Province mostly depend on the natural habitat for their livelihood (and medicinal plants are a part) of such habitat). Their cultural norms, values, standards, languages, skills, beliefs and spirituality, are woven within these natural habitat. These are few instances that indicate the importance and use of traditional medicine worldwide. Thus, this is an indication that ethnobotanical knowledge of medicinal plants is of vital importance. The importance, role, use, acquisition and measure of ethnobotanical knowledge is of paramount importance for the survival of local community members.

Meragiaw *et al.* (2015) predicate the origin of ethnobotanical knowledge to the local people, with potential to redress some of the shortcomings of contemporary western knowledge. More research confirms the significant contribution of ethnobotanical knowledge in different ways as observed by Martinez-Rodriguez (2009). Conklin (1954) emphasised the role of ethnobotanical knowledge as important in enhancing human survival over generations. Balick and Cox (1997) submit that ethnobotanical knowledge has its contributions to material culture. In the area of natural resource management practice, there is consensus among different authors such as Brandt *et al.*, (2013) that traditional ethnobotanical knowledge of indigenous communities can positively influence sustainable land management (SLM) practices. Folke *et al.* (2002) endorse this view point and maintain traditional ethnobotanical knowledge (TEK) has the capacity to broaden the conceptualisation of environmental challenges as addressed by communities, thereby enhancing a socioecological system's resilience.

According to Hamilton (2005), the use of medicinal plants by local communities or groups is high and will remain high, however, such local uses of medicine are known by different terms in each community. Hamilton (2005) broadly classifies these local use of medicine into three categories as follows: (i) Traditional Systems of Medicine (TSM) (a systematic codified body of knowledge which is either in the form of pharmacopoeias or ancient scriptures); (ii) Traditional Medical Knowledge or Folk Medicine (transmitted by oral means and mostly acquired through learning by doing the approaches; and lastly (iii) Shamanistic or Spiritual Medicine (the one that has a strong religious/spiritual element and because of that, it can be practised only by highly specialised local experts called shamans).

Contrast to the TSM as alluded to by Hamilton (2005), Shankar (1999 & 2001) maintains that the folk and spiritual medicine, the legal and political recognition and support at the national and global levels has been weak. To this end, Gupta (1999) observed the erosion of the local medicinal plant knowledge systems due to lack of official and governmental support, compounded by the devaluation of folk knowledge and also by local communities and societal systems at large. Shankar (1999 & 2001), in expanding his earlier argument, observed that the distinct lack of attention for folks and spiritual systems suggests further consideration of the same in countries such as India, China and South Africa as a reliance on TSM and folk medicine is more widespread and evident.

The degree and depth of the ethnobotanical knowledge of local communities were assessed and measured in this study. The literature reveals different tools used to determine ethnobotanical knowledge. However, the tools used by different authors to determine ethnobotanical knowledge, mostly do not quantify the knowledge. Thus, the matrix method according to De beer and Van Wyk (2011) was adopted in this study because it is rapid, simple to use and is able to provide information on the Ethnobotanical Knowledge Index (EKI) of the community. The objective of the study was to explore the ethnobotanical knowledge of medicinal plants among the community of Molatedi village. The research questions asked in the study were as follows: Where does the ethnobotanical knowledge reside within the community? and Is there a difference between the levels of knowledge among the different age groups?

### **5.3 Methodology of the chapter**

A mixed method design (QUAN-qual approach) was used in conducting the study. Qualitative data was collected during the interviews using De beer and Van Wyk's (2011) matrix method. The study area and the research design were discussed and outlined in Chapter 3 of this study. Figure 5.1 shows the tribal hall in Molatedi village used to hold the one-on-one in-depth interviews.



**Figure 5.1:** Tribal Hall of Molatedi village used to hold the one-on-one interviews



**Table 5.1: Selected medicinal plant species used in the study**

No.	Vernacular name	Scientific name
1.	Madi a Phalana	<i>Kohautia</i>
2.	Mojeremane	<i>Elaeodendron transvaalense</i>
3.	More wa Tonki	<i>Sckhuhria pinnata</i>
4.	Mosita Tlou	<i>Mundulea sericea</i> (Willd) A. Chev.
5.	Mokgopa	<i>Aloe marloothi</i> A. Berger
6.	Mosokela Tsebeng	<i>Sansevieria aethiopica</i> Thunb
7.	Motlhagala	<i>Hibiscus micranthus</i> L.f. Var micranthus
8.	Seboka	<i>Tavaresia barklyi</i> (Dyer) N.E.Br
9.	Mothata	<i>Pappea capensis</i> Eckl. & Zeyh
10.	Moologa	<i>Croton gratissimus</i>
11.	Ditantanyane	<i>Crabbea acaulis</i> N.E.Br
12.	Moselesele	<i>Dichrostachys cinerea</i>
13.	Sekgalofatshe	<i>Ziziphus</i> cf. <i>zeyheriana</i> Sond.
14.	Mogaga	<i>Drimia altissima</i>
15.	Mabala mantsi	<i>Aloe zebrine</i> Bark
16.	Lesitlhwane	<i>Lycium</i> sp.
17.	Mongana	<i>Senegelia mellifera</i> (Vahl) Seigler & Ebinger subsp.
18.	Mokgalo	<i>Ziziphus mucronata</i>
19.	Mosiamo	<i>Kleinia longiflora</i>
20.	Leshoe/Lefye	cf. <i>Pentarrhinum insipidum</i> E. Mey. [1]
21.	Toroko	<i>Opuntia</i>
22.	Mohubu	<i>Cysphostemma</i> sp.
23.	Mmabatsane	<i>Tragia dioica</i> Sond.
24.	Segope	<i>Clematis</i> sp.
25.	Tlhoka matshwaro	<i>Asparagus suaveolens</i> Burch. [1]
26.	Mosetlha	<i>Peltophorum africanum</i>

### 5.3.1 Target population of the chapter

The target population consisted of community members residing in Molatedi village. According to the 2011 census of Statistic South Africa, Molatedi village has a total population of 1201 inhabitants (Stat SA, 2011). In order to determine the existence of ethnobotanical knowledge between different age categories within the community, the population was categorised into three (3) age groups as follows: 21–40 years (the youth); 41–60 years (adults); and over 60 years (senior citizens). However, an indigenous strategy was used to establish the population for the study. This was done by inviting all the community to the Tribal Hall. The Headman of the Traditional Administration Council, Mr K.K. Matlapeng, together with the Traditional Council Administrator, Mr Dirang Matlapeng, were requested by the chief of Molatedi (Kgosi BFM Matlapeng) to invite all community members to a meeting at the Tribal Hall. During the meeting, Mr K.K. Matlapeng and Mr Dirang Matlapeng explained to the



purpose of the meeting to community members. The researcher was given the opportunity to inform the community about the study and further endorsed the information by reading the information letter in Setswana (Appendix 4). Both the consent (Appendix 5) and non-disclosure agreement (Appendix 6) forms were read and members who were willing to participate in the study, were asked to remain. The remaining members of the community were separated into the three age categories as stated above.

### **5.3.2 Sample size and sampling procedure**

The sample size consisted of three age categories as determined by the target population. Within each category, individuals were randomly selected to give the following sample size: five (5) senior citizens; five (5) adults; and six (6) youth. This sample was considered to be sufficient considering the time and resources available. All the instructions were given in Setswana, as the local language to avoid loss of information (De Beer and Van Wyk, 2011).

### **5.3.3 Data collection instruments**

A simple structured questionnaire, consisting of open and closed-ended questions (Appendix 4) was used to collect data for the study. The questionnaire was written in the language of the participants. The first section of the questionnaire focused on the demographic characteristics of participants (names, age and source of knowledge). Participants responded first to the first section of the questionnaire with the assistance of the researcher before displaying their knowledge of medicinal plants (Figure 4.2). The second section sought information on whether participants (1) knew the plants displayed, (2) could name the plant, and (3) explain the uses of the plant.





**Figure 5.2:** A participant with a research assistant responding to the first section of the questionnaire

#### **5.3.4 Data collection method**

Prepared Herbarium specimens and coloured photographs of medicinal plants were displayed in the Tribal Hall of the village. Participants were each observed and examined the displays on a one-on-one encounter before responding to the questions (Figure 5.3). Data was collected using face-to-face interviews and participants were given enough time to study the displays before responding to the questions asked. During the interviews, the researcher and research assistants recorded scores of each participant on a matrix score sheet. The first question was scored 1 if the participant knew the medicinal plant or 0 if he or she did not. For the second question, a score of 2 was recorded if the participant gave the name of the plant or 0 if he or she could not. For the third question, a score of 3 was given if the participant could give at least one of the uses of the medicinal plant or 0 if he or she could not (De Beer and Van Wyk 2011).



**Figure 5.3:** Participant observing and examining a prepared herbarium voucher specimen and the photographs of medicinal plants



**Figure 5.4:** A participant responding to questions during the one-on-one interview with the researcher

### **5.3.5 Validation and reliability of the study**

To ensure that research is rigorously done, different issues are important for this phase. It is important to ensure content validity of the data collection tool. All the tools used in this study were validated using a pilot study and the researcher discovered the shortcomings of the tools and were addressed immediately. The reason to conduct the pilot study was to ensure content validity of the data collection tool. Thus, all the tools were piloted for reliability and validity with Batswana Traditional healers and Knowledge holders from Magogoe village. Magogoe village is a Batswana community in Mahikeng, far from Molatedi study area. The researcher chose to conduct the pilot study with the Batswana people of a different community because the study is about the Batswana community of Molatedi village. The objective of the pilot study was to ensure that data collectors (the researcher and research assistants) use the data collection instrument in the same way and consistently before it could be used at the actual study area (Brink *et al.*, 2006). The pilot study was done after the approval of the proposal by the NWU Research Council.

A meeting was arranged at Magogoe village between the researcher and traditional healers. At the beginning of the discussion, it was very clear that the language used in the tools was a problem to participants. This was the first information gathered during the pilot study. Permission to access the village and its traditional healers was sought and obtained. This was another important step the researcher observed. Traditional healers agreed to sign the consent form and continued with data collection. During data collection, the pilot study revealed some of the weaknesses, shortfalls and unstructured areas of the tools. This was another important part where the pilot study revealed the shortfall of the questionnaire. The tools were corrected and translated into Setswana collectively by the researcher and representatives of the Batswana people. After consultation with several Batswana people, the researcher presented the tools to subject experts for review before the actual data collection (Brink *et al.*, 2006).

### **5.3.6 Data analysis**

Quantitative data collected using a matrix method was analysed on an excel spread sheet by calculating the total scores for each participant. In order to determine each participant's ethnobotanical knowledge, Ethnobotanical Knowledge Index (EKI) and the Species Popularity Index (SPI) (range 0 to 1) were calculated according to the formulae proposed by De Beer and Van Wyk (2011) to express the knowledge of participants, and the popularity of the species.



These were calculated as follows:

$$\text{EKI} = \text{Total personal score} / \text{total person maximum possible score} \dots\dots\dots (1)$$

Where: The total person maximum possible score is the total number of plants multiplied by the maximum score for each species and

$$\text{SPI} = \text{Total species score} / \text{total species maximum possible score} \dots\dots\dots (2)$$

Where: The total species maximum possible score is the total number of participants multiplied by the maximum scores for each species.

**Table 5.2: Age groups, name code, gender and source of knowledge of participants involved in the study**

Age group	No.	Name code	Gender	Source of knowledge
Senior citizens (Over 60 years)	1.	IM	Female	Grandmother and traditional healing school
	2.	EM	Female	Grandfather and traditional healing school
	3.	NM	Female	Grandmother
	4.	MM	Female	Sister
	5.	DMR	Male	Grandfather
Adults (41-60 years)	6.	JS	Male	Father
	7.	MS	Male	Grandfather
	8.	MM	Male	Learn by himself
	9.	SM	Male	Mother
	10.	DM	Male	Father
Youth (21-40 years)	11.	JM	Male	Grandfather and traditional healing school
	12.	TS	Male	Grandfather and aunt
	13.	KP	Male	Ancestors
	14.	OR	Male	Father
	15.	LM <sup>1</sup>	Male	Mother
	16.	LM <sup>2</sup>	Male	Father

## 5.4 Results

### 5.4.1 Characteristics of participants

Table 5.2 shows the characteristics of participants, age groups, code, gender and source of ethnobotanical knowledge (EBK). The codes are the first letter from the name and surname of participants. The code was used instead of the names during the discussion in the study. The results suggest some clear gender bias inclination, as majority of participants were males. It was also noted during the first meeting with Molatedi tribal authority that the Molatedi Traditional Administration Council consisted only of males. The Traditional Administration Council is regarded as the decision-making body and also the higher body of governance in Molatedi community. This was a clear reason for dominance of male participants. The Traditional Administration Council is a body that acknowledges community members who are supposed to take part in events or activities arranged by the tribal authority. If a community member was not acknowledged as a traditional healer by the Chief and Traditional Administration Council, he or she will not be accepted as such in the village. It was indicated previously that the Traditional Council mandated one member in the committee to invite community members to the meeting. This might have influenced the attendance to be more males than females. Thus, the study showed the distribution of participants as 25% women (all in the senior citizens category) and 75% men. The categories were distributed as follows: over 60 years (senior citizens); 41-60 years (adults); and 21-40 years (youth). Majority of participants (about 50%) indicated that the origin or source of their knowledge was their fathers and grandfathers, which is also an indication of a patriacal society, from grandparents, those whose source of knowledge were grandmothers, mother and sister, constituted 25%, other sources (ancestors with 6.25%). One participant indicated that he learned by himself because he had interest in medicinal plants, whereas others attended traditional healing schools (Table 5.2).

During meals and also informally, the researcher asked participants about their source of knowledge and they were willing to share the information. LM<sup>1</sup> (Late) indicated that he received his knowledge from his mother. As the elder son, he was always with his mother when she harvested medicinal plants from the forest and when she prepared them at home. Together with the mother, they used traditional medicine whenever they had health problems before they could decide to consult western specialist. LM<sup>1</sup> revealed how he learned about many medicinal plants and how he gained interest in using them as they were yielding positive results, especially when they used them together with the mother. The researcher raised a concern about the fact that

majority of participants were males. JS responded with a smile to the concern and indicated that the reason why males dominated the sector was because of the distribution of duties in Molatedi village. JS indicated that women and girls, most of the time, remained in the house doing household chores when men and boys went to the farms for crop and cattle farming.

Thus, when the men and boys are in the farm, they also interact with nature. Grandfathers and fathers teach the boys about natural habitat, including the use of medicinal plants. As a result, boys grow with the knowledge and as they also become fathers, they transfer the knowledge to the boys. This was the major reason why more males knew about medicinal plants than females. Females who have interested also asked their fathers to teach them. Females had the opportunity to transfer their knowledge to both their boys and girls if they showed interest. JS explained the transfer of knowledge from grandparents to parents and to the children. The explanation from JS clearly showed that knowledge was acquired informally as the opportunity prevailed and also as one showed interest to learn. This process has been going on from generation to generation.

LM<sup>2</sup> also indicated that he learned more about medicinal plants from his father during field work and as they spent time on the farm. KP indicated that he received knowledge about medicinal plants from the ancestors in his dream. TS explained that his source of knowledge was his grandfather and aunt. TS indicated that every opportunity with his grandfather and aunt yielded fruits with regard to his knowledge, as he observed them using medicinal plants to prepare traditional medicine. MS also indicated that he used to accompany his grandfather to collect medicinal plants in the forest and that is how he learned about the different medicinal plants and their uses. DMR also added that he learned about medicinal plants and traditional medicine from his grandfather. All participants were free to share their experiences on how they gained indigenous knowledge (Table 5.2).



**Table 5.3: Ethnobotanical Knowledge Index (EKI) and Species Popularity Index (SPI) of medicinal plant species groups of participants (De Beer and Van Wyk 2011).**

Scientific names	Over 60years (Senior Citizens)					41-60 (Adults)						
	IM	EM	NM	MM	DMR	JS	MS	MM	SM	DM	MJM	TS
1. <i>Kohautia</i> sp	0000	0000	0000	0000	0000	0000	1236	0000	0000	0000	0000	1236
2. <i>Elaeodendron transvaalense</i>	0000	0000	0000	0000	0000	1236	0000	1236	1236	1236	0000	0000
3. <i>Sckhuhria pinnata</i>	1236	1236	1236	0000	1236	1236	1236	1236	1236	1236	1236	1200
4. <i>Mundulea sericea</i> (Willd) A. Chev.	0000	1236	1236	0000	0000	1001	0000	1236	0000	0000	0000	0000
5. <i>Aloe marloothi</i> A. Berger	1236	1236	1236	1236	1236	1236	1236	1236	0000	1236	1236	1236
6. <i>Sansevieria aethiopica</i> Thunb	1236	1236	1236	1236	1236	1001	1236	0000	1236	1236	1236	0000
7. <i>Hibiscus micranthus</i> L.f. Var micranthus	0000	0000	0000	0000	0000	1236	0000	0000	0000	0000	0000	1236
8. <i>Tavaresia barklyi</i> (Dyer) N.E.Br	0000	0000	1236	1001	1236	1001	1236	1236	1236	1236	1236	0000
9. <i>Pappea capensis</i> Eckl. & Zeyh	1203	1203	1236	0000	1034	1236	1236	1236	1236	0000	0000	0000
10. <i>Croton gratissimus</i> Burch. var gratissimus	1236	1236	0000	1236	1236	1236	1034	0000	0000	1236	0000	1236
11. <i>Crabbea acaulis</i> N.E.Br	1236	0000	1236	1001	1236	1236	1236	1236	1236	0000	1236	1236
12. <i>Dichrostachys cinerea</i>	1203	0000	1236	1001	0000	1236	1236	1236	0000	1236	1203	1236
13. <i>Ziziphus cf. zeyheriana</i> Sond.	1236	0000	1236	1001	0000	1236	1236	0000	1236	1236	1236	1236
14. <i>Drimia altissima</i>	1236	1236	1236	1236	1236	1236	1236	1236	1236	1236	1236	1236
15. <i>Aloe zebrine</i> Bark	1236	1236	1236	0000	0000	1236	1034	1236	1236	1236	0000	1236
16. <i>Lycium</i> sp	1236	1236	1236	1001	1236	1001	1236	1236	0000	1236	0000	1236
17. <i>Senegelia mellifera</i>	0000	0000	1236	1001	0000	0101	1203	1236	0000	1236	1236	1200
18. <i>Ziziphus mucronata</i>	1236	1236	1236	1236	1236	1236	1203	1236	1236	1236	1203	1236
19. <i>Kleinia longiflora</i>	1236	1236	1236	0000	1236	1236	1236	1236	1236	1236	1236	0000
20. cf. <i>Pentarrhinum insipidum</i> E. Mey. [1]	1236	1236	1236	1236	1034	1001	1236	1001	0000	1203	1203	0000
21. <i>Opuntia</i> sp	0000	1236	1236	0000	0000	1236	0000	0000	0000	1203	1203	1200
22. <i>Cysphostemma</i> sp	0000	0000	0000	0000	1034	1001	1236	0000	0000	1236	1236	0000
23. <i>Tragia dioica</i> Sond.	1236	1236	1236	1236	0000	1236	1236	1203	0000	1236	1236	0000
24. <i>Clematis</i> sp	1203	0000	0000	0000	0000	0000	1001	1236	0000	0000	0000	0000
25. <i>Asparagus suaveolens</i> Burch. [1]	1236	0000	1236	0000	1236	1001	1203	1236	1236	1236	1001	0000
26. <i>Peltophorum africanum</i>	1236	1236	1236	1236	1236	1236	0000	1236	0000	1236	1236	1236
<b>EKI</b>	<b>0.60</b>	<b>0.50</b>	<b>0.76</b>	<b>0.40</b>	<b>0.50</b>	<b>0.66</b>	<b>0.70</b>	<b>0.69</b>	<b>0.50</b>	<b>0.70</b>	<b>0.50</b>	<b>0.50</b>
<b>Average EKI</b>			<b>0.55</b>					<b>0.65</b>				

#### 5.4.2 Species Popularity Index (SPI) of medicinal plants among the different age groups of participants

The results obtained after data analysis for ethnobotanical knowledge index (EKI) and species popularity index (SPI) are presented in Table 5.3. All twenty six (26) medicinal plant species were listed with their Species Popularity Indexes (SPI) and all sixteen (16) participants were listed with their Ethnobotanical Knowledge Indexes (EKI) (Table 5.3). The study revealed that the most popular and well known medicinal plants with the highest SPI values between 0.65 and 1 were: *Drimia sp altissima* (Mogaga) (SPI = 1); *Ziziphus mucronata* (Mokgalo) (SPI = 0.95); *Aloe marloothi* A. Berger (Mokgopa) (SPI = 0.93); *Peltophorum africanum* (Mosetlha) (SPI = 0.87); *Sckhuhria pinnata* (More wa Tonki) (SPI = 0.84); *Sansevieria aethiopica* Thunb (Mosokela Tsebeng) (SPI = 0.82); *Crabbea acaulis* N.E.Br. (Ditantanyane) (SPI = 0.82), *Kleinia longiflora* Mosiama (SPI = 0.81); *Aloe zebrine* Bark (Mabala mantis) (SPI = 0.72); *Tragia dioica* Sond. Mmabatsane (SPI = 0.71); *Dichrostachys cinerea* (Moselesele) (SPI = 0.69); and *Croton gratissimus* (Moologa) (SPI = 0.66) (Table 5.3).

The results of *Kohautia* (Madi a Phalana), *Hibiscus micranthus* L.f. var *micranthus* (Motlhagala), *Cysphostemma* sp. (Mohubu) and *Elaeodendron transvaalense* (Majeremane) scores show that all senior citizens did not know about these plants. *Kohautia* was reported in the previous Chapter as a medicinal plant used to treat sexual problems encountered by men and women (i.e. to assist men to be stronger and sexually active as well as cleansing blood for women to fall pregnant; treat barrenness) (Table 5.3). Interestingly, the same medicinal plant species (*Kohautia*, Madi a Phalana) was known by only two (2) young males and one (1) adult male participant (Table 5.3).

This could be due to the fact that the youth and adults are interested in this medicinal plant because they are still sexually active. Whereas, *Elaeodendron transvaalense* (Majeremane) was also reported in Chapter 3 as a medicinal plant used to cleanse the blood (Table 5.3). Cleansing of the blood is also related to the same use as *Kohautia*. *Drimia altissima* (Mogaga) (SPI of 1) was also common to all participants. This medicinal plant was familiar to all members of the village (from children to adults because of its use). The plant has been reported to be used for discipline, cleansing of the village from bad spirits and also for the removal of bad luck from human beings.

The dual role played by Mogaga could be the reason for its popularity. Participants maintained the plant is used to discipline on someone who might have committed a crime in the village, at the same time, it takes away bad luck from the person. After using the plant to discipline a person, he or she could be reported to have found a job (Table 5.3). Other medicinal plants common to majority of participants were: *Ziziphus mucronata* (Mokgalo) (SPI = 0.95) (used to treat boils); and *Aloe marlothii* A. Berger (Mokgopa) (SPI = 0.93) (used to treat high blood pressure) (Table 5.3). The popularity of these two medicinal plants could be attributed to its use in treating common diseases in the village such as high blood pressure and boils (Table 5.3).

**Table 5.4: Plant species categorised according to their levels of species popularity index (SPI)**

<b>High</b> ≥ 0.71	<p><i>Drimia altissima</i> (Mogaga) (1), <i>Ziziphus mucronata</i> (Mokgalo) (0.95), <i>Aloe marlothii</i> A. Berger (Mokgopa) (0.93), <i>Mundulea sericea</i> (Willd) A. Chev. “Mosita Tlou” (0.87), <i>Eltophorum africanum</i> (Mosetha) (0.87), <i>Schkuhria pinnata</i> (More wa Tonki) (0.84), <i>Sansevieria aethiopica</i> Thunb. (Mosokela tsebeng) (0.82), <i>Kleinia longiflora</i> (Mosiama) (0.81), <i>Crabbea acauli</i> N.E.Br (Ditantanyane) (0.82), <i>Aloe zebrine</i> (Mabala mantisi) (0.72) <i>Tragiadioica</i> sp. Sond. (Mmabatsane) (0.71).</p>
<b>Medium</b> 0.5-0.71	<p><i>Dichrostachys cinerea</i> “Moselesele” (0.69), <i>Croton gratissimus</i> Burch. var <i>gratissimus</i> (Moologa) (0.66), <i>Ziziphus</i> cf. <i>zeyheriana</i> Sond. (Sekgalofatshe) (0.63), <i>Tavaresia barklyi</i> (Seboka) (0.64), <i>Lycium</i> sp (Lesithwane) (0.61), <i>Asparagus suaveolens</i> Burch. [1] (Tlhoka matshwaro) (0.55), <i>Pappea capensis</i> Eckl. &amp; Zeyh (Mothata) (0.54), cf. <i>Pentarrhinum insipidum</i> E. Mey. [1] “Lefye” (0.51)</p>
<b>Low</b> ≤ 0.5	<p><i>Senegelia mellifera</i> (Vahl) Seigler &amp; Ebinger subsp. <i>Detinens</i> (Burch) Kyal. &amp; Bo (Mongana) (0.5), <i>Opuntia</i> (Toroko) (0.44), <i>Elaeodendron transvaalense</i> Mojeremane (0.37), <i>Cysphostemma</i> sp (Mohubu) (0.23), <i>Kohautia</i> sp (Madi a Phalana) (0.18), <i>Clematis</i> sp (Segope) (0.16) and <i>Hibiscus micranthus</i> L.f. var <i>micranthus</i> (Mothagala) (0.13)</p>



The SPI of a medicinal plant indicates the popularity of the plant within a particular community. The results revealed that medicinal plants in Molatedi village, with the highest SPI ( $\geq 0.71$ ), are the most popular, followed by those with medium SPI (0.5 - 0.71) and the last category with the lowest SPI ( $\leq 0.5$ ) (Table 5.4). These medicinal plants could be regarded as popular because they are used most often, or they are known in the village to cure particular diseases (especially those are prevalent in the village). Thus, the popularity of medicinal plants could be due to different reasons. The ethnobotanical knowledge in the community regarding the medicinal plant also places the plant in either of the categories.

Out of the twenty-six (26) medicinal plants used in this study, about 42% were found to have a high SPI, 31% were found to be in the medium SPI category while 27% were in the low SPI category (Table 5.4). These categories are a clear indication that majority of medicinal plants are found in the high SPI category. This is also a clear indication that in Molatedi village, community members have ethnobotanical knowledge of medicinal plants, however, they often utilise a particular category of medicinal plant for different reasons such as the prevalence of diseases, which are cured by such medicinal plants. Medicinal plants in the medium and lowest SPI categories could be special medicinal plants known by few specialists in the community. These medicinal plants need to be explored and exposed to other members of the community for maximum utilisation. The twenty-six (26) recorded vernacular names is also an indication that scientific knowledge of Molatedi community members with regard to ethnobotany is incomplete and that each ethnobotanical study of this type could make substantial contributions towards a more complete synthesis of what is believed to be the most ancient of human culture.

#### **5.4.3 Ethnobotanical Knowledge Index (EKI) of medicinal plant species among different age groups**

The results revealed that the EKI of all participants ranged from 0.50 to 0.76, with the exception of the lowest EKI (0.40) for MM (senior citizens) and LM<sup>(U)</sup> (the youth). The highest EKI (0.76) for NM (senior citizens and OR (the youth) (Table 4.3), is an indication of more ethnobotanical knowledge. 13% of participants had an EKI of 0.40, 31% had EKI of 0.50 (two senior citizens, two young people and one adult), while 31% of participants had EKI from 0.60 to 0.69 (2 adults, 2 young people and 1 senior citizen).

Finally, 25% of participants had an EKI from 0.70 to 0.76, which is an indication that they were highly knowledgeable about ethnobotanical knowledge (Table 5.3). The highest average EKI among the age groups was 0.65 (adults), followed by the youth with EKI (0.58) and senior citizens with an average EKI of 0.55 and the youth with 058. The results show that the most knowledgeable age group among the three were adults with average an EKI of 0.65. Senior citizens had an average EKI of 0.55 while the youth had an EKI of 0.58 (both are closest to 1). The results are a general indication that all age groups had ethnobotanical knowledge of medicinal plants, with adults as the most knowledgeable group (Table 5.3).

**Table 5.5: Scores of medicinal plants according to the age groups (Less knowledge 1 - 6 More knowledge)**

No.	Plant species	Over 60 years (Senior Citizens)	41-60 years (Adults)	21-40 years (Youth)
1.	<i>Kohantia</i> sp (Madi a Phalana)	0	1.2	2
2.	<i>Elaeodendron transvaalense</i> (Mojeremane)	0	4.8	2
3.	<i>Sckuhria pinnata</i> (More wa Tonki)	4.8	6	4.5
4.	<i>Mundulea sericea</i> (Wild) A. Chev. (Mosita Tlou)	2.4	1.4	1
5.	<i>Aloe Maloathi</i> A. Berger (Mokgopa)	6	4.8	6
6.	<i>Sansevieria aehiopica</i> Thunb (Mosokela Tsebeng)	6	3.8	5
7.	<i>Hibiscus micranthus</i> L.f. var <i>micranthus</i> (Mothlagala)	0	1.2	1.2
8.	<i>Tavaresia barklyi</i> (Dyer) N.E.Br (Seboka)	2.6	5	4
9.	<i>Pappea capensis</i> Eckl. & Zeyh (Mothata)	3.2	4.8	2
10.	<i>Croton gratissimus</i> (Moologa)	4.8	3.2	3
11.	<i>Crabbea accaulis</i> N.E. Br (Ditantanyane)	3.8	4.8	6
12.	<i>Dichrostachys cinerea</i> (Moselesele)	2	4.8	5.5
13.	<i>Ziziphus cf. zeyheriana</i> Sond (Sekgalofatshe)	2.6	4.8	4
14.	<i>Drimia altissima</i> (Mogaga)	6	6	6
15.	<i>Aloe zebrine</i> Bark (Mabala mantis)	3.6	5.6	4
16.	<i>Lycium</i> sp (Lesitlhwane)	4.4	3.8	3
17.	<i>Senegelia melifers</i> (Vahl) Seigler & Ebinger subsp (Mongana)	1.4	3.2	4.2
18.	<i>Ziziphus mucronata</i> (Mokgalo)	6	6	4
19.	<i>Kleinia longiflora</i> (Mosiana)	4.8	6	4
20.	cf. <i>Pentarrhinum insipidum</i> E. Mey. [1] (Lefye)	5.6	2.2	1.7
21.	<i>Opuntia</i> sp (Toroko)	2.4	1.8	3.7
22.	<i>Cysphostemma</i> sp (Mohubu)	0.8	2.6	1
23.	<i>Tragia dioica</i> (Mmabatsane)	4.8	4.2	1
24.	<i>Clematis</i> sp (Segope)	0.6	1.4	1
25.	<i>Asparagus suaveolens</i> Burch. [1] (Tlhokamatshwaro)	3.6	4.4	2.2
26.	<i>Peltophorum Africanum</i> (Mosetlha)	6	3.6	6

The study revealed that the adults' category had more ethnobotanical knowledge of individual medicinal plants since most of the medicinal plants (46%) in the adult's category had scores of 6 or close to 6 (i.e. between 4.8 and 6). The plants are: *Kleinia longiflora* (Mosiamama); *Ziziphus mucronata* (Mokgalo); *Aloe zebrine* (Mabala mantsi); *Drimia altissima* (Mogaga); *Ziziphus cf. zeyheriana* Sond. (Sekgalofatshe); *Dichrostachys cinerea* (Moselesele); *Crabbea acauli* N.E.Br (Ditantanyane); *Pappea capensis* Eckl. & Zeyh (Mothata); *Tavaresia barklyi* (Seboka); *Aloe marloothi* A. Berger (Mokgopa); *Schkuhria pinnata* (More wa Tonki); and *Elaeodendron transvaalense* Mojeremane (Moeremane) (Table 5.5). All the above-mentioned medicinal plants are also found in the three levels of SPI categories. This is an indication that the adults' category had a spread of ethnobotanical knowledge of medicinal plants.

The results in Table 5.5 show that both senior citizens and the youth each had 27% knowledge of medicinal plants, with the scores of 6 or closer to 6. This is confirmation that even though it is clear that generally all age groups have ethnobotanical knowledge of medicinal plants, the adult group was the most knowledgeable.

## 5.5 Discussion

Rural communities in the village have vast ethnobotanical knowledge that is not yet realised, thus, there is need to conduct similar studies as a matter of urgency to reveal such knowledge. However, the present ethnobotanical knowledge available in several rural communities, through studies such as the current one, have not been utilised to their maximum potential. If community members of Molatedi village and any other rural community in villages could be able to utilise their ethnobotanical knowledge to its maximum potential, poverty in rural communities could be reduced (Nyota and Mapara, 2008).

There is need for intervention strategies in favour of community members on how to maximise the use of their ethnobotanical knowledge to add value to their livelihood. Most traditional healers in villages are not employed. Traditional healing is their only source of income, making their standard of living is very low. Ethnobotanical knowledge is utilised in a small-scale within villages. The knowledge is only used as and when the need arises. Such knowledge is mostly confined to small traditional surgeries (Ndombo) for consultation (Yeboah, 2000).

Consultations depend on many factors such as availability of consultation fee, lack of money and access for western doctors as well as illnesses that cannot be cured by western medicine. Thus,



one of the intervention strategies could be to trade with ethnobotanical knowledge in a smaller or broader scale. Community members and traditional healers, seem not to know or understand the importance of consultation fee with regard to trading. Consultation fee (*Sekgantsho*), as indicated by PSM in Chapter 3, is regarded as payment to receive information and traditional medication for an illness. The most important thing for traditional healers in Molatedi village is to report the consultation fee (*Sekgantsho*) to the ancestors after every consultation. This is a way of showing respect to the ancestors because they are the owners of indigenous knowledge. As the community continues with the traditional respect and protocol regarding their ethnobotanical knowledge, government could intervene and assist the rural community with proper procedures and policies of trading with their ethnobotanical knowledge (South Africa, Government Gazette, 2008).

Many villages in the North West Province are not known to trade their ethnobotanical knowledge since community members, and in particular traditional healers, do not go out of their villages to sell their ethnobotanical knowledge. There is no visible and aggressive marketing or trade of ethnobotanical knowledge in many villages of the North West Province as this practice is common only in small and big towns. Even though the study has revealed that the general community of Molatedi village has ethnobotanical knowledge, traditional healers are the only community members in the village who freely utilise their ethnobotanical knowledge for their livelihood, however, at a minimal level. Other members hide their knowledge and just inform few people who eventually abuse their ethnobotanical knowledge through free consultations. Local communities have indigenous knowledge that could be used to enhance their livelihood, what is lacking is the intervention of government to assist them (De Beer & Whitlock, 2009).

Information about acceptance of the use of traditional medicine worldwide and by the South African government as well as formal components of health care systems, seem not well captured in other parts of the world, especially in rural communities (Balick *et al.*, 2000). Chiefs and members of Traditional Administration Council, as the highest decision-making bodies in rural communities, should be workshopped on government policies regarding trade and other uses of ethnobotanical knowledge for the benefit of members of their communities. Thus, awareness campaigns could be the best strategy to reach out to rural communities in villages and to make them aware of how to utilise their ethnobotanical knowledge for their own benefit and also to enhance their lives. The rural community seems to have limited information about the National

Health Plan (1994) that they have been liberated to freely practise traditional medicine guided by national policies.

Some, if not all traditional healers, use western medication as well as traditional medicine to assist their patients. What is of great concern is where do they draw the line between the use of western and African Traditional medication? When do they decide to opt for the use of western medication in the process as they are using African Traditional medication? It could be assumed that in the process of healing, traditional healers to western medication if they realise that the condition of the patient is getting worse. This could have either a negative or a positive impact on the life of a patient. Craffert (1997) argues that culture and the worldview of a particular society have an impact on the ways and methods of handling illnesses and health care systems, irrespective of being traditional or western. Berg (2003) concurs with Craffert and maintains every indigenous community deals with illnesses within their communities using their own special methods and remedies, which they have been practising over a period of time successfully.

This is a serious point of concern that requires further studies. It also brings in the importance of intergration of African Traditional Medicine with western medication as a matter of urgency within rural communities and health care centres (World Health Organisation, 2001; 2005). Traditional healers and western practioners require an environment that is condusive for colaboration and intergration of both western and traditional knowledge (UNEP, 2008). It was revealed in the literature that there are different methods of data collection and data analysis used to measure ethnobotanical knowledge, however, some of these methods are limited while some give out results that lack consensus (Reyes-Garci'a *et al.*,2007). Thus, it is recommended that future studies could use the simple Rapid appraisal matrix method as developed by De Beer and Van Wyk (2011) since it is reliable in measuring the ethnobotanical knowledge of the community. It is also recommended that further studies that could enhance ethnobotanical knowledge of rural communities to alleviate poverty be conducted. Most community members have ethnobotanical knowledge but cannot utilise it to earn a living. Studies that can promote trade in ethnobotanical knowledge products, guided by government acts of trade, could be one of the weapons that government could use to combat poverty in rural communities (WHO, 2001). Furthermore, IKS departments at universities, could include in the curriculum, research studies at different levels

that could address different dimensions of ethnobotanical knowledge within communities (and as community service in the North West Province).

Such dimension could include studies that deal with culturally defined theoretical ethnobotanical knowledge (such as naming of different plants found within a particular location “local plant”); culturally defined theoretical ethnobotanical knowledge of interactions between plants and the environment (for example, knowing the pioneer plants before rainy, winter, summer seasons and how they relate with the environment and the community); theoretical botanical knowledge (example, flowering plants and flowering seasons of different plants); practical botanical knowledge of plants and the environment (example, to identify plant species within the environment); and lastly, culturally and defined practical knowledge of the uses of plants (example, knowing how to prepare a medicine from a plant) and the relationship between these dimensions of ethnobotanical knowledge. This will ensure that practitioners are able to measure an individual’s belief that is released into ethnobotanical knowledge (Stepp, 1999; Begossi, 1986).

## **5.6 Conclusion**

In this Chapter, it was revealed generally, all members of Molatedi village have ethnobotanical knowledge, and that the most knowledgeable were the adult group. Furthermore, it was observed that best method to use to measure the ethnobotanical knowledge for the community is the Matrix method by De Beer and Van Wyk (2011). Through the matrix method, it was easy to compute accurate ethnobotanical knowledge index (EKI) and the species popularity index (SPI) of members of Molatedi village. Thus, it is recommended that the Matrix method by De Beer and Van Wyk (2011) be used for ethnobotanical studies such as the current one. The next chapter focuses on the general discussion, recommendations and conclusion of the study.

## CHAPTER SIX

### GENERAL DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### 6.1 Introduction

This chapter focuses on the general discussion, conclusion and recommendations of the study. In an open and general manner, the discussion in this chapter covers different aspects that relate to the study in order to ensure that the study is more authentic. In a more broader sense, the discussions with regard to the sustainable utilisation, conservation, preparations of medicinal plant as well as the ethnobotanical knowledge of communities from the previous chapters are discussed with practical examples from relevant studies. The general discussion in this chapter adds value and also authenticates the information given in previous chapters.

#### 6.2 Discussion

##### 6.2.1 Indigenous ways of knowing medicinal plants among communities

It was discovered that there are different ways of knowing or acquiring knowledge. However, there also contradictory results on how ethnobotanical knowledge varies across demographic and social characteristics (Reyes-Garcia *et al.*, 2007) in (Godoy *et al.*, 2005). The literature has also revealed that most species rely on genes to transmit information but human beings rely on both genes and cultures to transmit information across generations (Boyd & Richerson, 2005). Studies have revealed that the cumulative inheritance system that allows members of a group to transmit behaviour from one member to another, is called cultural transmission (Reyes-Garcia *et al.*, 2008) in (Castro & Toro, 2004). This is also referred to as the transfer of information between individuals by social learning (Reyes-Garcia *et al.*, 2008) in (Aoki, 2001). Boyd & Richerson (1985); Henrich and McElreath, (2003); Laland (2004), in explaining how cultural transmission among humans operates, used the anthropologists hypothesis that people do not imitate behaviours from other random people, but rather, the transmission of cultural traits move from those who have them to those who do not have.



Indigenous knowledge seems to have low status, however, it is used in the west notably by pharmaceutical companies as the basis for most allopathic medicines. The current value of the world market for the cultivation of medicinal plants from indigenous and local communities is estimated to be 443 \$ billion (Shiva). Scientific knowledge is still regarded as the production of knowledge even if there is no obvious need for such knowledge in communities, whereas indigenous knowledge on the other hand, has always produced knowledge to address the need. Therefore, the integration of IKS and modern science will produce new knowledge as they both engage in dialogue to solve an existing practical problem (Dewey, 2001). The following excerpt is a verbatim story about one of the traditional healers:

I became a traditional healer after a long sickness that landed me in the hospital. I was admitted and the doctors at the hospital could not diagnose my illness. "One day, as I was still at the hospital, I had a dream." In my dream, I was talking to my ancestor. "I did not know the person I was talking to in my dream. At that time, my body was painful." The person "ancestor" who was talking to me, said I will be discharged the next day and I should go to my grandmother's house. The next day, indeed, I was discharged and I went straight to my grandmother's house." I told my grandmother my dream and she understood and took me to a traditional healers' school. At the traditional healing school, the traditional healer explained to me that the person who was talking to me in my dream was my ancestor and she wanted to give me knowledge to be a traditional healer so that I can help people. My mother left me with the traditional healer at the traditional healing school and she taught me how to take instructions from the ancestors. I was taught how to become a traditional healer and my body was healed. I stayed at the traditional school learning to be a traditional healer for a period of a year. After I had finished my traditional healing school, I went back home but I could not proceed with my high school because of traditional healing work that demanded more of my time.

### **6.2.2 Potential for integrating indigenous and modern science**

The literature has revealed that western science and traditional knowledge, even if they vary according to different forms of knowledge, they can learn from each other (Fulvio Mazzocchi, 2017). Western science recognises the importance of traditional knowledge for the protection of biodiversity and its achievement of sustainable development (Gadgil *et al.*, 1993). The United

Nations (1992) encourages respect, preservation and maintenance of knowledge, innovation and practices.

Whereas Islamic Science pursued indigenous knowledge in collaboration with African Indigenous Knowledge, this was done to advance a coherent link between the two fields of practice (Laccarino, 2003). He further expatiates and elaborates this submission when he argues that literature has also shown that other contributions to the understanding of nature and the perception of the world in Asia and Africa were done among indigenous people of Australia and Africa. Thus, increasing indigenous knowledge is not only used with the aim of finding new drugs but also to derive new concepts that could assist to reconcile empirical accounts as he observed.

It is on this ground that pursuit and application of indigenous knowledge systems in Africa, South Africa and Malawi in particular ought to be read in the context of a quest to deepen understanding, expand knowledge and create awareness about the ecological value and medicinal value of plants in these contexts.

Integration of traditional and modern medicine is the incorporation of evidence-based medicine (EBM), which are an integral part of a country's formal health care system. This process has the potential to be achieved because it has been demonstrated to be practical in many countries such as China, Japan, Korea, and India, among others (World Health Organisation, 2001).

The integration of traditional medicine (TM) could be done using either of the following ways:

- It can be incorporated as an integral part of a country's formal health care system. Then the country recognises each system separately as legitimate forms of health care within the same framework; and
- It can also be a practice that is integrated within modern medicine by individual traditional health care practitioners by giving crash courses to all modern medicine practitioners.

Both traditional and modern practices could be integrated as two branches of medical science systems, with the ultimate incorporation of elements of both to form a new branch (World Health Organisation, 2001). The World Health Organisation (2001) has outlined ways that integration of traditional medicine into modern medicine could take place, as well as defined the types of health care systems. This was done to describe the degree to which TM/CAM is officially recognised as

part of the national health system, i.e. integrative systems. Again, TM/CAM has been officially recognised and also incorporated into all areas of health care provision, i.e. inclusive systems and the World Health Organisation recognise TM/CAM, even though it has not yet fully integrated it into all aspects of health care, i.e. tolerance systems (WHO Traditional Medicine Strategy, 2002–2005).

The importance of integration of traditional medicine and western medicine could be explained by the clinical experience of the limitation of western medicine that led Chang Ki-moor and Bang Hap-shin to study traditional medicine. They were both attracted by the school of Japanese traditional medicine called the School of Old Prescription, using a medical theory characterised by the simplification of vague and complicated theory of traditional medicine. The theory states that all diseases are caused by one poison and, consequently, the treatment of all diseases consists in eliminating the poison (Yeo, 2007). In their endeavour to study traditional medicine, Chang Ki-moor and Bang Hap-shin discovered another theory called one prescription for one disease.

This theory states that the same remedy is applied to a disease with the same cause even if it might manifest various symptoms. Finally, Chang Ki-moor and Bang Hap-shin realised that the theory called one prescription for one disease for traditional medicines was also applicable to western medicine. Therefore, their discovery made them to clearly understand why they were both attracted to the theory of the School of Old Prescriptions (Yeo, 2007). The study by Chang Ki-moor and Bang Hap-shin is a typical example of integration of traditional and western medicine because in one way or the other, the two medicinal systems complement each other. Chang Ki-moor and Bang Hap-shin's traditional knowledge brought into modern science, one prescription for one disease theory, which has been able to bring a balance between the two medicinal systems.

The objective of integration is that indigenous knowledge will bring into the integration of modern and traditional science, the missing holism, which addresses the broad development of the whole person at the cognitive and affective levels (Mahmoudi *et al.*, 2012). Holism is a model that integrates the two knowledge systems in a manner that incorporates holism into the education experience. It also gives learners an opportunity to solve problems in their daily experiences. It allows for natural integration where learners are exposed to worldviews and current debated on issues that affect students directly and indirectly (Mahmoudi *et al.*, 2012).

### **6.2.3 Measuring ethnobotanical knowledge**

The definitions and methods used to measure individual ethnobotanical knowledge vary across studies. This is because some of the authors have proxied ethnobotanical knowledge, which is the sum of the five scores which provides an index of global knowledge used as a proxy for TEK (Reyes-Garcia, 2007) as in (Sternberg *et al.*, 2001). Whereas, other scholars have concentrated on the many uses of wild plants (Reyes-Garcia *et al.*, 2005) while others have focused on crop (Reyes-Garcia, 2007) in (Boster, 1986). A variety of different methods have been used to measure individual ethnobotanical knowledge. Some have used transect survey, which is a sampling method that offers an efficient way to monitor many species, even though in some instances, the method does not work well. For example, if a survey is done on small plots, where plant species have a strongly aggregated distribution, or when plants that are on the line are not easily detected (Reyes-Garcia, 2007) as in (Zager and Stepp, 2004), specimen identification (Reyes-Garcia, 2007) as in (Begossi 1996), others used cognitive methods (Reyes-Garcia, 2007) as in (Atran and Reyes-Garcia, 2007; Boster 1986; Zent, 2001) or either objective tests (Reyes-Garcia, 2007) as in (Godoy *et al.*, 1998). Different methods and concepts used by different authors in measuring individual ethnobotanical knowledge are mainly due to different theoretical goals of authors.

### **6.2.5 Indicators of the level of intergration**

There are various types of traditional medicine (TM) and also medical practices, referred to as complementary or alternative medicine (CAM). Both TM and CAM have been increasingly used in developing and developed countries. Since the promotion of the integration of TM and CAM into national health care systems, there is need to appropriate one of the major components of WHO's Medicine Strategy. Therefore, the development of national policy and regulation are an essential indicator of the level of integration of such medicine within a national health care system (WHO Traditional Medicine Strategy, 2002–2005).

Global survey on policy on traditional medicines with regard to the regulation of herbal medicines was conducted by WHO. The global survey was able to complete survey returns from 141

countries. The results of the survey were captured into a database specifically designed for the project in order to create the basic country profile (World Health Organisation, 2001). This was done in order to assist countries to compare and learn each other's experiences in order to



strengthen their current TM/CAM systems and also to be able to guide WHO on the provision of support to Member States (World Health Organisation, 2001).

The study by Awodele *et al.* (2014) was designed to assess the policy and regulation guiding herbal medicine in Nigeria since the information was needed to form the safety index of herbal medicine use in Nigeria. The results of the study showed different percentages with regard to agreement that there is a national policy on TM whereas others disagreed. There were agreements and disagreements on the implementation of the manufacturing requirement of herbal medicine that is ensured by control mechanisms. Some indicated that herbal medicines are sold by licenced practitioners whereas the majority disagreed. 85.5% indicated that the WHO support in the form of workshops on national capacity building on safety monitoring of herbal medicine was needed. This is, therefore, in line with WHO's Medicine Strategy to guide in the provision of support to Member States (WHO Traditional Medicine Strategy, 2002–2005).

In Nigeria and all over the world, herbal medicine has been in use for a long time and perhaps due to its natural origin, it is generally regarded as safe. Regardless of the natural origin of herbal medicine, some of the constituents of medicinal plants have shown to be potentially toxic (Padano *et al.*, 2006, Awodele, 2012). Therefore, the public as well as health authorities, have been concerned about the safety and efficacy of herbal medicine, as well as quality control. Policy and regulation of the importance of traditional medicine cannot be overemphasised since it forms the frame work on which traditional medicine can be properly regulated (WHO, 2003).

According to WHO (2001), it is a theory issue to standardise herbal medicine that may contain hundreds of chemical constituents with little or no evidence indicating which might be responsible for the presumed or proven therapeutic effect. Thus, WHO has developed the Traditional Medicine Strategy in order to improve and promote the role of several medicines and the major objective being accessibility and affordability of medicine, safety, efficacy, and quality knowledge base and also to provide guidance on the regulatory and quality of the standards of herbal medicine by producers and consumers (Mathias *et al.*, 2015 in WHO, 2003).

It is, therefore, of crucial importance to introduce herbal education into the curricular of medicinal students for them to learn both Orthodox and Herbal medicine. This will be an attempt to make the two medical practices acceptable to the society. The local people should also be informed about

local herbal medicinal remedies so as to help them identify the various herbs and plants that are used for the treatment of common diseases (Mathias *et al.*, 2015 in Moody, 2007).

The draft National Policy on African Traditional Medicine in South Africa is designed to provide a frame work for the institutionalisation of African Traditional Medicine (ATM) in the South African Health care system. The resolution, which urges member states to implement the national policies and regulations on traditional medicines (TM), have been passed by WHO, UN as well as the Southern African Development Community (SADC). In 2006, the South African government officially took steps to recognise the institutionalisation of ATM as well as the establishment of the Directorate of TM. This was with regard to the coordination and management of initiatives regarding ATM within the department of health as well as enacting the Traditional Health Practitioners Act (No 22 of 2007) which established the Traditional Health Practitioners Council (Notice 906 of 2008; Department of Health, Notice: Draft policy on African traditional medicine for South Africa).

#### **6.2.6 Lessons learned from the study**

The lessons learned during the study are very significant for ethnobotanical studies. The most important lesson learned is that a pilot study is a very important component of ethnobotanical research because it paves the way, especially during data collection. During the pilot study, when data is collected, that is where the significance of piloting is seen. Thus, a pilot study should not only be regarded as important for the purpose of validation of the research tools but must be considered as a complete study on its own. A pilot study should be considered as a complete study because during piloting, all the processes to to be followed in the study are piloted for authenticity. Thus, piloting for ethnobotanical studies could be done and published as such based on the many lessons learned during the study. Lessons learned include aspects such as traditional protocols, the importance of the language of participants, and validation of the research tools, among others. The pilot study also has outcomes, which could be reports in the form of results or findings of the pilot study. Most of the information gathered during a pilot study is lost since all of the information cannot be recored during the actual study. It is recommended that there should be room in the actual studyto record information from the pilot study.

The collection of Herbarium specimens was another lesson learned during the study. This was a very important lesson from this study because data for such studies cannot be collected without such knowledge since herbarium specimens are collected in a specialised manner and procedures followed by all ethnobotanical researchers. Plant species that are not collected properly are rendered sterile and cannot be identified. Plant species collected as herbarium specimens, had to be a good representative of the species and should have all the essential features necessary for identification as follows: leaves; stems; flowers; and seeds (if the plant is suitably small, the roots should also form part of the collection, especially if the plant is common and in abundance). The process of plant identification starts in the field when plants are collected and pressed with a plant presser and allowed to dry before they could be submitted for identification.

### **6.2.7 Limitations of the study**

**Some limitations were encountered during the study and impacted the study negatively.**

**These include:**

- Three of the participants selected as part of the target population withdrew from the study, as a result, the target population was reduced;
- Ill-health of participants by the time of data collection further reduced the sample size of the study;
- When the researcher returned to the study area for data validation, one of the participants had passed on due to ill health; and
- There were some sterile medicinal plants without flowers which could not be identified.

### **6.3 Conclusion**

All data collected in this study provided evidence of indigenous knowledge of African Traditional medicine and ethnobotanical knowledge within Molatedi village. The study was based on African Traditional Medicine (ATM) as the most affordable and easily accessible source of treatment among poor rural communities.

It was revealed that traditional medicine is used for the treatment of different diseases and situations by community members. Ethnobotanical knowledge was found to be a rich heritage of community members of Molatedi village. The exciting element of the study was that the

community did not only possess ethnobotanical knowledge about ATM, but also had indigenous knowledge on how to sustainably utilise, prepare and conserve medicinal plants. It was, therefore, of paramount importance for the study to discover and also recognise this rich heritage of indigenous knowledge. It is also of great benefit and also very important that ethnobotanical knowledge of the community be recognised as it is useful to the community and to the body of knowledge.

All medicinal plants recorded, their uses, methods of preparation, indigenous conservation strategies, and ethnobotanical knowledge discovered in the study are an indication of the rich indigenous knowledge embedded within rural communities, which needs to be unearthed by studies such as the current one.

## **6.4 Recommendations**

### **6.4.1 Further studies**

There is need for further studies on the documentation of medicinal plants for African Traditional Medicine since this subject cannot be exhausted in a single study in Molatedi village and the neighboring villages along the Heritage Park Corridor. Further studies are also recommended on ethnobotanical knowledge of medicinal plants found within the Heritage Park in the North West Province. There are several communities within the Heritage Park and Molatedi village is one of them. It is, therefore, recommended that the ethnobotanical knowledge of these communities be studied.

Further studies on the phytochemical, pharmacological and biological activities of medicinal plants should be conducted for additional knowledge on the identification of their active ingredients for the production of drugs.

As indicated in Chapter 3, the main source of indigenous knowledge are ancestors, thus, it is recommended that further studies on spirituality, ancestral beliefs and belief systems be conducted. Furthermore, since the Batswana ethnic group has not been widely studied, it is recommended that further research on Batswana indigenous knowledge be undertaken. A study on propagation, agro-



processing and medicinal gene bank of medicinal plants from Molatedi village and other villages within the Heritage Park should also be undertaken

#### **6.4.2 Collaboration and campaigns**

The North-West University the Department of IKS should collaborate with traditional healers and knowledge holders within neighbouring communities to undertake joint studies and paper presentations on the use of medicinal plants to prepare African Traditional Medicine as well as undertake studies on indigenous conservation strategies of medicinal plants. In order to ensure a successful collaboration between the university and community, it is recommended that an “adopt a village” campaign strategy be implemented.

Finally, there should be greater collaboration among bodies involved in ethnobotanical study programmes at universities to ensure information flows and encourage attendance at relevant conferences. It is further recommended that there should be increased collaboration among ethnobotanical researchers on the integration of western and indigenous conservation strategies. More awareness campaigns in terms of collaboration with the university in rural areas on the balance between western and indigenous conservation strategic and the use of medicinal plants are also encouraged.

#### **6.4.3 Department of Health**

The Department of health should provide a platform where traditional medicinal practitioners could work together with health care practitioners within a clearly defined organisational framework. General trainings should be organised by the Department of Health for traditional medical practitioners and departmental health care practitioners to be able to integrate their services. Analyses by the Department of Health should be carried out on the safety and efficacy of herbal remedies to safeguard the lives of rural people who are mainly dependent on herbal medicine.

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## APPENDIX 1



### Questionnaire for the compilation of an inventory of medicinal plant species used for African Traditional Medicine (ATM) by the community of Molatedi village

#### SECTION A

##### Demographic and other Characteristics

*Instruction: Please place a tick where appropriate.*

A1. Please indicate your gender.

Male	
Female	

A2. Which category best describes your age group?

40 years	
41-60 years	
60 + years	

A3. What is your highest level of educational?

No schooling	
Primary School	
High School	

A4. Please indicate the number of years you have been practising as a traditional healer.

Years of practice as a traditional healer:

<10 years	
11 – 19 years	
20 years and over	

#### SECTION B

##### Information on the geographical area and time for collection of medicinal plants.

B1. Do you collect all medicinal plants you use in Molatedi village?

Yes	
No	

If "No", where else do you collect medicinal plants? Name the area(s)/location(s).

---

Give a reason for collecting medicinal plants in other area(s)/location(s)

---

B2. Which geographical area do you collect most of the medicinal plants you use and why?

Geographical Area		Reason
In deep bushy areas		
In the grass land		
In bushy, grass and a rocky mountainous areas		
In bushy and grass area		

B3. What time of the day do you collect medicinal plants and why?

Times of collection		Reason
Morning till midday		
Morning till midday and Afternoon		
Early morning and Evening		
Morning till midday and Early morning		

B5. What method do you use to collect medicinal plants?

Methods of collection		Reason
Cut the leaves only and dig the roots		
Cut the leaves, cut the entire plant and dig the roots		
Cut the entire plant		
Cut the branches only		

### SECTION C

#### Indigenous protection and conservation methods of medicinal plants

C1. What methods do you use to protect and conserve these medicinal plants?

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C2. How often do you do the conservation and protection of these medicinal plants?

---

---

---

C3. Why do you conserve the medicinal plants?

---

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---

C4. How do you monitor that the medicinal plants are protected and conserved?

---

---

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### SECTION D

#### The information on medicinal plants Biodiversity use and preparation

D1. Name different types of medicinal plants you collect?

No.	Tswana name	Common name	Medicinal Use/Other use	Which part is used	How is the preparation made
1					
2					
3					
4					

#### Question guide for the interview questions for table 1

1. Name of the plants
2. Medicinal use of the plant.
3. The part which is used to make medicine
4. The preparation of the mixture
5. The time during the year (season) and the time during the day or night,
6. The reason of collecting data at that time.



**Maikaelelo 1(Setswana)**

**KAROLO YA A**

**Popego ya boagi jwa morafe le Dipharologantsho tse dingwe**

*Ditaelo: Tswee tswee kwala sefane sa gago le maina ka botlalo mme o tshwaye ka letshwao la √ fa go leng maleba.*

**A1.**

Sefane	Maina

**A2. Bong.**

Monna	
Mosadi	

**A3. Ke maemo afe a bogolo jwa dingwaga a a tlhalosang mophato wa gago ka bogolo?**

Kwa tlase ga dingwaga di le 21	
Dingwaga di le 21-30	
Dingwaga di le 31-40	
Dingwaga di le 41-50	
Dingwaga di le 51-60	
Go feta dingwaga di le 60	

**A4. Tswee tswee, neela dingwaga tse o ntseng o dira ka tsona jaaka ngaka ya setso**

Kwa tlase ga dingwaga di le 5	
Dingwaga di le 5-10	
Dingwaga di le 11-14	
Dingwaga di le 15-19	

Dingwaga di le 20 le go feta	
------------------------------	--

### KAROLO YA B

**Tshedimosetso ka ga kgaolo ya lefelo le nako ya go kokoanya/epa dimela tse o di dirisetsang ditlhare/melemo e e leng teng**

B1. A o kokoanya dimela tsotlhe tse o dirang ditlhare tse o alafang ka tsona kwa motseng wa Molatedi?

Ee	
Nnyaa	

Fa o re “nnyaa” o bona kae gape dimela tse o dirang ditlhare tse o alafang ka tsona? Neela maina a dikgaolo/mafelo ao

---

Neela mabaka a go bo o kokoanya dimela tsa kalafi tse o di dirisang kwa mafelong a mangwe.

---

B2. Ke lefelo lefe le o kokoayang/epang bontsi jwa dimela tse o dirang ditlhare ka tsona le gore ke ka ntlha ya eng o di kokoanya/epa kwa teng?

Lefelo		Lebaka
Mo lefelong le le kwa teng teng le le nang le ditlhatsana tse di kitlaneng		
Mo go nang le bojang		
Mo lefelong le le nang le dithabana le le matlapa		

B3. A semela seo se ka jalwa?

EE	
NNYAA	

Fa o re “nnyaa” goreng o re jaalo? Mme fa o re “Ee” se ka jwala kae?

---

B4. A go na le nako e e kgethegileng e o kokoanyang/epang dimela tsa gago ka yona?

Goreng ka nako eo?

Nako ya go di kokoanya/epa	Tshwaya fa	Lebaka
----------------------------	------------	--------

Mo mosong go fitlha motshegare		
Nako nngwe mo mosong		
Thapama		
Bosigo		

B5. O kgetla/epa dimela tse o dirang ditlhare ka tsona jang le gore o kgetla/epa karolo efe ya semela, goreng o kgetla/epa tseo?

Mokgwa/tsela o e kgetlang/epang ka yona		Lebaka
Ke kgetla matlhare fela		
Epa semela ka medi		
Sega semela go tswa mo dikaleng		
Ke sega dikala fela		

B6. A o kgetla/epa dimela tse go ralala ngwaga otlhe, goreng?

Ee		Mabaka	
Nnyaa		Mabaka	

B7. Dimela tse di bonala ka setlha sefe sa ngwaga?

Mariga	
Dikgakologo	
Selemo	
Letlhabula	

### KAROLO YA C

**Tshireletsego ya setso le mekgwa ya tshomarelo ya dimela tse di dirisetswang kalafi**

C1. Ke ditogamaano/mekgwa efe e o e dirisang go sireletsa le go somarela dimela tse?

C2. O dirisa maano/mekgwa eo ya tshireletso le tshomarelo ya dimela tse di dirang

ditlhare/melemo leng/ga kae?

---

C3. Ke ka ntlha ya eng fa o somarela dimela tse tsa go dira ditlhare?

---

---

C4. Ke dikotsi/matshosetsi afe a a ka tlhagelang dimela tse?

---

### KARLO YA D

**Tshedimosetso ka ga maina a dimela tse di dirang ditlhare tse di farologaneng mo lefelong**

**le mokgwa o di tswakanngwang ka teng go dira ditlhare tseo.**

D1. Neela maina a dimela tse o di kokoanyang/epang, tse o dirang ditlhare ka tsona, karolo ya tsona e o e dirisang, le gore o dira motswako wa setlhare seo sa kalafi jang.

	Leina la Setswana	Leina le le tlwaelegileng la teng	Tirisetso ya sona ya kalafi/tse dingwe	Ke karolo efe e e dirisiwang	O dira jang motswako wa setlhare seo
1					
2					
3					
4					

**Kaedi ya Dipotso tsa dipuisano ka mmotsolotsi tsa Lenaane la 1 ka nako ya fa a tsamaya kwa ntle kwa bathong.**

1. Maina a dimela
2. Tirisetso ya semela jaaka setlhare sa kalafi.
3. Karolo e e dirisetswang go dira setlhare/molemo
4. Ka moo motswako wa setlhare o dirwang ka teng
5. Ke nako efe e e maleba ya go kokoanya/epa semela sa kalafi le gore ke ka ntlha ya eng o kokoangwa/epiwa ka nako eo?



## APPENDIX 2



### Questionnaire for the evaluation of the knowledge of local community members on the use of medicinal plants found in Molatedi village, including a part of the Heritage Park

#### SECTION A

#### Demographic and other Characteristics

*Instruction: Please write your surname and name(s) in full and place a tick where appropriate.*

A1.

Surname	Name(s)

A2. Gender.

Male	
Female	

A3. Which category best describes your age group?

Under 21 years	
21-30 years	
31-40 years	
41-50 years	
51-60 years	
Over 60 years	

A4. Please indicate the number of years you have been using the medicinal plants.

Less than 5 years	
5-10 years	
11-14years	
15-19years	
20 years and over	

## SECTION B

**Information on the knowledge of medicinal plants (score = 1), name of the plant (score = 2), use of the plant (score =3)**

The researcher shows participants pictures of the plants and the Herbarium specimens.

Participants, after observation of the plants, answer the questions that follow:

B1. Do you know the name of the plant in the picture/ Herbarium specimen? (Score =1)

B2. Give the name of the plant that you see on the picture /Herbarium specimen (Score =2)

B3. What is the plant used for? (Score =3)

### Score sheet for objective 2

		Abbreviated name of the participant				The use and preparation
		B1	B2	B3	TOT	
	Name of the Medicinal plant species					
1						
2						
3						
4						
5						
6						
7						

Who is the origin or source of your knowledge? Example: (parents or grandparents).

No.	Age	Names of Participants	Code	Gender	Source of knowledge

## Maikaelelo 2

**Tlhotlhomiso ya kitso ya Morafe wa Molatedi mabapi le dimela tsa go dira melemo ya Setso**

### KAROLO A

#### Demogerafi le dintlha tse dingwe

*Molaetsa: Ka kopo kwala Sefane le Leina la gago ka botlalo gape o tshwae gongwe le gongwe fa go maleba fa morago ga dipotso tse di latelang.*

A1. Ka kopo kwala Sefane le Leina la gago.

Sefane	Leina/Maina

A2. Tshwaa le tshwao go lebagama le bong ba gago.

Monna	
Masadi	

A3. Tshwaa karolo e e lebaganeng le dingwaga tsa gaga?

Dingwaga ka tlase ga 21	
21-30 dingwaga	
31-40 dingwaga	
41-50 dingwaga	
51-60 dingwaga	
Over 60 dingwaga	

A4 ke ngwaga tse kae o dirisa dimela tsa tlhago go dira meriane ya Setswana.

Ka fa tlse ga dingwaga tse 5	
5-10 dingwaga	
11-14 dingwaga	
15-19 dingwaga	
Tse 20 le go feta	

## KAROLO B

**Kitso ka dimela tsa tlhago tse di dirisiwang go dira meriane ya Setswana.**

Moithuti o tla bontsha mo tsaakarlo setswantsho sa semela sa naga/tlhago. Motsaakarlo o tla sekaseka semela pele a araba dipotso tse di latelang:

B1. A oitse se le se mo setshwantsong? (Maduo =1/0)

B2. Leina la semela se se mo sethwantshong ke mang? (Maduo =2/0)

B3. Semela se se dirisiwa go alafa bolwetse bofe? (Maduo =3/0)

**Letlakala la matshwao a maikaelelo a bobedi (2)**

	Maina a dimela	Leina la motsaa karolo				Kalafi le mokgwa wa go dira molemo
		B1	B2	B3	TOT	
1						
2						
3						
4						
5						
6						
7						
8						

Ke mang motswedi wa kitso ya gago? Sakai: (Batsadi kgotsa Nkoko/Rremogolo).

No.	Dingwaga	Leina la motsaa karolo	(Di)tlhaka ya leina	Bong	Motsedi wa kitso



## APPENDIX 3



### **Interview guide for the establishment of indigenous strategies of conserving medicinal plants by local community in Molatedi Village**

Information about conservation strategies will be obtained during focus group discussions. The focus group will consist of Traditional Healers and Knowledge holders. Random stratified sampling will be done to determine the sample for focus group discussions.

#### **Interview Guide Questions for objective 3**

1. Do you understand the meaning of the word conservation?
2. Briefly explain the meaning of conservation.
3. Do you conserve the medicinal plant in your area?
4. If yes, please explain how you do conservation in your village
5. Do you practise the conservation methods throughout the year?

If yes, please explain the reasons

If No, Which (time, seasons, months) of the year and why? Please explain.

6. What happen if conservation practices are not done within a particular year?

Please explain

7. How are the community members encouraged to conserve the medicinal plants?

Please explain

### Maikaelelo 3 (Setswana)



#### **Go tlotlhomisa ka ga ditogamaano tsa go somarela dimela tse di dirisetswang go dira ditlhare ka baagi ba selegae ba motse wa Molatedi**

Tshedimosetso e e ka ga ditogamaano tsa tshomarelo e tlaa bonwa ka nako ya dipuisano tsa setlhopha-tebagangwa. Setlhopha-tebagangwa se, se tlaa akaretsa Dingaka tsa Setso le batsholakitso, ba beilwe ka ditlhopha go ya ka dingwaga tsa bona jaaka Bagodi ba dingwaga di le 55 le go feta, bagolo ba dingwaga di le 36-54, Bašwa ba dingwaga di le 18-35. Go tlaa dirisiwa kaedi ya dipotsolotso go tsamaisa thulaganyo yotlhe. Batsholakitso ba tlaa bewa go ya ka moo baagi ba ba bonang ka teng mabapi le go ba kaya jaaka ba ba nang le kitso. Tshedimosetso e e ka ga ditogamaano tsa tshomarelo ya dimela e tlaa bonwa ka nako ya dipuisano tsa ditlhopha-tebagangwa.

#### **Kaedi ya dipotsolotso tsa maikaelelo a 3**

1. A o tthaloganya bokao jwa lefoko tshomarelo ya dimela?
2. Ka boripana tlhalosa bokao jwa se tshomarelo e se kayang.
3. A o somarela dimela tse di dirisetswang go dira ditlhare mo lefelong la lona?
4. Fa o re ee, tswee tswee tlhalosa gore le dirang jang fa le somarela dimela mo motseng wa lona?
5. Fa o re nnyaa, ke ka ntlha ya eng fa o sa somarele dimela tse di dirisetswang go dira ditlhare? k
6. A o dirisa mekgwa ya tshomarelo ya dimela go ralala ngwaga otlhe?

Fa o re ee, tswee tswee tlhalosa mabaka.

Fa o re nnyaa, ke ka (nako, setlha le kgwedi efe) ya ngwaga le gore ke ka ntlha eng ka nako tseo? Tswee tswee tlhalosa.

7. Go diragala eng fa go sa somarelwe dimela e bile go sa dirwe sepe mo ngwageng otlhe? Tswee tswee, tlhalosa.
8. Baagi ba rotloetswa jang go somarela dimela tse di dirisetswang go dira ditlhare?  
Tswee tswee, tlhalosa.

## APPENDIX 4



### Participants Information Letter (in Plain English)

#### **An ethnobotanical study of African Traditional medicinal plants in the Heritage Park, North West Province**

My name is Mittah Malebo Magodielo. I am a student doing a Master's Degree in Indigenous Knowledge Systems at the North-West University. My Supervisor is Prof. S.A. Materechera. The topic of my study is: **An ethnobotanical study of African Traditional medicinal plants in the Heritage Park North West Province.**

The focus is on medicinal plants.

I need your help for this research study, but you must be able to **tell your own**

**Story** and you must **be able to read and write**. You must be **residing in Molatedi Village**

I want to interview you for two hours. You have to fill in a "**consent** " **form** before the interview. You can **ask your family, friend or team leaders for advice** on this.

You can stop me at any time, and you will not get into trouble for this. It is up to you if you would like to keep going with the study and I will ask you if you want to keep going with the study.

### **Lekwalo la dikitsiso ka Setswana**

**Leina la me ke** Mittah Malebo Magodielo. Nomoro ya me ya Sekolo ke: 16461088. Ke moithuti wa Master's Degree in Indigenous Knowledge Systems mo Unibesithi ya Bokone Bophirima. Barutabana ba me ke Moprofesa S.A. Materechera. Dinomoro tsa gagwe tsa mogalake: 018 3812453, aterese ya emaile ke: [Simeon.Materechera@nwu.ac.za](mailto:Simeon.Materechera@nwu.ac.za); le Ngaka W. Otang Mbeng. Dinomoro tsa gagwe tsa mogals ke: 018 381 2353. Aterese ya emaile ke: [28391432@nwu.ac.za](mailto:28391432@nwu.ac.za).

Setlhogo sa serutwa sa me ke: **An ethnobotanical study of African Traditional medicinal plants in the Heritage Park North West Province.**

Thuto e e lebagane thata le dimela tse di dirisiwang go dira dithare tsa setswana.

Ke kopa thuso ya gago mabapi le serutwa se, fela o tshwanetse go kgona go mpolelela kang ka botshelo jwa gago. Gape o tshwanetse wabo o le moagi wa mo motseng wa Molatedi.

Ke kopa go go botsa dipotso o le nosi ura elengwe fela. Ke kopa gore o ntshaenele lekwalo la tumelano (**consent form**) pele re ka tswela pele ka dipotso. O ka kopa kgakololo go ba lelapa kgotsa ditsala pele o araba dipotso. O letleletswe go nkemisa fa osa tlhole o ba tla go tswela ka dipotso. Ga pe o letlelelwa go letsetsa Barutabana ba me fa o nale dipotso.



APPENDIX 5



Consent Form

Read this if you agree then you can sign

I (please print) \_\_\_\_\_ give my consent to take part in this study.

1. I have read the information sheet. I understood. I know that I will answer questions about an ethnobotanical study of African Traditional medicinal plants in the Heritage Park North West Province.
2. I know that everything I say is between me and the researcher but if there is something very serious, such as harm of somebody or me, then the researcher will have to tell somebody. My name or personal information is private and will not be used without my agreement. The information and audiotapes will be kept safe and only the researcher will see the interview information and audiotapes. I can view them at any time.
3. I volunteer freely to be part of this study, without duty or obligation. I understand that I am free to withdraw from this study at any time without notice or penalty. I have received a copy of this agreement.

Participant's signature: \_\_\_\_\_

Date: \_\_\_\_\_

Researcher's name (in print): \_\_\_\_\_

Researcher's signature: \_\_\_\_\_

Date: \_\_\_\_\_

### Foromo la tumelano (Consent Form)

#### Buisa pele fa o dumela ke kopa o saene.

Nna (kwala ka mokwalo o o sa tshwaraganang) \_\_\_\_\_ ke saena lekwalo la tumelano (consent form) go re ke tla tsaya karolo mo serutweng se.

1. Ke buisitse lekwalo la dikitsiso, ke le tlhalogantse. Ke a itse gore ke tla araba dipotso ka serutwa sa “ethnobotanical study of African Traditional medicinal plants in the Heritage Park North West Province”.

2. Ke dumela gore sengwe le sengwe se ke se buang magareng ga me le moithuti, se felela mo serutweng. fela fa go nale sengwe se se masisi, jaaka go gobala ga mongwe kgotsa ga me, moithuti o tla bolelela mongwe ga pe o tla dira sengwe go thusa. Leina la me le tlhaloso e e kgethehileng ka nna ga e kitla e dirisiwa kwa ntle le tumelano le nna. Kitso yotlhe le ditheipi tsotlhe di tla somarelwa ke moithuti mot ulong e ekgethehileng. Nna nka kopa go bona le go fiwa kitso e fa ke e tlhoka

3. Jaanong ke dumela go tsaa karolo mo serutweng se kwa ntle ga pateletso ebile ke sa duelwe. Ke tlhalogana sentle gore ke lokologile go emisa go tswelala ka serutwa se nako ngwe le ngwe fa ke tlhoka go dira jalo. Ke amogeste kgatiso ya lekwalo la tumelano e.

Leina la Motsaa karolo (ka mokwalo o o sa kopanang): \_\_\_\_\_

Tsheano ka Motsaa karolo: \_\_\_\_\_

Letlha: \_\_\_\_\_

Leina la Moithuti ka mokwalo o o sa kopanang): \_\_\_\_\_

Tsheano ka Moithuti: \_\_\_\_\_

Letlha: \_\_\_\_\_

APPENDIX 6



**Non-disclosure agreement forms**

**Traditional Knowledge Identification and Documentation Procedures**

This document serve as an agreement between the researcher, traditional healers and knowledge holders, that the identification and documentation of Traditional Knowledge (TK) is important for the protection and management thereof. It is a process which will be handled in care and foresight and that the **researcher:**

1. Will not disclose documented TK unless there has been a clear decision agreement between the traditional healers and knowledge holders;
2. Will only disclose the information for the agreed purpose which is for study.
3. Will only disclose the information for the agreed purpose which is for study and protect confidentiality, unless if there is a need to do so will consult first the traditional healers and knowledge holders.
4. Will not use the Traditional Knowledge information for commercial purpose.

**Participant's signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Researcher's name (in print):** \_\_\_\_\_

**Researcher's signature:** \_\_\_\_\_

**Date** \_\_\_\_\_

**Foromo ya ditumelano ka go se tlhagise kitso (Non-disclosure agreement forms)**

Foromo e e dira jaaka tumelano magareng ga moithuti, dingaka tsa setso le baitseanape ba setso, gore go tlhagisa le go kwala ka kitso ya setso go botlhokwa go isireletswa le go e tlhokomelwa sentle. Kgato e e tla tsamaisiwa sentle ka tlhokomelo le ponelopele.

1. Moithuti ga a kitla a tlhagisa dikitso ya tsasetso tse di kwetsweng kwantle le tumelano magareng ga dingaka tsa setso le baitseanape ba kitso ya setso;
2. Moithuti o tla tlhagisa kitso fela go ya ka tumelano e e maleba le dithuto tsa gagwe.
3. Moithuti o tla sireletsa ka tshomarelo e e tseneletseng kitso ya dingaka tsa setso le baitseanape ka go sa tlhagise maina a bona kwa ntle ga tumelano le bone.
4. Moithuti ga a kitla a dira kgwebo ka kitso e ya setso

**Leina la Motsaa karolo (ka mokwalo o o sa kopanang):**

\_\_\_\_\_

**Tsheano ka Motsaa karolo:** \_\_\_\_\_

**Letlha:** \_\_\_\_\_

**Leina la Moithuti ka mokwalo o o sa kopanang):**

\_\_\_\_\_

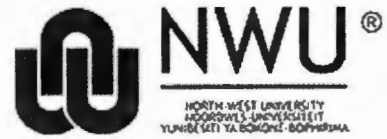
**Tsheano ka Moithuti:** \_\_\_\_\_

**Letlha:** \_\_\_\_\_

**NWU**  
**LIBRARY**



## APPENDIX 7



FACULTY OF HUMANITIES

Tel No.: (018) 389 2347

### SETSWANA SUBJECT GROUP/ SETLHOPHA SA SERUTWA SA SETSWANA

#### CERTIFICATE OF TRANSLATION

This is to certify that I Ms Eileen Poee an accredited Setswana translator, member of The South African Translator's Institute and Programme Leader - Setswana Subject Group, Mafikeng Campus, NWU have translated the research tools, i.e. questionnaires from English to Setswana for Ms Magodiello's research. The work was done from 17 – 21 April 2017.

I hereby guarantee that the work was done with all the professionalism it needed and it will add value to her research to speak without any ambiguity to the Setswana audience.

Thanking you in advance / Ke lebogela kwa pele.

Yours sincerely

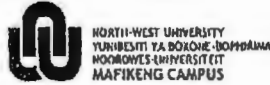
E.E Poee – Programme Leader: Setswana Subject Group, NWU, Mafikeng

Accredited Translator – SATI

Tel.: 018 389 2347

Email: [eileen.poee@nwu.ac.za](mailto:eileen.poee@nwu.ac.za)

## APPENDIX 8



FACULTY OF AGRICULTURE, SCIENCE AND TECHNOLOGY  
SCHOOL OF RESEARCH AND POSTGRADUATE STUDIES

Tel: +27 18 3892531  
Fax: +27 18 3892052  
E-mail: [ushotanefe.usch@nwu.ac.za](mailto:ushotanefe.usch@nwu.ac.za)  
Internet: <http://www.nwu.ac.za/>

### CERTIFICATE OF APPROVAL OF RESEARCH PROPOSAL AND TITLE REGISTRATION

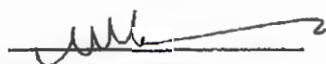
This is to certify that: Magodielo MM - 16461088

Whose proposal is titled: An ethnobotanical study of African traditional medicine

Was considered by the Faculty Research Committee on the 13 July 2016 and approved.

Proposed Qualification: MIKS

Supervisor (s): Prof SA Materechera

  
Signature: Director SRPS

Prof Ushotanefe Useh

Name: Director SRPS



## APPENDIX 9



NORTH-WEST UNIVERSITY  
YUNIBESITHI YA BOKONE-BOPHIRIMA  
NOORDWES-UNIVERSITEIT  
MAFIKENG CAMPUS

Private Bag X2046, Mmabatho  
South Africa 2735

INDIGENOUS KNOWLEDGE  
SYSTEMS PROGRAMME

Tel: 018 389 2157

Fax: 018 389 2837

e-mail:

motheo.koisiwe@nwu.ac.za

To: Whom It May Concern

13 July 2015

**SUBJECT: PERMISSION TO CONDUCT RESEARCH: MR S MITTAH MALEBO  
MAGODIELO**

(STUDENT NO: 16461088)

Dear Sir / Madam

This serves to inform you that Mrs Magodielo is a registered student for the Masters of Indigenous Knowledge Systems in the Faculty of Human and Social Sciences, North West University since 2015. The M.A IKS is a two (02) years degree which is research focused with no course work. Mrs Magodielo's academic performance has been very impressive and she is busy working on her dissertation in order to complete the degree at the end of 2016 academic year. Her topic is as follows: The Utilization, Conservation and Documentation of Medicinal Plants at the Heritage Park between Pilanesberg and Madikwe Game Reserves in the Rustenburg region, North West Province. As indicated above, the research is for academic purposes so that she can be able to complete her 2 years degree at the end of 2016 academic year.

(It will be our great pleasure if you can assist her to complete her studies.

Regards.

  
Motheo Koisiwe (Mr)

IKS Coordinator

North West University



## APPENDIX 10



NORTH-WEST UNIVERSITY  
YUNIBESITHI YA BOKONE-BOPHIRIMA  
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom,  
South Africa, 2520

Tel: (018) 299-4900

Faks: (018) 299-4910

Web: <http://www.nwu.ac.za>

Institutional Research Ethics Regulatory Committee

Tel: +27 18 299 4849

Email: [Ethics@nwu.ac.za](mailto:Ethics@nwu.ac.za)

### ETHICS APPROVAL CERTIFICATE OF PROJECT

Based on approval by the Health Science Ethics Committee (FAST-HSEC) on 07/02/2017 after being reviewed at the meeting held on 07/02/2017, the North-West University Institutional Research Ethics Regulatory Committee (NWU-IRERC) hereby approves your project as indicated below. This implies that the NWU-IRERC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

<b>Project title:</b> An ethnobotanical study of African Traditional Medicinal plants in the Heritage Park of the North West Province.
<b>Project Leader/Supervisor:</b> Prof SA Materechera
<b>Student:</b> MM Magodielo
<b>Ethics number:</b> NWU - 00253 - 16 - A9
<b>Application Type:</b> N/A
<b>Commencement date:</b> 2017-02-07
<b>Expiry date:</b> 2019-06-30
<b>Risk:</b> Minimal/ No

#### Special conditions of the approval (if applicable):

- Translation of the informed consent document to the languages applicable to the study participants should be submitted to the HSEC (if applicable).
- Any research at governmental or private institutions, permission must still be obtained from relevant authorities and provided to the HSEC. Ethics approval is required BEFORE approval can be obtained from these authorities.

#### General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:

- The project leader (principle investigator) must report in the prescribed format to the NWU-IRERC via HSEC:
  - annually (or as otherwise requested) on the progress of the project, and upon completion of the project
  - without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.
  - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the HSEC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-IRERC via HSEC and new approval received before or on the expiry date.
- In the interest of ethical responsibility the NWU-IRERC and HSEC retains the right to:
  - request access to any information or data at any time during the course or after completion of the project;
  - to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process.
  - withdraw or postpone approval if:
    - any unethical principles or practices of the project are revealed or suspected,
    - it becomes apparent that any relevant information was withheld from the HSEC or that information has been false or misrepresented,
    - the required annual report and reporting of adverse events was not done timely and accurately,
    - new institutional rules, national legislation or international conventions deem it necessary.
- HSEC can be contacted for further information via [Musanchi.Sichembe@nwu.ac.za](mailto:Musanchi.Sichembe@nwu.ac.za) or 018 289 2319.

The IRERC would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the IRERC or HSEC for any further enquiries or requests for assistance.

Yours sincerely

Prof LA  
Du Plessis

Digitally signed by  
Prof LA Du Plessis  
Date: 2017.02.23  
09:31:40 +02'00'

Prof Linda du Plessis

Chair NWU Institutional Research Ethics Regulatory Committee (IRERC)