Integration of phytomedicine into the main-stream health care system: Perceptions from Bojanala District, South Africa

By

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DECLARATION

I, **Maropeng Erica Matlala**, student number, **220207089**, hereby declare that the dissertation titled "**Integration of phytomedicine into the main-stream healthcare system: Perceptions from Bojanala District, South Africa"**, submitted in fulfilment for the requirement of the degree Master of Science at the University of Mpumalanga, is my own original work in design and execution. I further declare that this study has not previously been submitted for a degree at this or any other institution of higher learning in South Africa or elsewhere. This dissertation does not contain other scholars' works, except where otherwise stated and properly referenced.

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DEDICATION

I dedicate this study to my siblings and cousins, SL Matlala, RJT Matlala, MP Rambuda, M Nkoana, NK Rambuda, T Ramoshaba and VK Rambuda. As the older sister and first grandchild in the family, I feel I have the responsibility to set an example, and my hope is that this project, born from many sleepless nights and countless hours of dedication, serves as a testament to the power and importance of education. You always ask me: "*Sesi, kgale o tsena skolo, o fetsa leng?*" I want you to know that learning never stops. It is not only about textbooks and degrees, but also about unlocking potential and broadening horizons. I know studying is not easy, but you need to know that the challenges we face in our studies are opportunities to help us grow stronger and smarter, and are part of the journey towards great achievements. A world of endless possibilities awaits you in education. I want you to dream big, work hard and never stop being curious. Always strive to be the best versions of yourselves and reach for the stars. I look forward to seeing the incredible things you will achieve in future.

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ABSTRACT

South Africa's healthcare system is plagued by inequalities, especially in rural and marginalised areas, where access to healthcare facilities and quality healthcare services is limited. This is one of the reasons why the use of traditional medicine is still very prevalent in the country. In the North-West Province, there is limited research on phytomedicinal plant use. This study therefore aimed to explore phytomedicinal practices in the Bojanala District, North-West Province, and to assess healthcare professionals' perceptions of integrating traditional medicine into the mainstream healthcare system. Ethnobotanical data were collected from 37 participants selected following purposive and snowball sampling techniques through face-to-face interviews using semi-structured questionnaires. Thereafter, ethnobotanical indices, including use value (UV), fidelity level (FL), and plant part value (PPV) were calculated. The survey revealed 52 medicinal plant species across 28 families, with Asteraceae, Fabaceae, and Anacardiaceae being the most represented. *A. afra* (UV=1.108), *D. anomala* (UV=0.622), *S. aethiopicus* (UV=0.459), *D. sanguinea* (UV=0.459), and *H. hemerocallidea* (UV=0.405) were the most commonly cited species. Leaves and roots were the most frequently harvested plant parts, with PPVs of 0.329 and 0.237, respectively. Decoction and burning were the most commonly used preparatory methods, and the majority of herbal preparations were taken orally. Although 63% of recorded plant species were classified as Least Concern (LC) by SANBI, several of these species experienced decline in populations due to overharvesting and habitat loss. There is, therefore, a need for continuous monitoring and the implementation of sustainable harvesting practices, as well as the pharmacological validation of the most frequently used species. Additionally, further research is needed to identify bioactive compounds in medicinal plant species, to support traditional claims, and promote the development of plant-based therapeutic agents.

In the second phase of the study, 40 purposively selected healthcare professionals were interviewed using a semi-structured questionnaire focusing on knowledge, attitudes, and practices (KAP). The collected data were analysed using thematic analysis. The findings revealed that most healthcare professionals acknowledged the effectiveness of traditional medicine. Only 17% of participants expressed confidence in the safety of traditional

medicine, while others raised concerns about the lack of standardisation of dosage and the absence of scientific evidence on its efficacy. Even so, 65% of healthcare professionals supported the integration of traditional medicine into the mainstream healthcare system, provided concerns over its safety and effectiveness were addressed. Fifty-five percent (55%) of healthcare workers have never used traditional medicine before, while 67.5% indicated they would not recommend it to anyone. The findings revealed that successful integration is possible only if both traditional health practitioners and healthcare professionals are properly educated and trained, and if thorough research on traditional medicine is conducted to address safety concerns.

Keywords: Medicinal plants, Access to healthcare, Conservation, Integration, Mainstream healthcare system

DEFINITION OF KEY CONCEPTS

Indigenous knowledge (IK): Knowledge, beliefs, and practices developed by local communities from their lived experiences, acquired over time and adapted to the local culture and environment (Bruchac, 2014; Setshego, 2019). This knowledge is specific to an ethnic group and unique to a particular culture or society. It is holistic knowledge that encompasses local people's values, attitudes, and belief systems. Furthermore, it embodies the wisdom ingrained in a community and serves as a standard that local communities have relied on for generations to guide them in managing their natural resources.

Indigenous knowledge systems (IKS): The systematic reference to indigenous communities' knowledge, practices, and belief systems (Khupe, 2014). It is a term that generally refers to the collective knowledge of indigenous people about their relationships with their surrounding environments. Beliefs, language, ideas, customs, rituals, ceremonies, folk stories, customs, and techniques all form part of IKS (Khupe, 2014).

Traditional medicine: "The total of knowledge, skills and practices based on theories, beliefs and experiences indigenous to different cultures, whether explicable or inexplicable, used in the maintenance of health as well as in the prevention, diagnosis or treatment of physical and mental illnesses" (World Health Organization, 2023). This type of healing uses plants, animals, and minerals and relies on experiences or observations transmitted orally from generation to generation.

Phytomedicine: This refers to medicine obtained/derived from plants in their original state (Bonam *et al.*, 2018; Oniyangi and Cohall, 2020). It encompasses the use of botanical preparations to prevent or treat various ailments and promote general health. Phytomedicine is based on indigenous or traditional knowledge systems, in which indigenous peoples have long utilised plants for their therapeutic properties. Phytomedicine practices involve the use of different plant parts, such as leaves, roots, bark, stems, and flowers, alone or in combination, to prepare remedies.

Biodiversity: The variety and variability of all life forms on earth and includes the diversity within and between species as well as of ecosystems (Minelli, 2001; Sumida, 2014; Ndhlovu, 2019). South Africa has a rich plant biodiversity, with some species used for medicinal purposes.

Healthcare system: The World Health Organisation (2000) has defined a healthcare system as "all activities whose primary purpose is to promote, restore and maintain health", with health being the state of total physical, mental and social wellbeing and the absence of illness. A healthcare system is also defined as a combination of resources, organisation, funding, and administration that results in the provision of healthcare services to the general public (Wang, 2008; Hsiao and Burgess, 2009). A healthcare system is an organised network of facilities, professionals, and services that deliver medical care to individuals. Its main aim is to provide accessible, high-quality medical care to individuals, focusing on the diagnosis, treatment, and management of illnesses and injuries.

Integration: a process of combining two or more things, such as systems, processes or organizations, to make a unified whole (Payyappallimana, 2010b), where all components work together seamlessly and effectively to achieve common goals.

Western medicine: A system wherein healthcare professionals, such as physicians, nurses, and pharmacists, treat illnesses using drugs, radiation, or surgery (National Cancer Institute). Western medicine, also known as conventional, modern, or allopathic medicine, has evolved through hypothetical deduction. It mainly focuses on evidence-based practices and standardised treatments (Dobos and Tao, 2011). Every statement in Western medicine is an outcome of investigations and scientific research (Tsuei, 1978). Additionally, this approach to medicine clearly distinguishes health from disease, focusing on the individual body. It emphasizes the physiological and biological aspects of health.

Traditional health practitioner (THP): This is a person who is acknowledged by the community in which they live as competent to render health care, using plants, animals or minerals and other methods based on social, cultural and religious background of the community as well as the prevalent knowledge, attitudes, and beliefs regarding physical,

mental and social well-being and the causes of disease and disability (Bereda, 2002; Latif, 2010; Shankar *et al.*, 2012; Habtom, 2015). THPs include diviners, herbalists, and faith healers.

Modern health practitioner (MHP) / Healthcare professional: This refers to an individual who is licensed, registered, or certified under state laws and regulations to provide healthcare services to the public. This individual offers medical care and advice based on formal education, experience, and evidence-based practices (IGI Global; Joseph and Joseph, 2016), and often works in healthcare facilities, such as hospitals, clinics, and pharmacies. MHPs include medical doctors, nurses, pharmacists, and psychologists, among others.

PUBLICATIONS

Matlala, M.E., Lubisi, N.P., Chauke, S., Kola, E., Ramarumo, L.J.,& Ndhlovu, P.T. 2025. Plant species used to treat various ailments of the North-West Province, South Africa: A systematic review. Next Research, 100446.

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CONFERENCE PRESENTATIONS

Matlala, M.E., Lubisi, N.P., Chauke, S., Kola, E., Ramarumo, L.J., & Ndhlovu, P.T. 2024. Botanicals used in traditional healthcare systems of the North-West Province, South Africa: A systematic review. University of Mpumalanga Research and Innovation Day. Mbombela, South Africa (27th November 2024) (Poster presentation).

Matlala, M.E., Lubisi, N.P., Chauke, S., Kola, E., Ramarumo, L.J. & Ndhlovu, P.T. 2025. Overview on ethnobotanical appraisal of medicinal plants used in traditional healthcare systems of the North-West Province, South Africa. South African Association of Botanists (SAAB) Postgraduate Online Symposium (30th January 2025).

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANC	African National Congress
ATM	African Traditional Medicine
CHC	Community Healthcare Center
CHW	Community Healthcare worker
CTM	Chinese Traditional Medicine
DFFE	Department of Forestry, Fisheries and the Environment
ENA	Enrolled Nursing Assistant
FL	Fidelity Level
HIV	Human Immunodeficiency Virus
IK	Indigenous Knowledge
IKS	Indigenous Knowledge Systems
IPNI	Internation Plant Names Index
IUCN	Internation Union for Conservation of Nature
LC	Least Concern
NDP	National Drug Policy
NWDoH	North-West Department of Health
PPV	Plant Part Value
RMIC	Rainbow Model of Integrated Care
SANBI	South African National Biodiversity Institute
SDG	Sustainable Development Goal
TB	Tuberculosis
THP	Traditional Health Practitioner
THO	Traditional Healers Organization
TM	Traditional Medicine
INICEF	United Nations International Children’s Emergency Fund

UMP	University of Mpumalanga
UV	Use Value
WHA	World Health Assembly
WHO	World Health Organisation

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Chapter 1: Introduction

1.1 Background

Phytomedicine, commonly known as herbal medicine, is a component of traditional medicine, the oldest and most popular form of healthcare (Simelane and Msomi, 2018; Ozioma Ezekwesili-Ofili and Okaka, 2019). This form of medicine uses plant materials, such as leaves, roots, barks, and/or their extracts, as active ingredients for therapeutic purposes in humans and animals. About 50,000 to 70,000 plant species worldwide are used for medicinal purposes, and several others are still being studied for their potential therapeutic properties (IUCN, 2025). South Africa is the third most biodiverse country in the world, with more than 30 000 plant species, of which more than 3000 have been used for traditional medicine for many years (Wynberg, 2002; Maze *et al.*, 2016; Bih *et al.*, 2023).

For centuries, traditional healing has played an essential part in healthcare systems in South Africa and around the world. According to earlier research, approximately 70-80% of black South Africans consult with traditional healers before visiting hospitals or clinics (Ramgoon *et al.*, 2011; Mokgobi, 2012; Mmamosheledi and Mncengeli, 2019). Furthermore, according to estimates from the World Health Organisation, more than 70% of people in low- and middle-income countries have used traditional healing in one way or another. Although many people have long used traditional medicine, colonial authorities and the apartheid government in South Africa did not acknowledge the effectiveness of this type of healing (Mokgobi, 2012). Modern medicine was introduced and advocated among Africans, and dominated traditional healing practices (Sebata, 2015). Indigenous Knowledge and traditional healing methods have been labelled as “primitive”, “superstitious”, “unscientific” or “outdated” (Mawere, 2014; Mankantshu, 2019; Murwira, 2020; Reddy, 2024). Nevertheless, many people continue to use this form of healing, mainly because it is easily accessible and inexpensive (Sebata, 2015; Mmamosheledi and Mncengeli, 2019).

After the 1994 democratic elections, the South African government reconsidered the integration of the two healthcare systems (Motloenya, 2016b; Mmamosheledi and Mncengeli, 2019). After about 31 years into the new democratic dispensation, discussions on how to successfully integrate the two systems continue. The South African National Department of Health has proposed integrating African traditional healing into the country's hospitals and clinics. This is mainly because many people still use traditional healing methods, and traditional healers fought to be recognised as medical professionals by all healthcare authorities (Mokgobi, 2012; Mmamosheledi and Mncengeli, 2019).

1.2 Problem statement and justification of the study

Previous research shows that over 70% of black Africans still depend on traditional medicine as a primary source of healthcare, despite the rapid advancements in western/conventional medicine (Mokgobi, 2012). One of the reasons for this is the inaccessibility of conventional medicine. As it stands, the South African public healthcare system is failing to provide its people with proper medical services because there is just not enough resources for everyone (Biermann, 2017). The country roughly has 77 doctors for every 100,000 people, compared with 500 traditional healers for the same population (Mmamosheledi and Mncengeli, 2019). This just reveals the significance of the traditional healthcare system. Several years ago, the WHO established policy frameworks such as the Traditional Medicine Strategy 2002-2005, which advocated for the recognition, regulation and integration of traditional medicine into formal healthcare systems to help improve access to healthcare services (Chaudhary and Singh, 2011; Mmamosheledi and Mncengeli, 2019; Park and Canaway, 2019; Mutola *et al.*, 2021). South Africa has also developed policies such as the National Drug Policy (NDP) of 1996 and the Draft National Policy on ATM (2008) to facilitate the integration (Mmamosheledi and Mncengeli, 2019). However, the formal healthcare system remains largely conventional, with traditional medicine operating in parallel but not integrated into the mainstream healthcare system (Maluleka, 2020; Mutola *et al.*, 2021).

Traditional medicine forms part of indigenous knowledge, which is usually orally transmitted from generation to generation. Studies reveal that this knowledge is fast disappearing due to globalisation, technological advancements, and cultural changes

within ethnic groups (Oroma and Guma, 2018; Tshidzumba, 2018; Henrietta Marie, 2019). Due to this, ethnobotanical and ethnomedicinal studies are necessary to help gather and document this knowledge for safekeeping. Furthermore, these kinds of studies have the potential to lead to the discovery of more effective medicines. There are several plants worldwide that still need to be investigated for their medicinal activities (Tshidzumba, 2018). In South Africa, various researchers have conducted studies on phytomedicinal plants and their use in different regions (Erasmus *et al.*, 2012; Ramarumo *et al.*, 2019; Twilley *et al.*, 2020; Ndhlovu *et al.*, 2023), however, there are still gaps in understanding the extent of use of phytomedicine by traditional healthcare practitioners in Bojanala District Municipality, North-West Province, South Africa. Additionally, reports by Stats SA (2018b) and Ndhlovu *et al.* (2023), the North West public health system has been in a state of crisis for many years due to limited medicine supply and an uneven distribution of health facilities and healthcare professionals.

This study will therefore assist in identifying medicinal plants and documenting traditional medicinal knowledge in Bojanala District of the North-West Province, thereby addressing the gap of limited ethnobotanical research in the province. Literature acknowledges the widespread use of traditional medicine and the policies advocating for its integration into the formal healthcare system, however, there is an insufficient understanding of how communities, traditional healers or healthcare professions perceive the integration. Therefore, this study will also assess healthcare professionals' perceptions of integrating traditional medicine into the formal healthcare system to identify why integration is stalling. Data obtained from this study will contribute to discussions on the formulation of policies to support the integration of healthcare systems.

1.3 Aim and objectives of the study

This study aimed to explore the use of phytomedicine in Bojanala District Municipality, South Africa, and to assess perceptions regarding integrating traditional medical practice into the mainstream healthcare system.

Objectives of the study

The objectives of the study were to:

- Generate an inventory of phytomedicinal plants used in Bojanala District Municipality, North-West Province, South Africa;
- Document knowledge and practices associated with phytomedicine in Bojanala District, North-West province, South Africa; and
- Evaluate prospects of integrating phytomedicine into the mainstream healthcare system in Bojanala District Municipality, North-West Province, South Africa.

1.4 Research questions

The following research questions were asked in the study:

- What phytomedicinal plant species are used for healthcare purposes in Bojanala District Municipality, North-West Province, South Africa?
- How indigenous knowledge regarding preparation, dosage and administration of these phytomedicines practices among local communities in Bojanala District?
- What are the barriers and enablers for the formal integration of phytomedicinal practices into the mainstream healthcare system in Bojanala District?

1.5 Significance of the study

This study provides valuable insights into two very important areas. Firstly, as mentioned above, this study focuses on the prevalence and use of traditional medicine in Bojanala District Municipality, North-West Province, South Africa. This study examines factors that influence people's preferences for traditional medicine over Western medicinal practices and their tendency to use both simultaneously. The information gathered will assist healthcare practitioners in improving outreach and service delivery. Secondly, this research will help bridge the knowledge gap between different healthcare systems. Research on healthcare professionals' views is fundamental because it will reveal their reservations or support for the use of traditional medicine and its potential integration into formal healthcare systems. Thus, this study will help identify areas where traditional medicine practitioners and healthcare professionals can collaborate to improve patient care. Moreover, this study will help highlight the need for educational and training programmes to equip healthcare professionals with knowledge of the various traditional

healthcare practices. The study will further assist with training opportunities for traditional healthcare practitioners on safe practices and potential interactions with conventional medicines. Essentially, this study will help strengthen healthcare systems, improve access to healthcare, and enhance patient care. The researcher also aims to produce publications from this study, which will potentially contribute to the body of knowledge.

1.6 Research approach

The triangulation (mixed method) research approaches were employed in this study. According to Kemper *et al.* (2003), a mixed-methods research approach involves collecting and analyzing qualitative and quantitative data in parallel. On the other hand, Creswell and Creswell (2017) define a mixed-methods approach as one that consists of collecting, analysing, and combining qualitative and quantitative data in a single study. In this type of research, the researcher uses a qualitative approach in one phase and a quantitative approach in another. Furthermore, Creswell *et al.* (2004) indicate that the basic rationale for mixing qualitative and quantitative methods is that neither of them is adequate in themselves to capture the patterns and details of the situation, but when combined, both qualitative and quantitative data yield a more complete analysis, and complement each other.

With a qualitative research approach, the researcher filters all observations, interpretations, and analyses through their lens; they become the main instrument for data collection. Qualitative research focuses on phenomena in nature or the real world and involves studying them in all their complexities. These phenomena can include how people experience aspects of their lives, how they behave, how organisations function, and how interactions shape relationships (Teherani *et al.*, 2015). The researcher examines why events occur, what happens, and what those events mean to the participants studied (Bogdan and Biklen, 1997). On the contrary, quantitative research involves collecting quantifiable data from participants and analysing the numbers using statistics (Creswell, 2012). It assumes what is reality by using statistics and expends less effort to reveal the processes underlying the community's dynamics (Ndhlovu, 2019). The objectives of this study, which sought not only to explore and document knowledge but

also to determine perceptions, informed the adoption of a mixed-methods research approach.

1.7 Research design

A research design is the plan or framework for conducting research. It helps provide the structure and direction to the research. The purpose of a research design is to outline the overall approaches and methods used to collect and analyse data to answer research questions or test hypotheses (Saunders *et al.*, 2009; Sunaina, 2023) and to arrange the research in such a way that maximises the ultimate validity of the research results (Creswell and Creswell, 2017; Ndhlovu, 2019). Every study requires clear, well-defined research questions, a detailed data collection plan, and methods for data analysis and interpretation. This study is descriptive in nature and provides a thorough and accurate picture of the study population's characteristics and behaviors. By observing and collecting data on a given topic, descriptive research helps the researcher gain a deeper understanding of a specific issue. It provides valuable insight that can inform future studies (Siedlecki, 2020). According to Botma *et al.* (2010) and Ramalepa *et al.* (2021), when a study is descriptive, data are more factual, based on stories, and thus provide truthful descriptions of phenomena.

1.8 Outline of study

This study is divided into five chapters as follows:

Chapter 1 provides background on traditional medicine and its incorporation into formal healthcare systems, the problem statement, aim and objectives, research questions, and the significance of the study. It also outlines the research approach and design used in the study.

Chapter 2 provides an in-depth literature review on access to healthcare services, the concept of traditional medicine, factors influencing the use of traditional medicine, traditional healing in South Africa, the concept of integration, different categories of integration, previous research conducted in South Africa, and the dimensions of integration.

Chapter 3 focuses on the different phytomedicinal plants used in the study area, as well as the knowledge and practices associated with them in Bojanala District, North-West

Province, South Africa. It also provides an outline of the methodology used in the study, the methods used to collect and analyse data, ethical considerations, the study's limitations, and the results and discussion.

Chapter 4 focuses on perceptions on the integration of traditional medicine into the mainstream healthcare system in Bojanala District, North-West Province, South Africa.

Chapter 5 provides a summary of the main findings of the research, the conclusions drawn, and the recommendations.

Chapter 2: Literature review

2.1 Introduction

Traditional medicine has been used for centuries to promote health and wellness, with a sizeable portion of the world's population relying primarily on it as a result of limited access to proper healthcare services (Payyappallimana, 2010b; Machaba, 2018b; Twilley *et al.*, 2020; Mutola *et al.*, 2021). This demonstrates the importance of traditional medicine in helping local populations meet their healthcare needs. However, in many countries, TM practices still exist outside the formal healthcare system. In recent years, there has been a growing recognition of the importance of integrating TM into formal healthcare systems to provide more comprehensive and inclusive care (Mmamosheledi and Mncengeli, 2019; Mutola *et al.*, 2021). This chapter provides a review of the literature to summarise the current state of research on integrative healthcare, with special focus on Bojanala District, North-West Province, South Africa. The primary goal of a literature review is to demonstrate to the reader that the researcher has read original research work (articles, books, reports, case studies, theses and dissertations, among others) and is aware of the current trends and events in the field of study (Hofstee, 2006; Randolph, 2019; Setshego, 2019). The researcher needs to understand previous research, the strengths and shortcomings of existing studies, and what they imply in order to identify gaps. Additionally, a literature review provides a better understanding of how the findings of a study are presented and discussed in a particular field (Setshego, 2019). Thus, this chapter offers definitions of key concepts used in the study, and a review of the literature on the following components: the state of public healthcare; indigenous knowledge; the role of traditional medicine in public healthcare; and the integration of healthcare systems.

2.2 Conceptual framework

A conceptual framework for a study is a tool used to organise and present the main ideas of a research study and to show how those ideas relate to each other. This study focuses on the use of phytomedicine in the Bojanala District, North-West Province, South Africa, and on perceptions of its integration into the mainstream healthcare system. Phytomedicine is a component of traditional medicine, founded on indigenous knowledge

acquired over time from lived experiences. Conversely, the mainstream healthcare system is derived from scientific research and evidence-based practices. Many people use traditional medicine due to its affordability and availability, among other reasons. In South Africa, these two systems are practised independently of each other. However, the World Health Organisation states that these two systems should be integrated to provide an effective and sustainable solution to healthcare challenges. Integrative healthcare will open up more easily accessible, cost-effective treatment options to the population. For these systems to be successfully integrated, healthcare professionals need to be aware and open to the use of phytomedicine. There is also a need for proper research on medicinal plants, as well as on regulation, registration, standardisation, and policies to support integration. **Figure 2.1** provides the conceptual framework for the study. This framework informs a culturally respectful study design (mixed-method, descriptive design) that allows the researcher to study phenomena such as people's lived experiences (ethnobotanical survey), how they relate to the environment and their perceptions; to address the research objectives and questions. This conceptual framework provides a lens through which the data will coded, categorized, and interpreted. Thematic analysis and quantitative analysis will be guided by the framework to allow findings to be organized around major themes such as community reliance on phytomedicine, barriers and enablers of integration, and the role of policy and healthcare systems.

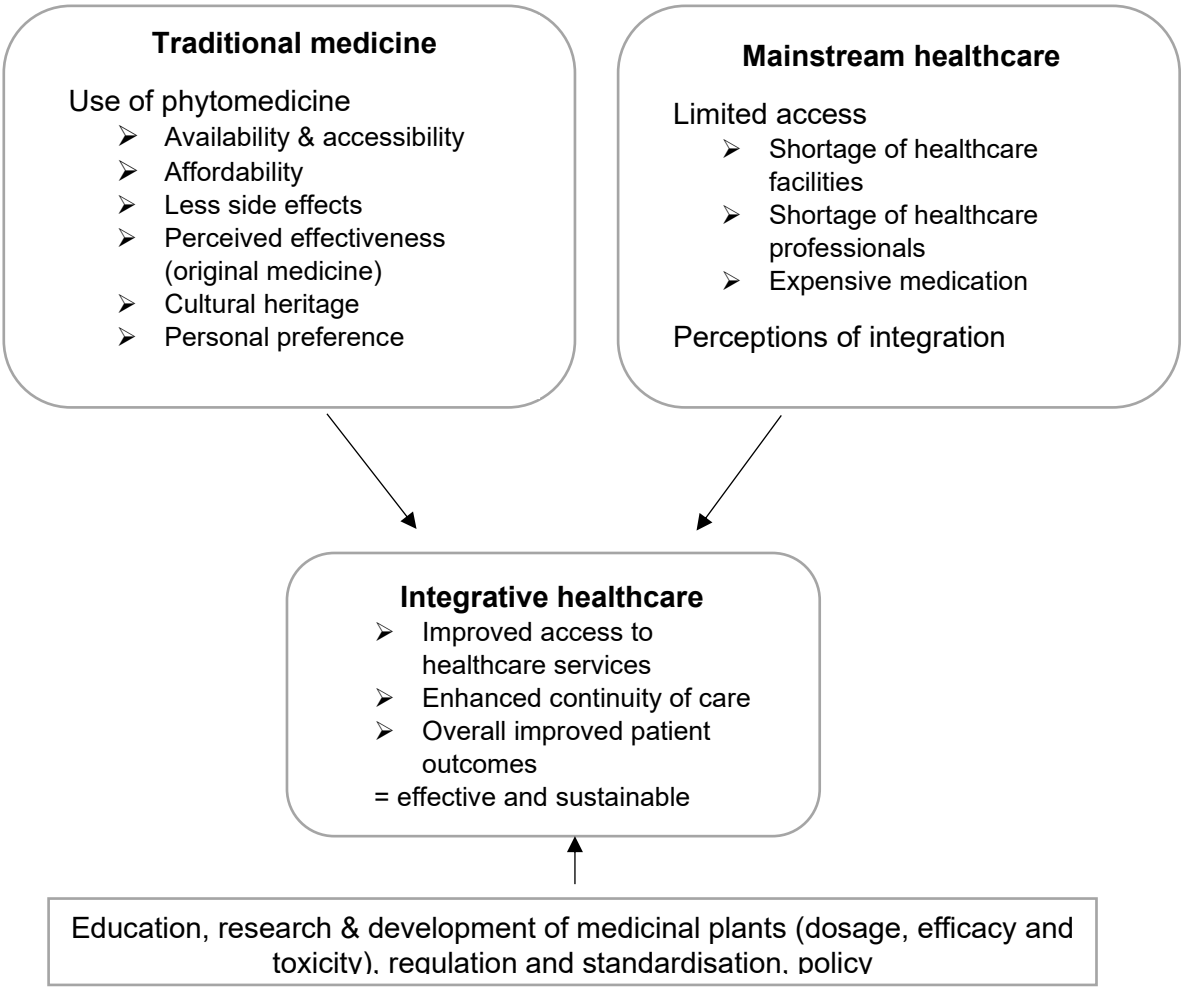

Figure 2.1: Conceptual framework of the study

2.3 Access to healthcare services

According to the World Health Organisation (2000), a healthcare system refers to "all the people and activities whose primary purpose is to promote, restore and maintain health", with health being the state of total physical, mental and social wellbeing and the absence of illness. Doctors and nurses are among those who work in modern/western medicine, as are allied health professionals, such as psychologists, occupational therapists, nutritionists, and physiotherapists. However, a healthcare system consists of more than just human resources. Hsiao and Burgess (2009) and Wang (2008) define a healthcare system as a combination of resources, organisation, funding and administration that results in the provision of healthcare services to the general public.

Katuu (2018) argues that a country's healthcare system is the result of years of historical development, not just "one logical policy-making experience". Primary healthcare, on the other hand, is defined as "the care provided at the first point of contact with the healthcare system" (Ndhambi, 2012). It is characterised by a comprehensive approach to community development and the provision of basic health services (Ndhambi, 2012). Primary healthcare is concerned with serving the community's healthcare needs. Contrarily, the National Health Plan of South Africa states that primary health care is based on practical, scientifically sound, socially acceptable methods and technology provided to all individuals and families in the community through their full participation, and at the cost that the community and the nation can afford at every stage of their development (McElmurry, 1999; Elujoba *et al.*, 2005). The joint report from the WHO and UNICEF provides a definition akin to this: "primary healthcare is essential healthcare provided to all individuals and families at the cost that both the nation and the community can afford, through methods that are acceptable to them through their full participation" (Peu *et al.*, 2001). It is an essential part of the nation's healthcare system, as well as the centre of the community's general social and economic development. It ought to satisfy the needs of those who depend on it because they cannot afford other forms of medical care. However, the WHO (2017) states that a third of the world's population lacks access to primary healthcare, and in some parts of Africa, Asia, and Latin America, almost half of the population does not have regular access to modern medicine.

Saurman (2016) defines access to healthcare as "the degree of fit between the prospective user of healthcare and the service itself". In this definition, the prospective user refers to the patient or the person who needs healthcare; healthcare services refer to the actual medical care or resources available, and the "degree of fit" describes how well these two elements align (Gulzar, 1999; Saurman, 2016). For instance, if a person has a specific healthcare need, the healthcare service must be capable of addressing those needs effectively; the services must be located in a place that is convenient for the person or be available in a way that matches their preference; and the cost of the services must be manageable for the person. So, if the healthcare service is well-suited to the needs of individuals and they can access it easily and affordably, then it is a good fit, meaning access is high. However, if there are mismatches, such as services being too

far away, too expensive, or inappropriate for individuals' needs, then the fit is poor and access is low.

South Africa has poor health outcomes in both rural and urban areas, even though it spends much more on healthcare than other middle-income and developing countries with better health outcomes (Schoeman *et al.*, 2010; Gaede and Versteeg, 2011). The country has a two-tiered healthcare system, comprising a public and a private sector (Katuu, 2018; Loeffler, 2019; Willie and Maqbool, 2023). The government and general tax finances the public sector, while the private sector is financed by direct out-of-pocket charges and contributions from medical aid schemes. The reality of the country is that there are inequalities in the healthcare system (Ataguba *et al.*, 2015). The private sector offers excellent services that can only be afforded by the wealthier segment of the population (Katuu, 2018; Reichenberg, 2023). On the other hand, the public sector, which provides healthcare services to more than 80% of the population in the country, suffers from a lack of equipment and medical supplies, affecting the quality of services it can provide (Katuu, 2018; Reichenberg, 2023). South Africa is facing an immense shortage of healthcare professionals, particularly in rural areas (Coovadia *et al.*, 2009; Mbemba *et al.*, 2016; Loeffler, 2019). Furthermore, research indicates that multiple costs are associated with seeking healthcare, which can limit one’s access to desired services (Ensor and Cooper, 2004; Harris *et al.*, 2011; Reichenberg, 2023). For instance, travel costs, frequency of visits to healthcare facilities, unreasonably long waiting times, medication costs, and what the clinic or hospital can provide based on the funds available to run the facility (Harris *et al.*, 2011). According to Visagie *et al.* (2015), travel costs and time are the most prominent barriers to accessing healthcare services.

Rural residents in South Africa struggle to access healthcare services due to socio-economic factors, such as unemployment, limited economic means to pay for treatment and to provide for themselves, and a lack of transportation to distant facilities (Goudge *et al.*, 2009; Burger and Christian, 2020; Willie and Maqbool, 2023). Just like other provinces in the country, the North-West Province is still faced with socio-economic challenges, including high unemployment, poverty, and inequality. Reports from the North West Provincial Government (2024) reveal that the Province has an unemployment rate of

36.3%, with Bojanala District Municipality ranking first at 50.5%. According to Willie and Maqbool (2023), there is a correlation between high unemployment rates and high poverty levels in impoverished communities, and such communities frequently face resource scarcity. These socioeconomic factors play a critical role in shaping health outcomes by influencing access to healthcare, living conditions, and overall well-being. Research shows that access to healthcare in rural areas of the North West Province is a significant challenge (Stats SA, 2018b; Ndhlovu *et al.*, 2023). Long distances, poor road infrastructure, and limited transportation options hinder access to healthcare facilities. Additionally, many rural communities lack basic amenities, such as electricity and running water, which can further impede the delivery of healthcare services (Willie and Maqbool, 2023). This disparity in access to healthcare between urban and rural areas contributes to health inequalities and disparities in health outcomes.

2.4 The concept of traditional medicine

Traditional medicine forms part of indigenous knowledge. The universally accepted definition of traditional medicine is one provided by WHO (2023), as “the total of knowledge, skills and practices based on theories, beliefs and experiences indigenous to different cultures, whether explicable or inexplicable, used in the maintenance of health as well as in the prevention, diagnosis or treatment of physical and mental illnesses”. It is a comprehensive term used to refer to traditional health systems, such as the African Traditional Medicine (ATM), the Chinese Traditional Medicine (CTM), and Indian Medicine (Ayurveda), among others. Traditional medicine involves the use of plant substances (herbal remedies/phytomedicine), animals, and minerals. Herbal medicine is one of the most commonly used forms of TM (Shewamene *et al.*, 2017). Traditional medicine has been used since ancient times, long before the arrival of Western medicine. To some extent, it was the only form of healing available. However, even today, it continues to play an important role in meeting the primary healthcare needs of many people worldwide, especially in low- and middle-income countries. In developed countries, only a sizable portion of the population uses traditional medicine as complementary and alternative medicine. For instance, research shows that approximately 71% of the population in Chile uses traditional medicine, 40% in Colombia, 31% in Belgium, 48%in Australia, 70% in Canada, 49% in France, and 42% in the United

States of America (Habtom, 2015; Ampomah *et al.*, 2023). In sub-Saharan Africa, roughly 80% of the population still uses traditional medicine. This explains why other populations use traditional medicine more than others. Some of the reasons for these variations in the use of TM include availability, accessibility, affordability, perceived effectiveness, and cultural heritage.

2.4.1 Factors that influence the use of traditional medicine

Availability can be categorised into two ways. Firstly, it refers to geographical distribution, and secondly, the supply of services (treatments/products) and the provider. It is well known that traditional health practitioners (THPs) are more readily available and accessible in terms of service and geographic distribution than modern medicine. For instance, research reveals that in Uganda, there is at least one traditional healer for every 200-400 patients, compared to one healthcare worker for every 20,000 patients (Payyappallimana, 2010b). In Ghana, the ratio of traditional healers to patients is 1:400, compared to the 1:12,000 medical practitioner-to-patient ratio (Ampomah *et al.*, 2023). In South Africa, it has been estimated that there are roughly 500 traditional healers for every 100,000 people, compared with 77 medical practitioners for the same population (Mmamosheledi and Mncengeli, 2019).

Affordability refers to the financial costs associated with consulting THPs or buying their treatments or products. Some researchers believe that traditional medicine is affordable (Oyebode *et al.*, 2016; Ndhlovu, 2019), while others expressed that it is relatively costly (Latif, 2010; Joos *et al.*, 2012). According to Latif (2010), THPs can be expensive due to inflation and the cost of travelling to obtain specific herbs. Additionally, certain plant species are becoming rare and at risk of extinction due to climate change and global warming (Fordham *et al.*, 2012; Wiens, 2016). Thus, it becomes complicated for THPs to obtain such herbs. Either way, herbal medicine remains affordable compared to the very high costs of Western medicine (Simelane and Msomi, 2018).

Many people believe that traditional medicine or medicinal plants are more effective and have fewer side effects than pharmaceutical drugs (Haq, 2004; Mukherjee *et al.*, 2015; Simelane and Msomi, 2018). This stems from the idea that traditional medicine is the “original” medicine, derived directly from nature or natural resources, and

that it existed before Western medicine. Another reason is that the practice of TM is ingrained in the belief systems of many communities and forms part of their cultures (Payyappallimana, 2010b).

2.4.2 Traditional healing in South Africa

According to Louw (2020), there are about 200,000 THPs in South Africa. These are individuals recognised by community members as competent to render medical services, treating both spiritual and physical ailments, using herbal remedies (Shilubane, 2008; Khoza, 2023). They are guardians of the invaluable traditional medicinal knowledge. In South Africa, there are two main types of THPs, namely, diviners and herbalists (Latif, 2010; Ngobe, 2015; Louw, 2020; Khoza, 2023).

Diviners, also known as *Sangomas*, are individuals or healers who use divination and prophecy to solve problems. The word “diviner” is derived from the term “divine”, which can be used as a verb and as an adjective. As a verb, it refers to having supernatural or magical insight into the future; as an adjective, it is used to refer to God or a god. The term “divination” is defined as a practice of seeking knowledge by supernatural means (Pearsall, 1999). Essentially, diviners use listening, observation, and experience to make diagnoses, aided by supernatural powers (usually communication from the ancestors) and the tossing of bones (Krige, 2009). The spirits or ancestors (*badimo*, seTswana; *madlozi*, Zulu) communicate with diviners through dreams and visions, giving them signs and messages. These spirits also provide guidance on specific plant species, where to obtain them, and recipes for the medication (*muti*) needed to cure a particular diagnosis (Latif, 2010; Khoza, 2023). It is important to note that not everyone can become a diviner, and people cannot just decide to become one. For a person to become a diviner, they need to have a special calling. This calling comes from ancestral spirits and is usually inherited through the bloodline as a gift (Hammond-Tooke, 1998). This calling also manifests as dreams or illness. In other words, a person would begin to show signs of a mysterious disease. This “mysterious disease” affects physical and psychological being in a way that prevents diviners from leading everyday lives. In rare cases, these people can die from the illness (Hammond-Tooke, 1998; Louw, 2020; Khoza, 2023). The symptoms of this illness, which include hallucinations, visions, and

dreams, are the ancestors trying to communicate the calling to the person. The person with the calling will then have to go through training, often known as "*go thwasa*". During such period, the person will be taught the basics that they need to know before qualifying as a diviner. For instance, some diviners use bones to make their diagnoses, thus, need to be taught how to read or interpret what the bones are saying. After completing the training, the diviner will then be able to heal people.

Herbalists, on the other hand, are just regular people who have acquired knowledge of magical techniques and are not endowed with supernatural powers; they voluntarily choose to become traditional healers (Khoza, 2023). Herbalists do not use divination; they diagnose the person based on physical or psychological symptoms (Peters, 2021). They learn to prescribe herbal medicine to treat various ailments and to act as pharmacists by dispensing *muti* (Krige, 2009; Latif, 2010). Herbalists gain their knowledge through hands-on experiences with other experienced herbalists. They learn to diagnose and treat illnesses, collect plant parts, and prepare herbal remedies.

In South Africa, it is estimated that approximately 27 million people still rely on traditional medicine to meet their healthcare needs (Reid *et al.*, 2018; Mmamosheledi and Mncengeli, 2019). Every village has a THP to render medical services. Furthermore, the country has at least 3000 plant species used for medicinal purposes (De Wet et al., 2013; Maze et al., 2016; Bih et al., 2023), and the majority of them are harvested from the wild (Mashile *et al.*, 2019). According to Mathibela (2013), local community members in the Blouberg Mountain, Limpopo, believe that certain diseases can only be treated or cured with TM. As a result, many of them still prefer TM to modern Western medicine for treating some diseases. Moreover, research shows that the South African public healthcare system is strained and failing to provide its people with proper medical services (Biermann, 2017). There is an inequitable distribution or shortage of healthcare facilities, adequate equipment, healthcare workers, and medicine, particularly in rural parts of the country (Biermann, 2017). Thus, people continue to use TM to meet their healthcare needs. The government has recognised the importance of medicinal plants and therefore supports ethnobotanical research (Khoza, 2023). For instance, various government departments, including Science and Technology, Agriculture and Land Affairs, Health and

Education, are conducting research on African Traditional Medicine (Khoza, 2023). In addition, some universities and research institutions are conducting similar studies. Several studies have documented the ethnobotanical uses of various medicinal plants in different parts of the country. For instance, in Limpopo (Shilubane, 2008; Semenya *et al.*, 2012; Ramarumo, 2017; Tshidzumba, 2018; Cherane, 2019), KwaZulu Natal (de Wet *et al.*, 2010; Coopoosamy and Naidoo, 2012; Mhlongo and Van Wyk, 2019), Eastern Cape (Bhat, 2014; Thinyane and Maroyi, 2019; Sagbo and Otang-Mbeng, 2021), Mpumalanga (Tshikalange *et al.*, 2016; Mashile *et al.*, 2019; Khoza *et al.*, 2023). At some point, the government proposed the incorporation of traditional medicine into the country's mainstream healthcare system (Mmamosheledi and Mncengeli, 2019). However, there are several challenges that are delaying such incorporation. Some of the challenges include lack of ethnobotanical research in other parts of the country and absence of frameworks to regulate prescriptions and uses of TM (Matlala *et al.*, 2025).

2.4.3 A systematic review of plant species used to treat different ailments in the North-West Province, South Africa

2.4.3.1 Materials and methods

A literature search, not restricted by year of publication, was conducted from February to August 2024. Information about medicinal plants used to manage and treat different health conditions and ailments in the North-West Province was collected from various online databases, such as Google Scholar, ScienceDirect, ResearchGate, Semantic Scholar, and PubMed. The search for information was conducted across published research articles, theses, dissertations, books, and e-books. During the search process, various techniques, including keyword and term searches, were employed. Some of the keywords and terms used included the following: "ethnobotany,"; "traditional medicine,"; "phytomedicine,"; "ethnomedicine,"; "South Africa"; "North-West Province"; "traditional healthcare"; "traditional health practitioners"; "alternative medicine"; "complementary medicine"; and "medicinal plants". During the literature search, keywords were used both as stand-alone terms and in combination. The screening of all search results involved examining the full texts of each article, determining which were eligible, downloading identified publications, and evaluating each research article critically to determine

whether it satisfied the inclusion criteria. The inclusion criteria consisted of peer-reviewed journal articles and grey literature, such as dissertations, theses, reports, and books, that focused on the use of ethnomedicine for different health conditions. Some studies were excluded from this review because they focused on natural remedies other than plant resources and ethnoveterinary medicine. All scientific identifications of medicinal plants collected were authenticated using the International Plant Names Index (IPNI) and World Flora Online databases. In contrast, their vernacular names and conservation statuses were authenticated using the South African National Biodiversity Institute (SANBI) database for Red List Plant Species (http://redlist.sanbi.org/species).

2.4.3.2 Results and discussion

2.4.3.2.1 Results of the literature search

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines as outlined by Moher *et al.* (2009) (**Figure 2.2**). The search across various scientific databases yielded 328 studies. Additional data from 13 sources, including theses, dissertations, and books, were obtained from the University of Mpumalanga Library. After removing duplicates, 134 studies were retained. The 134 studies were subjected to a thorough full-text evaluation and assessed for eligibility. Five (5) studies were excluded from the review because they focused on ethnoveterinary medicine, while this review focused on medicinal plants used for human ailments. Finally, 129 studies contributed to the review, with only four studies focusing on the North-West Province. This reveals the lack of ethnobotanical and ethnomedicinal studies in the province. The most common data collection method across the studies included in the review was in-depth interviews and semi-structured questionnaires.

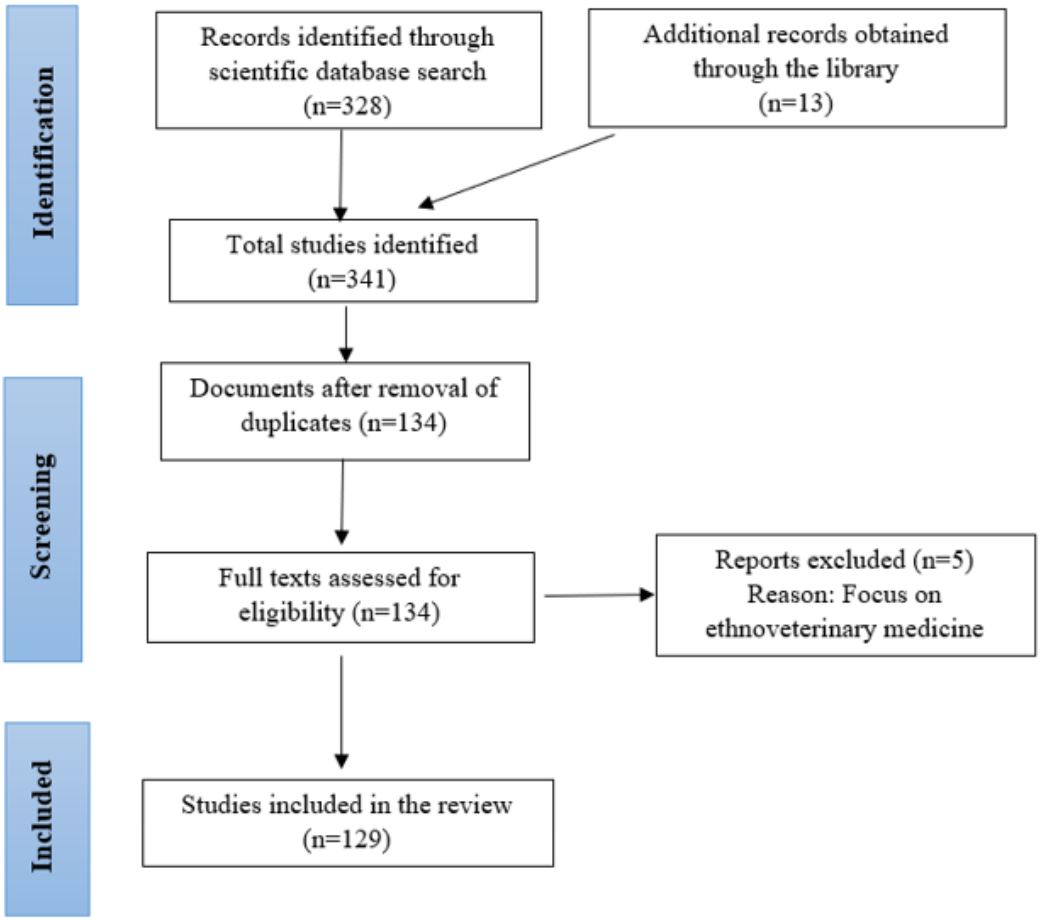

Figure 2.2: Flow diagram showing the search and selection process of articles

2.4.3.2.2 Medicinal plants used for the treatment of different health conditions in the North-West Province

The current review revealed that 144 plant species were used for distinctive medicinal purposes in the North-West Province (**Table 1.1**). These medicinal plants belonged to 58 families as follows: Asteraceae (n=15) (27%); Fabaceae (n=14) (24%); Euphorbiaceae (n=8) (14%); Asphodelaceae (n=8) (14%); Malvaceae (n=7) (12%); Solanaceae (n=7) (12%); Apocynaceae (n=6) (10%); Asparagaceae (n=6) (10%); and Rubiaceae (n=4) (7%). These families constitute more than half of all reported medicinal plant species in the region (**Figure 2.3**). This observation is similar to the findings of (Mhlongo and Van Wyk, 2019; Mogale *et al.*, 2019; Ndhlovu *et al.*, 2021; Mudau *et al.*, 2022; Ndhlovu *et al.*, 2023), where Asteraceae, Asparagaceae, Fabaceae, Euphorbiaceae, and Malvaceae were found to be among

the most used plant families for medicinal purposes. The remaining 49 families, including but not limited to Amaryllidaceae, Sapindaceae, Cannabaceae, and Hypoxidaceae, have the fewest species (**Figure 2.3**). This should not be considered peculiar, since plant families such as Fabaceae, Asteraceae, Asphodelaceae, and Euphorbiaceae are considered larger than Sapotaceae, Iridaceae, and Hypoxidaceae (Bessada *et al.*, 2015b).

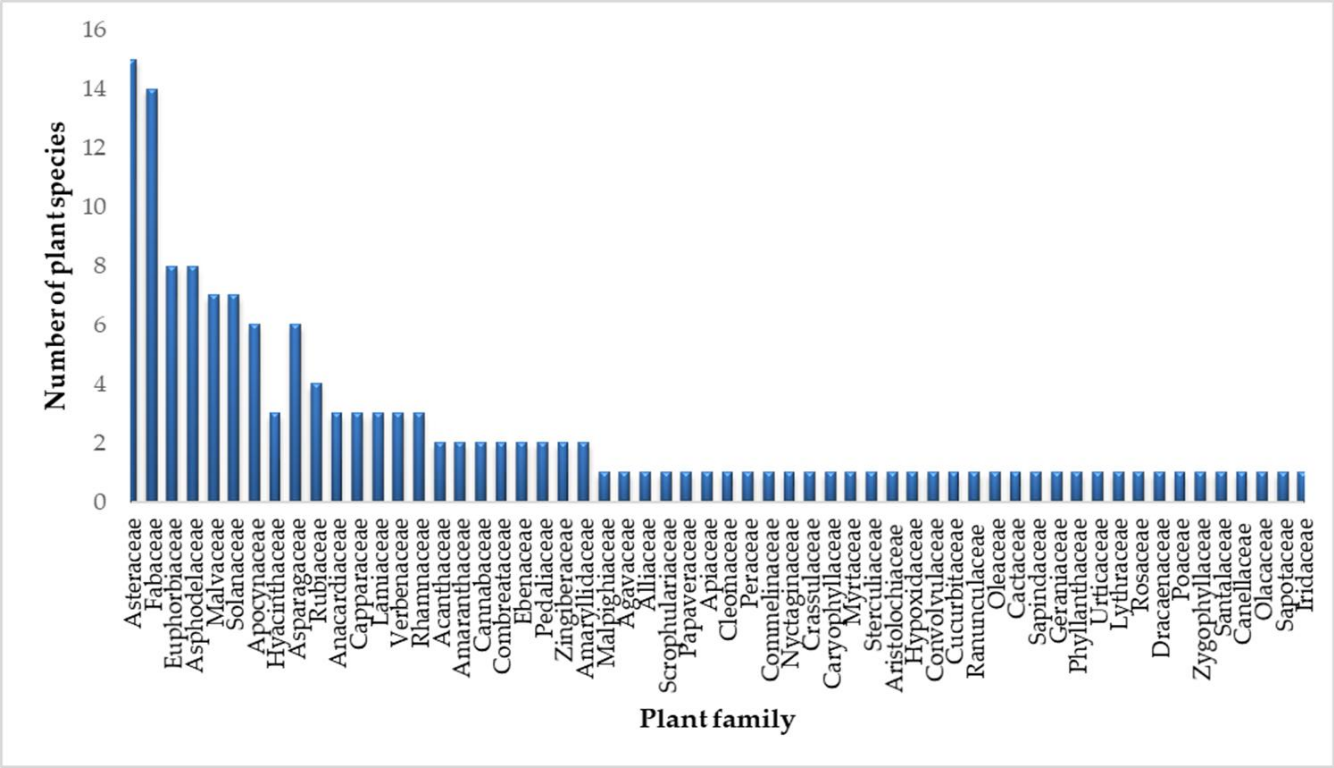

Figure 2.3: Distribution of medicinal plant species per family

Asteraceae is one of the most prominent flowering plant families, with more than 1600 genera and 25,000 species globally (Bessada *et al.*, 2015a; Rolnik and Olas, 2021; Bonokwane *et al.*, 2023). Many members of this family have been grown for edible and medicinal purposes for over 3000 years. Although they are known worldwide, they are more prevalent in the arid and semi-arid areas of subtropical countries (Rolnik and Olas, 2021). Members of this family exhibit diverse anti-inflammatory, antibacterial, antioxidant, and hepatoprotective properties (Rolnik and Olas, 2021). Fabaceae, also known as Leguminosae, is the third-largest plant family,

behind Asteraceae and Orchidaceae, with approximately 770 genera and 19,500 species worldwide (Mothogoane, 2019; Tibini, 2021). Many members of this family, used in traditional medicine, contain bioactive compounds with diverse pharmacological properties against several disease-causing pathogens. The plant's family possesses antitumor, antidiabetic, antifertility, anthelmintic, anti-inflammatory, antimicrobial, antioxidant, ant-parasitic, cytotoxic, hepatoprotective, hypoglycemic, and immunomodulatory properties (Maroyi, 2023). On the contrary, the Iridaceae family has 66 genera and roughly 2244 worldwide (Xu *et al.*, 2017); the Sapotaceae family has 53 genera and about 1250 flowering plants (Baky *et al.*, 2022).

Table 2.1: Examples of medicinal plants used in traditional healthcare systems in the North-West Province, South Africa**.** The botanical names were verified using Worldflora online (https://www.worldfloraonline.org/) while the conservation status was verified using the South African Red data list (http://redlist.sanbi.org/species)

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Acrotome inflata Benth. Lamiaceae	Mogato (T)	Whole plant	Burn, maceration	Albinism, burns, chickenpox, fleabites, sores, rash, and wounds (Asong *et al.*, 2019). Weakness, urinary tract infection, measles, and sunken fontanelle (Ndhlovu *et al.*, 2023)	Mode: Topical, orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Root or fruit decoction used to treat gonorrhea, also called 'drop'. Infusions are used to relieve ear ache (Mataha, 2021).	**Namibia:** Used as a treatment for persistent cough and breast pain (Nafuka and Mumbengegwi, 2014; Rattray and Van Wyk, 2021) **Botswana:** Roots are used to relieve uterus pains (Setshogo and Mbereki, 2011).
Acridocarpus natalitius A. Juss. Malpighiaceae	Mabophe (T)	Stem	-	Used as a contraceptive (Moroole, 2021)	Mode: - Dosage: -	Ngaka Modiri Molema District	NE	**Eastern Cape:** Leaves used in cold or warm water as a body wash for skin allergies (Bhat, 2014). **Western Cape:** Used to ward off anger, to treat colic and constipation (Philander, 2011).	-
**Agave americana* (L.) Agavaceae	Garamboom	Leaves	-	Eczema (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Leaves used to treat hypertension (Semenya, S. *et al.*, 2012; Semenya and Potgieter, 2014). Plant also used as medicine for young men (Mogale *et al.*, 2019). Leaf fibers are used to treat headaches (Mataha, 2021). **Eastern Cape:** Leaf sap and whole plant	**Lesotho:** Leaves used as a treatment for skin problems (herpes sores/ulcers), sore feet, bruises, rheumatism and syphilis. Leaves also used as a purgative (Seleteng-Kose *et al.*, 2023). **Brazil:** Roots leaves used to treat seborrhea, anemia; Also used for uterus strengthening (Ribeiro *et al.*, 2017).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								used to treat high blood pressure (Maroyi, 2017a)	**Spain:** Leaves used to treat whooping cough, colds, bronchitis and pneumonia (Menendez-Baceta *et al.*, 2014). **Italy:** Leaves are used to treat hematomas, pimples, swelling, wounds (Tuttolomondo *et al.*, 2014)
Albuca sp. Hyacinthaceae	Wakgobaka-wa-seso (T)	Bulb	-	*Kaposi sarcoma* (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
**Allium cepa L.* Alliaceae	Onion (E)	Bulb	-	Yaws (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	ND	**Limpopo:** Bulb used to treat angina pain and tuberculosis (Semenya and Maroyi, 2019).	**India:** Raw leaves used to treat indigestion (Silambarasan and Ayyanar, 2015). Bulb also used as a blood purifier and remedy for oligomenorrhea (menstrual disorders) (Bhatia *et al.*, 2015) **Palestine:** Leaves and seeds used for colds and virility enhancement. Its oil used to lower sugar and cholesterol levels, and to treat mouth ulcers (Jaradat, 2005). Bulb used for pulmonary infection, urinary retention, abscess, diarrhea and cough. Bulb also used as an anti-inflammatory, antiseptic, anthelmintic and rubefacient (Jaradat *et al.*, 2016). **Mexico:** Bulb used to treat *diabetes mellitus*, cough, epilepsy, sore throat, toothache, flu, rash, body

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
									pain cramps. It is also used as a vermifuge (Alonso-Castro *et al.*, 2012). **Brazil:** Bulb used to treat *diabetes mellitus*, asthma, bronchitis, flu and cough (Ribeiro *et al.*, 2017). **Kenya:** Leaves or root tubers used to treat snake bites (antivenin). **Uganda:** Stem-bulb leaves and roots used for sexual impotence and erectile dysfunction (Kamatenesi *et al.*, 2011). **Iran:** Bulb used for respiratory problems, bronchitis, constipation stomachache, hypertension and *diabetes mellitus*(Mehrnia *et al.*, 2021). **Cameroon:** Rhizome used to treat sexual weakness and rheumatism (Jiofack *et al.*, 2008)
Aloe arborescens Mill. Asphodelaceae	Lekgala (T)	Leaves	-	Itching skin and irritation (Ndhlovu *et al.*, 2023)	Mode: - Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	LC	**Eastern Cape:** Leaves used as an anti-inflammatory, used to treat constipation and stomachache. Leaves also used in child birth (Bhat, 2014). **Limpopo:** Old dry leaves burned and mixed with tobacco to make snuff which elderly women smoke as medicine (Mogale *et*	**Swaziland:** Leaves of this plant mixed with the roots of *Aloe saponaria* Haw to treat cardiac problems (Amusan *et al.*, 2002).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								al., 2019). Leaves are also used as medicine for high blood pressure. Plant also used to treat HIV/AIDS (Semenya and Potgieter, 2014). **Western Cape:** Leaves used as a blood purifier and to treat gastrointestinal complaints. Plant is also used to treat skin ailments, acne, condition dreadlocks and as skin moisturizers. Crystallized aloe sap is a diabetic remedy (Philander, 2011).	
**Aloe greatheadii var. davyana* (Schonland) Glen & D.S Hardy Asphodelaceae	Kgopane (T)/ Spotted aloe (E)	Leaves, roots	-	Buruli ulcer, boils, chickenpox, eczema, Steven Johnson syndrome (Asong *et al.*, 2019) Wounds, sores, and burns (Moroole, 2021)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Eastern Cape:** Leaves and leaf sap used to treat cancer, wounds, sores, various skin ailments such as eczema, skin irritation and bruises (Thinyane and Maroyi, 2019).	**Zimbabwe:** Leaves used to treat gonorrhea and constipation (Maroyi, 2011).
Aloe maculata All. Asphodelaceae	Lekgala la thaba (T)	Leaves, stem and rhizome	Maceration or infusion	Bladder inflammation, urinary tract infection, umbilical cord, diarrhea and burns (Ndhlovu *et al.*, 2023).	Mode: Orally and topically Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Mpumalanga:** Leaves infusion used to bathe the whole body to cleanse the family after a funeral (Khoza, 2023).	**Spain:** Leaves used to treat burns, wounds, cuts and wounds (Menendez-Baceta *et al.*, 2014).
**Aloe turkanensis* Christian Asphodelaceae	Lekgala (T)	Leaves	-	Eczema (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	**Kenya:** Plant used to manage malaria, wounds, stomachache, pain, fatigue and as a laxative. Leaves used to treat

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
									pneumonia and cellulitis (Wanzala *et al.*, 2016).
**Aloe vera* (L) Burm. f. Asphodelaceae	Lekgala (T)	Leaves	-	Boils, chickenpox, rash, ringworm, sores (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	**Uganda:** Leaves used to treat burns, wounds, bacterial- and fungal infections, cough and tuberculosis, diarrheal infections, herpes zoster, malaria, yellow fever, and also to boost appetite and immunity (Namukobe *et al.*, 2011; Asiimwe *et al.*, 2013; Tugume *et al.*, 2019). **Palestine:** Juice, leaves and gum used to treat skin diseases, wounds, acne, peptic ulcer, burns also used as a purgative, laxative and anti-diabetic (Jaradat, 2005). **Mexico:** Whole plant used as treatment for inflammation, body pain, diabetes, dandruff, burns, wounds, gastritis, obesity, rash, fever, and toothache (Alonso-Castro *et al.*, 2012). **Brazil:** Leaves are used to treat diarrhea, cancer, leukemia, high cholesterol, hemorrhoids, high blood pressure, bronchitis, flu, stomachache, swollen liver, gastritis, indigestion, ulcer, skin inflammation, ovarian infection, urinary infection, prostate, wounds, snake bites,

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
									burns, hangover, throat infection and inflammation (Ribeiro *et al.*, 2017). **Iran:** The plant is used as an anti-inflammatory, immune system tonic and for wound healing (Mehrnia *et al.*, 2021). **Cameroon:** Leaves used to treat poisoning (Jiofack *et al*., 2008). **India:** Leaves used to treat fever (Salve and Mishra, 2019).
Aptosimum elongatum Eng. Scrophulariaceae	Ditantanyane (T)	Whole plant, stem	Infusion	Chickenpox, yaws (Asong *et al.*, 2019), umbilical cord, muscle fits, measles, bladder inflammation, weight and appetite (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
**Argemone ochroleuca* subsp. *stenopetala* (Rose) Ownbey Papaveraceae	Sepodise (T)	Roots	Decoction	Teething (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	IA	**Limpopo:** Leaves used to treat genital warts in women (Ramarumo, 2017). The root is used to treat tuberculosis (Semenya and Maroyi, 2019).	-
Artemisia afra Jacq. Ex Willd. Asteraceae	Lengana (T)	Leaves, whole plant	Decoction	Chickenpox, rash (Asong *et al.*, 2019) Influenza (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Leaves used to treat fever, wheezing, asthma, nasal congestion and sinusitis (Semenya and Maroyi, 2018a, b). Leaves also used as treatment for flu and tuberculosis (Semenya and Potgieter, 2014; Mogale *et al*., 2019); roots used	**Lesotho:** Leaves used to treat coughs, colds, influenza, sore throats, intestinal worms, stomach complaints, worms, constipation, menstrual chill, earache, malaria, loss of appetite, headache, toothache, gout. Leaves also used to help with childbirth

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								to treat impotence. Plant also used to treat colds, stomach problems and malaria (Semenya and Maroyi, 2020). **Eastern Cape:** Leave decoction used to treat coughs and asthma. Stem and root decoctions are used as enemas. Plant also used for fever, respiratory problems, and stomach complications (Thinyane and Maroyi, 2019) **Mpumalanga:** Leave decoctions taken to treat colds (Khoza, 2023). **Western Cape:** Leaves used to treat cough, cold, and flu. Plant also used as a general health tonic, an antispasmodic, an anthelmintic, and eye drop. Leaves used to treat chest problems in infants and stomach problems (Van Wyk *et al.*, 2008; Philander, 2011).	(Seleteng-Kose *et al.*, 2023). **Uganda:** Leaves used to treat malaria (Adia *et al.*, 2014).
**Artemisia tridentata* Asteraceae	Morothothobe (T)	Whole plant	Decoction	Stomach ache, eye problems (Magodielo, 2018)	Mode: Orally, washing Dosage: -		ND	-	-
Asparagus exuvialis Burch Asparagaceae	Tlhokabotshwaro (T)	Whole plant, leaves	Decoction or maceration	Leprosy, impetigo, *condylomata acuminate*,	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema &	LC	-	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				Madura foot (Asong *et al.*, 2019) and teething (Ndhlovu *et al.*, 2023)		Bojanala Districts			
Asparagus nodulosus (Oberm) J.P. Lebrun & Stock Asparagaceae	Radipolopolwane (T)	Roots	-	Boils (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Asparagus suaveolens Burch. Asparagaceae	Mothantanyane (T) Motswere (T)	Roots, leave	Decoction, burning	Leprosy, impetigo, Madura foot (Asong *et al.*, 2019) Cough, baby fontanelle (Magodielo, 2018)	Mode: Orally, inhale Dosage: -	Ngaka Modiri Molema & Bojanala Districts	LC	**Gauteng:** Whole plant used to treat all types of cancer (Raimi *et al.*, 2021).	-
Asparagus suaveolens (L.) Asparagaceae	Lesitlwane (T)	Roots	Decoction	Dizziness (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	-	-
Babiana hypogaea Burch Iridaceae	Thuge (T)	Leaves	-	Burns (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
**Baillonella toxisperma* Pierre. Sapotaceae	Mpumbulo	Roots	Decoction	Sunken fontanelle (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	IA	-	**Cameroon:** Seeds used as an ant poison. Fruit and bark also used to treat conditions related to childbirth and rheumatism (Jiofack *et al.*, 2008; Ndah *et al.*, 2013).
Barleria macrostegia Nees. Acanthaceae	Magata/ Thotsethunya (T)	Roots, rhizome	Poultice	Boils, burns, chickenpox, athlete's foot (Asong *et al.*, 2019) and sunken fontanelle (Ndhlovu *et al.*, 2023)	Mode: Bathing Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Barleria sp. Acanthaceae	Thotshana tonya (T)	Roots, whole plant	Decoction	Albinism, burns, chickenpox, rash, wounds and sores	Mode: Orally Dosage: -	Ngaka Modiri Molema District	LC	-	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				(Asong *et al.*, 2019)					
Berkheya setifera DC. Asteraceae	Mavhumbuka	Roots	-	Used as a contraceptive (Moroole, 2021)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	**Swaziland:** Roots and leaves used to treat toothache (Amusan *et al.*, 2002). **Lesotho:** Roots and leaves used to treat itching skin and rash (Mugomeri *et al.*, 2016).
Boophone disticha (L.f) Herb. Amaryllidaceae	Lesoma (T)	Rhizome, bulb	Infusion	Ringworm (Ndhlovu *et al.*, 2023)	Mode: Topical Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Kwa-Zulu Natal:** Used to treat lower back aches, fits and hysteria (Mhlongo and Van Wyk, 2019). **Limpopo:** Bulb leaves used to cover wounds like a bandage/elastic plaster (Mogale *et al.*, 2019), bulb decoction drank as treatment for blood circulation or used to bath crying children to soothe pain. Plant also used as medication to keep a person awake (Mogale *et al.*, 2019). **Western Cape:** Bulb used to treat circumcision wounds, stitches, deep cuts and draws out puss (Philander, 2011). Leaves ingested is an internal wash and to quit drinking alcohol (Van Wyk *et al.*, 2008).	-
Boscia foetida Schinz subsp. minima Toelken.	Motsetsigaralele (T)	Leaves	Decoction	Sunken fontanelle and weaning	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema &	LC	**Western Cape:** Leaves used to promote energy and health in the womb	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Capparaceae				(Ndhlovu *et al.*, 2023)		Bojanala Districts		and stomach (Philander, 2011).	
Bulbine abyssinica A. Rich Asphodelaceae	Kgomo ya badisa (T)	Leaves, roots	-	Chickenpox (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Western Cape:** Root used by women for unspecified ailments, infertility and back pain. Leaves taken to treat vaginal and bladder problems and generally for back pain and cough. Whole plant used for healthy kidneys and to clean the alimentary tract (Van Wyk *et al.*, 2008).	-
Bulbine capitata Poelln Asphodelaceae	Kgomo (T)	Leaves	-	Chickenpox in children (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Bulbine frutescens (L) Willd Asphodelaceae	Makgabenyane (T)	Roots, rhizome, bulb	Infusion, maceration	Boils, *Kaposi sarcoma*, chickenpox, candidiasis (Asong *et al.*, 2019), sunken fontanelle, umbilical cord, body rash, sores, phlegm, urinary tract infection and eczema (Ndhlovu *et al.*, 2023). It is also used as a contraceptive (Moroole, 2021).	Mode: Topical, orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Eastern Cape:** Leaves and roots used to treat wounds, burns, rashes, itches, ringworms, cracked lips and herpes (Thinyane and Maroyi, 2019)	-
**Cannabis sativa* L. Cannabaceae	Matekwane (T)	Seed	-	Used as a contraceptive (Moroole, 2021).	Mode: - Dosage: -	Ngaka Modiri Molema District	NE	**Limpopo:** Decoction of leaves used to treat asthma and TB, while dried leaves smoked to treat headache (Ramarumo, 2017). Leaves are also used to treat fever. Plant also	**Lesotho:** Leaves and seeds used as a treatment for pain, rheumatism, asthma, glaucoma, nausea, multiple sclerosis, depression, cancer, lack of appetite associated with HIV/AIDS, constipation,

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								used as cough and flu medicine (Semenya, S. *et al.*, 2012; Semenya and Potgieter, 2014; Semenya and Maroyi, 2018b). Whole plant boiled and decoction used to treat epilepsy (Mogale *et al.*, 2019). **Eastern Cape:** Leaves and twigs used to treat cough, colds, fever, and headache; and to enhance memory (Thinyane and Maroyi, 2019).	fatigue, malaria, wound healing, gastrointestinal diseases, insomnia, snake bites. Plant also used as an anodyne, a sedative and a general tonic (Seleteng-Kose *et al.*, 2023). **Uganda:** Leaves used to manage cough and tuberculosis. Leaves and stem used to treat or manage HIV/AIDS (Asiimwe *et al.*, 2013; Nyamukuru *et al.*, 2017). Leaves used for sexual impotence and erectile dysfunction (Kamatenesi-Mugisha and Oryem-Origa, 2005). **Mexico:** Leaves used to treat rheumatism (del Carmen Juárez-Vázquez *et al.*, 2013). **Iran:** Plant used to treat eye inflammation, asthma, hypertension, depression, decrease labour and menstrual pains and treat rheumatism. Also used as a pain killer and analgesic (Mehrnia *et al.*, 2021).
Cadaba aphylla (Thunb) Wild Capparaceae	Sekgalofatshe (male) (T)	Whole plant	-	Sores, rashes, common warts and yaws (Asong *et al.*, 2019).	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Western Cape:** Stems used to expel evil (Van Wyk *et al.*, 2008).	-
Cadaba aphylla (Thunb.) Wild Capparaceae	Monna-montsho (female) (T)	Leaves, roots	Decoction, maceration	Chickenpox, *Hermangioma, Kaposi sarcoma* and malignant melanoma (Asong	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				et al., 2019). Also used for cleansing the child and treating sunken fontanelle (Ndhlovu *et al.*, 2023).					
**Catharanthus roseus* (L) G. Don Apocynaceae	Dabula	Leaves	-	Genital warts and syphilis (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	NE	**Limpopo:** Roots used to treat gonorrhea (Mulaudzi *et al.*, 2015) **Eastern cape:** Leaves and whole plant used to treat cancer and *diabetes mellitus* (Maroyi, 2017b)	-
Celtis burmanni Planch. Cannabaceae	White stinkwood (E) Modutu (T)	Roots	-	Used to increase sexual desire (Moroole, 2021).	Mode: - Dosage: -	Ngaka Modiri Molema District	ND	-	-
Centaurea scabiosa L. Asteraceae	Cornflower (E)	Whole plant	Infusion	Wounds and sunken fontanelle (Ndhlovu *et al.*, 2023).	Mode: Topical Dosage: -	Ngaka Modiri Molema & Bojanala Districts	NE	-	-
Centella asiatica (L.) Urb Apiaceae	Setimamollo (T)/ Pennywort (E)	Whole plant	-	Burns, genital warts and skin itch (Asong *et al.*, 2019).	Mode: - Dosage: -	Ngaka Modiri Molema District	ND	**Eastern Cape:** Leaves and roots taken against influenza, common colds, diarrhea, dysentery and wounds. Also used to purify blood and to enhance memory (Thinyane and Maroyi, 2019). **Western Cape:** Fresh leaves used to treat ear pain in children (Van Wyk *et al.*, 2008). **Gauteng:** Whole plant used to treat skin cancer (Raimi *et al.*, 2021).	**Uganda:** Leaves used to manage HIV/AIDS (Lamorde *et al.*, 2010). Whole plant used as a treatment for Malaria (Adia *et al.*, 2014). **India:** Aerial parts used for memory power (Silambarasan and Ayyanar, 2015). **Cameroon:** Whole plant used to treat vomiting and appendicitis (Jiofack *et al.*, 2008).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Pentarrhinum insipidum Apocynaceae	Lefye/ Leshwe (T)	Whole plant	Decoction	Running stomach (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	**Limpopo:** Roots used to treat heart attack and high blood pressure (Mogale *et al.*, 2019).	-
Chenopodium multifidum L. Amaranthaceae	Schalahalasamatlaka (T)	Whole plant	-	Eczema, sores and rash (Asong *et al.*, 2019).	Mode: - Dosage: -	Ngaka Modiri Molema District	NE	-	-
Cleome gynandra (L) Cleomaceae	Lerotho, rothwe (T)/ African spider flower (E)	Roots, leaves, seeds	-	Fevers, scorpion stings, rheumatism, and ear pain. Also used as an anthelmintic and rubefacient (Moroole, 2021).	Mode: - Dosage: -		LC	-	**Uganda:** Flowers used to treat fungal infections. Leaves used to treat headaches, snakebites, ringworm (Tugume *et al.*, 2019) and also to manage HIV/AIDS (Nyamukuru *et al.*, 2017). Roots used to treat eye diseases (Namukobe *et al.*, 2011). Leaves and roots used for sexual impotence and erectile dysfunction (Kamatenesi-Mugisha and Oryem-Origa, 2005).
Clutia pulchella var. *obtusata* (Sond.) Mu¨ll.Arg. Peraceae	Pudimolwetsi (T)	Leaves	Maceration	Weaning (Ndhlovu *et al.*, 2023).	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**-**	-
Combretum apiculatum Sond. subsp apiculatum Combretaceae	Tsholakhudu / Kgosi ya di tlhare (T)	Bark, rhizome, bulb	Maceration or poultice	Chickenpox, *Kaposi sarcoma*, flea bites, incision, *Molluscum contagiosum*, Malignant melanoma, rash, sores and infective eczema (Asong *et al.*, 2019).	Mode: Orally Dosage: -	Ngaka Modiri Molema District	LC	**Mpumalanga:** Roots used by traditional healers to awaken/activate spirits, whole plant also used for mouth colouring (Tshikalange *et al.*, 2016; Khoza, 2023).	**Zambia:** Leaves and stem bark used to treat gonorrhea and tuberculosis (Chinsembu *et al.*, 2019). **Kenya:** Fruit bodies used to treat cancer (Kipkore *et al.*, 2014).
Combretum hereroense var. parvifolium (Engl.) Wickens Kew Bull	Makakaba (T)	Leaves	Infusion	Constipation (Ndhlovu *et al.*, 2023).	Mode: Enema Dosage: Once	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Used to treat tuberculosis (Semenya and Maroyi, 2020).	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Combretaceae									
Commelina diffusa Burm.f. Commelinaceae	Kgopokgolo (T)	Rhizome, bulb	Decoction	Umbilical cord, preventing evil spirits and weak children. It is also used as a purgative (Ndhlovu *et al.*, 2023).	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	**India:** Roots used to treat fever (Salve and Mishra, 2019).
Commicarpus pentandrus (Burch) Heimerl Nyctaginaceae	Moetapele (T)	Whole plant	-	Burns, sores, warts and wounds (Asong *et al.*, 2019).	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Corchorus olitorius f. grandifolius De Wild. Malvaceae	Jute mallow (E)	Roots	Decoction	Constipation and cramps (Ndhlovu *et al.*, 2023).	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	NE	-	-
Cotyledon orbiculata L. Crassulaceae	Tsebe ya kolobe (T)	Stem	Maceration	Pain, inflammation, sunken fontanelle and constipation (Ndhlovu *et al.*, 2023).	Mode: Paste, topical, orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Leaves sun dried and powdered, and then used to awaken fainted patients. People suffering from lefufunyane (fits) are also administered the leaf powder as snuff, which is believed to enable them to communicate with ancestors (Mogale *et al.*, 2019). Fresh leaves crushed and the juices sniffed to induce sneezing to cure certain ailments or to treat aching feet (Mogale *et al.*, 2019). Plant also used to treat flu and the root used to treat gonorrhea (Erasmus *et al.*, 2012; Semenya and Potgieter, 2014)	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								Western Cape: Leaves used as a remedy for toothache and skin ailment (Philander, 2011).	
Croton gratissimus Burch. Euphorbiaceae	Lavender fever berry (E) Mologa (T)	Leaves, Roots, Bark	Decoction	Body sores, cold, bathing for protection against misfortunes (Moroole, 2021)and flue (Magodielo, 2018).	Mode: Orally Dosage: -	Bojanala District	LC	**Limpopo:** Roots used to treat sinusitis (Semenya and Maroyi, 2018a). Also used to treat asthma, nasal congestion, sore throat, TB and wheezing (Semenya and Maroyi, 2019; Semenya and Maroyi, 2020).	**Zambia:** Leaves used to treat genital sores and bacterial vaginosis (Chinsembu *et al.*, 2019)
Cullen tomentosum (Thunb.) J.W.Grimes Fabaceae	Mojakubu (T)	Whole plant	Maceration	Rashes and sores (Ndhlovu *et al.*, 2023).	Mode: Topical, orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**-**	-
Dianthus mooiensis F.N Williams subsp. kirkii (Burtt Davys) SS Hooper Caryophyllaceae	Tlhokalatsela/ Letlhoka la tsela (T)	Roots, whole plant	-	Genital warts (Asong *et al.*, 2019), weaning, sunken fontanelle and body rash (Ndhlovu *et al.*, 2023).	Mode: Orally, topical Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**-**	-
Dicerocaryum senecioides (Klotzsch) Abels. Pedaliaceae	Tshetlho ya mibitla e mebedi (T)	Thorn	Decoction or maceration	Body rashes (Ndhlovu *et al.*, 2023).	Mode: Topical, orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Used to treat chronic cough and tuberculosis (Semenya and Maroyi, 2019). Leaves used to treat asthma (Semenya and Maroyi, 2018b).	-
Dichrostachys cinerea (L.) Wight & Arn. Fabaceae	Moselesele (T)	Leaves, roots	Infusion, decoction	Diarrhea (Ndhlovu *et al.*, 2023), tooth ache and vomiting (Magodielo, 2018).	Mode: Orally Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	LC	**Kwa-Zulu Natal:** Roots taken to ease pain or rubbed into incisions cut over painful area. Also used for sharp internal body pains and side pains in babies	**Swaziland:** Roots used to treat persistent coughs (Amusan *et al.*, 2002) **Zambia:** Roots used to treat gonorrhea, genital sores (Chinsembu *et al.*, 2019).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								(Mhlongo and Van Wyk, 2019). **Limpopo:** Used to treat tuberculosis (Semenya and Maroyi, 2019; Semenya and Maroyi, 2020).	**Kenya:** Roots and barks used to treat oral thrush, cough stomachache and chest pains (Wanzala *et al.*, 2016).
Dichrostachys akataensis Villiers Fabaceae	Kalahari christmas (E) Mosêlêsêlê (T)	Bark	-	Dysentery, elephantiasis, snakebites, leprosy, syphilis, gonorrhea, anthelminthic and toothache (Moroole, 2021).	Mode: - Dosage: -		LC	-	-
Dicoma anomala Sond. Asteraceae	Tlhonya (T)	Roots, whole plant, bulb	Decoction or poultice	Albinism, boils, burns, flea bites, herpes zoster, *condylomata acuminata*, impetigo, *Kaposi sarcoma*, skin itch and sores (Asong *et al.*, 2019), diarrhea, body rash and sunken fontanelle (Ndhlovu *et al.*, 2023). It is also used as a contraceptive (Moroole, 2021).	Mode: Orally, topical Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Used to treat tuberculosis (Semenya and Maroyi, 2019; Semenya and Maroyi, 2020).	**Swaziland:** Bulb used to treat kidney problems (Amusan *et al.*, 2002). **Lesotho:** Tubular roots used as a treatment for general body pains, diarrhea, colic, rheumatism and fevers (Mugomeri *et al.*, 2016).
Disparago anomala Schltr. Ex Levyns. Asteraceae	Mojakabomo (T)	Rhizomes, whole plant, roots	Maceration and decoction	Used as a contraceptive (Moroole, 2021) and as remedy for sunken fontanelle, weaning and constipation (Ndhlovu *et al.*, 2023).	Mode: Topical, orally Dosage: topical (2x/day), orally (3x/day)	Ngaka Modiri Molema & Bojanala Districts	LC	-	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Drimia altissima (L.F) Ker Gawl Asparagaceae	Thobega (T)	Leaves	-	Sores (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Drimia sanguinea (Schinz) Jessop Asparagaceae	Sekaname (T)	Bulb	-	Candidiasis, common warts, genital warts, syphilis and yaws (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	NT	**Limpopo:** Bulb used to treat chest pains and tuberculosis (Semenya and Maroyi, 2019).	-
**Dysphania ambrosioides* (L.) Mosyakin & Clemants Amaranthaceae	Hlahlabadimo (T)	Whole plants	-	*Kaposi sarcoma*(Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	ND	**Kwa-Zulu Natal:** Used to treat fever, venereal disease, boils, lice, body odour, colds and flu, stomach cramps, baby sicknesses, fever, urinary infections, bladder-, prostate- and kidney issues. Also used to deworm (Mhlongo and Van Wyk, 2019).	**DRC:** Leaves used to treat cough and fever (MASENGO *et al.*, 2023).
Elephantorrhiza burchellii Benth (Burch) Skeels Fabaceae	Mositsane (T)	Roots	Maceration or poultice	Chickenpox, squamous carcinoma, malignant melanoma, infantile acropustulosis, hemangioma, keratosis, *kaposi sarcoma*, pearl penile papules, genital warts, Madura foot, keratosis, herpes simplex (Asong *et al.*, 2019), infective eczema, diarrhea, ulcer, burns and measles (Ndhlovu *et al.*, 2023).	Mode: Orally and topical Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Roots used to treat or manage HIV/AIDS (Semenya *et al.*, 2013) and tuberculosis (Semenya and Maroyi, 2019). **Kwa-Zulu Natal:** Used to treat diarrhea, dysentery, intestinal disorders, perforated peptic ulcers, abdominal pains, coughs, fever, chest complaints, pneumonia, hemorrhoids, dysmenorrheal, syphilis, infertility, HIV/AIDS, hypertension, anemia, and weakness.Also	**Botswana:** Roots used for massaging muscles. Pregnant women are massaged with it before giving birth (Setshogo and Mbereki, 2011).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				It is also used as a contraceptive (Moroole, 2021).				used as a skin lighter (Mhlongo and Van Wyk, 2019). **Mpumalanga:** Root infusion used as a remedy for diarrhea and hemorrhoids (Khoza, 2023). **Eastern Cape:** Rhizomes used to treat high blood pressure, hemorrhoids, rashes and to purify blood	
Elephantorrhiza elephantina Fabaceae	Mositsana (T)	Roots	Decoction	Blood related diseases and baby fontanelle (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	**Eastern Cape:** Leaves and roots taken for diarrhea, dysentery, syphilis, bleeding and heart ailments, and ointment used for sun burn (Thinyane and Maroyi, 2019). Leaves used to treat high blood pressure (Olorunnisola *et al.*, 2011).	-
Eucalyptus camaldulensis Dehnh. Myrtaceae	Eucalyptus (E)	Leaves and bark, whole plant	Maceration and decoction	Ringworm, tuberculosis and influenza (Ndhlovu *et al.*, 2023).	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Used to treat colds, flu and headache (Ramarumo, 2017; Mogale *et al.*, 2019). Bark of the tree also used to treat fever and sinusitis (Semenya and Maroyi, 2018a). Leaves used to treat tuberculosis (Semenya and Maroyi, 2019). **Kwa-Zulu Natal:** Used to treat headaches, toothache, high blood pressure, colds and flu, diarrhea, inflammation and tight chest	**Pakistan:** Leaf decoction mixed with sugar to treat colds and flu (Shah *et al.*, 2015). **Cameroon:** Leaves used to treat cough and catarrh (Jiofack *et al.*, 2008)

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								(Mhlongo and Van Wyk, 2019). **Eastern Cape:** Stems and leaves used to treat cough and TB (Maroyi, 2017a)	
Euclea divinorum Hiern Ebenaceae	Mokwere (T)	Bark	-	Used as a skin lightener and a treatment for rashes and eczema (Asong *et al*., 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Mpumalanga:** Roots decoction used as a laxative and blood purification remedy and treat STI's (Khoza, 2023).	**Swaziland:** Roots used to treat ulcers (Amusan *et al.*, 2002). **Botswana:** Roots used as a cure for kidneys (Setshogo and Mbereki, 2011). **Zimbabwe:** Roots used to treat diarrhea (Maroyi, 2011). **Kenya:** Bark used as antivenom (Kipkore *et al.*, 2014). Roots used to treat cough and chest pains (Wanzala *et al.*, 2016).
Euclea crispa (Thunb.) Gürke Blue suarri Ebenaceae	Mohlakolo (T)	Bark, roots, leaves	-	*Diabetes mellitus*, rheumatism, epilepsy, chronic wounds and stomachache, constipation (Moroole, 2021).	Mode: - Dosage: -		LC	**Limpopo:** Roots used to treat or manage HIV/AIDS (Semenya and Potgieter, 2014; Mogale *et al.*, 2019). **Mpumalanga:** Roots chewed and used as toothbrush (Tshikalange *et al.*, 2016).	**Zimbabwe:** Roots used to treat coughs (Maroyi, 2011).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Eucomis autumnalis (Mill). Chitt Hyacinthaceae	Mathubadifhala (T)	Rhizome, roots	Infusion	Acne vulgaris, boils, chicken pox, Herpes zoster, sores (Asong *et al.*, 2019), urinary inflammation, oral blisters and infective eczema (Ndhlovu *et al.*, 2023).	Mode: Orally and topical Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Kwa-Zulu Natal:** Used to treat sharp internal body pains, back pains, venereal disease, blood purification, sores eruption, operation healing, wounds, ulcers, baby sicknesses, colds and flush the kidneys, cleanse the bladder and prostate (Mhlongo and Van Wyk, 2019). **Mpumalanga:** Bulb boiled and decoction taken to improve libido, purify blood, treat HIV and help with healing after an operation. (Khoza, 2023) **Limpopo:** Bulb used to treat tuberculosis (Semenya and Maroyi, 2019). **Gauteng:** Leaves and roots used to treat esophageal and lung cancer (Raimi *et al.*, 2021).	**Lesotho:** Tubular roots used to treat hemorrhoids, syphilis and gonorrhea (Mugomeri *et al.*, 2016).
Euphorbia inaeqilatera Sond. Var. inaequilatera Euphorbiaceae	-	Roots	-	Burns, sores and rash (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Whole plant used to treat chest pains (Semenya and Maroyi, 2019).	-
Euphorbia ingens E.Mey. ex Boiss Euphorbiaceae	Naboom (A) Monkgopo (T)	Leaves, bark, roots	-	Warts and chronic ulcers, blood related diseases, and to clean decayed teeth (Moroole, 2021).	Mode: - Dosage: -		LC	**Kwa-Zulu Natal:** Latex taken in very small doses as a purgative; plant used as an unspecified cancer cure, and taken for warts (Corrigan *et al.*, 2011). Also used to	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								treat acne, sores, nyongo-"biliousness", diarrhea and inflammation (Mhlongo and Van Wyk, 2019). **Limpopo:** Latex used as a laxative (Mogale *et al.*, 2019) and the stem used to treat breast cancer (Semenya and Potgieter, 2014). **Gauteng:** Latex used to treat skin and breast cancer (Raimi *et al.*, 2021).	
Euphorbia prostrata Aiton Euphorbiaceae	Letswetlane (T)	Rhizome	Enema or decoction	Candidiasis, syphilis, infantile acropustulosis, chickenpox (Asong *et al.*, 2019), constipation and phlegm (Ndhlovu *et al.*, 2023).	Mode: Orally Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	NE	-	**Pakistan:** Latex applied on skin for eruptions and ringworm (Ali and Qaiser, 2009).
Euphorbia serpen Kunths Euphorbiaceae	Lwetsane (T)	Leaves, roots, rhizome, bulb	Maceration	Athlete's foot, ringworm (Asong *et al.*, 2019), weaning and sunken fontanelle (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	LC	**-**	-
Gompocarpus fruticosus (L) Aiton.f. sudsp. fruticosus Apocynaceae	Moetimolo (T)	Whole plant	-	Burns, sores and rash (Asong *et al.*, 2019)	Mode: - Dosage:	Ngaka Modiri Molema District	LC	**Limpopo:** Leaf decoction used as an enema for kidney dysfunctions or taken orally as a headache treatment. Plant also used as treatment for epilepsy (Mogale *et al.*, 2019), root used to treat erectile dysfunction	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								(Semenya and Potgieter, 2013, 2014).	
Gomphocarpus fruticosus (L.) W.T.Aiton. Apocynaceae	Segamelamatshi (T)	Whole plant	Poultice	Sunken fontanelle (Ndhlovu *et al.*, 2023)	Mode: Topical, orally and enema Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Roots used to treat gonorrhea (Mulaudzi *et al.*, 2015)	-
Grewia flava DC. Malvaceae	Morwetla (T)	Roots	-	Pearl penile papules (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Roots used to treat diarrhea (Semenya and Potgieter, 2014) and sexually transmitted diseases (Mongalo and Makhafola, 2018; Mogale *et al.*, 2019). Also used to treat tuberculosis (Semenya and Maroyi, 2020).	-
Grewia flavescens Juss. Malvaceae	Motsotsojane (T)	Leaves		Candidiasis, common warts, sores (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** root is taken for lack of appetite (Semenya and Maroyi, 2019).	**Botswana:** Roots used to treat big sores under the chin (Setshogo and Mbereki, 2011). **Zimbabwe:** Roots used to treat menorrhagia (Maroyi, 2011).
Grewia occidentalis L. Malvaceae	Crossberry (E) Motsotsojane (T)	Fruits, bark, roots	-	Wounds, bladder inflammation, and to prevent hair from getting grey (Moroole, 2021).	Mode: - Dosage: -		LC	**Kwa-Zulu Natal:** Used to treat head sores and men sicknesses, and improve sperm quality (Mhlongo and Van Wyk, 2019). **Eastern Cape:** Roots used for child birth, whole plant used to treat sterility or impotency, and the bark crushed and used to treat wounds (Bhat, 2014). **Limpopo:** Roots used to treat tuberculosis	

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								(Semenya and Maroyi, 2019).	
Harpagophytum procumbens (Burch.) DC ex Meisn. subsp. Pedaliaceae	Sengaparile (T)	Whole plant	Decoction	Bladder inflammation, kidney failure, pneumonia, liver failure, pain and inflammation, urinary tract infection and bronchitis. Also used to gain weight (Ndhlovu *et al.*, 2023).	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	NE	-	**Botswana:** Tubers used to treat high blood pressure, rheumatism and cramps (Setshogo and Mbereki, 2011).
Helichrysum caespititium (DC.) Sond. ex Harv. Asteraceae	Phate ya ngaka (T)	Leaves	-	Used as a contraceptive (Moroole, 2021)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Whole plant used to treat gonorrhea, various respiratory conditions (cough, asthma), *diabetes mellitus*, epilepsy, hypertension, blood purifier, measles and diarrhea, also used as an enema for constipation (Semenya and Potgieter, 2014; Mogale *et al.*, 2019). Roots used to treat blood problems (Semenya and Potgieter, 2014). Whole plant used to treat fatigue (Semenya and Maroyi, 2018b).	**Lesotho:** Roots and leaves used to treat coughs and flu (Mugomeri *et al.*, 2016).
Helichrysum nudifolium (L). Less Asteraceae	Mphepho (T)/ Motlhatlhabadimo (T)	Leaves, whole plant	Burning	Genital warts (Asong *et al.*, 2019) and to enhance child growth (Ndhlovu *et al.*, 2023)	Mode: Paste Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	LC	**Eastern Cape:** Leaves used to treat *diabetes mellitus*, menstrual pain, cough and wounds (Maroyi, 2017a)	**Uganda:** Whole root used to treat or manage HIV/AIDS (Lamorde *et al.*, 2010)

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Helichrysum paronychioides DC. Humbert Asteraceae	Phate-ya-ngaka (T)	Whole plant, roots, leaves	Decoction, poultice	Boils, candidiasis, eczema, *Kaposi sarcoma*, rash, yaws, Herpes zoster, ringworm, pearl penile papules (Asong *et al.*, 2019), sunken fontanelle, ulcer, bladder inflammation, influenza and nappy rash (Ndhlovu *et al.*, 2023)	Mode: Topical and orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Helichrysum sp. Asteraceae	Phate-ya-ngaka (T) (female)	Whole plant	-	Boils and candidiasis (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Hermannia depressa N.E. Br Sterculiaceae	Selejane (T)	Whole plant	-	Sores (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Eastern Cape:** Leaves used to treat colds and cough (Maroyi, 2017a)	**Lesotho:** Tubular roots used as treatment for stomachache (Mugomeri *et al.*, 2016; Seleteng-Kose *et al.*, 2023). Plant also used as treatment for nausea, diarrhea, heartburn, colic, coughs, cancer, wounds, and bruises. It is also used to improve appetite in pregnant women (Seleteng-Kose *et al.*, 2023).
Hibiscus calyphyllus Cav. Malvaceae	Motshididi (T)	Roots	Maceration	Impetigo (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Hibiscus micranthus Malvaceae	Motlhagala (T)	Roots	Decoction	Abscesses and boils (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	-	**Palestine:** Llowers used to treat diarrhea (Jaradat *et al.*, 2016)

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Hilliardiella elaeagnoides (DC) Swelank & J.C. Manning Asteraceae	Ntshikologa (T)	Roots, whole plant	Decoction	Scabies, eczema (Asong *et al.*, 2019) and diarrhea (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Hydnora africana Thunb. Aristolochiaceae	Letlhoele (T)	Rhizome, bulb	Maceration	Used as a remedy for someone who is coughing blood (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: as needed	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Hypoxis hemerocallidea Fisch., C.A Mey & Ave-Lall. Hypoxidaceae	Tshuka ya poo (T)	Bulb, roots	Decoction	Acne vulgaris, boils, genital warts, infantile acropustulosis, Herpes zoster, pimples, rash, ringworm, sores, syphilis, wounds, yaws (Asong *et al.*, 2019), sunken fontanelle, bladder inflammation, kidney failure, urinary tract infection, bronchitis pneumonia, child cleanse influenza, ulcer, gastro-intestinal and appetite (Ndhlovu *et al.*, 2023)	Mode: Topical and orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Used to treat gonorrhea and HIV/AIDS (Semenya *et al.*, 2013). Tuber used to treat tuberculosis (Semenya and Maroyi, 2019). **Kwa-Zulu Natal:** Used to treat HIV, back pains, sharp internal body pains, head sores, scabies, high blood pressure, boils, septic wounds, septic sores, ulcers, ease childbirth, arthritis, colds, flush or clear stomachs, wounds incurred from an injury, burn wounds, bladder and prostate issues (Corrigan *et al.*, 2011; Mhlongo and Van Wyk, 2019). **Eastern Cape:** Root tuber used to treat tuberculosis (TB) and cancer (Bhat, 2014). Leaves and roots used to treat urinary tract infections, rheumatoid arthritis, testicular	**Lesotho:** Tubular roots used to treat chronic wounds and boost the immune system (Mugomeri *et al.*, 2016). Corm used to treat dizziness, cancers, inflammations, mental disorders, HIV, bladder disorders, burns, prostrate problems, testicular tumours, urinary infections and headaches (Seleteng-Kose *et al.*, 2023). **Botswana:** Tuber used as treatment for sexually transmitted diseases and kidney problems. Also used as an aphrodisiac (Setshogo and Mbereki, 2011).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								tumors, depression and anxiety (Thinyane and Maroyi, 2019). Corm and leaves used for stroke, high blood pressure and heart weakness (Olorunnisola *et al.*, 2011). **Mpumalanga:** Roots used to treat HIV, boost the immune system and treat ulcers (Khoza, 2023). Bulb also used to treat high blood pressure (Tshikalange *et al.*, 2016). **Western Cape:** Bulb used for purging and treating HIV and arthritis. Also used to strengthen blood and as an immune system booster (Philander, 2011). **Gauteng:** Corms used to treat skin cancer, lung cancer, cervical and prostate cancer (Raimi *et al.*, 2021)	
Ipomoea oblongata E.Mey.ex Chiosy A. Convolvulaceae	Morebe / Mokatelo (T)	Roots, rhizomes	Poultice and maceration	Genital warts, leprosy, scabies, chickenpox, measles (Asong *et al.*, 2019), umbilical cord and to boost appetite (Ndhlovu *et al.*, 2023)	Mode: Topical and orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Mpumalanga:** Root decoction used to treat drop (STI) (Khoza, 2023). Bulb also used to treat asthma and high blood pressure (Tshikalange *et al.*, 2016).	**Lesotho:** Roots used to treat asthma and exude wounds (Mugomeri *et al.*, 2016).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Jatropha zeyheri Sond. Euphorbiaceae	Seswagadi (T)	Roots	-	Acne vulgaris, albinism, boils, Herpes zoster, genital warts, and yaws (Asong *et al.*, 2019)	Mode: - Dosage:-	Ngaka Modiri Molema District	LC	**Limpopo:** Roots used to treat gonorrhea (Erasmus *et al.*, 2012), TB (Semenya and Maroyi, 2019). Bulb decoction used for blood ailments and as an enema (Mogale *et al.*, 2019). Dried leaves used to treat feet problems (ailments) and induce vomiting (Mongalo and Makhafola, 2018). **Mpumalanga:** Roots used to treat menstrual pains, painful womb and maintain pregnancy (Khoza *et al.*, 2023). Bulb used for miscarriages and testicle sores (Tshikalange *et al.*, 2016).	**Botswana:** Roots used to cleanse kidneys and intestines (Setshogo and Mbereki, 2011).
Kedrostis nana var. *zeyheri* Cucurbitaceae	Mpitike (T)	Bulb	-	Eczema (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Western Cape:** Tuber used to treat cancer, ulcers, menstrual complaints, diabetes, hypertension and constipation (Philander, 2011). Also used as a blood purifier, diuretic and external ointment for sores. Plant also used for dieting. Roots used for stomach ache or stomach cramps (Van Wyk *et al.*, 2008).	-
Kleinia longiflora Asteraceae	Mosiama/Kganya (T)	Whole plant, roots	Infusion, decoction	Used to cleanse bad luck and as a remedy for loose	Mode: Bathing, orally Dosage: -	Bojanala District	LC	**Limpopo:** Roots used to treat chlamydia (Semenya *et al.*, 2013).	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				tooth (Magodielo, 2018)				Also used to treat rhinitis and pneumonia (Semenya and Maroyi, 2020). Twigs used to treat chest pain (Semenya and Maroyi, 2019).	
**Kohautia sp.* Rubiaceae	Madi a phalana (T)	Roots	Decoction	Barrenness and used to make men sexually strong (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	ND	-	-
Lantana angolensis Moldenke Verbenaceae	Selaole (T)	Roots	-	Ringworm (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	ND	-	-
Lippia javanica (Burm.f.) Spreng Verbenaceae	Selaole (T) / fever tea (E)	Whole plant	-	Incision, rashes, sores and common warts (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Kwa-Zulu Natal:** Leaves boiled in water and whole body covered over the steam to cure fever (Corrigan *et al.*, 2011). Leaves used for colds and coughs, to treat febrile rashes, chest ailments and diarrhea. Also used to treat headaches, wounds, flu, inflammation, hysteria and shock, eye problems, as well as congested nasal passages (Mhlongo and Van Wyk, 2019). **Limpopo:** Leaf decoction taken as treatment for sinusitis (Semenya and Maroyi, 2018a). Plant also used to treat asthma, fatigue, fever, laboured breathing, nasal congestion, pneumonia,	**Swaziland:** Roots used to treat napkin rash and night terrors. Roots also used to treat kidney problems (Adeniji *et al.*, 2000; Amusan *et al.*, 2002). **Uganda:** Leaves and root bark used to treat or manage HIV/AIDS (Nyamukuru *et al.*, 2017). **Kenya:** Leaves and twigs used for amoebiasis (Kipkore *et al.*, 2014). Leaves also used for deworming and colds (Wanzala *et al.*, 2016).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								rhinitis, TB and wheezing (Semenya and Maroyi, 2020). **Mpumalanga:** Roots used as herbal tea and treatment for respiratory problems and chest pains (Tshikalange *et al.*, 2016). **Eastern Cape:** Leaves and stems used as remedy for bronchial problems, coughs, fever, malaria and lung problems (Thinyane and Maroyi, 2019).	
Lippia scaberrima Verbenaceae	Mosukujwane (T)/ Thobega	Whole plant	Decoction	High blood pressure (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	-	-
Lycium horridum Thunb. Solanaceae	Motlhala wa dikonyana (T)	Whole plant, roots, leaves	Infusion	Keratosis (Asong *et al.*, 2019), umbilical cord, warts, skin irritation and sunken fontanelle (Ndhlovu *et al.*, 2023)	Mode: Topical Dosage: -	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Lycium sp. Solanaceae	Lesitlwane (T)	Roots, leaves	Decoction, infusion	Blood related diseases, dizziness and baby fontanelle (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	-	-
Malva neglecta Wallr. Malvaceae	Tikamotse (T)	Whole plant	-	Albinism, bullous dermatosis, herpes simplex, sores and yaws (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	NE	-	**Pakistan:** Whole plant used as an appetizer, used to treat vomiting, bone diseases, joints dislocation and high blood pressure (Bibi *et al.*, 2014). **Palestine:** Fruits used for nutritional anemia and as

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
									a laxative (Mehrnia *et al.*, 2021). **Iran:** Plant used to treat colds, kidney and bladder infections.Also used as an anti-tussive and antipyretic (Jaradat, 2005). **Spain:** Flowers used for general health (Menendez-Baceta *et al.*, 2014).
Mundulea sericea (Willd.) A.Chev. Fabaceae	Mosita-Tlou (T)	Barks	Grind into powder	Hiccups (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	**Limpopo:** Used to treat epilepsy and menstrual disorders (Semenya *et al.*, 2013; Mogale *et al.*, 2019).	-
**Nigella sativa* L. Ranunculaceae	Blackseed (E)	Whole plant	Poultice	Used for rebuilding cells and treating burns (Ndhlovu *et al.*, 2023)	Mode: Orally and topical Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	ND	-	**India:** Seeds used for body refreshment (Silambarasan and Ayyanar, 2015) **Palestine:** Oil and seeds used for nausea, liver disease, gastro-intestinal tract inflammation, dysentery, colds, rash, acne, renal stones, asthma and hair loss.Also used as a tonic for skin, anti-lice and an anthelmintic (Jaradat, 2005). **Iran:** Seeds used for cough, diabetes and rheumatism (Mehrnia *et al.*, 2021).
Olea europaea L. Oleaceae	Wild olive (E) Motlhware (T)	Roots, leaves	-	Blood pressures, kidney disease, diarrhea and sore	Mode: - Dosage: -		LC	**Eastern Cape:** Leaf and fruit decoctions used to treat blood pressure (Bhat, 2014).	**Uganda:** Plant used to treat or manage HIV/AIDS (Lamorde *et al.*, 2010).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				throats (Moroole, 2021)				Leaves and roots used for heart problems (Olorunnisola *et al.*, 2011). **Limpopo:** Root used to treat tuberculosis (Semenya and Maroyi, 2019).	**Palestine:** Fruits and leaves used to treat liver disease, skin disease, burns, foot pain, damaged hair, eczema and skin rash. Fruits and leaves are also used to destroy urinary & gall bladder stones, reduce cholesterol level, prevent arteriosclerosis and as a laxative. Bark used for mouth sores; oil used to treat constipation, arthritis, kidney stones, allergies and hypertension. Oil also used as a diuretic andis usedsedsedanti-diabetic (Jaradat, 2005). **Iran:** Seeds, leaves and bark used for memory improvement, cholesterolemia, hypertension and diabetes (Mehrnia *et al.*, 2021).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
***Opuntia ficus-indica* (L) Mill.** Cactaceae	Toorofeye (T)	Leaves	Maceration, decoction	Diabetes and cholesterol (Magodielo, 2018; Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	NE	**Mpumalanga:** Stem decoction taken to treat high blood pressure (Tshikalange *et al.*, 2016). **Limpopo:** Fruit used to treat sexually transmitted diseases (Mbambala *et al.*, 2017). Fruit believed to induce menstruation, roots used to treat people who have urinary ailments (Mogale *et al.*, 2019), hypertension (Semenya and Potgieter, 2014), gonorrhea (drop), diabetes mellitus and shingles associated with HIV/AIDS (Mongalo and Makhafola, 2018). Leaves, root and whole plant used to treat mouth sores and wounds (Semenya *et al.*, 2012). **Western Cape:** Leaves used to treat skin ailments and as a hair conditioner (Philander, 2011).	**Lesotho:** Leaves used to treat constipation, toothache, piles and musculoskeletal ailments (Seleteng-Kose *et al.*, 2023). **Palestine:** Fruit used as an astringent (Jaradat, 2005). **Italy:** Flowers used as anti-inflammatory for the treatment of urinary system and digestive problems (Tuttolomondo *et al.*, 2014).
Ornithogalum tenuifolium Hyacinthaceae	Sekanama (T)	Bulb	Decoction	Blood related diseases (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	-	-
***Ozoroa paniculosa* (Sond.) R. Fern.** & A.Fern. Anacardiaceae	Monokwana (T)	Bark	Maceration	Impetigo and body rash (Ndhlovu *et al.*, 2023)	Mode: Topical Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Kwa-Zulu Natal:** Bark and roots infused in water and taken as a health tonic. Bark used for acute inflammatory	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								conditions of the chest and also for dysentery (Corrigan *et al.*, 2011). **Limpopo:** Bark and root used to treat stomach pains, diarrhea, measles, erectile dysfunction, impotence and sexually transmitted diseases (Semenya and Potgieter, 2013, 2014; Chauke *et al.*, 2015; Mogale *et al.*, 2019).	
Pappea capensis Eckl. & Zeyh. Sapindaceae	Jacket-plum (E) Mothata (T)	Fruits, leaves, roots, barks	Decoction	Baldness, ringworms and miscarriages (Moroole, 2021), heals private parts, strengthens manhood and to increase libido (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	**Mpumalanga:** Bark used to treat poisoning (sidliso) and tuberculosis (TB) (Khoza, 2023). Bark decoction also used to help with penis enlargement and reduction of breasts in men (Tshikalange *et al.*, 2016).	**Kenya:** Fruit bodies used to treat cancer; plant also used to treat rheumatism (Kipkore *et al.*, 2014). Bark used to treat gonorrhea (Wanzala *et al.*, 2016).
***Pelargonium luridum* (Andrews) Sweet Geraniaceae**	Thotamadi (T)	Roots	-	Acne vulgaris, burns, eczema, pimples and yaws (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Plant used to treat or manage HIV/AIDS (Semenya *et al.*, 2013)	-
Peltophorum africanum Sond. Fabaceae	Weeping Wattle (E) Mosetlha (T)	Roots, leaves, barks	Infusion	*Kaposi sarcoma* and heat rash (Asong *et al.*, 2019), toothache, sore throat, intestinal parasites, stomach related illness, diarrhea, dysentery (Moroole, 2021)	Mode: Orally Dosage: -	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Bark and roots used to treat or manage HIV/AIDS (Semenya *et al.*, 2013) and sinusitis. Bark used to treat high blood pressure, stomach pains ,and erectile dysfunction, as a postpartum medicine and to treat female	**Botswana:** Bark mixed with *Sclerocarya birrea* (A.Rich) Hosch subsp. *caffra* (Sond.) for the treatment of early cancer. Plant also used to treat asthma (Setshogo and Mbereki, 2011). **Zambia:** Stembark used to treat gonorrhea, HIV,

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				and sicknesses that came as a result of dead spouse (boswagadi) (Magodielo, 2018).				fertility (Semenya and Potgieter, 2013; Mogale *et al.*, 2019). When a baby has white spots on his or her face (sefala), a razor is used to make short narrow cuts around the eyes and the leaves rubbed on the baby's face. Plant also used to treat chest and respiratory problems and external wounds (Mogale *et al.*, 2019). Root or stem bark used to treat sexually transmitted infections (Semenya *et al.*, 2013) as well as infections of the skin and stomach. Roots and bark used to treat asthma and fatigue (Semenya and Maroyi, 2018b) **Mpumalanga:** Bark decoction used to treat stomach complains and to purify blood (Khoza, 2023). Root decoction also used to treat body pains (Tshikalange *et al.*, 2016).	tuberculosis, diarrhea (Chinsembu *et al.*, 2019). **Zimbabwe:** Bark, leaves or roots used to treat syphilis. Roots used to treat diarrhea, toothache, sore eyes and sexually transmitted diseases (Maroyi, 2011).
Pentanisia prunelloides (Klotzsch ex Eckl. & Zeyh.) Walp. Rubiaceae	Setimamollo (T)	Roots	Burning, decoction, maceration or poultice	Cancer, impetigo, skin irritation, sunken fontanelle and chicken pox and oral blisters (Ndhlovu *et al.*, 2023)	Mode: Topical and orally or paste Dosage:	Ngaka Modiri Molema & Bojanala Districts	LC	**Eastern Cape:** Root juice used as a remedy for snakebites. Root decoction also used to treat rheumatisms (Bhat, 2014).	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Phyllanthus maderaspatensis L. Phyllanthaceae	Leetsane (T)	Leaves	-	Ringworms and eczema (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Pouzolzia mixta Solms Urticaceae	Moreba (T)	Roots	-	Abscess, boils, eczema, infantile acropustulosis, and pearl penile papules (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Pterocarpus angolensis DC. Fabaceae	Blood wood (E), Mokwa/Morotômadi (T)	Bark, roots	-	Ringworms, eye problems, and stomach problems, and to increase breast milk (Moroole, 2021)	Mode: - Dosage: -		LC	**Mpumalanga:** Root decoction used to treat heartburn, stomach problems and induce vomiting (Tshikalange *et al.*, 2016).	**Zimbabwe:** Bark used to treat earache and menorrhagia. Roots used to treat infertility in women; sap used to treat sore eyes (Maroyi, 2011).
**Punica granatum* L. Lythraceae	Pomegranate (E)	Bark	Decoction	Diarrhea (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	NE	**Limpopo:** Fruit scale used for lack of appetite (Semenya and Maroyi, 2019).	**Pakistan:** Fruit pericarp dried, powdered, mixed with sugar and used to treat diarrhea and dysentery (Bibi *et al.*, 2014). Also used against swellings, resulting from injuries. Fruit is astringent, cooling agent and blood purifier. Fruit pericarp mixed with tea and given for whooping cough; also used as laxative (Ali and Qaiser, 2009). **India:** Leaves and dried fruit rind used to treat menorrhagia (heavy menstrual bleeding) (Bhatia *et al.*, 2015). Roots used as a remedy for intestinal worms, seeds used for blood circulation and fruit rind used to treat uterine problems (Silambarasan and

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
									Ayyanar, 2015). Fresh fruits used to treat fever (Salve and Mishra, 2019). **Palestine:** Fruit peels used to treat diarrhea (Jaradat *et al.*, 2016). **Mexico:** Fruit used to treat diarrhea and headache (del Carmen Juárez-Vázquez *et al.*, 2013). **Brazil:** Fruits, fruit peels, and seeds used to treat diarrhea, infections, cancer, diabetes, flu, stomach pain, gastritis, indigestion, ulcer, rheumatism, ovarian cyst, vaginal discharge, uterine infection, vaginal infection, uterine inflammation, wounds, throat infection and throat inflammation (Ribeiro *et al.*, 2017).
**Prunus persica* (L.) Batsch. Rosaceae	Perekisi (T)	Leaves	Decoction	Constipation and stomach cramps (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	NE	**Kwa-Zulu Natal:** Used for deworming, diarrhea, and stomach cramps (Mhlongo and Van Wyk, 2019). **Eastern Cape:** Leave decoction used to treat sore eyes (Bhat, 2014). **Limpopo:** Skin of the fruit used to stop vomiting in children (Mogale *et al.*, 2019); root used to treat erectile dysfunction (Semenya, S. *et al.*, 2012; Semenya and Potgieter, 2013, 2014).	**Palestine:** Fruits used as treatment for damaged hair (Jaradat, 2005).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								Seed used to treat headaches (Semenya, S. *et al.*, 2012; Semenya and Potgieter, 2014). Roots used to treat gonorrhea (Mulaudzi *et al.*, 2015)	
Rauvolfia caffra Sond. Apocynaceae	Quinine (E)	Leaves	-	Measles, rash and athlete's foot (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Kwa-Zulu Natal:** Used as a general vermifuge (agent that destroys parasitic worms) and appetite stimulant. Also used to treat toothache, body odour, skin problems, jaundice, constipation, baby sicknesses, sharp internal side pains, kidney problems and inability to urinate (Mhlongo and Van Wyk, 2019).	-
**Ricinus communis* L. var communis Euphorbiaceae	Mokhura (T)	Leaves	Maceration	Abscess and chicken pox (Asong *et al.*, 2019; Ndhlovu *et al.*, 2023)	Mode: Topical Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	NE	**Limpopo:** Decoction of roots and fruits used to treat STIs (gonorrhea) (Masevhe *et al.*, 2015) and dried powdered leaves smoked to treat asthma (Ramarumo, 2017). Leaves used as bandages (Mogale *et al.*, 2019), whole plant also used to treat wounds and a swelled up leg (sore) (Semenya, S. *et al.*, 2012; Semenya and Potgieter, 2014; Mogale *et al.*, 2019). **Kwa-Zulu Natal:** Used to treat toothaches,	**Pakistan:** Seeds and leaves used to treat constipation (Bibi *et al.*, 2014) **Thailand:** Leaves used to treat tinnitus. **Uganda:** Sap used to treat fresh wounds (Namukobe *et al.*, 2011). **India:** Leaves and twigs used to treat dysmenorrhea (Bhatia *et al.*, 2015). **Palestine:** Oil used to treat burns, also used as a purgative and hair emollient (Jaradat, 2005). **Mexico:** Leaves used to treat fever and gallstones.

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								sores, skin problems, swollen glands, constipation, inflammation, fever, swollen testicles as well as kidney-, bladder- and prostate issues. Also used to purify blood, hasten teething, promote weight loss, and ease childbirth. Used as a purgative and an appetite stimulant (Mhlongo and Van Wyk, 2019) **Eastern Cape:** Leaves used to treat stomachaches and boils (Bhat, 2014). **Mpumalanga:** Seeds are used to treat skin irritations and stretch marks (Khoza, 2023) **Western Cape:** Warm leaves wrapped around a child to treat stomachache (Philander, 2011).	Leaves also used to treat dizziness, diarrhea and vomiting (Alonso-Castro *et al.*, 2012; del Carmen Juárez-Vázquez *et al.*, 2013). **Zambia:** Roots used to treat gonorrhea, HIV, and tuberculosis (Chinsembu *et al*., 2019). **Zimbabwe:** Roots used to treat toothache; seeds used to treat sore eyes (Maroyi, 2011). **Iran:** Seeds used as a laxative, treat skin injuries (external use), burns and cuts, dandruff and varicose veins (Mehrnia *et al.*, 2021). **Kenya:** Plant used to treat gonorrhea, burns, stomachache (Wanzala *et al.*, 2016). **Cameroon:** Leaves, stem, roots and fruits used to treat sterility in women (Jiofack *et al.*, 2008)
***Rubia horrida* (Thunb.) Puff Rubiaceae**	Madi-a-phalane (T)	Roots	-	Albinism (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**-**	**Botswana:** Leaves taken to treat dizziness (Setshogo and Mbereki, 2011).
Sansevieria hyacinthoides (L) Druce Dracaenaceae	Mosekelatsebeng (T)	Roots, leaves	Poultice	Genital warts (Asong *et al.*, 2019), earache and sores (Ndhlovu *et al.*, 2023)	Mode: Topical Dosage: As needed	Ngaka Modiri Molema & Bojanala Districts	LC	**Kwa-Zulu Natal:** Root decoction used to treat toothache. Leaf sap used for earache (Corrigan *et al.*, 2011).	-
***Sclerocarya birrea* subsp. *multifoliolata* (Engl)**	Morula (T)	Barks	-	Genital warts (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Fruits used to treat sinusitis (Semenya and Maroyi,	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Anacardiaceae								2018a). Also used to treat asthma, headache, rhinitis and TB (Semenya and Maroyi, 2020).	
Schkuhria pinnata Asteraceae	More wa Tonki/ Moroto wa Tonki (T)	Roots	Infusion	Stomach ache (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	NE	**Limpopo:** Whole plant used to treat asthma (Semenya and Maroyi, 2018b).	-
Searsia pyroides (Burch.) Moffett. Anacardiaceae	Mohitla/ Bohitlha (T)	Leaves	Decoction	Influenza (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Senecio longiflorus (DC). Sch.Bip Asteraceae	Mosiama (T)	Whole plant	-	Athlete's foot, chicken pox, eczema, *Kaposi sarcoma*, molluscum contagiosum, rash, syphilis and yaws (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
Senegalia caffra (Thunb.) P.J.H. Hurter & Mabb Fabaceae	Poo-tshetlha (T)	Whole plant	Maceration	Ulcer, sores and vomiting (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Plant used to treat candidal infections, blood cleansing and abdominal disorders (Masevhe *et al.*, 2015). **Kwa-Zulu Natal:** Used to treat colds, fever, mouth and blood purification (Madikizela *et al.*, 2017)	-
Senegelia mellifera Fabaceae	Mongana (T)	Branches and roots	Decoction	Toothache (Magodielo, 2018)	Mode: Orally (gurgle) Dosage:	Bojanala District	LC	-	-
Senna italica Mill subsp. arachoides Burch Lock Fabaceae	Sebetebete (T)	Whole plant, roots	Maceration or decoction	Chickenpox (Asong *et al.*, 2019), constipation and	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Used to treat gonorrhea (Semenya *et al.*, 2013) and sinusitis (Semenya and Maroyi, 2018a). Roots used to	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				ulcer (Ndhlovu *et al.*, 2023)				treat chronic coughs and tuberculosis (Semenya and Maroyi, 2019). Roots also used to treat asthma (Semenya and Maroyi, 2018b). **Mpumalanga:** Used to treat STI's (Tshikalange *et al.*, 2016). **Gauteng:** Leaves used to treat internal cancer (Raimi *et al.*, 2021).	
**Senna tora* (L.) Roxb. Fabaceae	Monepenepe (T)	Roots	Decoction	Diarrhea (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	ND	-	**India:** Seeds used to treat stomach ache (Silambarasan and Ayyanar, 2015).
Siphonochilus aethiopicus (Schweinf.) B.L.Burtt Zingiberaceae	Serokolo (T)	Whole plant, rhizome	Decoction	Chickenpox (Asong *et al.*, 2019), sunken fontanelle, influenza, appetite, ulcer and diarrhea (Ndhlovu *et al.*, 2023)	Mode: Topical and orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	CE	**Limpopo:** Bulb boiled in water, and steam inhaled (nasally) to treat sinusitis (Semenya and Maroyi, 2018a, b, 2020). Also used to treat asthma, chronic cough, rhinitis and TB (Semenya and Maroyi, 2018b, 2020). **Western Cape:** Roots used to treat respiratory and circulation problems (Philander, 2011).	-
***Solanum campylacanthum* Hochst. ex A.Rich. subsp. panduriforme (Drege ex Dunal) J.** Solanaceae	Tolwane nnye (T)	Roots	Maceration and decoction	Sunken fontanelle, umbilical cord, bladder inflammation and gastroenteritis (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**-**	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Solanum catombelense Peyr Solanaceae	Morolwana (T)	Whole plant	-	Chickenpox, fleabites, *Kaposi sarcoma*, rash and sores (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Used to treat asthma, chronic cough and pneumonia (Semenya and Maroyi, 2018b; Semenya and Maroyi, 2019; Semenya and Maroyi, 2020).	-
Solanum lichtensteinii solanum Solanaceae	Tolwane (T)	Whole plant	-	Burns (Asong *et al.*, 2019)	-	Ngaka Modiri Molema District	LC	-	-
Solanum lichtensteinii Willd Solanaceae	Kgaba (T) Bitter apple (E)	Roots, flower	Maceration and decoction	Scabies in children, ringworm in adults (Asong *et al.*, 2019), sunken fontanelle, bladder inflammation, umbilical cord, to stop vomiting and enhance growth in children (Ndhlovu *et al.*, 2023)	Mode: Topical and orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Sorghum bicolor (L) Moench Poaceae	Sorghum (E)	-	-	Chickenpox (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Dried seeds pounded and taken with Mageu drink or soft porridge for fatigue (Semenya and Maroyi, 2019). Seed used to treat tuberculosis and fatigue (Semenya and Maroyi, 2018b, a).	-
***Stapelia gigantea* N.E. Br Apocynaceae**	Meno a noga (T)	Whole plant	-	*Kaposi sarcoma* and molluscum contagiosum (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
***Sutherlandia frutescens* (L.) R.Br.** Fabaceae	Lerumo la madi (T)	Roots, whole plant	Decoction	Acne vulgaris, boils, yaws (Asong *et al.*, 2019), body rashes, bladder inflammation,	Mode: Orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	NE	**Western Cape:** Leaves used to treat hypertension, ulcers, gastrointestinal complaints, gall and	-

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
				kidney failure and urinary tract infection (Ndhlovu *et al.*, 2023)				skin cancer (Philander, 2011). Plant also used as a fertility treatment (Van Wyk *et al.*, 2008). **Eastern Cape:** Leaves used to treat high blood pressure (Olorunnisola *et al.*, 2011)	
Tarchonanthus camphoratus L. Asteraceae	Mohatlha wa dikonyana (T)	Roots	-	Albinism (Asong *et al.*, 2019)	Mode:- Dosage: -	Ngaka Modiri Molema District	LC	-	-
**Teucrium sessiliflorum* Benth. Lamiaceae	Setlhokotlhoko (T)	Leaves	Maceration	Diarrhea and sunken fontanelle (Ndhlovu *et al.*, 2023)	Mode: Orally and topical Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	NE	-	-
Teucrium trifidum Retz. Lamiaceae	Setlhokotlhoko (T)	Leaves	-	Used as a contraceptive (Moroole, 2021)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Western Cape:** Used to treat colds, back pain, bladder problems in women and influenza (Van Wyk *et al.*, 2008).	-
Tragia dioica Sond. Euphorbiaceae	Mmabatsane/ Sebabetsane (T)	Roots	Decoction	Sores (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	**Limpopo:** Leaves used to treat fatigue (Semenya and Maroyi, 2018b).	-
Tribulus terristris L. Zygophyllaceae	Tshetlho (T)	Seeds	-	Chickenpox, eczema and infantile acropustulosis (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Whole plant used to treat chlamydia (Semenya *et al.*, 2013; Semenya and Potgieter, 2014; Mogale *et al.*, 2019).	**India:** Whole ripe fruit used to treat stone problems (Silambarasan and Ayyanar, 2015). Fruit and root taken to prevent white discharge in women and to treat urinary troubles (Muthu *et al.*, 2006). **Iran:** Flowers, fruits, roots and seeds used to treat immune system disorders, such as eczema and skin allergies; joint pain and for backache (Mehrnia *et al.*, 2021).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
Tulbaghia violacea Harv Amaryllidaceae	Wild Garlic (E)	Whole plant	-	Eczema and Herpes zoster (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Bulb decoction used as medicine for blood ailments, flu/colds and leaves crushed and placed in warm water and used as an enema (Mogale *et al.*, 2019). Bulb also used to treat tuberculosis and nasal congestion (Semenya and Maroyi, 2018b; Semenya and Maroyi, 2019). **Eastern Cape:** Bulb used to treat high blood pressure, heart problems, chest complaints and high cholesterol (Olorunnisola *et al.*, 2011) **Western Cape:** Leaves and roots used to treat high blood pressure and diabetes (Davids *et al.*, 2016). **Gauteng:** Bulbs and leaves used to treat esophageal cancer (Raimi *et al.*, 2021).	-
Vachellia karroo (Hayne) Banfi & Galasso Fabaceae	Sweet thorn (E), Mooka (T)	Bark, roots, thorns, leaves	-	Eye illnesses, wounds, cold, stomach pains, throat infections (Moroole, 2021)	Mode: - Dosage: -		LC	**Kwa-Zulu Natal:** Root bark (skin of the root) infusion used as a snake repellent in gardens. Roots used to treat colic in babies, body pains, dizziness, convulsions and venereal diseases (Corrigan *et al.*, 2011).	**Swaziland:** Gum used to treat mouth ulcers and throat thrush and reputed to delay puberty. Bark and leaves used to treat diarrhea and dysentery (Corrigan *et al.*, 2011). **Zimbabwe:** Roots used to treat convulsions (Maroyi, 2011).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								Limpopo: Roots and stem bark used to treat candidal infections, venereal diseases and diarrhea (Masevhe *et al.*, 2015). **Mpumalanga:** Roots used to treat Sexually Transmitted Infections (STIs) (Tshikalange *et al.*, 2016). **Eastern Cape:** Bark, leaves and stem used to treat boils, diarrhea, hemorrhage, ringworm, thrush and tuberculosis (TB) (Maroyi, 2017a)	
Vangueria infausta Burch. Wild medlar Rubiaceae	Mmilo (T), mothwanyê (T)	Fruits, roots, leaves	-	Ringworms, pneumonia, toothache (Moroole, 2021)	Mode:- Dosage: -		LC	**Limpopo:** Seeds used as a laxative (Mogale *et al.*, 2019).	**Zimbabwe:** Roots used to treat diarrhea (Maroyi, 2011).
Viscum menyharthii Engl.& Schinz Santalaceae	Lephakama (T)	Stem	-	*Kaposi sarcoma* (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	-	-
***Warburgia salutaris* (G.Bertol.) Chiov.** Canellaceae	Lekwati/Molaka (T)	Leaves, stem and bark	Maceration and decoction	Pneumonia, influenza and sores (Ndhlovu *et al.*, 2023)	Mode: Steaming, orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	EN	**Limpopo:** Bark decoction taken to treat sinusitis (Semenya and Maroyi, 2018a). Plant also used to treat angina pain, asthma, chest pain, chronic cough, fatigue, headache, pneumonia, rhinitis, sore throat, TB and wheezing (Semenya and Maroyi, 2020). **Mpumalanga:** Bark infusion taken to treat tonsillitis, colds and flu (Khoza, 2023).	**Uganda:** Stem bark and root barks used as a remedy to manage HIV/AIDS (Lamorde *et al.*, 2010).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								Western Cape: Bark used as an emetic and also used to treat respiratory ailments and increase blood circulation (Philander, 2011).	
***Withania somnifera* (L) Dunal Solanaceae**	Modikashope (T)	Whole plant, leaves, roots	Maceration	Rash, syphilis, creeping eruptions, herpes simplex (Asong *et al.*, 2019), sunken fontanelle, restless and weaning, sores, piles and constipation (Ndhlovu *et al.*, 2023)	Mode: Topical, orally Dosage: 3x/day	Ngaka Modiri Molema & Bojanala Districts	LC	**Kwa-Zulu Natal:** Used to treat head sores and inflammation (Mhlongo and Van Wyk, 2019). **Western Cape:** Leaves used as a douche (Philander, 2011).Plant also used to treat fever, clean the stomach, treat kidney failure and inflammation, and cancer (Van Wyk *et al.*, 2008). **Limpopo:** Roots used to treat tuberculosis (Semenya and Maroyi, 2019).	**Lesotho:** Tubular roots and leaves used as an anticancer and a treatment for infertility. Plant may also be used to strengthen blood circulation and shorten long menstrual periods (Mugomeri *et al.*, 2016). **India:** Roots used to stimulate sexual power in men (Silambarasan and Ayyanar, 2015). Stem used as a remedy for leucorrhea (menstrual disorder) (Bhatia *et al.*, 2015)
Ximenia caffra Olacaceae	Moretologa wa poo/Seretologa sa Poo (T)	Roots, bark	Decoction	Ulcers and a fast heartbeat (Magodielo, 2018)	Mode: Orally Dosage: -	Bojanala District	LC	**Kwa-Zulu Natal:** Leaves used to treat inflamed eyes (Corrigan *et al.*, 2011). Also used for blood purification, nyongo-"biliousness", ease childbirth, as well as chest complaints (Mhlongo and Van Wyk, 2019). **Mpumalanga:** Root infusion taken to help maintain pregnancy (Khoza *et al.*, 2023). Infusion also taken to help with fertility and	**Swaziland:** Whole plant used to treat weight loss (Adeniji *et al.*, 2000) **Zambia:** Roots used to treat gonorrhea, genital ulcerative diseases (Chinsembu *et al.*, 2019) **Zimbabwe:** Leaves used to treat backache; roots used to treat diarrhea, wounds and venereal diseases; and also used as an aphrodisiac (Maroyi, 2011).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								treat diarrhea (Khoza, 2023). **Limpopo:** Seed pulp used to treat dry lips; root decoction ingested to treat tonsils (Mogale *et al.*, 2019). Roots also used to treat sexually transmitted diseases and tuberculosis (Chauke *et al.*, 2015; Mongalo and Makhafola, 2018; Semenya and Maroyi, 2019).	
Zingiber officinale Roscoe Zingiberaceae	Ginger (E)	Rhizome	-	Herpes zoster and vitiligo (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Rhizome used to treat chronic coughs, tuberculosis and sore throat (Semenya and Maroyi, 2019; Semenya and Maroyi, 2020).	**Uganda:** Tuber used to boost appetite and immunity and treat coughs and tuberculosis (Asiimwe *et al.*, 2013). Roots also used to treat hernia (Kibuuka and Anywar, 2015). Rhizome used to treat erectile dysfunction and sexual impotence (Kamatenesi *et al.*, 2011). **India:** Rhizomes used to treat dysmenorrhea, cancer and indigestion (Bhatia *et al.*, 2015; Silambarasan and Ayyanar, 2015). **Palestine:** Rhizomes used as a carminative and anti-hypertension drug, and also used to decrease cholesterol levels and treat diarrhea (Jaradat, 2005; Jaradat *et al.*, 2016).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
									Brazil: Rhizomes used to treat general infections, ingrown nails, asthma, bronchitis, flu, pneumonia, hoarseness, shoulder pain and throat infection (Ribeiro *et al.*, 2017). **Cameroon:** Roots used to treat rheumatism (Jiofack *et al.*, 2008)
Ziziphus oxyphylla Edgew. Syn: *Ziziphus acuminata* Royle. Rhamnaceae	Sekgalofatshe (T)	Leaves and bark	Poultice	Diarrhea (Ndhlovu *et al.*, 2023)	Mode: Orally Dosage: 2x/day	Ngaka Modiri Molema & Bojanala Districts	LC	-	-
Ziziphus zeyheriana Sond. Rhamnaceae	Mokgalofatse (T)	Leaves	-	Used to treat condylomata acuminate, discoid lupus, erythematodes and *kaposi sarcoma* (Asong *et al.*, 2019)	Mode: - Dosage: -	Ngaka Modiri Molema District	LC	**Limpopo:** Roots used to treat tuberculosis (Semenya and Maroyi, 2019; Semenya and Maroyi, 2020).	-
Ziziphus mucronata Willd Rhamnaceae	Mokgalo (T) Buffalo-thorn (E)	Stem, fruits, leaves, bark, roots	Paste	Boils, eczema, ringworm (Asong *et al.*, 2019), dysentery, chest complaints, lumbago (Moroole, 2021) and abscess (Magodielo, 2018)	Mode: Topical Dosage: -	Ngaka Modiri Molema & Bojanala Districts	LC	**Limpopo:** Roots used to treat gonorrhea, chlamydia, diabetes, stomach infections and manage HIV/AIDS (Chauke *et al.*, 2015; Mogale *et al.*, 2019). Chewed leaves applied to burns and used to treat tonsils (Mongalo and Makhafola, 2018). Roots also used to treat tuberculosis and asthma (Semenya and Maroyi, 2019). **Kwa-Zulu Natal:** Leaf put on a wound to pull	**Botswana:** Bark used to treat toothache (Setshogo and Mbereki, 2011). **Zambia:** Stem bark used to treat gonorrhea, genital ulcerative diseases, boils and cough (Chinsembu *et al.*, 2019) **Zimbabwe:** Fruits and leaves used to treat boils. Roots used to treat infertility in women, abdominal pains and wounds (Maroyi, 2011).

Botanical and family names	Common names	Part used	Preparatory	Ailment treated	Administration mode and dosage	Area of study	Cs	Similar or other uses country-wide	Similar or other uses elsewhere
								out a thorn. Bark is used as emetics for chronic coughs. Leaves and bark used to treat respiratory ailments and steam baths from the bark used to purify complexion. Roots used to treat toothache and scrofula and leaves used to treat boils and glandular swellings (Corrigan *et al.*, 2011). Also used to treat sharp internal body pains and dermatological conditions, such as sores and boils (Mhlongo and Van Wyk, 2019). **Mpumalanga:** Leaves and roots used to treat skin problems (Tshikalange *et al.*, 2016).	

Footnote: "-" = Not Specified: Common names: English (E), Tswana (T), Afrikaans (A); "Cs"- conservation status, LC (Least Concern), EN (Endangered), NE (Not Evaluated), CE (Critically Endangered), ND (No Data), NT (Not Threatened), IA (Invasive Alien); "*" Exotic species

2.4.3.2.3 Diseases or conditions treated with medicinal plants in the North-West Province, South Africa

Traditional healthcare practitioners of the North-West Province, South Africa, use various medicinal plants to treat or manage different health conditions. This review revealed that most plant species were used to treat skin-related conditions, such as burns, wounds, sores, chickenpox, and eczema, among other conditions (**Table 2.1 and Figure 2.4A**). According to Hay *et al.* (2014), Asong *et al.* (2019), and (Ndhlovu *et al.*, 2023), about 34% of occupational health diseases worldwide are caused by skin infections. These infections are a significant public health concern in both developed and developing nations (De Wet *et al.*, 2013; Asong *et al.*, 2019), mainly because of their association with HIV/AIDS. More than 90% of individuals infected with HIV/AIDS develop skin disorders at some point during their disease (De Wet *et al.*, 2013). Furthermore, burns have been listed as one of the 15 leading causes of death in individuals between the ages of 5 and 29 years in South Africa (De Wet *et al.*, 2013; Asong *et al.*, 2019). With an increase in skin infections, shortage of specialist doctors, and the high cost of consultations in South Africa, a lot of people often seek medical attention from traditional healthcare practitioners. Medicinal plants are in high demand because of their supposed ability to alleviate skin conditions.

The review also revealed that different plant species are also used to treat gastrointestinal conditions (**Table 2.1 and Figure 2.4A**). The main symptoms of gastrointestinal diseases include diarrhea, constipation, stomach cramps, distention and gastrointestinal bleeding. In tropics and subtropics, diarrheal illnesses cause morbidity and mortality (Xavier and Thomas, 2013). With 1.8 million under-five deaths annually from diarrhea, children are most frequently and severely affected (Xavier and Thomas, 2013; Ndhlovu *et al.*, 2023). Furthermore, water-borne diseases, such as gastroenteritis, cholera, typhoid fever, and dysentery, pose a high risk to South Africans (Stats SA, 2018a). According to Ndhlovu *et al.* (2023), about 49% of people in the North West Province, South Africa, do not have access to adequate housing, water and sanitation. These poor living conditions contribute to these illnesses and account for many local communities using traditional medicine.

Lifestyle diseases, such as diabetes mellitus, hypertension, and conditions related to respiratory systems, such as tuberculosis (TB), pneumonia, and influenza, were found

to be part of medical conditions treated with traditional medicine in the North-West Province, South Africa. Reports indicate that these conditions are among the leading causes of death in South Africa, with TB accounting for 8.8% of all deaths, followed by influenza and pneumonia at 5.2%, *diabetes mellitus,* 4.8%, and hypertensive diseases at 3.7% (Stats SA, 2018a; WHO, 2018). Additionally, South Africa is facing a quadruple burden of disease as a result of communicable diseases, such as HIV/AIDS and TB, maternal and child mortality, non-communicable diseases, including hypertension and cardiovascular diseases, *diabetes mellitus*, cancer, mental illness, and chronic lung diseases, such asthma; as well as injury and trauma (Stats SA, 2018a; Neethling, 2019; Samodien *et al.*, 2021). This presents a complex set of challenges for the country's healthcare system. As it is, South Africa has a shortage of medicine, medical staff, and healthcare facilities (MacGregor *et al.*, 2018; Modisakeng *et al.*, 2020). This leads people to look for alternative options, such as consulting traditional healthcare practitioners and using traditional medicine to meet their healthcare needs.

2.4.3.2.4 Important plant species used for medicinal purposes

For thousands of years, medicinal plants have been an essential part of human health practice in many cultures and regions around the globe, demonstrating the profound impact of "nature's pharmacy" on human health and well-being. *Ricinus communis* L. (Euphorbiaceae) is a popular plant species used for medicinal purposes globally (**Table 2.1**). It is a tropical plant commonly known as castor bean, found worldwide (Manpreet *et al.*, 2012; Abdul *et al.*, 2018). It is a robust shrub or small tree with a soft woody stem, growing up to 4 m high. The stems are smooth, round, and frequently red, with clear sap. The leaves are simple and alternate. Long purple leaf stalks are attached near the centres of the leaf blades. The plant is indigenous to India and grows in fields, gardens and the wild (Manpreet *et al.*, 2012; Chouhan *et al.*, 2021). Among all plant species in the family Euphorbiaceae, *R. communis* L. has high traditional and medicinal value for maintaining health. Numerous studies have revealed many phytochemicals, such as phenolic substances, alkaloids, flavonoids, saponins and terpenes (Abdul *et al.*, 2018). These phytochemicals are responsible for the pharmacological and therapeutic properties, including anticancer, antibacterial, anti-diabetic, anti-inflammatory, analgesic, bone regenerating, antioxidant, anticonvulsant and antinociceptive, anthelminthic, antifertility,

anti-asthmatic, laxative, uterine contracting, anti-implantation, antihistamine, wound-healing, insecticidal, anti-arthritic and antidandruff activities (Manpreet *et al.*, 2012; Abdul *et al.*, 2018; Chouhan *et al.*, 2021). This plant is used to treat various ailments, such as skin-related conditions, gastrointestinal conditions, STIs, oral conditions as well as conditions related to the female reproductive tract used to treat a wide range of ailments. Diverse cultures have independently discovered and harnessed the therapeutic qualities of various plant species. The way these plants are used may be similar or vary from place to place and between cultures. This current review compares the use of similar medicinal plants (**Table 2.1**) in different parts of the world. *Allium cepa* L. (Alliaceae) is also one of the most popular plant species used for medicinal purposes globally (**Table 2.1**). *A. cepa* L., also known as an onion, is a vegetable that originates from Central Asia. It is the most widely cultivated species in the genus *Allium*. *Allium cepa* are cultivated in about 170 countries for domestic use and approximately 8% of the global production is traded internationally. *Allium cepa* are mostly used as a food source but are also known for their high medicinal properties. They contain generous amounts of phytochemicals, which have been linked to promoting good health of the body (Shafiq *et al.*, 2017). For instance, it contains flavonoids, such as kaempferol and quercetin, which are beneficial as they exhibit antiallergenic, anti-inflammatory, cardioprotective, vasodilatory, anti-carcinogenic and antioxidant, antibacterial and antifungal properties (Shafiq *et al.*, 2017). The bulb is also anthelmintic, antiseptic, antispasmodic, carminative, diuretic, expectorant, febrifuge, hypoglycemic, hypotensive, lithotripsic, stomachic and tonic (Kumar *et al.*, 2010). *Allium cepa* can relieve lung and bronchial tract congestions, relieve upset stomachs and other gastrointestinal disorders, and improve appetite (Kumar *et al.*, 2010).

Aloe vera (Xanthorrhoeaceae) is also one of the most important and well-known medicinal plants in different parts of the world (**Table 2.1**). *A. vera* has a high enzyme content and contains mostly water (90-99%). It also contains salicylic acids, sugars, amino acids, lignin, saponins and anthraquinones. According to (Tiwari and Upadhayay, 2018), over 75 nutrients and 200 active compounds, including 20 minerals, 18 amino acids and 12 vitamins, are found in *Aloe vera* leaves. It is the world's greatest natural anti-biotic, anti-septic, anti-bacterial, anti-inflammatory, anti-allergic, anti-ulcer, anti-tumor, immunostimulant and highly potent intracellular antioxidant (Rajeswari *et al.*, 2012).

Reported uses of this plant include purgative, analgesic, pain killer, diuretic, emollient, hair and appetite stimulant, ant asthmatic, antipyretic, rejuvenate, anthelmintic, liver stimulant and local anesthetic (Tiwari and Upadhayay, 2018). However, it is mostly used in cosmetics and for treating dermatological conditions, particularly to treat burns, promote wound healing and combat cell aging (Rajeswari *et al.*, 2012).

Zingiber officinale Roscoe (Zingiberaceae), commonly known as ginger, is a perennial creeping plant with tall, oblique, round, annual stems, thick tuberous rhizome and yellow-green flowers. The plant grows to a height of two or three feet. Depending on the kind, the flesh of the ginger rhizome may be yellow, white, or red in colour. The flesh is covered with a brownish skin, which may be either thick or thin, depending on when the plant was harvested, whether it was young or mature. Ginger has been medicinally used for over 2000 years. According to Kumar and Sharma (2014) , cultivation of *Z. officinale* originated in China and then spread to India, South East Asia, West Africa and the Caribbean. India is the world's biggest producer of this plant. The active ingredients of *Z. officinale* are found in its volatile oils, which account for about 1-3% of its weight. The main active components of ginger oil are the sesquiterpenes (bisapolene, zingiberol and zingiberene).

It is observed in this study that some plant species used for traditional medicine in the North-West Province, South Africa, are alien invasive plant species. South Africa has been significantly affected by alien invasive plant species (Maema *et al.*, 2016; Cherane, 2019). An *alien* species refers to any non-native species purposefully or accidentally brought outside of its natural range of adaptation (Kumar and Prasad, 2014; Atyosi *et al.*, 2019). Not all plant species brought in from other ecosystems are detrimental, but only a tiny portion of them with decisive reproductive and proliferative potential turn into invasive species(Kumar and Prasad, 2014; National Geographic, 2024). Their rapid growth allows them to outcompete native biota regarding space, food and water resources (McGaw *et al.*, 2022; National Geographic, 2024). This may cause ecosystem disruptions and lead to situations where native species are reducing in numbers and possibly threatened with local extinction (Hulme *et al.*, 2010; Máximo *et al.*, 2020). However, a potential solution lies within this very problem. Some alien invasive plant species also contain a wealth of

bioactive compounds with medicinal properties (Cherane, 2019; Máximo *et al.*, 2020; McGaw *et al.*, 2022). By harvesting and exploiting these plant species for medicinal purposes, among other things, their spread could be controlled and possibly contribute to their management. In this study, alien invasive species identified were *Agave americana* (L.), also used by Pedi people to treat or manage HIV, hypertension and swollen legs (Cherane, 2019); *Argemone ochroleuca*, used to treat gonorrhea, impotence, STIs and body pains; *Eucalyptus camaldulensis* Dehnh., used to treat cough and flu; *Opuntia ficus-indica* (L) Mill. Used to treat pain, HIV, impotence, gonorrhea, toothache, *diabetes mellitus*, STIs and swollen legs (Maema *et al.*, 2016; Cherane, 2019); and *R. communis* used by Zulu and Venda people to treat toothache, blood purification, skin problems, constipation, inflammation, kidneys, bladder, ease childbirth, repair and beautify the skin (Asong *et al.*, 2019; Mhlongo and Van Wyk, 2019). Different ethnic groups in South Africa use these alien invasive species for the treatment and management of different health conditions. These species have become so imbedded that they are overly used and exploited for personal use.

2.4.3.2.5 Medicinal plant parts used and preparation method

Different parts of plants are harvested and used for their medicinal properties (**Figure 2.4B**). In this review, it was found that the roots (29%) are the most commonly used plant part, followed by the leaves (23%), whole plant (19%) and the bark (10%) (Figure 3B). The seeds, thorns, flowers, fruits and stem accounted for less than 10% in the study. This observation is similar to previous studies conducted in South Africa (Mahwasane *et al.*, 2013; Magodielo, 2018; Asong *et al.*, 2019; Cherane, 2019) and in other countries (Lulekal *et al.*, 2008; Maroyi, 2011; Sitoe, 2020), where the roots were found to be the most used part of the plant in ethnomedicine. This is an indication that there are similarities in traditional medicine practices among different ethnic groups. According to Maroyi (2011), Mahwasane *et al.* (2013) and Ndhlovu *et al.* (2023), the roots of plants are preferred due to their availability throughout the year and also because they have a high concentration of bioactive compounds or healing agents compared to other plant parts. They are, therefore, traditionally considered to be strong medicine (Mahwasane *et al.*, 2013). However, harvesting reproductive parts, such as the roots for medicinal purposes is an unsustainable practice, which could possibly lead to the destruction of plant life

(Maroyi, 2011; Asong *et al.*, 2019; Matlala *et al.*, 2024). Appropriate harvesting techniques and conservation measures must be applied to guarantee the sustainable use of medicinal plant resources. For instance, one strategy could be the cultivation and domestication of medicinal plants, which are in high demand and often harvested for the roots (Amujoyegbe *et al.*, 2012; Ramawat and Arora, 2021; Ndhlovu *et al.*, 2023). This will reduce the stress on wild populations and ensure continuous supply of resources to local people. Another strategy could be to implement community-based conservation programmes, where local communities are involved in the conservation of natural resources. Involving local communities in the management and monitoring of medicinal plants promotes a sense of ownership, sharing of traditional knowledge and sustainable use practices (Buthelezi *et al.*, 2016; Galvin *et al.*, 2018; Shukla, 2023). Examples of these include the establishment of community-run nurseries or gardens and benefit sharing mechanisms where local communities could benefit something from using resources sustainably. In some studies, the leaves were reported to be the most frequently used plant part, which is better for the survival of medicinal plants compared to the roots (Ghasemi *et al.*, 2013; Ahmed, 2016).

Preparation of medicinal plant formulations varies among different communities based on the nature of the disease/illness. With the exception of cases (37%) where the methods of preparation are not specified, six different ways in which medicinal plant formulations are prepared by local communities in the North-West Province were recorded in this review (**Figure 2.4C**). The most common preparation method was found to be decoction (28%), followed by maceration (17%) and infusion (8%). These findings are consistent with other studies conducted in South Africa (Machaba, 2018a; Cherane, 2019). Decoctions involve boiling different plant parts in water to extract active ingredients (Sadeghi *et al.*, 2014), and are often used as the main method of preparation in traditional healing systems (Cherane, 2019). The type of plant species, conditions treated, and plant parts utilised, determine which method of preparation should be followed (Ndhlovu *et al.*, 2021).

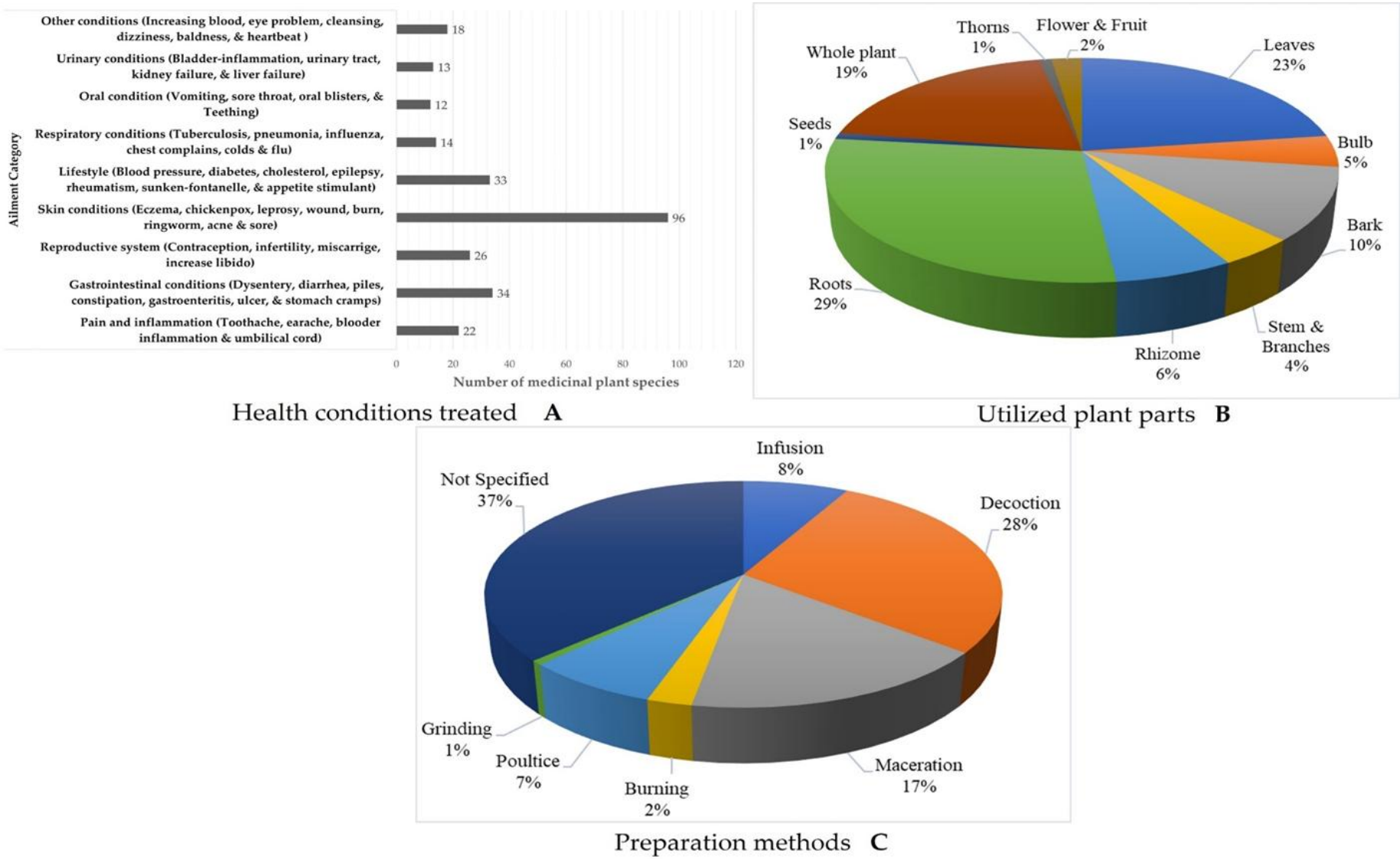

Figure 2.4: Illustration of different ailments treated (A), plant parts used (B) and methods of preparation (C) in the North-West Province, South Africa

2.4.3.2.6 Conservation status

According to Ndhlovu *et al.* (2021) and (Moyo *et al.*, 2015), there is need for more studies in sub-Saharan Africa to mitigate the continuously growing strain of valuable medicinal plants. Similar trends are seen worldwide, particularly in biodiversity hotspots (Ndhlovu *et al.*, 2021). Conservation of natural resources is an important aspect that assists in protecting resources from extinction. Based on the SANBI Red List for South African Plants (http://redlist.sanbi.org/), none of the plant species documented in this review are classified as “rare”. In this review, 81% of plants used for medicinal purposes are of least concern (LC) and not threatened (NT) (**Figure 2.5**). This suggests that these medicinal plants are “widespread and abundant” (Asong *et al.*, 2019; Ndhlovu *et al.*, 2021) and that the tradition of the people in the North-West regarding the use of these medicinal plants, is not threatened. Nonetheless, there are increasing risks regarding global conservation of medicinal plant populations due to factors, such as industrialisation, deforestation, habitat loss, pressure from harvesting from the wild and other anthropogenic factors (Mehta *et al.*, 2020; Ndhlovu *et al.*, 2021; Matlala *et al.*, 2024). Furthermore, this review also reveals that roots are the most commonly used plant parts for medicinal remedies. This unsustainable practice could possibly result in the extinction of this resource (Matlala *et al.*, 2024) that is important for maintaining health. It could also have dire implications for the preservation of ethnobotanical knowledge and conservation in general (Asong *et al.*, 2019). Only two (1.39%) of the plant species in this review were found to be classified as endangered and critically endangered (Figure 2.5). These plants are *Warburgia salutaris* (G. Bertol.) Chiov. and *Siphonochilus aethiopicus* (Schweinf.) B.L. Burtt respectively. Seventeen percent (17%) of plant species in this review were not evaluated (NE) and had no data (ND).

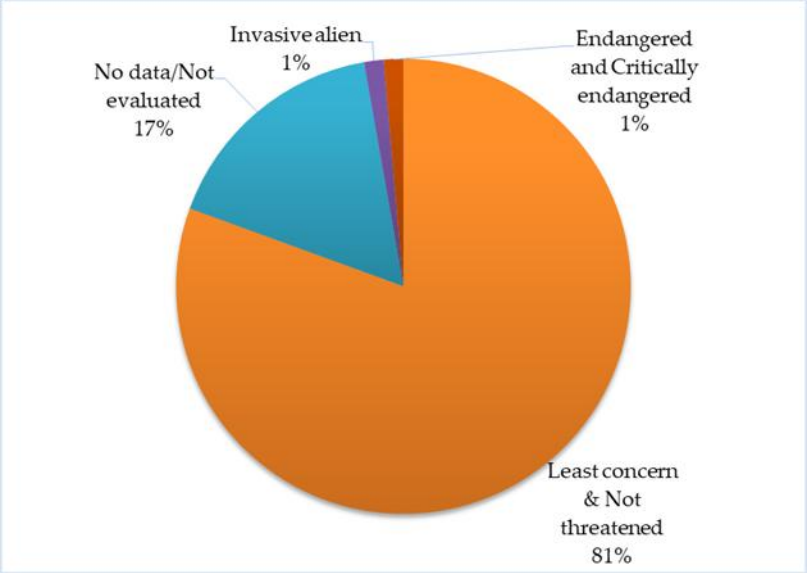

Figure 2.5: Conservation status of medicinal plants used in the North-West Province, South Africa

2.5 The concept of integration

According to Contandriopoulos *et al.* (2003), integration is "the process involving the establishment of greater independence between parts of a living being or between members of a society". Ampomah *et al.* (2020) state that integration is the "act of broadening the scope of health delivery through communication, participation, accommodation, and partnership building between biomedical and traditional health systems, while safeguarding indigenous medical knowledge". Asante and Avornyo (2013) consider integration as the process of integrating traditional medicine into the formal healthcare system. All these definitions convey the idea of bringing together different components, or systems or stakeholders to work seamlessly, promoting interdependence, cooperation and unity. In the context of this study on the integration of healthcare systems, this theme suggests that the goal is to create a unified, efficient and effective whole, which leverages the strengths of each system. This idea concurs with that of other researchers, such as Ampomah *et al.* (2020) and Kruk and Freedman (2008), who found that the sole purpose of integrating the two healthcare systems (traditional and modern) is to provide equitable and satisfactory access to high quality healthcare to the whole population, improve patient outcomes, enhance continuity of care and optimise

utilisation of resources. In addition, Tham *et al.* (2018) state that integrated care is the effective and efficient way of health management. The idea of integrating healthcare systems arose from the Alma Ata conference held in Kazakhstan in 1978 (Chaudhary and Singh, 2011; Mmamosheledi and Mncengeli, 2019; WHO, 2019; Mutola *et al.*, 2021). During this conference, the World Health Assembly (WHA) recommended that governments prioritise integrating THPs into national healthcare systems to ensure access to healthcare by all. This was after the WHO recognised and accepted traditional medicine as a form of healthcare in 1976. Thus, the formal practice of TM commenced in the early 1980s.

2.5.1 Categories of integration

According to Ampomah *et al.* (2022), Ampomah *et al.* (2021), Kwame (2021) and Kang and Lim (2012), integration of TM is categorised into the following three systems: integrative; inclusive; and tolerant systems. This depends on the extent of integration in the region, particularly in aspects of health financing, regulation of TM, formal education and monitoring (Ampomah *et al.*, 2022).

In an integrative healthcare system, TM and modern medicine have been successfully merged together and are operating as one system (Kang and Lim, 2012; Park and Canaway, 2019; Ampomah *et al.*, 2022). This is observed in countries, such as China, Korea, Thailand, Singapore, Vietnam, Sri Lanka, Pakistan, Japan, Indonesia and Germany (Latif, 2010; Egharevba *et al.*, 2015; Park and Canaway, 2019; Ampomah *et al.*, 2022). For instance, In China, TM has coexisted with modern medicine for centuries. According to Ampomah *et al.* (2022) and Latif (2010), several hospitals in China have traditional medicine units within them, where ancient Chinese medicines are used to treat millions of people every year. Latif (2010) states that every Chinese city has a traditional hospital. Modern doctors receive training in the field of TM practice, so that they will be able to support and assist competent THPs, embrace treatment processes founded on TM principles and learn from THPs. Additionally, China has approximately 170 research institutions that focus on traditional Chinese medicine (Latif, 2010). There are about 28 universities in China, offering courses in traditional Chinese medicine and traditional pharmacology; traditional medicine is registered in the same manner as modern

healthcare practitioners; and all herbal remedies and drugs registered and regulated by the State Drug Administration (Latif, 2010). In India, Ayurveda (Indian Traditional Medicine) was recognised as an official healthcare system way before WHO realised the potential of TM (Chaudhary and Singh, 2011). In 1970, eight years prior to the Alma Ata Conference, the Indian government established an act known as the Central Council of Indian Medicine Act of 1970 (WHO, 2004; Chaudhary and Singh, 2011). The establishment of this Act granted legal status to complementary and traditional medicine in the country (Mafuva and Marima-Matarira, 2014). This council established regulations for TM, including a registration process, standards for professional conduct and a code of ethics (WHO, 2004). It standardised training to a minimal standard for all healthcare workers, including THPs and made registration mandatory for all practitioners (Latif, 2010; Mafuva and Marima-Matarira, 2014). Furthermore, research shows that India has numerous institutions that deal with TM. For instance, there are about 3000 hospitals in the country, which provide TM and about 20 000 dispensaries (WHO, 2004; Latif, 2010). In 1993, the government of Thailand established the National Institute of Thai Traditional Medicine under the supervision of the Ministry of Public Health (Chokevivat *et al.*, 2005). The main goal was to preserve, promote and develop traditional Thai medicine and to ensure the full integration into the public healthcare system (Latif, 2010). According to Peltzer and Pengpid (2019) and Latif (2010), approximately 75% of Thai TM is integrated into the country's healthcare system, and a number of schools have been established for efficient training. Thailand has about 21 academic institutions that offer a four-year bachelor's degree in Thai TM (Peltzer and Pengpid, 2019), and TM is made available in many modern hospitals in the country (Chotchoungchatchai *et al.*, 2012).

With the inclusive system, countries have officially recognised and accepted TM as a medical practice, however, it is still not fully integrated into the mainstream healthcare system (Kang and Lim, 2012; Kwame, 2021; Ampomah *et al.*, 2022). For instance, the traditional health system may not be covered by the country's health financing plan, and formal education and training in TM may not be offered at tertiary level (Owoahene-Acheampong and Vasconi, 2010; Ampomah *et al.*, 2022). Countries, such as Ghana, Nigeria, Australia, United Kingdom, Mali and Australia, practice an inclusive healthcare system (Latif, 2010; Kang and Lim, 2012; Ampomah *et al.*, 2022). In Nigeria, the Federal

Ministry of Health and a few international partners have, on behalf of government, conducted some training of traditional health practitioners and public awareness campaigns (Egharevba *et al.*, 2015), and the increased awareness has assisted in improving understanding, perception and acceptance of TM practice by healthcare workers as a vital strategy to improve access to healthcare services in light of rising costs of Western medicine. Ghana maintains an inclusive status since THPs are recognised as healthcare providers and some public health facilities provide access to TM products and medications (Owoahene-Acheampong and Vasconi, 2010; Kang and Lim, 2012; Agyei-Baffour *et al.*, 2017; Ampomah *et al.*, 2022). The Ghanaian government started the process of integrating TM into the national health system in 2005 by establishing a TM policy, a TM Practice Council and TM units in a few hospitals within the country (Asante and Avornyo, 2013; Ampomah *et al.*, 2020; Ampomah *et al.*, 2021). Additionally, the government established TM departments at the Kwame Nkrumah University of Science and Technology in Ghana in 2001 to train THPs (Ampomah *et al.*, 2022). Countries with an inclusive system are working towards establishing an integrated health system in future. As a result, these countries are working to implement measures to enhance collaboration among healthcare providers, with the goal of promoting mutual respect and trust among healthcare providers, patients and all parties involved. However, according to Ampomah *et al.* (2022), the inclusive health system as practiced in many African countries, is not efficient due to lack of support from governments in terms of training opportunities.

In a tolerant health system, the country's healthcare system is based entirely on Western medicine, but some TM practices are tolerated by the country's laws (Kang and Lim, 2012; Kwame, 2021). In such health systems, TM is not recognised as a form of healthcare or as an alternative method to the country's health system. Countries that have a tolerant system include Cameroon, New Zealand, Bangladesh, Bahamas, Niger, Guinea Bissau and the United States of America (Latif, 2010; Fokunang *et al.*, 2011; Kwame, 2021). According to Kwame (2021), in the United States of America, "there is no national plan to integrate T&CM into the delivery of mainstream health service".

2.5.2 Integration of traditional medicine in South Africa

Based on the above categories of integration, one would classify the South African health system as an inclusive one. South Africa has taken significant steps in integrating TM into the national healthcare system. During the colonial era of South Africa, the practice of TM was considered unlawful, unscientific, backwards and superstitious (Latif, 2010; Mmamosheledi and Mncengeli, 2019; Pemunta and Tabenyang, 2020). The Witchcraft Suppression Act of 1957 and the Witchcraft Suppression Amendment Act of 1970 were put in place to prohibit the practice of TM for practitioners and users and declared it unconstitutional (Tugendhaft, 2010; Mdhluli, 2022). The prohibition of TM practice was partly due to the belief that diseases and illnesses in Africa were often associated with witchcraft (Nemutandani *et al.*, 2016). Following strategies proposed by the WHO at the 1978 Alma Ata Conference, South Africa attempted to regulate the practice of THPs by enacting the Associated Health Service Profession Act in 1982 (Ṙreeman and Motsei, 1992; Mmamosheledi and Mncengeli, 2019). This legislation established a system for registering and licensing herbalists, naturopaths, and homeopaths, while also prohibiting them from using the title of medical practitioners. Prior to the country's first democratic government in 1994, the African National Congress (ANC) proposed in its health plan that THPs would be acknowledged as an essential component of the country's healthcare system (Gqaleni *et al.*, 2007; Mmamosheledi and Mncengeli, 2019). It stated that patients would have the freedom to select the healthcare provider of their choice (Gqaleni *et al.*, 2007).

The 1996 National Drug Policy (NDP) was among the first policies to acknowledge the potential role and benefits of TM for the national healthcare system. Its main goal was to investigate the use of effective and safe TM at a primary level (Latif, 2010; Mmamosheledi and Mncengeli, 2019). In 2003, the government began efforts to formalise the regulation of THPs with the development of the Traditional Health Bill, which was gazetted as a draft bill (Gqaleni *et al.*, 2007). The following year, this draft bill was finally passed as the Traditional Health Practitioners Act (Act 35 of 2004). The Act provided a regulatory framework to ensure the efficiency, safety and quality of traditional health services and the establishment of the Interim Traditional Health Practitioners Council of South Africa (Gqaleni *et al.*, 2007). However, the Constitutional Court ordered the Act be

returned to Parliament because it was improperly processed. In 2007, the Act was approved and enacted as the Traditional Health Practitioners Act (Act 22 of 2007) (Gqaleni *et al.*, 2007). In 2006, the South African government also established a Directorate of Traditional Medicine to coordinate and manage initiatives regarding African Traditional Medicine within the Department of Health (Latif, 2010; McFarlane, 2015). The vision of the directorate was to promote the role of TM in improving public health and well-being. The mission was to facilitate the institutionalisation of TM into the National Healthcare System through the validation and production of safe and effective TM and the promotion of TM practice based on solid legislative and policy framework (Ndou, 2018; Mmamosheledi and Mncengeli, 2019). Furthermore, the South African government has provided funding for research and development of African Traditional Medicine to manage and control diseases (Latif, 2010; Mmamosheledi and Mncengeli, 2019).

Even with the abovementioned initiatives or efforts towards integration, there are some researchers who believe that South Africa is only practicing an inclusive system on paper, but in actual fact, the country is practicing a tolerant system (Mokgobi, 2012; Ndou, 2018). This is because the initial “push” to achieve an integrative healthcare system has stalled and no integration has been implemented in practice, leaving stakeholders perplexed (Mokgobi, 2012; Ndou, 2018). Felix (2017) believes there is lack of national priority to classify traditional medicine in South Africa, which delays the full integration of traditional medicine in South Africa.

2.5.3 Previous research in South Africa

Literature reveals that various researchers across different provinces of South Africa have been studying the integration of traditional medicine into the formal healthcare system (**Table 2.2**). Earlier studies by Latif (2010) and Mokgobi (2012) laid the foundation for the argument supporting integration, focusing on the cultural acceptance and availability of traditional medicine. Latif (2010) argued that the primary barrier of integration was the lack of practical implementation frameworks for integration, but Mokgobi (2012) indicated that it is only a matter of biomedical bias. Contrary to this, Nemutandani *et al.* (2016) then shifted the conversation beyond just cultural recognition and identified a clash of paradigms where the two healthcare systems are not compatible with one another and

therefore cannot operate as one. In this study, the researchers found that although traditional health practitioners are eager for recognition, conventional healthcare professionals remained hesitant due to the lack of empirical evidence of traditional medicine. In recent studies, authors argue that while conventional healthcare professionals are increasingly aware of traditional medicine, they still act as gatekeepers who require strict registration, regulation and labeling prior to achieving full integration (Masemola *et al.*, 2023). All of these previous studies demonstrate a gradual shift towards the acceptance of integration of healthcare systems, with conditions. There remains a gap between community support and professional resistance , which indicates that successful integration does not only rely on policy frameworks but also mutual trust, capacity building within healthcare systems and epistemological reconciliation.

Table 2.2: Previous research on the integration on healthcare systems in South Africa

Author (year)	Study area	Main aim & objectives	Research type	Population Sample size	Method of data collection	Main findings & recommendations
Latif (2010)	Limpopo	The aim of the study was to investigate the extent of use of traditional medicine in Limpopo and to add value to the draft policy proposed by the Minister of Health. The study also aimed to explore possibilities and challenges involved in integrating traditional medicine into the formal healthcare system.	Qualitative	Practicing traditional healers, users, Western doctors, nurses, managers and government policy makers	Individual- and group face-to-face interviews	Doctors practicing Western medicine in the study believed that traditional healers should restrict treatments to spiritual practices, unless they operate with scientifically validated scopes and limitations. The study also revealed that traditional healers wish to be formally recognised and integrated into the formal healthcare system but oppose any regulated fixed pricing. Nurses and doctors acknowledge that sometimes, traditional healers may hinder patients' healthcare by causing delays in hospital treatment, which worsens the patient's condition. Nevertheless, they also acknowledge that traditional healers provide important spiritual and mental support. As a result, policy makers have identified strategies to educate these healers. There is need for all traditional healers to be registered with the relevant board and the development of exchange workshops between traditional healers and practitioners of Western medicine.
Mokgobi (2012)	Limpopo & Gauteng	The aim of the study was to examine opinions, attitudes, knowledge and	Mixed model design (qualitative	Psychiatrists, physicians, general nurses and psychiatric nurses	Questionnaires	Psychiatric nurses and psychiatrists showed a more positive attitude, opinions and knowledge and willingness to collaborate with traditional healers compared to general

		experiences of healthcare practitioners with traditional healers and to determine how these factors would impact their intention to collaborate with traditional healers.	& quantitative)	n = 319		nurses and physicians. Many participants had conflicting views, recognising the value of traditional healing, but at the same time, being wary of its practices.
Hlabano (2013)	Kwa-Zulu Natal	The aim of the study was to explore perceptions of traditional healers with regard to collaborating with biomedical professionals.	Qualitative	Traditional healers Purposive sampling n = 6	Individual in-depth interviews	The study revealed that traditional healers are very popular and highly respected in many African communities. They are, however, not trusted, and disrespected by biomedical professionals who appear to be ignorant of traditional medicine. The study also revealed there was lack of material support, resource allocation and incentives for traditional healers as well as poor management and mechanisms to support collaboration. There is need for education and training of traditional healers and biomedical practitioners to strengthen collaboration between practitioners. There is also the need for government, through the Department of Health, to put in place clear instructions and policy guidelines on how such collaboration can be managed.

Nemutandani *et al.* (2016)	Limpopo	The study examined perceptions and experiences of healthcare workers on collaboration with THPs in post-apartheid SA.	Qualitative descriptive study	Healthcare workers employed by the Limpopo Department of Health Purposive sampling n = 77	In-depth focus group discussions and meetings	Healthcare workers believed the quality of healthcare would be compromised if THPs worked alongside them in public healthcare facilities. It was also perceived that the two healthcare systems are not compatible in terms of the science involved and the source of knowledge. For instance, TM is unscientific, based on superstitions and spirits. THPs get their knowledge from ancestors, and this does not allow them to learn from healthcare professionals. There is a need for universities to include TM modules in their curricula and for the National Department of Health to develop and implement policies on its integration into the healthcare system.
Mutola *et al.* (2021)	Eastern Cape	The aim of the study was to find out why the integration of TM with the biomedical healthcare system in Qokolweni was stalling.	Qualitative	Nurses Purposive sampling n = 8	Participant observation and in-depth ethnographic interviews	Many participants were against integration because of lack of transparent and standard operating procedures and the fact that TM is not scientifically evaluated and certified. The study recommended that the government sets up regulatory strategies that will provide for the scientific evaluation and certification of TM to build confidence for TM among healthcare practitioners. In doing so, collaboration and integration will be easy.
Masemola *et al.* (2023)	Gauteng	The research aimed to explore the views of	Cross-sectional,	Psychiatrists and psychiatric nurses	Survey questionnaires	Majority of participants (mental healthcare providers) welcomed the integration of TM into the mental

	mental healthcare providers on the integration of TM within the mental healthcare system.	descriptive study	n = 85	healthcare system. They seemed to be willing to learn and understand TM and some of them have even used TM at some point in their lives. Participants were, however, concerned about lack of clear strategies on how THPs can be integrated into the mental healthcare system. There is need for the introduction and inclusion of TM practice in university curriculum for mental healthcare providers in order to fast-track the integration process. There is also the need for government to develop policies and frameworks to facilitate integration.

2.5.4 Dimensions of integrative medicine

Integration of healthcare systems is a monumental task that should not be taken lightly. It is not just different healthcare providers working together to improve patient outcomes or just the development of new policies. Several researchers use the Rainbow Model of Integrated Care (RMIC) (**Figure 2.6**) to demonstrate that for integration to take place, it must happen across different levels (Valentijn *et al.*, 2013; Soori *et al.*, 2024). The RMIC is a sophisticated model, which structures and delivers healthcare in a comprehensive manner by combining all components in a healthcare system (Soori *et al.*, 2024). With an integrated healthcare system, service users should be able to receive their needed support throughout and across different parts of the healthcare system. Integration must happen across the macro-, meso- and micro levels, with integration activities linking up across all levels.

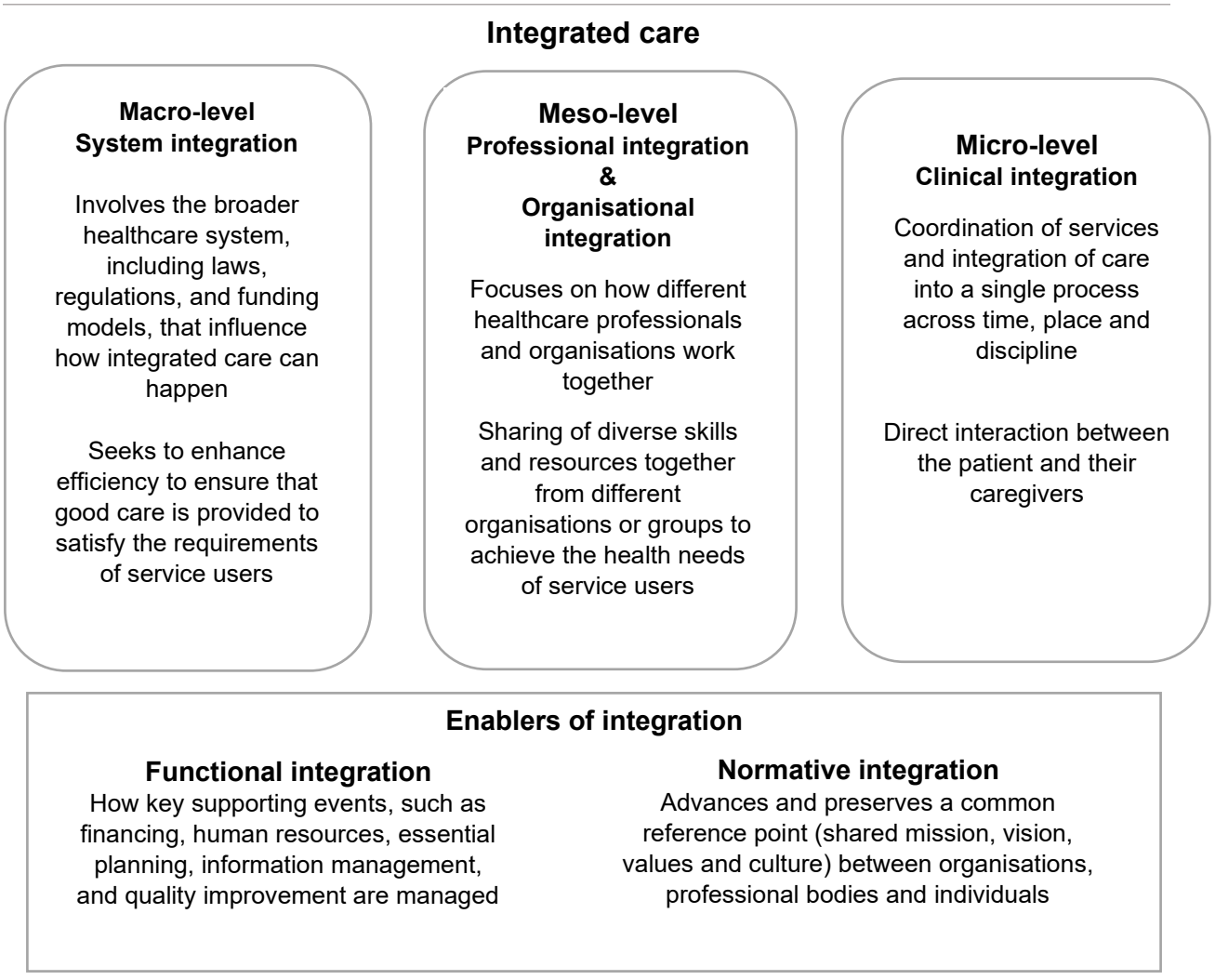

Figure 2.6: Rainbow Model of Integrated Care (Valentijn *et al.*, 2013; Soori *et al.*, 2024)

Chapter 3: Use of medicinal plants in Bojanala District, South Africa: An ethnobotanical assessment of Indigenous Knowledge and conservation status

Abstract

Bojanala District in North-West Province of South Africa, is home to a diverse array of plant species, many of which are known for their medicinal properties. Despite their historical use, the pharmacological effects of these plants remain largely unexplored. These species represent a potential source for the development of novel therapeutic agents. This study aimed to examine phytomedicinal practices in the Bojanala District by documenting medicinal plants and associated indigenous knowledge. Ethnobotanical data were collected from 37 purposively selected participants across six communities through face-to-face interviews, using a semi-structured questionnaire. A total of 52 plant species from 28 families were documented for treating ailments in the study area. Data were analysed using ethnobotanical indices, including Use Value (UV), Fidelity Level (FL), and Plant Part Value (PPV). In terms of families, Asteraceae had the highest (7) number of plants, followed by Fabaceae (6) and Anacardiaceae (4). The top five plant species in terms of Use Value (UV) were *Artemisia afra* (1.108), *Dicoma anomala* (0.622), *Siphonochilus aethiopicus* (0.459), *Drimia sanguinea* (0.459), and *Hypoxis hemerocallidea* (0.405). Twenty species had a FL of 100%, including *Artemisia afra*, *Bidens pilosa,* and *Cadaba aphylla*. The most commonly used plant parts were leaves with a PPV of 0.329, roots (PPV=0.237), and barks (PPV=0.118). The most common methods of preparation included decoction (54%), burning (12%), and infusion (11%). Musculoskeletal conditions, pain, and inflammation were the most commonly treated health conditions, using phytomedicine, with 20 plant species reported for this purpose. Although 63% of recorded plant species were classified as Least Concern (LC) by SANBI, some of these species are experiencing population declines due to overharvesting and habitat loss. Thus, there is a need for continuous monitoring and implementation of sustainable harvesting practices. Furthermore, pharmacological validation and phytochemical profiling of the most frequently used species are essential for identifying

bioactive compounds, supporting traditional claims, and promoting the development of plant-based therapeutic agents.

Keywords: North-West Province, Traditional medicine, Medicinal plants, Primary healthcare, Conservation status

3.1 Introduction

Herbal medicine, also known as phytomedicine, is the oldest and is still widely used worldwide today (Simelane and Msomi, 2018; Ozioma Ezekwesili-Ofili and Okaka, 2019). It involves using herbs or plant-derived materials to prevent and treat various ailments, as well as promote overall health.

Before the introduction of orthodox medicine, traditional medicine constituted the sole healthcare system available to local communities (Mokgobi, 2012; Sebata, 2015). However, during the colonial and apartheid period in South Africa, the ruling authorities aimed to eradicate African Traditional Medicine (ATM), denouncing such practices as witchcraft, superstition, and magic, and also enforcing prohibition on their use among indigenous communities (Mokgobi, 2012; Sebata, 2015). Nevertheless, ATM has persisted and continues to thrive in many parts of South Africa. In fact, some people still prefer herbal medicine over modern Western medicine because they believe it is more effective, calling it “original medicine” (Mmamosheledi and Mncengeli, 2019). Additionally, traditional medicine is preferred for its cost-effectiveness, ease of access, and availability (Payyappallimana, 2010a; Sebata, 2015; Ozioma Ezekwesili-Ofili and Okaka, 2019). The aforementioned factors, together with the search for sustainable alternatives to Western medicine, have led to renewed interest and appreciation for traditional medicine (Patwardhan and Partwardhan, 2005; Hussain *et al.*, 2012; Ross, 2020). According to Malerba (2010), there are relatively few genuinely effective medical cures, most of which come with unpleasant side effects, and the cost of quality health care keeps increasing year after year.

Ethnobotany is the study of how people interact with plants, and often focuses on traditional medicine practices and their potential relevance and application in modern or Western medicine (Nair *et al.*, 2023). The foundation of ethnobotany lies in the indigenous

knowledge that communities have gained through many generations of continuous engagement with the natural environment (Ndou, 2018; Kindie and Mengistu, 2022; Veliz, 2024). This knowledge serves as the basis for local decision-making regarding livelihood within a community, such as health maintenance, food production, and adaptation to societal and environmental changes. Different cultures have different views about plants and their uses. Knowledge about how other cultures and indigenous communities use plants has been transmitted orally from generation to generation (Mahmood *et al.*, 2013; Regassa, 2013). However, this knowledge is fast disappearing due to advancements in technology, globalisation, cultural changes among ethnic groups, and a lack of interest among the youth (Tshidzumba, 2018; Henrietta Marie, 2019; Matlala *et al.*, 2024). Ethnobotanical research plays a crucial role in preserving indigenous knowledge by providing a systematic approach to documenting it for future generations (Falemara *et al.*, 2021). Furthermore, ethnobotanical and ethnomedicinal studies are valuable tools for identifying new medicinal plants and re-investigating previously documented plants to further explore them. Despite advancements in modern medicine, traditional medicine continues to play a significant role in many people's lives.

Numerous studies have documented the use of medicinal plants in various parts of South Africa, such as in Limpopo Province (Semenya *et al.*, 2012; Semenya and Potgieter, 2013; Semenya and Maroyi, 2018c; Tshidzumba, 2018; Ndhlovu *et al.*, 2019; Mudau *et al.*, 2020), KwaZulu-Natal (de Wet *et al.*, 2010; De Wet *et al.*, 2012; Gebashe *et al.*, 2019; Mhlongo and Van Wyk, 2019; Mbanjwa, 2020) and the Eastern Cape (Odeyemi and Bradley, 2018; Thinyane and Maroyi, 2019; Sagbo and Otang-Mbeng, 2021). However, there is very limited documentation in the North-West Province (Magodielo, 2018; Moroole, 2021; Ndhlovu *et al.*, 2023). Previous studies conducted in this province have largely focused on specific categories of ailments. For instance, Asong *et al.* (2019) documented plants used for treating skin-related conditions, Moroole (Moroole, 2021) explored plants used as contraceptives and Ndhlovu investigated those used in managing childhood illnesses (Ndhlovu *et al.*, 2023). While these studies have made important contributions to understanding the therapeutic applications of plant species in the province, they remain condition-specific in scope. Contrarily, this study adopted a broader approach of exploring medicinal plant use for general health

management and the treatment of a wide range of ailments in Bojanala District. This study addressed the question of “what medicinal plants are used for the treatment of various health conditions in Bojanala District?”. This study aims to fill this knowledge gap and to contribute to broader ethnopharmacological and conservation priorities by identifying species and knowledge systems that require further validation and preservation.

3.2 Materials and methods

3.2.1 Study area

This study was conducted across six communities of the Bojanala District, North-West Province (-25°38’04"S, 27°44’52"E) (Figure 3.1). Communities sampled included Legonyane, Jericho, Maboloka, Letlhabile, Oskraal, and Hebron. Bojanala District is one of the four districts in the North-West Province, subdivided into five local municipalities, namely: Kgetlengrivier, Kotane, Madibeng, Moretele and Rustenburg. The district covers an area of 18 333 km^2 and boasts a population of approximately 1 848 133, of whom 52.8% are males and 47.2% are females (Department of Cooperative Governance and Traditional Affairs, 2023). 94% of the population in the district are Black Africans, 5% are white and 1% are colored and the dominant ethnic group (55.3%) are Setswana speaking people (Mokoena *et al.*, 2023). Fifty-nine percent (59%) of the population is aged between 18 and 64 years (Department of Cooperative Governance and Traditional Affairs, 2023). There are approximately 501 696 households in the district, and over 50% are living in poverty (Gwedla *et al.*, 2022). Additionally, reports from the North West Provincial Government (2024) reveal that Bojanala District Municipality ranks first with an unemployment rate of 50.5% in the North-West Province. According to Willie and Maqbool (2023), there is correlation between high rates of unemployment and high levels of poverty in impoverished communities, and such communities frequently have scarcity of resources. Due to reasons such as unemployment, people have a lack economic means to pay for treatments and supply for themselves, and a lack of transportation to distant facilities.

Bojanala District is a central bushveld area of the Savanna biome, which includes 22 vegetation units. Its vegetation mainly consists of thorny woodlands dominated by *Vachellia* Species, which can be dense or open with a herbaceous layer consisting of

grasses and forbs (Gwedla *et al.*, 2022). Additionally, the area is between 1000 and 1500 m above sea level and experiences high summer rainfall with dry and frosty winters (Mokoena *et al.*, 2023). It receives about 550-650 mm of rain per annum and has average maximum temperature of 36.7°C. Large parts of this district are characterized by high levels of biodiversity, and it is home various ecosystems and protected areas such as Borakalalo Nature Reserve, Hartbeespoort Dam Nature Reserve and Magaliesberg Protected Environment which also contribute to the region's biodiversity. This suggests an abundance of plant species, many of which are likely to have traditional uses. However, industry activities in the area such as mining and agriculture have the potential for rapid urbanisation, which might adversely affect local biodiversity (Mpolokeng *et al.*, 2025). Additionally, Bojanala District was chosen because the researcher resides within the same municipality and this helped in cutting costs and saving time.

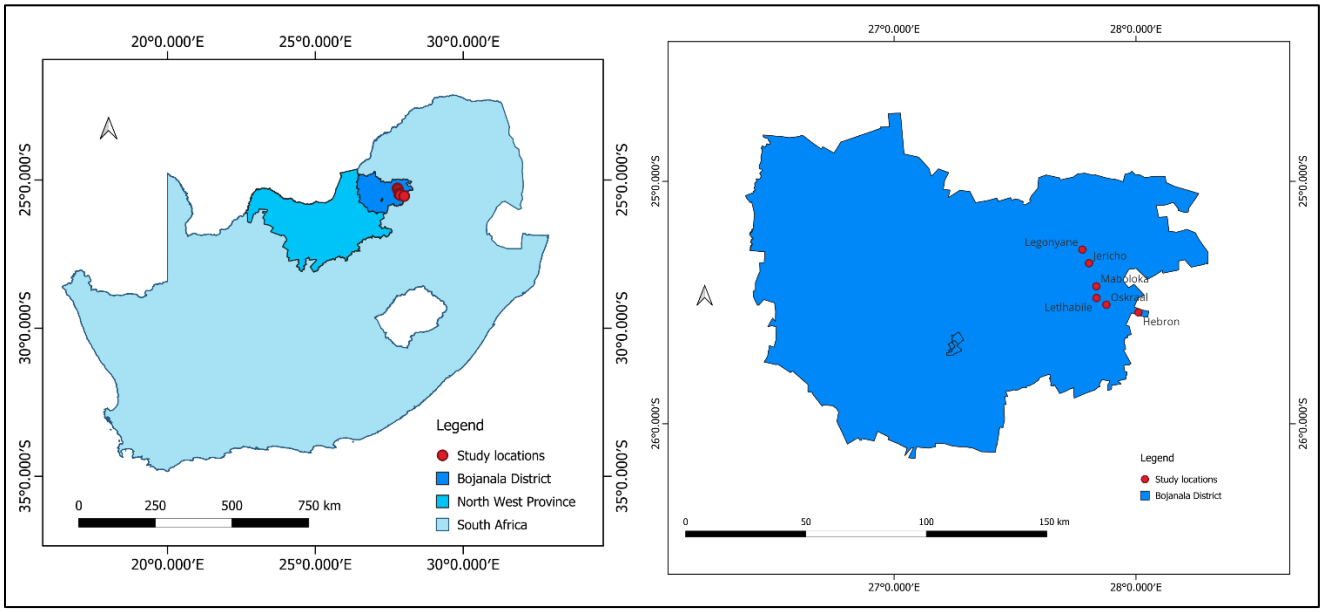

Figure 3.1: Geographical location of study locations within Bojanala District, North-West Province, South Africa. The map was generated using the free software QGIS version 3.40.12-Bratislava (available at www.qgis.org).

3.2.2 Sampling technique

Purposive sampling was used to identify key participants with specific knowledge of traditional medicine and indigenous knowledge. This sampling technique involves the

intentional selection of individuals with characteristics or expertise relevant to the research or topic (Lopez and Whitehead, 2013; Palinkas *et al.*, 2015). This widely used technique in ethnobotany (Tongco, 2007; Ndhlovu, 2019), where the researcher relies on judgment to select participants likely to provide rich and meaningful information for the study. Thus, the inclusion criteria for this study consisted of individuals residing in the study area, aged 18 years and above, who used phytomedicine (elders/knowledge holders) and practicing traditional health practitioners from the local communities. Individuals who were less than 18 years of age were excluded from the study, in accordance with South African law (Constitution of the Republic of South Africa, 2005), which identifies them as minors who cannot give consent on their own.

Additionally, a snowball sampling technique was used to identify or recruit traditional health practitioners and other knowledge holders. Snowball sampling is a recruitment technique in which initial participants refer additional participants from their own social networks who share relevant characteristics (Sadler *et al.*, 2010). With this technique, the researcher begins by identifying a few initial participants who meet the study criteria. These participants then suggest others in their network who might also be relevant (Sadler *et al.*, 2010). The process continues like a snowball, with the sample growing organically through referrals.

According to Rosenthal (2018), the sample size of qualitative research should be sufficiently large to explore the phenomenon under investigation, but it should also adhere to the principle of saturation, which is the point in data collection process where no new insights are identified (Saunders *et al.*, 2018). Although Keshoofy *et al.* (2023) contend that there is no agreement on the minimum sample size for qualitative research, data saturation and adequacy are the foundational elements for determining qualitative sample size. When data reaches saturation, it starts to repeat, indicating that a sufficient sample size has been attained and additional data collection would not be necessary. Therefore, in this study the sample size was determined by reaching saturation during data collection (n = 37). The researcher continued interviewing participants until no new valuable data emerged.

3.2.3 Data collection

Ethnobotanical data were collected between October 2024 and March 2025. To enhance the depth and accuracy of the data, follow-up interviews with key participants were carried out from April to June 2025. Data was primarily collected through in-depth, face-to-face interviews with 37 participants, using semi-structured questionnaires in Setswana. The semi-structured interviews were conducted at the participants' herbal vendors' homes. Semi-structured interviews were chosen because they allowed the researcher to ask follow-up questions and probe unclear responses. The plant names provided were then matched to their corresponding botanical names using several previous ethnobotanical surveys (Semenya and Maroyi, 2018b; Magwede *et al.*, 2019; Mhlongo and Van Wyk, 2019; Ndhlovu *et al.*, 2023). The authenticity of the matched botanical names was further validated by the South African National Biodiversity Institute (SANBI) databases (http://redlist.sanbi.org/, https://pza.sanbi.org/). Plant samples were collected from various locations in the study area. The plant samples were dried and pressed, assigned voucher numbers, and deposited at the temporary herbarium, located in the left wing of Lab 206, Building 12, at the University of Mpumalanga, South Africa. The plants were then authenticated and confirmed by a botanist at the University of Mpumalanga.

3.2.4 Data analysis

Collected data was entered into a Microsoft Office spreadsheet for analysis. Mixed method analysis techniques were employed for this purpose. Initially, the qualitative data obtained were examined using thematic analysis methods. This approach was essential for categorizing data with similar characteristics. Secondly, various ethnobotanical indices, such as Fidelity level (Khan *et al.*, 2014; Jadid *et al.*, 2020), Use value (Chekole, 2017), and Plant part value (El Hachlafi *et al.*, 2020) were also applied following the formulas below:

Fidelity level (FL) indicates participants' preference for particular plant species to treat specific diseases. It was calculated following Zent (1996), using the given formula (1):

$$FL\% = \frac{N_p}{N} \times 100 \ (1)$$

Where FL refers to the fidelity level of the species, Np is the number of participants reporting use of a particular plant species for a specific disease category, and N is the total number of participants who mentioned uses of a particular plant species across all disease categories. According to Kayani *et al.* (2014), a high FL value indicates the highest frequency of use among participants for treating a particular disease.

Use Value (UV): Use value marks the relative importance of different uses of species. It was determined using a formula previously cited, following the protocol of other researchers who have used the same formula (Amjad and Arshad, 2014).

$$UV_i = \frac{\sum U_i}{N} \quad (2)$$

Where: UV_i refers to the relative use value of the species, U_i is the number of uses mentioned by each participant, and N stands for the total number of participants who reported the species (Khanum *et al.*, 2022).

Plant part value (PPV): Plant part value (PPV) is used to show the use frequency of each plant part (Gomez-Beloz, 2002; El Hachlafi *et al.*, 2020). The part with the highest PPV is the most used part by participants. It is calculated as follows:

$$PPV = \frac{RU_{plant\ part}}{RU} \quad (3)$$

Where: PPV stands for the plant part value of a species, $RU_{plant\ part}$ refers to the sum of uses reported for a specific part of the plant and RU is the number of uses reported of all parts of the plant.

3.2.5 Validation and reliability

Before the main investigation, a pilot study was conducted in Maphosa Village, outside Polokwane. Similar to the study locations, Maphosa is a rural area where people still depend heavily on traditional medicine due to the limited access to quality healthcare services. The pilot survey was conducted to ensure the quality and accuracy of the study. Three (3) traditional healthcare practitioners and two (2) knowledgeable community members were chosen, using purposive and snowball methods to assess the reliability of

the research tools. Each participant was interviewed to get their feedback on the tools used for this study. The tool was then updated based on participants' suggestions.

3.2.6 Limitations of the study

Bojanala District has a total of six (6) local municipalities, and it would have been better if the researcher had collected data from all five to provide a clear representation of phytomedicinal use within the district. However, due to financial constraints, the researcher could only collect data in one local municipality, Madibeng. Additionally, the study focused solely on the views of indigenous knowledge holders and traditional healthcare practitioners regarding the use of phytomedicine. A larger sample size could have provided better insight into the study, but only 37 participants were identified. Many knowledge holders were uncomfortable sharing their knowledge due to privacy concerns and fear of the researcher misusing their information, while others wanted to be paid for their time. This prevented the researcher from accessing valuable information that these knowledge holders could have provided.

3.2.7 Ethical considerations

Before conducting the study, the researcher requested and obtained ethical clearance from the University of Mpumalanga Research Committee (*UMP/Matlala 220207089/SBES/MSc/2024/1*). The researcher also obtained approval to collect data from traditional healthcare practitioners through the Traditional Health Practitioners Organisation (THO) and from community members through the Bakwena ba Mogopa Tribal Authority. During data collection, all participants were given an information leaflet with a consent form attached. The researcher explained the contents of the information leaflet to participants, making them aware of the study's details, aims, and objectives, and the expectations of both the researcher and the participants. The researcher also informed participants that their participation was voluntary, that they were not forced to participate, and that they had the right to withdraw from the study even after signing the consent form. Ethical principles applied in this study included the principle of anonymity, which ensured participants' identities remained confidential. The principle of respect was also applied as all participants were treated with utmost respect.

3.3 Results and discussion

3.3.1 Demographic characteristics of participants

Thirty-seven participants were interviewed on the use of phytomedicine in the study area. Among the 37 participants, 16 were traditional healthcare practitioners, 7 were herbalists, and 14 were indigenous knowledge holders. Table 3.1 below shows the distribution of participants across communities in the study area.

Table 3.1: Distribution of participants across communities in the study area

Community/village	Participants			
	Traditional healthcare practitioners	Herbalists	Indigenous knowledge holders	Total
Letlhabile	4	3	2	9
Maboloka	3	1	1	5
Jericho	2	0	4	6
Legonyane	2	0	5	7
Oskraal	3	0	2	5
Hebron	2	3	0	5
Total no. of participants	**16**	**7**	**14**	**37**

3.3.2 Age and sex of participants

Among the 37 participants interviewed, 73% (n=27) were female and 27% (n=10) were male. The percentage of female participants across the five age categories was significantly higher than that of males (**Figure 3.2**). The findings also revealed that the percentages of both males and females increased slightly with increasing participant age, particularly in the 41-50 years age category. The percentages decreased slightly in the 51-64 years age category and increased slightly in the 65+ years age category. According to Ramarumo (2017) and Howard (2003), there is an uneven distribution between the sexes in understanding how plant species are used in indigenous knowledge. Previous studies show that throughout history, women have possessed more knowledge than men about the use of plants, as such knowledge is required for their daily activities (Kainer and Duryea, 1992; Howard, 2003; Senouci *et al.*, 2019). The findings of this study are similar to those of other studies, which revealed that women are more aware and well-

informed about the use of plants compared to men (Upadhyay *et al.*, 2007; Fatima-Zahra *et al.*, 2017; Senouci *et al.*, 2019; Jan *et al.*, 2021; Yiblet and Adamu, 2023). On the other hand, Buenavista *et al.* (2022), Chekole (2017), Tadesse *et al.* (2024), and Yimam *et al.* (2022) found that men are more knowledgeable than women.

In terms of age, the study revealed that participants aged 41-50 years had greater knowledge of the use of plants (Figure 3.2), while those aged 18-30, 31-40, 51-64, and 65 years and above had limited knowledge of the use of plants. These findings are similar to those of other studies, which have shown a decline in indigenous knowledge among younger generations (Hailemariam *et al.*, 2021; Matlala *et al.*, 2024). This could be attributed to factors such as urbanisation and technological advancements. For instance, research has shown that many people, particularly youth, are moving from villages and rural areas to cities and towns in search of new opportunities. When the youth reach the cities, they adopt new, modernised ways of living (Ndhlovu, 2019). This suggests that indigenous knowledge of medicinal plants in the study area may be at risk of being lost. The study also revealed a decline in the number of older adults with knowledge of the use of phytomedicine, which could be due to the passing of older adults in communities (Ndhlovu, 2019; Matlala *et al.*, 2024).

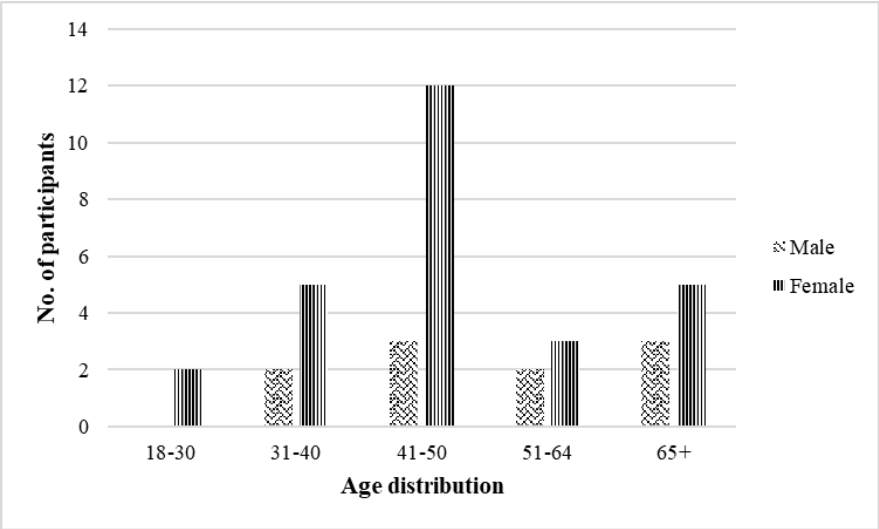

Figure 3.2: Distribution of participants according to age and sex in Bojanala District, North-West Province, South Africa (n=37)

3.3.3 Level of formal education and employment status of participants

Cameron and Harrison (2012) consider formal education an approach delivered by institutions in a classroom-based setting, taught by qualified teachers. **Figure 3.3a** shows that the majority of participants in the study area attained secondary and tertiary levels of education, while less than 10% did not receive formal education. This is contrary to findings from other studies, in which many participants had low levels of formal education (Ndhlovu, 2019; Hu *et al.*, 2020; Xin *et al.*, 2020). Several studies have shown that, generally, people who know or use traditional medicine are likely to have low formal levels of education, while highly educated people are likely to have minimal indigenous knowledge and would therefore prefer modern medical technology to indigenous knowledge (Hu *et al.*, 2020). In this study, most participants had formal education. The findings are in line with those of Mander *et al.* (2007) and Mmamosheledi and Mncengeli (2019), who found that traditional medicine is not limited to underprivileged people living in remote areas or lacking education.

Furthermore, over 50% of participants in this study were employed and received income (**Figure 3.3b**). Twenty-four percent (24%) of participants were retired, while 24% were unemployed. As noted by Hughes *et al.* (2013), Mander et al. (2007), and Otang *et al.* (2011), traditional medicine is used by people from all social groups and classes, irrespective of age, level of education, religious affiliation, or occupation.

Figure 3.3: Levels of education (left) and employment status (right) of knowledge holders in Bojanala District, North-West Province, South Africa (n=37)

3.3.4 Plant diversity

Medicinal plant species used in the study area belong to twenty-eight (28) families, and the most common plant family is Asteraceae, with seven plant species, followed by Fabaceae with six species, Anacardiaceae with four species, Asphodelaceae and Euphorbiaceae with three species each (Table 3.2, Figure 3.4). The findings of this study are similar to those of other scholars in South Africa, who identified Asteraceae, Fabaceae, Euphorbiaceae, and Asphodelaceae to be among the dominant families used in traditional healthcare systems (Mhlongo and Van Wyk, 2019; Mogale *et al.*, 2019; Ndhlovu *et al.*, 2021; Mudau *et al.*, 2022). In addition, the updated list of medicinal plants of Southern Africa reveals that these families, except Anacardiaceae, are among the top 10 medicinal plant families in Southern Africa (Cornelius and Van Wyk, 2024). It is no surprise that Asteraceae and Fabaceae are among the most commonly used medicinal plant families, as they are among the most prominent, with approximately 25,000 and 19,500 plant species worldwide, respectively. Members of these families exhibit anti-inflammatory, antioxidant, antibacterial, antimicrobial, and antidiabetic properties (Rolnik and Olas, 2021; Maroyi, 2023), which enable them to play a vital role in traditional medicine.

On the other hand, Anacardiaceae has only about 700 species (Salehi et al., 2019), yet it still ranks among the most popular medicinal plant families in this study. Some species of this family possess bioactive compounds with antimicrobial, antifungal, immunological, and antioxidant properties, which make them beneficial in traditional medicine (Guerra *et al.*, 2025). In addition to their bioactive compounds, the popularity of the aforementioned plant families can also be attributed to the availability or cultural significance of species from these families in the study area (Odukoya *et al.*, 2022). The high number of medicinal plant species (52) mentioned in this study may indicate the region’s rich traditional knowledge of medicinal plants.

Table 3.2: Inventory of medicinal plants used by selected communities in Bojanala District, North-West Province, South Africa. Botanical names of plants and conservation statuses validated using the South African National Biodiversity Institute (SANBI) databases (http://redlist.sanbi.org/, https://pza.sanbi.org/)

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
Aizoaceae	*Carpobrotus edulis* (L.) L.Bolus **MEM 001**	Mochips	Cr	Used to treat tonsils, and as an anti-inflammatory	Whole plant, leaves	Crush and add to water, or squeeze the juice into the mouth	Oral consumption Gargle as needed	2	0.081	LC
	Sceletium tortuosum (L.)/ *Mesembryanthemum tortuosum* L. **MEM 002**	Kanna	Cr	Management of stress and anxiety	Flower, seed	Decoction Burning	Oral consumption Smoke inhalation 1 cup/day	2	0.081	LC
Alliaceae	*Allium cepa* L. **MEM 003**	Onion	H	Feet cracks Blocked nose, tight chest	Bulb	Juicing (mix with baking soda and Vaseline). Infusion	Topically Steaming Apply as needed	2	0.081	-
Amaranthaceae	*Beta vulgaris* L. **MEM 004**	Beetroot	H	Boost the immune system	Leaves, bulb	Decoction	Oral consumption Drink as needed	1	0.027	NE
	Dysphania ambrosioides (L.) Mosyakin & Clemants **MEM 005**	Motlhatlhabadimo	H	Used for gut cleansing and as treatment for piles and constipation; Also used to treat *hlogwana ya bana*	Leaves	Decoction Grind dried leaves and mix with snuff and grated green sunlight bar, roll into a small ball	Enema or insert the small ball into the anus. Oral decoction Use as needed	4	0.135	NE

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
Amaryllidaceae	*Boophone disticha* (L.f.) Herb. **MEM 006**	Legwama/ seipone	H	Operation wounds that will not heal, *go tlhatswa lefahla* (clearing chest congestion), to call upon ancestors for divination	Bulb	Decoction	Oral consumption Drink ¼ cup 2 times a day	3	0.081	LC
Anacardiaceae	*Lannea schweinfurthii* (Engl.) Engl. var. *stuhlmannii* (Engl.) Kokwaro **MEM 007**	Molebatsi	T	Depression, calming the nerves, helps people forget their troubles or trauma for a little while	Roots	Burning	Smoke inhalation As needed	4	0.135	LC
	Mangifera indica L. **MEM 008**	Mango	T	Used for the management of diabetes mellitus, treat dysmenorrhea and constipation	Leaves	Decoction	Oral consumption ½ cup 2 times per day	1	0.081	DD
	Schinus molle L. **MEM 009**	Monwametsi/ mopepere	T	Respiratory conditions (Influenza, asthma, covid19), headache, blood cleansing, *diso ka mogare* (s*ebabo*)-vaginal thrush	Leaves, roots, bark	Decoction	Oral consumption Steaming ¼ cup 2 times/day	5	0.297	NE
	Sclerocarya birrea (A.Rich.) Hochst. subsp. caffra (Sond.) Kokwaro **MEM 010**	Morula	T	Used to treat sexually transmitted diseases, help after miscarriages, cleanse blood, treat various reproductive system conditions,	Bark, roots	Decoction Infusion	Oral consumption, steaming and bathing ¼ cup 2 times/day	6	0.162	LC

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
				diseases that come to the bereaved, chase away badluck, sebabo (vaginal thrush)						
Asparagaceae	*Asparagus suaveolens* Burch. **MEM 011**	Lesitlwane/ Mfahlanamane	S	Treatment for *hlogwana ya ngwana* and eye problems	Roots	Decoction	Steam for hlogwana Take orally for eye problems ½ cup during the day & 1 cup at night	2	0.054	LC
Asphodelaceae	*Aloe ferox* Mill. **MEM 012**	Kgopane/ Sekgopha	Su	Used for treating *sebabo* (vaginal thrush/bacterial vaginosis), rash, alopecia, to manage diabetes and hypertension, arthritis, abscess, boost immune system, wounds, sefifi (bereavement & grief), poisoning	Whole plant	Blend the gel	Topical application, oral consumption Bathing Take 1 tablespoon of gel in 1 cup of water 3 times/day	4	0.270	LC
	Aloe greatheadii var. davyana **MEM 013**	Aloe	Su	General use, poisoning, hangover, painful & swollen legs, weight loss, acne	Leaves	-	Oral (chew), bath, or apply topically Use as needed	3	0.135	LC
	Aloe vera **MEM 014**	Lekgala	Su	Used to treat hair breakage, dandruff and any other skin	Whole plant	-	Topical application	3	0.135	LC

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
				conditions (acne, eczema), *go ntsha gala* (bile reflux)			Use as needed			
Asteraceae	*Artemisia afra* Jacq. ex Willd. **MEM 015**	Lengana	S	Used to treat respiratory problems, Covid-19, colds and Influenza, asthma, sinuses, TB, tight chest, pollen allergies, bronchitis, to boost immune system, gout, heartburn	Leaves, flowers	Decoction	Oral consumption and steaming Drink ½ cup 2 times/day	21	1.108	LC
	Bidens pilosa L. **MEM 016**	Sepodisi/Maphodisa	H	Toothache	Roots	Decoction	Oral consumption Drink or gargle with ½ cup of the decoction	2	0.054	NE
	Dicoma anomala Sond. **MEM 017**	Tlhonya	S	Used to treat Influenza and fever, rash, persistent cough blood related conditions, stomachache and neutralizing blood	Roots, leaves, stem	Decoction Infusion	Oral consumption Drink 3 cups/day, as needed	16	0.622	NT
	Helichrysum caespititium (DC.) Harv. **MEM 018**	Phate ya ngaka	H	Used to treat Influenza and coughs and to call upon ancestors during rituals	Leaves, flowers	Decoction Burn the dried parts	Oral consumption Smoke inhalation	2	0.081	LC

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
							Use as needed			
	Helichrysum odoratissimum (L.) Sweet. **MEM 019**	Impepho	H	Treats common cold symptoms, Influenza, headaches/migraines	Whole plant	Decoction Burning	Steaming, smoke inhalation Use as needed	3	0.081	LC
	Kleina longiflora DC. **MEM 020**	Mosiama (mali)/mmale	H	Used as an anti-depressant, and antibiotic. Also used to treat stiff joints, body pains, exhaustion, burnouts, operation wounds	Leaves	Infusion poultice	Oral consumption, topical application and used for bathing Use as needed	2	0.216	LC
	Schkuhria pinnata (Lam.) Kuntze ex Thell. **MEM 021**	Mpabane	H	Stomachache and diarrhoea	Whole plant	Crush and mix with water	Oral consumption 1 cup per day	4	0.162	NE
Brassicaceae	*Cadaba aphylla* (Thunb.) Wild **MEM 022**	Monnamontsho	S	Headaches, migraines	Bark	Burning	Smoke inhalation Use as needed	2	0.054	LC
Cannabaceae	*Cannabis sativa* L. **MEM 023**	Motekwane/patje	H	Respiratory tract infections, such as asthma, Influenza, Covid-19, pneumonia, headaches, promote hair growth	Leaves	Decoction	Oral consumption, washing ½ cup/day	5	0.189	NE

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
Convolvulaceae	*Ipomoea oblongata* (E.Mey.ex Choisy) **MEM 024**	Ubhoqo	H	Improves fertility in women, cleanses blood, helps with weight gain	Leaves and roots	Cut into pieces, put in tap water and beat/mix until it creates a foam.	Oral consumption	1	0.081	LC
Euphorbiaceae	*Euphorbia prostrata* Aiton **MEM 025**	-	H	Used to treat shingles	Whole plant	Burn to ashes and mix with blue seal Vaseline and a bit of paraffin	Apply topically Use as needed	1	0.027	NE
	Manihot esculenta Crantz **MEM 026**	Mutumbula	S	Boosts the immune system, boosts fertility in men and women, arthritis	Tuber, leaves	Leaves can be cooked as morogo Leave decoction The tuber can be ground	Oral consumption (tuber can be eaten as a vegetable, cooked leaves can be eaten as morogo and the ground tuber can be used in porridge) Consume as you need	1	0.081	NE
	Ricinus communis L. **MEM 027**	Mokhure	S	Treatment for swollen and painful legs	Leaves	Infusion	Use the leaves as “wash cloth” and wash the legs Use as needed	3	0.081	NE

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
Fabaceae	*Elephantorrhiza elephantina* (Burch.) Skeels **MEM 028**	Mosetlhana (young)/ ntolwane	S	Used as an immune booster, to treat erectile dysfunction, infertility, malnutrition and anemia. It is also used to treat *gala/nyoko* (biliousness), Influenza, rash	Roots	Grind dried parts into fine powder Decoction	Oral consumption Add small amounts of the powder into porridge and consume as needed. The decoction can be drunk as purgative to induce vomiting "*go gapa*"	3	0.243	LC
	Peltophorum africanum Sond. **MEM 029**	Mosetlha (old)	T	Stomachache, bloating, blood cleansing and cleansing after funerals (diseases that come to the bereaved)	Bark	Decoction Infusion	Oral consumption and used for bathing ½ cup 2 times/day	6	0.243	LC
	Senegalia caffra (Thunb.) P.J.H.Hurter &Mabb. **MEM 030**	Poo-tshehla	T	Erectile dysfunction and headaches, migraines	Roots	Decoction	Oral consumption ½ cup when needed	3	0.108	LC
	Senna itilica Mill. subsp. arachoides (Burch.) Lock **MEM 031**	Sebete/ Morototshwetse/ Morotelatshoswane	H	Sesepidi (abscess), gala (biliousness), blood and kidney cleansing, stomachache	Leaves, roots	Poultice Decoction Chew	Topical application, oral consumption Use as needed	4	0.135	LC

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
	Vachellia karroo (Hayne) Banfi & Glasso **MEM 032**	Mosu	T	Ringworm, stop vomiting	Stem and branches (gum), roots and thorns	Burn the stem or branches until you see gum at the end of the stick Decoction	Topical application Oral consumption	2	0.054	LC
	Vachellia xanthophloea (Benth) P.J.H.Hurter **MEM 033**	Mukhanyakude	T	Blood cleansing and blood related conditions	Bark	Decoction	Oral consumption Drink ½ cup 2 times a day	1	0.054	LC
Geraniaceae	*Monsonia angustifolia* Sond. **MEM 034**	Tee ya thaba	H	Kidney cleansing, womb cleansing, erectile dysfunction, sebabo (vaginal thrush), blood cleansing	Leaves	Decoction (mix with FG, treker and Joko)	Oral consumption Drink 1 cup of decoction as needed	2	0.135	LC
Hyacinthaceae	*Drimia sanguinea* (Schinz) Jessop **MEM 035**	Sekaname	H	Used for hypertension, stomach problems, blood and kidney cleansing, womb cleansing, erectile dysfunction, and *sebabo* (vaginal thrush/bacterial vaginosis). Also used to get rid of bad luck, back pain, pins and needles	Bulb	Decoction Infusion	Oral consumption and bathing Drink 3 cups/day	9	0.459	NT

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
	Eucomis autumnalis (Mill.) Chitt **MEM 036**	Mathubadifala/ Mathunga	H	Miscarriages (clean out the remaining blood in the womb), blood cleansing, heals operation wounds from inside	Whole plant, roots	Decoction (mix with a bit of holy ash)	Oral consumption 1 cup every morning	4	0.108	LC
Hypoxidaceae	*Hypoxis hermerocallidea* Fisch., C.A.Mey. & Avé-Lall. **MEM 037**	Tshuku ya poo/monna maledu	H	Hypertension, stomach ulcers, boost immune system, blood cleansing, kidney cleansing, urinary tract infections, infertility, drop, burn wounds on children, erectile dysfunction	Bulb, flower, roots	Decoction Poultice	Oral consumption, topical application ½ cups 2 times/day	10	0.405	LC
Lamiaceae	*Menta spitica* L. **MEM 038**	Mint	H	Asthma, bronchitis, Influenza, nausea, and sore throat	Leaves	Decoction	Oral consumption and steaming 1 cup 2 times a day or steam as you need	2	0.135	NE
Lythraceae	*Punica granatum* L. **MEM 039**	Garenate	T	Toothache, stomachache, diarrhoea, stroke	Roots	Decoction	Oral consumption (rinse the mouth for toothache) Drink ½ cup when needed	7	0.243	NE

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
Moringaceae	*Moringa olifera* Lam. **MEM 040**	Moringa	T	Boost immune system, cleans blood, manage diabetes mellitus and hypertension, respiratory conditions, pain and inflammation	Leaves, roots, seeds	Decoction Grind into fine powder	Oral consumption Drink 1 cup 2 times/day or a tablespoon of powder into porridge every morning	3	0.243	LC
Musaceae	*Musa acuminata* subsp. acuminata **MEM 041**	Panana	T	Heart conditions, arthritis, painful and swollen feet	Flower, leaves, bark	Decoction Burn to ashes	Oral consumption or the ashes can be applied on incisions to get into the bloodstream	2	0.108	LC
Myrtaceae	*Eucalyptus camaldulensis* Dehnh. **MEM 042**	Mobilikomo	T	Influenza, cough, covid19, asthma and other respiratory conditions, painful body	Bark, leaves	Decoction	Steaming As needed	6	0.270	NE
	Psidium guajava L. **MEM 043**	Moguava	T	Hypertension, menstrual cramps, used as an anti-inflammatory	Leaves	Decoction	Oral consumption	3	0.081	NE
Solanaceae	*Solanum aculeastrum* Dunal subsp. *aculeastrum* **MEM 044**	Thola	T	Toothache and worm in the teeth/gums, Influenza	Roots	Decoction	Oral ½ cup per day or steam as much as needed	4	0.135	LC

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
Rhamnaceae	*Ziziphus mucronata* Willd. subsp. *mucronata* **MEM 045**	Mokgalo	T	Sesepidi (abscess), boils and ulcers (*diso ka mo gare*), blood cleansing. Also used as a painkiller and antibiotic	Leaves, bark	Poultice Decoction	Topical application or oral consumption ¼ cup 2 times a day	6	0.297	LC
Rosaceae	*Eriobotrya japonica* **MEM 046**	Mmupudu wa sekgowa/Loquad tree	T	Hypertension and diabetes	Leaves	Decoction	Oral consumption 1 cup/day	2	0.081	-
	Prunus persica (L.) Batsch **MEM 047**	Perekisi	T	Diarrhoea, stomachache	Leaves	Decoction	Oral consumption	2	0.054	NE
Rubiaceae	*Pentanisia prunelloides* (Klotzsch ex Eckl. & Zeyh.) **MEM 048**	Setimamollo	H	Rash	Roots	Infusion	Oral consumption or steaming	2	0.054	LC
Verbenaceae	*Lippia javanica* (Burm.f.) Spreng **MEM 049**	Mosunkwana	S	Persistent cough, colds and Influenza, dizziness, blocked noses	Leaves	Decoction Burning	Oral consumption Smoke inhalation Steaming As needed	3	0.216	LC
Zingiberaceae	*Siphonochilus aethiopicus* (Schweif.) B.L. Burt **MEM 050**	Serokolo	H	Influenza and fever, khubyana (umbilical cord), go gatolla	Rhizome	Decoction Chew (then mix with Vaseline)	Oral consumption Topical application 3 cups/day	11	0.459	CE
	Zingiber officinale	Ginger	H	Influenza and persistent coughs	Rhizome	Decoction	Oral consumption	3	0.081	LC

Family	Scientific name Voucher no.	Common name	Plant form	Ailment treated/Use	PPU	Method of preparation	Administration & Dosage	N	UV	Cs
	Roscoe **MEM 051**						2 cups/day			
Zygophyllaceae	*Balanites maughamii* Sprague **MEM 052**	Gobandlovu	T	Kidney failure and erectile dysfunction	Bark, roots	Decoction	Oral consumption Drink ½ cup 2 times per day	1	0.054	LC

*PPU: Plant part used; N: Frequency of mention; UV: Use value; Cs: Conservation status. Plant forms - Cr: Creeper; Su: Succulent, H: Herb; T: Tree; S: shrub

Conservation status – LC: Least concern; NE: Not evaluated; DD: Data deficient; NT: Near threatened; CE: Critically endangered, "-": not specified

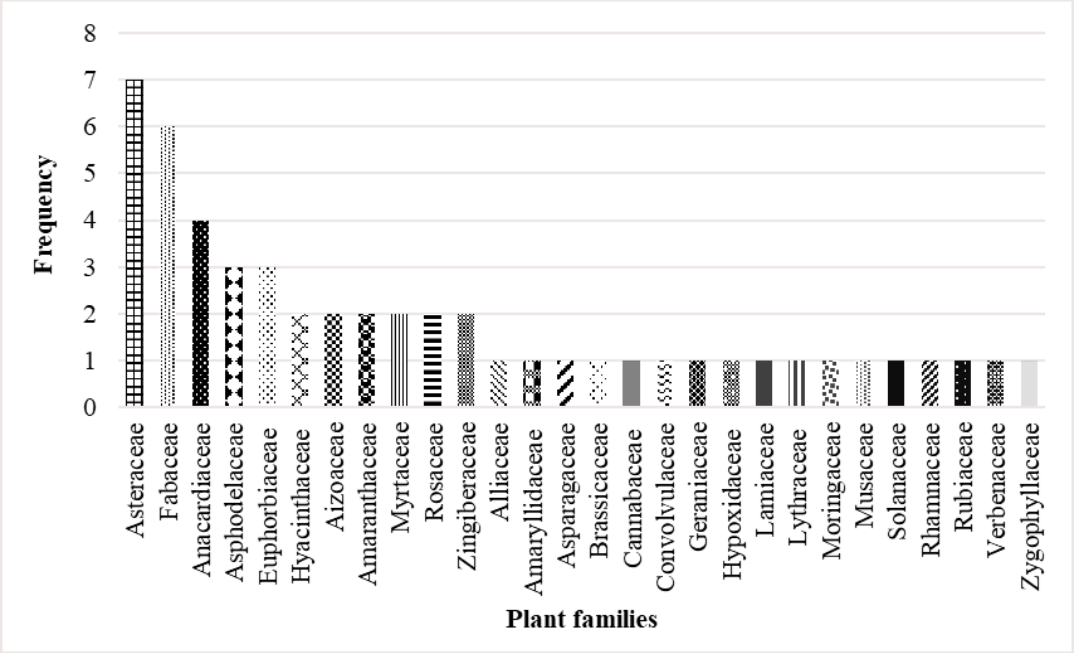

Figure 3.4: Distribution of plant families used in traditional healthcare systems in Bojanala District, North-West Province, South Africa

3.3.5 Plant forms

The data in Table 3.3 above allows analysis of the plant growth forms of medicinal plants used in the Bojanala District. Useful species harvested in the study area have different growth forms (**Figure 3.5**). The majority (40%) of these plant species are herbs, followed closely by trees (35%), shrubs (15%), succulents (6%), and creepers (4%). These findings are similar to those of Hu *et al.* (2020), Mekonnen *et al.* (2022), and Ndhlovu *et al.* (2023), who found that herbs are the most commonly used plant species for medicinal purposes. According to Hu *et al.* (2020), herbs are more “widely distributed”, occurring almost everywhere compared to other habitats, such as shrubs and trees, and are easier to collect. Ndhlovu *et al.* (2023) also found that, from a conservation standpoint, the use of herbs in herbal medicine is more encouraged because they regenerate or grow more quickly after harvest.

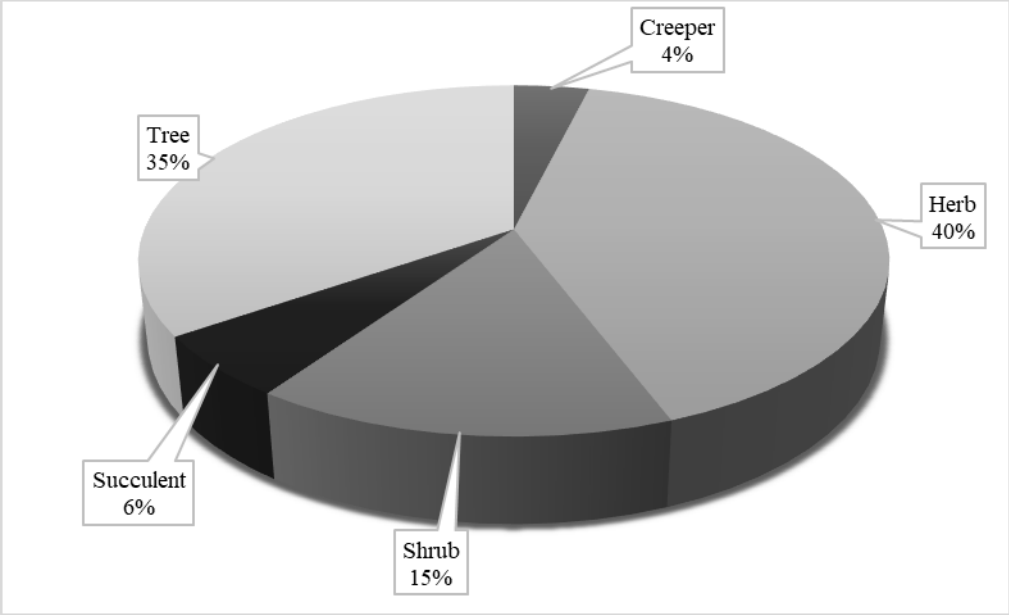

Figure 3.5: Distribution of life forms of plant species used for medicinal purposes in Bojanala District, North Province, South Africa (n=52)

3.3.6 Plant parts used

In traditional medicine systems across the world, various parts of plants are used for their healing properties. In this study, leaves were found to be the most preferred plant part in herbal medicine, with a PPV of 0.329, followed by roots, barks and bulbs, rhizomes, and tubers, with PPVs of 0.237, 0.118, and 0.105, respectively (**Figure 3.6 and Table 3.3**). The frequent use of leaves over other plant parts in herbal medicine has also been observed by several researchers in Africa (Ndhlovu *et al.*, 2019; Chaachouay *et al.*, 2020; Mekonnen *et al.*, 2022; Oyeniyi *et al.*, 2025). According to Chaachouay *et al.* (2020), the choice of plant leaves can be attributed to their easy availability, the harvesting process, and the ease of remedy preparation. Additionally, Ahmed (2016) argues that using the leaves is preferable to using the roots and barks, as they are better for the durability and sustainable development of medicinal plants. This is supported by Maroyi (2011), Semenya and Potgieter (2013), and Asong *et al.* (2019), who further found that the overuse of these plant parts may threaten the existence of particular plant species. Although it is not advisable to excessively use the roots and barks of plants, these plant parts are said to be the ones with the most active ingredients and a high concentration of phytochemicals (Semenya and Potgieter, 2013; Ozioma Ezekwesili-Ofili and Okaka, 2019; Ndhlovu *et al.*, 2023). The seeds, stems, and thorns were the least preferred plant

parts in herbal medicine in the study area, with PPVs of 0.026, 0.013, and 0.013, respectively.

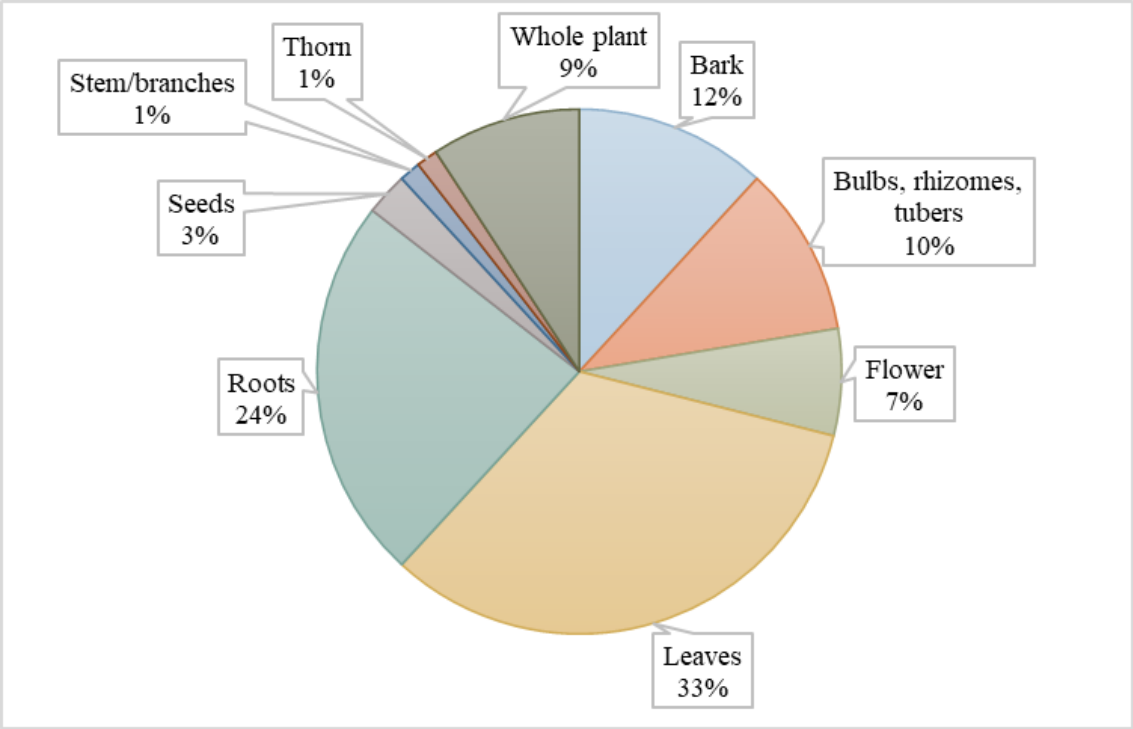

Figure 3.6: Distribution of plant parts used in Bojanala District, North-West Province, South Africa (n=76)

Table 3.3: Plant part values (PPVs) of parts used in traditional healing in Bojanala District, North-West Province, South Africa

Plant parts	$RU_{plant\ part}$	PPV
Bark	9	0.118
Bulbs, rhizomes, tubers	8	0.105
Flower	5	0.066
Leaves	25	0.329
Roots	18	0.237
Seeds	2	0.026
Stem/branches	1	0.013
Thorns	1	0.013
Whole plant	7	0.092
RU	**76**	

*$RU_{plant\ part}$: plant part reported use; PPV: plant part value; RU: reported use

3.3.7 Method of preparation, administration, and dosage

There are various methods of preparing herbal remedies, and a particular method is chosen to increase the remedy's efficiency in treating or preventing a particular condition (Ozioma Ezekwesili-Ofili and Okaka, 2019; Matlala *et al.*, 2025). Asong *et al.* (2024) state that the selection of a method can sometimes be attributed to the complexity or simplicity of the remedy's preparation. The findings of this study showed that decoction (54%), burning (12%), and infusion (11%) are the most common methods of preparation (**Figure 3.7**). These findings are consistent with those of previous studies (Semenya and Potgieter, 2013; Hu *et al.*, 2020; Oyeniyi *et al.*, 2025), which found that decoction was the most popular preparatory method. Research further reveals that decoction is among the most well-documented methods of preparation in traditional medicine (Tandon and Rane, 2008), and one of the most critical methods in the South African traditional healing system (Semenya and Potgieter, 2013). This method involves boiling plant parts to extract active compounds and is preferred when dealing with roots, barks, and other tough, fibrous parts. In this study, however, decoction was also used with plant materials, such as leaves and flowers. Interestingly, burning was found to be among the most preferred methods in the Bojanala District. With this method, dried plant parts are burned for their therapeutic smoke or to create char. According to Braithwaite *et al.* (2008), burning is also a common practice in African traditional healing. Other preparatory methods used for traditional healing systems in the study area included crushing and grinding (7%), poultice (6%), chewing (4%), and juicing/blending (3%). Some remedies did not require any intensive methods, as participants mentioned that some plant parts are used as they are, fresh from harvest. It was interesting to see poultice among the least used methods of preparation, whereas previous studies found it among the most commonly used (Cussy-Poma *et al.*, 2017; Ndhlovu, 2019).

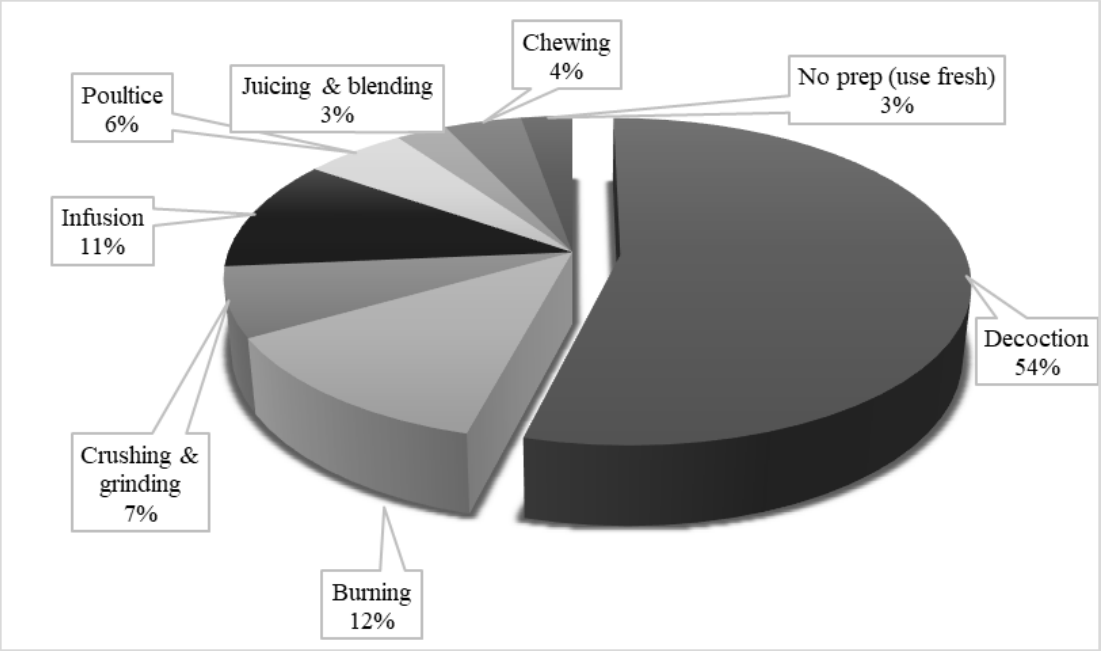

Figure 3.7: Preparatory methods used in traditional healing systems in Bojanala District, North-West, South Africa (n=72)

Regarding route of administration, the majority of herbal remedies were taken orally (**Figure 3.8**). These findings are consistent with those of (Semenya *et al.*, 2012; Hu *et al.*, 2020; Mekonnen *et al.*, 2022; Ndhlovu *et al.*, 2023). The widespread practice of oral consumption of herbal remedies may be due to their ease of administration and to their easy absorption by the body in this form (Semenya and Potgieter, 2013; Hu *et al.*, 2020). Some participants mentioned using additives, such as sugar or honey, to improve the taste of the remedy, as many of them are bitter. The second most popular route of administration is topical application, followed by steaming and smoke inhalation. Topical applications are commonly used for dermatological conditions (Oyeniyi *et al.*, 2025), and steaming and smoke inhalation are used for respiratory conditions to relieve congestion, headaches, and anxiety (Braithwaite *et al.*, 2008; Ozioma Ezekwesili-Ofili and Okaka, 2019).

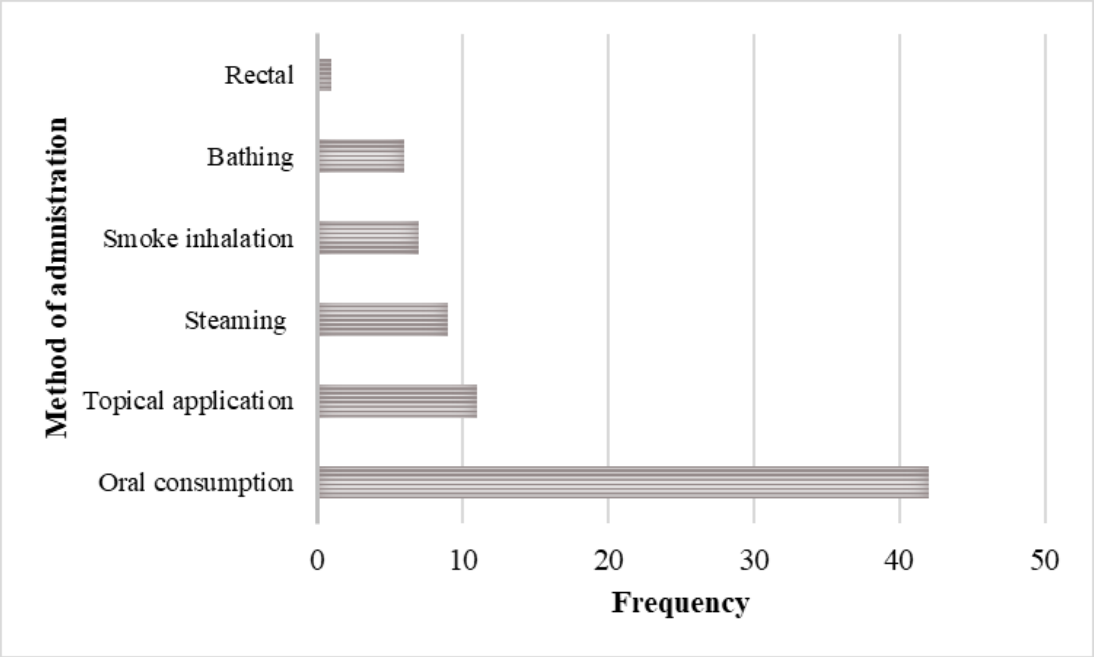

Figure 3.8: Route of administration of herbal remedies in traditional healing systems in Bojanala District, North-West Province, South Africa

The dosage of a herbal remedy determines how well a particular illness can be cured (Mekonnen *et al.*, 2022). No standard dosages were observed in this study for the remedies, as participants were prescribed different doses even for the same health condition. The commonly used measuring instrument for herbal remedies was a metal/tin cup "*bekere*/*lebekere*", and doses would range between ¼ cup to 1 full cup of the remedy once, twice, or even three times per day. However, these dosages would differ between adults and children, with children receiving the lowest possible dose. One participant, a traditional healer, indicated as follows: "*dihlare ga dina bontsi kgotsa bonnyane*, *but the smaller the dosage, the better".* Other participants suggested that when taking herbal remedies, it is always advisable to drink plenty of water to protect vital organs, such as the liver and kidneys, since herbal remedies can be more effective. Furthermore, for some remedies, there were no specific dosages, and one would use them as needed. The findings of this study suggest there are no standard dosages as in modern Western medicine, since the quantity of medicine varies from community to community and from healer to healer. This lack of proper, precise, and standardised dosages is one of the

weaknesses of traditional medicine (Mokgobi, 2012; Hamanyanga, 2019; Mekonnen *et al.*, 2022; Saggar *et al.*, 2022).

3.3.8 Use value (UV)

Use value marks the relative importance and usefulness of a species. It tells how vital or popular a species is, in general. It combines the frequency with which a species is mentioned with the number of uses mentioned per species (Zenderland *et al.*, 2019). In this study, the use values ranged from 0.027 to 1.108 (**Table 3.4**). *Artemisia afra* (1.108), *Dicoma anomala* Sond. (0.622) and *Drimia sanguinea* (0.459) had the highest UVs. Twenty-one participants indicated Use Values for *A. afra* for the treatment of respiratory and gastrointestinal conditions, while sixteen participants maintained *D. anomala* had Use Values for the same health conditions. A high UV demonstrates the significance of a plant species in the local community.

Table 3.4: Determination of use values (example: *Carpobrotus edulis*)

Number of uses reported by participants	1	2	3	4	5
Number of participants who mentioned the number of uses	1	1	0	0	0
Total number of participants involved in the study	37				

UV = (1×1/37) + (2×1/37) + 0 + 0 + 0 = 0.081

3.3.9 Fidelity level (FL)

Fidelity level is a measure used to identify plant species that are most preferred by community members for treating certain health conditions (Khan *et al.*, 2014; Jadid *et al.*, 2020). Plant species widely used by local people will have higher fidelity than those that are less popular. Fidelity level presents the percentage of participants who claim to use a particular plant species for the same primary purpose, indicating the importance of that species for that purpose (Khan *et al.*, 2014). In this study, all diseases or health conditions reported from the study locations were grouped into different categories before calculating fidelity levels. Fidelity level was determined using the formula by Zent (1996), FL (%) = $N_p/N \times 100$, where N_p is the number of participants who reported the use of particular

plant species for a specific disease category and N is the total number of participants who mentioned uses for a particular plant species for all disease categories. In this study, FL ranged from 4.76% to 100%. A total of 20 plants had a FL of 100%, suggesting the importance of these species for specific purposes. Fo instance, *Sceletium tortuosum* (L.) is preferred for mental health conditions, such as stress and anxiety, *Lippia javanica* is preferred for respiratory conditions, such as persistent coughs, colds, Influenza, and blocked noses, *Bidens Pilosa* is commonly used for toothache, and *Eriobotrya japonica* is preferred for conditions, such as diabetes and hypertension, among others (Table 3.5). According to Jadid *et al.* (2020), a low FL may indicate a scarcity of the species in the area or limited information about the plant's use among local people.

Table 3.5: Fidelity level of medicinal plants used in Bojanala District, North-West Province, South Africa

Category of disease	Plant species	Use	FL (%)
Musculoskeletal conditions, pain and inflammation	*Aloe ferox*	Arthritis	25
	Aloe greatheadii	Painful and swollen legs	33.33
	Artemisia afra	Gout	4.17
	Bidens pilosa	Toothache	100
	Cadaba aphylla	Headaches	100
	Cannabis sativa	Headaches	20
	Carpobrotus edulis	Used as an anti-inflammatory	50
	Drimia sanguinea	Back pain	11.11
	Helicrysum odoratissimum	Headaches, migraines	33.33
	Kleina longiflora	Body pains	50
	Manihot esculenta Crantz	Arthritis	100
	Moringa olifera	Pain and inflammation	33.33
	Musa acuminata	Painful and swollen feet, arthritis	50
	Psidium guajava	Used as an anti-inflammatory	33.33
	Punica granatum	Toothache	28.57
	Ricinus communis	Painful and swollen legs	100
	Schinus molle	Headaches	40
	Senegalia caffra	Headaches, migraines	66.67
	Solanum aculeastrum	Toothache	100
	Ziziphus mucronata	Painkiller	33.33

Respiratory conditions	*Allium cepa*	Blocked nose, tight chest	50
	Artemisia afra	COVID-19, colds, Influenza, sinuses, TB, tight chest, pollen allergies, bronchitis	100
	Bophoone disticha	To ease chest congestion	33.33
	Cannabis sativa	Asthma, Influenza, COVID-19, pneumonia	60
	Dicoma anomala	Influenza, fever	87.5
	Eucalyptus camaldulensis	Influenza, cough, Covid-19, asthma	100
	Helichrysum caespititium	Influenza, cough	50
	Lippia javanica	Persistent cough, colds, Influenza, blocked noses	100
	Menta spitica	Asthma, bronchitis, Influenza	100
	Moringa olifera	Respiratory conditions	33.33
	Schinus molle	Influenza, asthma, and Covid-19	80
	Siphonochilus aethiopicus	Influenza, fever	45.45
	Solanum aculeastrum	Influenza	25
	Zingiber officinale	Influenza, persistent cough	100
Dermatological conditions	*Allium cepa*	Feet cracks	50
	Aloe ferox	Rash, alopecia, abscess	50
	Aloe greatheadii	Acne	33.33
	Aloe vera	Hair breakage, acne, eczema	66.67
	Bophoone disticha	Operation wounds that will not heal	33.33
	Cannabis sativa	Promotes hair growth	20
	Dicoma anomala	Rash	12.5
	Elephantorrhiza elephantina	Rash	33.33
	Eucomis autumnalis	Operation wounds	25
	Euphorbia prostrata	Shingles	100
	Hypoxis hermerocallidea	Burn wounds	10
	Kleina longiflora	Operation wounds	50
	Pentanisia prunelloides	Rash	100
	Senna itilica	Abscess	25
	Vachellia karroo	Ringworm	50

	Ziziphus mucronata	Abscess, boils, ulcers	66.67
Gynecological and obstetric conditions	*Drimia sanguinea*	Womb cleansing, sebabo (vaginal thrush/bacterial vaginosis)	11.11
	Eucomis autumnalis	Miscarriages	25
	Mangifera indica	Dysmenorrhea	100
	Monsonia angustifolia	Womb cleansing, sebabo (vaginal thrush)	50
	Psidium guajava	Menstrual cramps	33.33
	Sclerocarya birrea	Helps after miscarriages, vaginal thrush	33.33
	Schinus molle	Vaginal thrush	20
Reproductive conditions	*Balanites maughamii*	Erectile dysfunction	100
	Drimia sanguinea	Erectile dysfunction	11.11
	Elephantorrhiza elephantina	Erectile dysfunction, infertility	33.33
	Hypoxis hermerocallidea	Drop, infertility, erectile dysfunction	30
	Ipomoea oblongata	Improves fertility in women	100
	Manihot esculenta	Improves fertility in men and women	100
	Monsonia angustifolia	Erectile dysfunction	50
	Sclerocarya birrea	STDs	16.67
	Senegalia caffra	Erectile dysfunction	33.33
Gastrointestinal conditions	*Aloe vera*	Bile reflux	33.33
	Artemisia afra	Heartburn	4.76
	Dicoma anomala	Stomachache	6.25
	Drimia sanguinea	Stomachache,	11.11
	Dysphania ambrosioides	Gut cleansing, piles and constipation	75
	Elephantorrhiza elephantina	Biliousness (gala)	33.33
	Hypoxis hermerocallidea	Stomach ulcer	10
	Mangifera indica	Constipation	100
	Peltophorum africanum Sond.	Stomachache, bloating	33.33
	Menta spitica	Nausea	100
	Prunus persica	Stomachache and diarrhoea	100
	Punica granatum	Stomachache and diarrhoea	71.43

	Schkuhria pinnata	Stomachache and diarrhoea	100
	Senna itilica	Stomachache, biliousness	50
Endocrine conditions	*Aloe ferox*	Diabetes mellitus	25
	Eriobotrya japonica	Diabetes mellitus	100
	Mangifera indica	Diabetes mellitus	100
	Moringa olifera	Diabetes mellitus	33.33
Kidney and urinary tract	*Balanites maughamii* Sprague	Kidney failure	100
	Drimia sanguinea	Kidney cleansing	11.11
	Hypoxis hermerocallidea	Urinary tract infection, kidney cleansing	30
	Monsonia angustifolia	Kidney cleansing	50
	Senna itilica	Kidney cleansing	25
Mental health conditions	*Kleina longiflora*	Used as anti-depressant	50
	Lannea schweinfurthii	Depression, calms nerve and makes people forget their trauma or problems	100
	Sceletium tortuosum	Stress, anxiety	100
Pediatric conditions	*Asparagus suaveolens*	Sunken fontanelle	50
	Dysphania ambrosioides	Sunken fontanelle	25
	Siphonochilus aethiopicus	Umbilical cord	36.36
Cardiovascular diseases	*Aloe ferox*	Hypertension	25
	Dicoma anomala	Blood related conditions, neutralizes blood	6.25
	Drimia sanguinea	Hypertension, blood cleansing	100
	Eriobotrya japonica	Hypertension	100
	Eucomis autumnalis	Blood cleansing	50
	Hypoxis hermerocallidea	Hypertension, blood cleansing	40
	Ipomoea oblongata	Blood cleansing	100
	Monsonia angustifolia	Blood cleansing	50
	Moringa olifera	Hypertension and blood cleansing	100
	Musa acuminata	Heart conditions	50
	Peltophorum africanum	Blood cleansing	50
	Psidium guajava	Hypertension	33.33

	Punica granatum	Stroke	14.29
	Schinus molle	Blood cleansing	20
	Sclerocarya birrea	Blood cleansing	33.33
	Senna itilica	Blood cleansing	25
	Vachellia xanthophloea	Blood cleansing, blood related conditions	100
	Ziziphus mucronata	Blood cleansing	16.67
Oral conditions	*Carpobrotus edulis*	Tonsils	100
	Solanum aculeastrum	Worms in teeth/gums	50
Eye conditions	*Asparagus suaveolens*	Eye problems	50
Spirituality	*Aloe greatheadii*	Bereavement and grief	33.33
	Bophoone disticha	Call upon ancestors for divination	33.33
	Peltophorum africanum	Makgome/boswagadi (disease that comes to the bereaved)	66.67
	Sclerocarya birrea	Disease that comes to the bereaved, chase away misfortunes	66.67
Tonic	*Aloe ferox*	Boosts immune system	50
	Artemisia afra	Boosts immune system	14.29
	Beta vulgaris	Boosts immune system	100
	Elephantorrhiza elephantina	Immune booster	33.33
	Hypoxis hermerocallidea	Boosts immune system	20
	Manihot esculenta	Boosts immune system	100
	Moringa olifera	Boosts immune system	100
Various disease categories	*Aloe greatheadii*	Poisoning, hangover, weight loss	66.67
	Elephantorrhiza elephantina	Malnutrition, anemia	33.33
	Ipomoea oblongata	Helps with weight gain	100
	Kleina longiflora	Antibiotics, stiff joints, exhaustion, burnout, relaxant	100
	Lippia javanica	Dizziness	33.33
	Vachellia karroo	Stop vomiting	50
	Ziziphus mucronata	Used as antibiotic	16.67

3.3.10 Commonly encountered health conditions in the study area

The findings of this study reveal that community members in the study area use traditional medicine/phytomedicine for different health conditions. Most medicinal plants in the study were used for musculoskeletal conditions, pain, and inflammation (**Figure 3.9**). Musculoskeletal conditions are conditions that affect the locomotor system, characterised by pain and reduced physical function (Briggs *et al.*, 2018). These conditions include arthritis, gout, and back pain. Pain and inflammation are ways the body responds to injury or infection, often causing an unpleasant sensation and redness. According to Khumalo *et al.* (2022), inflammatory and pain-related conditions remain a major global concern affecting people worldwide. Billions of people across the globe suffer from chronic pain, and this has a negative impact on their lives (Bagdas *et al.*, 2020). Pain makes it difficult for people to carry out their activities; increases their use of medication and the cost of healthcare (Khumalo *et al.*, 2022). Research shows that in developing countries, back pain and headaches are the most prevalent types of chronic pain (Tsang *et al.*, 2008). The most commonly used medications for these conditions are, however, often associated with adverse and harmful side effects (Pahwa *et al.*, 2018). This could be one reason people choose alternatives, such as traditional medicine, to relieve symptoms. In this study, 20 plant species were used to treat musculoskeletal conditions, pain, and inflammation.

Cardiovascular conditions are a group of conditions that affect the heart and blood vessels and are among the leading causes of death worldwide. The WHO reports that over 17 million people die from cardiovascular diseases every year, with heart attacks and stroke accounting for four out of five of these deaths. In this study, only two plant species, *Musa acuminata* and *Punica granatum,* were reportedly used for heart conditions and stroke, respectively. Similarly, Edenta *et al.* (2017) argue that the fruit peels of *M. acuminata* are used to treat hypertension and other cardiovascular diseases in Northern Nigeria. A study by Yadav (2021) on the therapeutic value of *M. acuminata* found that this species has antioxidant, antidiabetic, hypolipidemic, and antimicrobial properties, enabling it to treat and cure a variety of illnesses. In South Africa, hypertensive disease accounts for about 3.7% of deaths (Stats SA, 2018a; WHO, 2018). Six (6) plant species,

namely, *Aloe ferox*, *Drimia sanguinea*, *Eriobotrya japonica, Hypoxis hermerocallidea, Moringa olifera,* and *Psidium guajava,* were used to manage hypertension in the study area. Blood cleansing is also very popular in the study area, with twelve (12) species used for this purpose. These include *Drimia sanguinea, Euconomis automnalis, Hypoxis hermerocallidea, Ipomea oblongata, Moringa olifera, Monsonia angustifolia, Peltophorum africanum, Schinus molle, Sclerocarya birrea, Senna itilica, Vachellia xanthophloea* and *Ziziphus mucronate*. Similarly, Mhlongo and Van Wyk (2019) and De Wet and Ngubane (2014) found that *Euconomis automnalis*, *Sclerocarya birrea*, and *Peltophorum africanum* are used to purify blood in KwaZulu-Natal. In many African cultural traditions, blood is considered sacred. These traditions believe that sicknesses are not mere coincidences, but the result of spiritual and social imbalance (Van Vuuren and Frank, 2020). Thus, blood cleansing or purification is seen as a means to achieve holistic healing.

Dermatological conditions are skin-related ailments. Asong *et al.* (2019), Hay *et al.* (2014) and Khoza (2023) found that dermatological infections are a significant public health concern in developing countries, accounting for over 30% of all occupational health problems. According to Matlala *et al.* (2025), there is a shortage of dermatologists in South Africa, and the cost of dermatological medications is very high. Fifteen (15) plant species were used to treat dermatological conditions in the Bojanala District. The most popular plants used were *Aloe ferox*, *Aloe vera,* and *Ziziphus mucronata,* with three reported uses each for skin conditions, including rash, abscess, acne, eczema, boils, ulcers, and alopecia. In contrast, Asong *et al.* (2019) identified *Hypoxis hemerocallidea*, *Helichrysum paronychiodes*, *Elephantorrhiza elephantina*, and *Senecio longiflorus* as the most commonly used remedies for skin conditions in the North West Province, South Africa.

Respiratory conditions are those that affect the airways from the nasal cavity to the throat and lungs (Soriano *et al.*, 2020; Teka and Maryo, 2023). Over one billion people across the globe suffer from respiratory tract infections, and it is one of the leading causes of death in developing countries (Teka and Maryo, 2023). In developing countries, such as South Africa, where there are numerous risk factors, such as the use of biomass fuels, crowded living conditions, smoking, and dust, the health impacts of these infections are

severe (Semenya and Maroyi, 2018c). *Artemisia afra* was the most common plant used for respiratory conditions, including Covid-19, colds, Influenza, sinuses, TB, tight chest, pollen allergies, and bronchitis. Liu *et al.* (2009), Suliman *et al.* (2010) and Adeleye *et al.* (2021), also highlight the importance of this species (*Artemisia afra*) in the treatment of respiratory conditions. *Cannabis sativa, Dicoma anomala* Sond., *Eucalyptus camaldulensis* Dehnh. and *Lippia javanica* were also among the very popular plants used to treat respiratory conditions in the study area, with 3-4 reported uses each.

Various reproductive system conditions are treated with herbal medicine in the study area. Erectile dysfunction is the most commonly treated condition, with six mentions. *Balanites maughamii* Sprague, *Drimia sanguinea*, *Elephantorrhiza elephantina* (Burch.) Skeels, *Monsonia angustifolia, Senegalia caffra,* and *Hypoxis hemerocallidea* are used to treat erectile dysfunction. Contrary to this, Semenya and Potgieter (2013) found *Zanthoxylum humile*, *Catha edulis*, *Ozoroa sphaerocarpa,* and *Hypoxis hemerocallidea* to be the most commonly used remedies for erectile dysfunction in Limpopo Province. Vaginal thrush (*Sebabo)* also appears to be a problem in the study area, and it is treated with *Aloe ferox, Drimia sanguinea, Monsonia angustifolia, Sclerocarya birrea,* and *Schinus molle*. Other plants are used to treat menstrual cramps, miscarriages and to improve fertility. Khoza (2023) states that black South Africans place a high value on fertility because it ensures survival and growth of the tribe, and usually, a barren person, is seen as a disgrace. Additionally, a study by Mashile *et al.* (2019) revealed that individuals who suffer from menstrual cramps or dysmenorrhea have difficulty conceiving because their wombs are “tied”.

Gastrointestinal conditions are also prevalent in the study area and are managed or treated with 14 plant species. The most common symptoms of gastrointestinal conditions in the study area are stomachache and diarrhoea. According to de Wet *et al.* (2010), gastrointestinal conditions are often linked to poor sanitation and insufficient access to clean drinking water. The North West Province is reported as one of the provinces in the country struggling with access to clean water and proper sanitation (Ndhlovu *et al.*, 2023; Matlala *et al.*, 2025). *Dicoma anomala* Sond., *Drimia sanguinea*, *Dysphania ambrosioides, Peltophorum africanum* Sond.*, Prunus persica, Punica*

granatum, and *Schkuhria pinnata* are used for stomachache and diarrhoea. *Dysphania ambrosioides* is*,* however, popular with three reported uses, including stomachache, piles, and constipation. Other researchers found *Elephantorrhiza elephantina, Euclea divinorum, Siphonochilus aethiopicus, Sclerocarya birrea, and Aloe maculata among the* plants used for the treatment of gastrointestinal conditions (Mhlongo and Van Wyk, 2019; Khoza, 2023; Ndhlovu *et al.*, 2023).

Diabetes is among the leading causes of death in South Africa, accounting for 4.8% of the population (Stats SA, 2018a; WHO, 2018). Participants involved in this study indicated that they use four (4) plant species to treat f diabetes. These include *Aloe ferox*, *Eriobotrya japonica, Mangifera indica,* and *Moringa olifera.* Several other researchers have also found *Aloe ferox, Hypoxis hemerocallidea* and *Moringa olifera* to be popular for the treatment of diabetes (Semenya *et al.*, 2012; Davids *et al.*, 2016; Odeyemi and Bradley, 2018; Nyakudya *et al.*, 2020; Khoza, 2023) . There are no reported uses of *Eriobotrya japonica* in South African traditional medicine; however, this plant has been used to treat diabetes in Japanese and Chinese traditional medicine (Zhu *et al.*, 2022).

Only six (6) plants were found to be used for kidney and urinary tract infections. Kidney cleansing is the most common symptom, treated with *Drimia sanguinea, Hypoxis hemerocallidea, Monsonia angustifolia, and Senna italica.*

According to Craig *et al.* (2022), the prevalence of mental health issues among adults in low- and middle-income countries is becoming an increasingly significant public health concern. Several factors associated with or contributing to poor mental health conditions, such as stress, anxiety, and depression, include socioeconomic factors (unemployment, poverty, inequality) and childhood traumas (Mkhwanazi and Gibbs, 2021; Craig *et al.*, 2022). These conditions have a significant impact on the well-being, personal relationships as well as productivity of individuals and society, and are major contributors to suicidal behaviors. Many people have been using herbal medicine to treat various mental health conditions for centuries (Liu *et al.*, 2015). Participants in this study indicated that they use *Sceletium tortuosum* (L.) N.E. Br [*Mesembryanthemum tortuosum* L.], *Lannea schweinfurthii*, and *Kleina longiflora* for the treatment of mental health conditions, such as stress, anxiety, and depression. A review by Bonokwane *et al.* (2022)

revealed that *Sceletium tortuosum* (L.) N.E. Br [*Mesembryanthemum tortuosum* L.], *Boophone disticha*, *Gomphocarpus fruticosus* (L.) W.T.Aiton, *Schinus molle* L., *Cannabis sativa* L., *Hypericum perforatum* L., and *Hypoxis hemerocallidea* Fisch., C.A. Mey. are some of the most important plants used for the treatment of mental health conditions in South Africa.

Ndhlovu *et al.* (2023) state that although the current mortality rates for newborns align with the United Nations Sustainable Development Goal (SDG-3) target of 12 deaths for every 1000 live births, South Africa still faces an unacceptably high infant mortality rate, with over 20 deaths per 1000 live births. According to Maroyi (2024), children are vulnerable to a variety of infections and diseases due to their weakened immune systems. *Hlogwana ya ngwana*, also known as sunken fontanelle disease, is the most commonly treated pediatric condition in the study area. These findings align with those of Maroyi (2024) and Towns *et al.* (2014). This condition contributes to morbidity and mortality of children under the age of 5 (Ndhlovu *et al.*, 2023). It is often associated with symptoms, such as weight loss, persistent vomiting, loss of appetite, and sunken eyes (Khoza, 2023). Furthermore, Khoza (2023) and Ndhlovu *et al.* (2023) argue that this condition is believed to be caused by evil spirits and should be treated immediately. *Asparagus suaveolens, Dysphania ambrosioides, and Siphonochilus aethiopicus* are used to treat pediatric conditions in the study area.

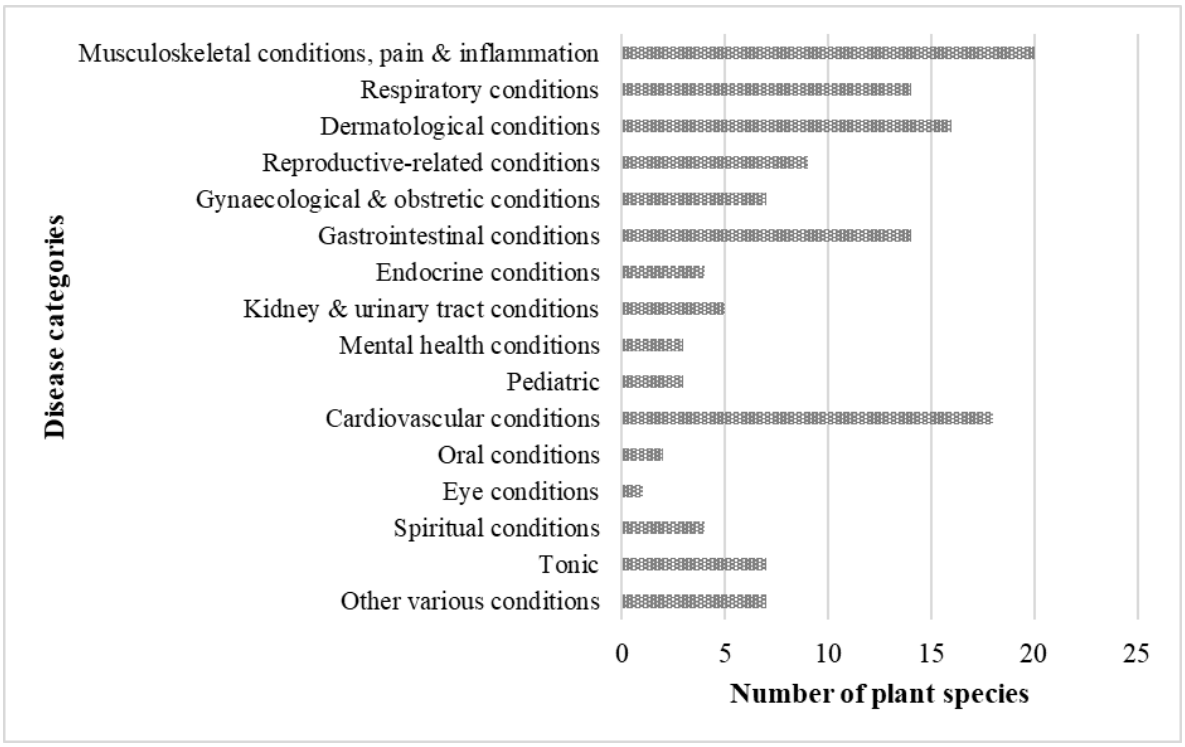

Figure 3.9: Health conditions treated with medicinal plants in Bojanala District, North-West Province, South Africa

3.3.11 Knowledge and practices associated with the use of phytomedicine in Bojanala District, North West Province, South Africa

Indigenous people in the study area have relied on traditional medicine for generations. In addition to information on which medicinal plants are used for which health conditions, the researcher had much to learn. In this study, some traditional healers indicated that there is a specific time to collect medicinal plants. For instance, one cannot harvest plants at midday (around 12h00) and in the evenings, after sunset. Medicinal plants should be collected very early in the morning. No explanation was given to the researcher. Furthermore, one participant indicated that certain plants or animal materials are harvested and used in traditional medicine because of their alleged symbolic meanings. For example, certain plants may be associated with a particular condition, protection or strength. It was also mentioned that when treating children, one should use small or new plants, and that when harvesting a plant part, one should pay attention to the direction of the sun. All these practices in traditional healing systems reflect the cultural beliefs of indigenous communities.

3.3.12 Conservation status

Concerning the conservation status, plant species used in traditional healing systems in Bojanala District are classified by the SANBI Redlist for South African Plants (http://redlist.sanbi.org/) as Least Concern (LC), Not Evaluated, Near Threatened (NT), Critically Endangered (CE), and Data Deficient (DD) (**Figure 3.10**). The findings of this study suggest that the majority (61%) of plants used for medicinal purposes in the study area are LC. However, the SANBI Red List also reveals that, although these plant species are classified as LC, some are facing population decline due to excessive harvesting for medicinal purposes, habitat loss and degradation. For instance, *Sceletium tortuosum* (L.), also known as *Mesembryanthemum tortuosum* L., is suspected to be declining for medicinal purposes, *Boophone ditcha* is assessed as declining in South Africa due to habitat loss in Kwa-Zulu Natal and Gauteng provinces and because trade volumes suggest unsustainable harvesting, especially because large reproductive individuals are being removed. *Euconomis automalis* has experienced large population declines due to its use in traditional medicine, and it is very popular in the marketplace, with large numbers being harvested. *Hypoxis hermerocallidea* has been subject to extensive commercial exploitation since 1997, resulting in population declines, especially in Gauteng Province, where it is also threatened by habitat loss and degradation. Lastly, there is *Balanites maughamii* Sprague, which is said to be declining due to extensive habitat loss in the KwaZulu-Natal Province, the harvesting of its bark for the commercial medicinal plant trade, and poor wound-healing. Although these species are assessed as declining in population, the SANBI Red List assessments still suggest they are not yet threatened and are classified as LC, but they should be closely monitored. In this study, one participant from Legonyane village reported a decline in the populations of tlhonya *(Dicoma anomala)* and sekaname *(Drimia sanguinea)* since many healers from other locations come to the village to harvest these species in large bags (*dikgetse*), leaving almost nothing for village-dwellers. The findings of this study also revealed that thirty-one percent (31%) of species were not evaluated or listed, 4% were near threatened, 2% were critically endangered, and 2% had no data (**Figure 3.10**). According to the SANBI Red List, species classified as not evaluated are naturalised exotics, an indication that such species are not indigenous to South Africa but have successfully adapted to local

conditions and reproduced freely in the wild (Francis, 1991; Lavoie *et al.*, 2016; Hassan and Mohamed, 2020).

Research reveals that medicinal plants worldwide, and in South Africa, are facing significant population declines due to excessive harvesting, unsustainable trade, habitat loss, climate change, and other anthropogenic factors (Kirakosyan *et al.*, 2009; Halder and Jha, 2023; Ndhlovu *et al.*, 2023; Matlala *et al.*, 2024). In this study, the SANBI Red List for South African plants found *Siphonochilus aethiopicus* to be critically endangered, as it is the most highly sought-after medicinal plant in South African *muthi* markets. It is currently extinct over most of its former range, and the numbers left in the wild are critically low. The protection and conservation of medicinal plants are crucial, as they play major cultural, livelihood, and economic roles in the lives of many people. Several researchers have compiled recommendations for conserving medicinal plants. These include the combination of *in situ* and *ex situ* conservation strategies for conservation, inclusion of community gender perspectives in the development of policies and programmes, the need for additional information on medicinal plant trade, advancements of sustainable harvesting practices, cultivation and domestication of plants, the development of systems for monitoring medicinal plant statuses and the protection of traditional resources and intellectual property rights (Hamilton, 2004; Amujoyegbe *et al.*, 2012; Shukla, 2023; Matlala *et al.*, 2025).

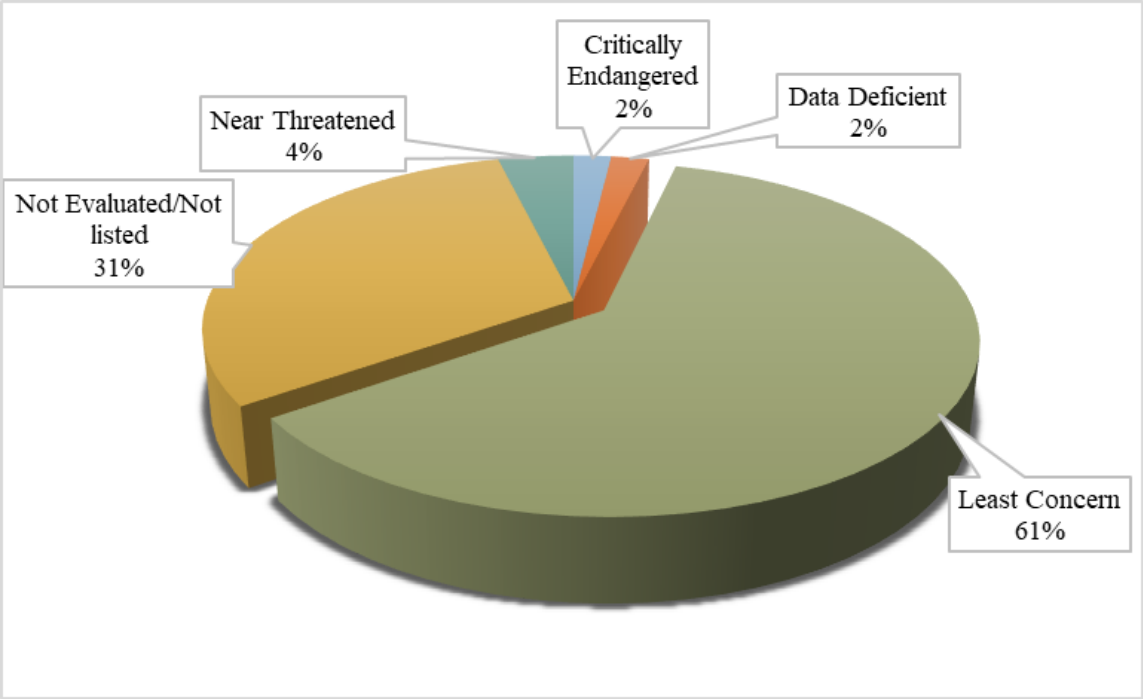

Figure 3.10: Conservation status of medicinal plants used in Bojanala District, North-West Province, South Africa

3.4. Concluding remarks

Bojanala District Municipality harbours extensive indigenous knowledge on medicinal plants, with 52 species from 8 families used to treat a variety of health conditions. Quantitative ethnobotanical indices, such as FL and UV, identified key species, such as *Artemisia afra* and *Dicoma anomala*, as highly significant in local phytomedicinal practices. The predominance of herbs and the frequent use of leaves, along with decoction as the primary preparation method, reflect traditional approaches optimised for efficacy and accessibility. The focus on ailments related to pain and inflammation underscores the practical importance of these plants in meeting primary healthcare needs in the community. Despite these valuable insights, the study also highlights challenges, including the reluctance of some knowledge holders to share information and the ecological pressures posed by overharvesting and habitat loss faced by certain species. These factors threaten both the preservation of ethnobotanical knowledge and the sustainability of plant populations. To address these issues, ongoing community engagement, sustainable harvesting practices, and comprehensive conservation strategies are imperative. Furthermore, pharmacological validation and phytochemical

profiling of the most used plants are critical next steps to scientifically substantiate traditional uses, ensure safety and efficacy, and support the integration of plant-based therapies into broader healthcare frameworks.

Chapter 4: Perceptions of healthcare workers in Bojanala District on integrating phytomedicine into the mainstream healthcare system

Abstract

In 1994, post-apartheid, the South African government began recognising the value of traditional medicine in primary healthcare and proposed integrating African traditional healing into the country's hospitals and clinics. However, 31 years into the new democratic era, traditional healing continues to operate outside the mainstream healthcare system, and discussions about how to successfully integrate the two systems remain ongoing. The aim of this study was to assess perceptions among healthcare professionals and to evaluate the prospects of incorporating phytomedicine into the mainstream healthcare system. A purposive sampling method was used to collect data from 40 healthcare professionals of different categories, using a knowledge, attitude, and practices (KAP) semi-structured questionnaire. The data was further analysed using descriptive statistics and thematic analysis. The findings revealed that healthcare professionals are aware of traditional healing practices, particularly herbal remedies, for treating and managing various ailments. The majority (57%) of participants believe traditional medicine is effective in treating various health conditions; however, they also raised concerns about its safety. Only 17% of healthcare workers were confident in the safety of traditional medicine, and this was echoed by their concerns about the lack of proper dosages or measurements of herbal remedies. The majority (65%) of healthcare professionals were in favour of incorporating phytomedicine into the mainstream healthcare system, but emphasised the need to improve knowledge, training, and education, while also addressing concerns about the safety and efficacy of traditional medicine. Only 20% of participants did not agree with integration. Fifty-five percent (55%) of healthcare professionals have never used traditional medicine before, and 67.5% indicated they will not recommend it to anyone because of a lack of scientific evidence of its efficacy and because their profession does not allow them to do so. The findings of the study revealed that, to achieve full integration, there is a need to improve healthcare workers' knowledge base on the use of traditional medicine. There is also the need to provide proper education and training to traditional health practitioners. Additionally,

educational interventions, such as workshops for healthcare workers and traditional health practitioners, and rigorous research on traditional medicine and its proper regulation are necessary.

Keywords: Integration, Phytomedicine, Mainstream healthcare system, North-West

4.1 Introduction

African Traditional Medicine (ATM) has withstood the test of time and colonialism in many countries (Ndou, 2018). Despite being labelled as “primitive”, “superstitious” and “unscientific” (Mawere, 2014; Mankantshu, 2019; Murwira, 2020; Reddy, 2024), traditional medicine (TM) continues to play a significant role in the lives of many people in Africa, since many people continue to depend on it (Sebata, 2015; Mmamosheledi and Mncengeli, 2019). Colonisers failed to eradicate indigenous knowledge and traditional healing practices as planned. Following the end of the apartheid era in South Africa, the African National Congress (ANC), the ruling party, began acknowledging the significance of traditional healing practices in the lives of South Africans (Motloenya, 2016a; Mmamosheledi and Mncengeli, 2019). The governing party aimed to correct the past injustices by legalising and regulating traditional healing practices.

In South Africa, traditional medicine remains important, especially in rural areas where access to proper and affordable primary healthcare is difficult and, at times, near impossible (Ramgoon *et al.*, 2011; Mokgobi, 2012; Ndou, 2018). It is reported that about 27 million South Africans still use TM to meet their healthcare needs, as it forms part of their cultural and spiritual beliefs, but also because of the lack of availability, accessibility, and affordability of conventional medicine (Reid *et al.*, 2018; Mmamosheledi and Mncengeli, 2019). At present, South Africa is facing an immense shortage of medical staff, facilities, equipment, and medicine, and as a result, is failing to meet the healthcare needs of its people (Katuu, 2018; Loeffler, 2019; Willie and Maqbool, 2023). The recognition of the value of traditional medicine by the government resulted in the establishment of legislative frameworks, such as the National Drug Policy (NDP) of 1996, the Traditional Health Practitioners Act (Act 22 of 2007), and the draft policy on ATM for South Africa in 2008, to ensure the efficiency, safety, and quality of traditional health

services (Gqaleni *et al.*, 2007; Latif, 2010; Mokgobi, 2012; Sebata, 2015; Motloenya, 2016a; Mmamosheledi and Mncengeli, 2019). These are among the few steps the government has taken toward integrating TM into the mainstream healthcare system. However, the success of any integration efforts relies on the stakeholders' perceptions (Ndou, 2018). In South Africa's public health sector, physicians, nurses, pharmacists, psychologists, and all other healthcare personnel would be crucial to the integration of TM and conventional medicine, given that they may be required to work hand in hand with traditional healthcare practitioners.

Despite government efforts, the integration of traditional medicine into the South African mainstream healthcare system remains a work in progress. The country has still not reached the level of integration seen in other countries, such as China and India, where traditional and conventional medicine have been successfully merged into a single system (Mokgobi, 2014; Ndou, 2018; Mutola *et al.*, 2021). Thus, this study aimed to assess healthcare professionals' perceptions, identify reasons why integration seems to be stalling, and evaluate the prospects of integrating phytomedicines into the mainstream healthcare system. This study therefore has the potential to contribute to discussions on developing policies that support the integration of healthcare systems.

4.2 Materials and methods

4.2.1 Study area

This study was conducted in Bojanala District, North-West Province, South Africa. The Waterberg District Municipality borders the district to the north, Dr Kenneth Kaunda District Municipality to the south, City of Tshwane Metro to the east, West Rand District Municipality to the south-east, and Ngaka Modiri Molema District Municipality to the west. It is one of four district municipalities in the province and comprises five local municipalities: Kgetlengrivier, Madibeng, Moses Kotane, Moretele, and Rustenburg. The study was conducted in the Madibeng sub-district (-25°38'04"S, 27°44'52"E), which is home to 22 clinics, two community healthcare centres (CHCs), and two hospitals. The researcher visited 10 healthcare facilities: nine clinics and a community health centre (CHC). These facilities were chosen because they are primary healthcare centres or the first point of contact for people living in these communities/villages.

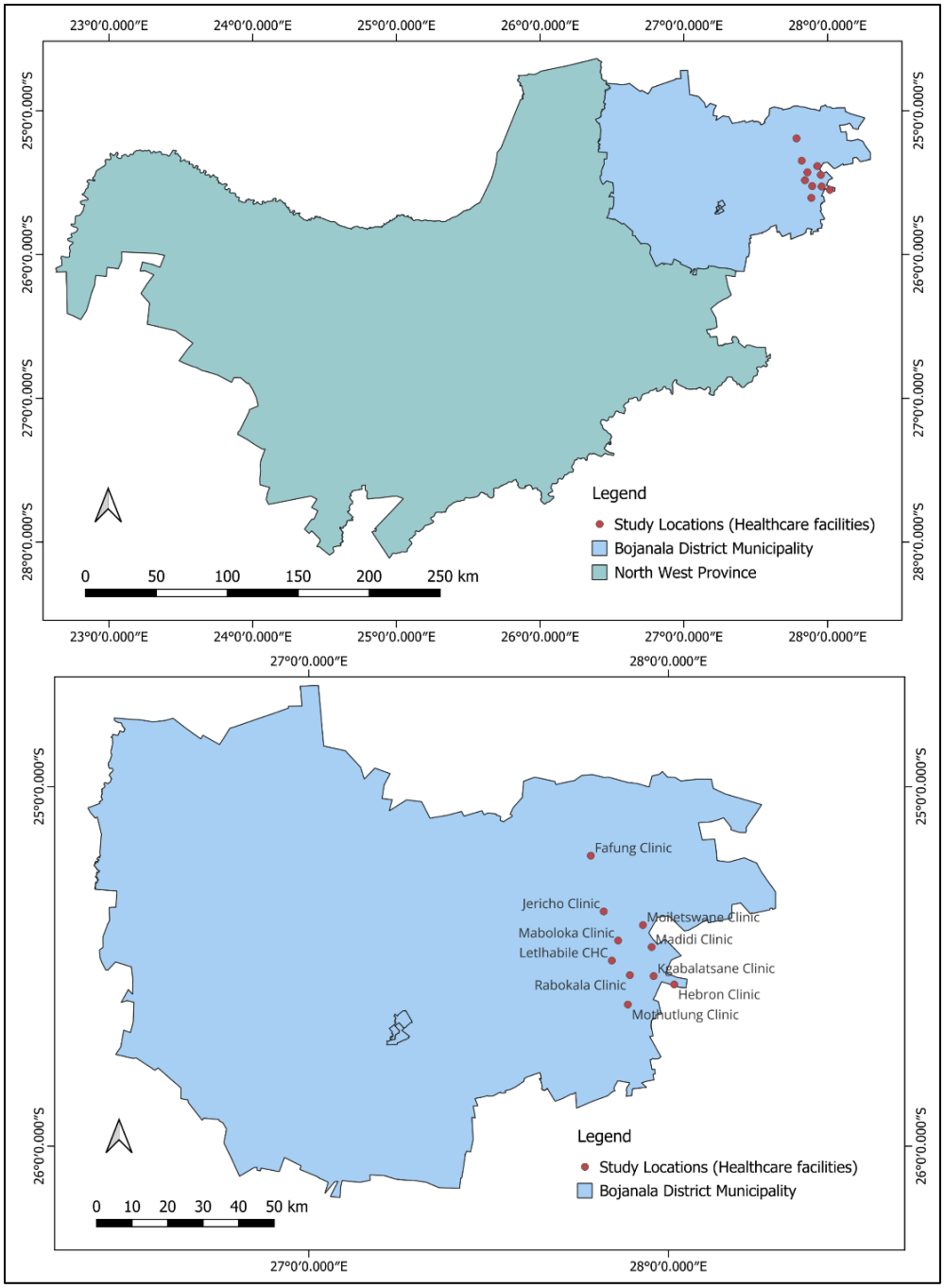

Figure 4.1: Geographical location of healthcare facilities visited within Bojanala District, North-West Province, South Africa

4.2.2 Sampling technique and target population

Purposive sampling was used in this study. It involves the deliberate selection of participants with specific characteristics or experiences believed to be particularly informative for the research question (Lopez and Whitehead, 2013; Palinkas *et al.*, 2015).

The targeted population for this study consisted of healthcare professionals, such as physicians, nurses, and pharmacists, employed by the North-West Department of Health and working at clinics and Community Healthcare Centres. Clinics and Community Healthcare Centres are the primary healthcare providers within the study area, rather than those in the private sector. The researchers believed that the participants selected for the study had good exposure to traditional medicinal practices within the communities where they served and had developed perceptions of these practices.

4.2.3 Data collection

Data was collected between October 2024 and March 2025. The data were collected through face-to-face interviews with 40 healthcare workers, using a Knowledge, Attitudes and Practices (KAP) questionnaire, as well as semi-structured questionnaires to assess knowledge, attitudes, and perceptions of healthcare professionals regarding the use of traditional medicine and its integration into the mainstream healthcare system. The interviews were conducted in English and Setswana in the healthcare providers' offices or consulting rooms, and each lasted 15 to 30 minutes. Before data collection, the researcher explained the study's purpose to participants and obtained their consent to record and use the information they provided. Demographic information about participants were recorded, followed by questions about their knowledge and awareness of traditional medicine and their attitudes towards the use and integration of phytomedicine. A total of 10 primary healthcare facilities (nine clinics and a community healthcare centre (CHC)) in the Madibeng sub-district, Bojanala District, were visited, and 40 healthcare workers were interviewed. This included doctors, nurses, pharmacists, physiotherapists, and community healthcare workers.

4.2.4 Pilot study

The main aim of the pilot study was to test the validity and reliability of the questionnaire and sampling methods. The questionnaire was tested for validity through piloting with neighbours who are healthcare providers (professional nurses) at different healthcare facilities. The content validity of the questionnaire was assessed based on participants' input. Participants were interviewed using the research tool; thereafter, each participant

was asked for feedback regarding the tool. The research tool was modified based on participants' suggestions.

4.2.5 Data analysis

Descriptive statistics, such as frequency counts, percentages, figures, and tables, were used to analyse background information of healthcare professionals in the study area. Thematic analysis was performed using the 6-step framework by Braun and Clarke (2006) to identify and interpret meaningful patterns in the collected data. These steps include becoming familiar with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing up (Braun and Clarke, 2006; Maguire and Delahunt, 2017; Castleberry and Nolen, 2018). The researcher familiarised themself with the data by reading and re-reading the transcripts, paying attention to any patterns that emerged. Attention was given to data that addressed the research question, and codes were assigned. Generating initial codes involved identifying and listing key ideas and concepts that followed a recurring pattern. The generated codes were then examined and grouped into broader, overarching themes. The researcher then critically examined the themes to determine whether they were coherent and reflected the collected data. Finally, the key themes identified were used to develop the report, addressing the research question.

4.2.6 Ethical considerations

Ethical clearance was requested and obtained from the University of Mpumalanga Research Committee (*UMP/Matlala 220207089/SBES/MSc/2024/1*) before collecting data. Approval was also requested and obtained to collect data from healthcare workers in the North-West Department of Health (NWDoH) and the Bojanala District Research Office. During data collection, healthcare professionals received an information leaflet attached to the consent form. The information leaflet provided details on the study's purpose. Participants were informed of all study details, including the aims and objectives, as well as the researcher's and the participant's expectations. Participants were also informed that participation was voluntary and that they had the right to withdraw at any time, despite having signed the consent form. The data collection process was conducted with utmost respect of the rights of participants.

4.2.7 Limitations of the study

The sample of this study is not fully representative of all healthcare workers in the study area, as some facilities do not have certain categories; thus, perceptions may be skewed. Furthermore, the findings of this study may apply only to the study area and may not reflect perceptions in other geographical settings.

4.3 Results and discussion

4.3.1 Profile of participants

Table 1 shows the socio-demographic characteristics of conventional healthcare workers who participated in the study.

Table 4.1: Demographic characteristics of healthcare professionals in Bojanala District, North-West Province, South Africa

Demographic characteristics	Description	Frequency	%
Sex	Female	35	87.5
	Male	5	12.5
Age	≥30	6	15
	31-40	13	32.5
	41-50	14	35
	51-60	7	17.5
Occupation	CHW	5	12.5
	HIV/AIDS	3	7.5
	Counsellor	10	25
	ENA	1	2.5
	EN	17	42.5
	PN	1	2.5
	PA	1	2.5
	PHYSIO	2	5
	MO		
Race	Black	39	97.5
	White	0	0
	Coloured	0	0
	Asian	1	2.5
Professional experience in years	Less than 5	14	35
	Less than 10	9	22.5
	Less than 15	6	15
	Less than 20	3	7.5
	Less than 30	5	12.5
	Above 30	3	7.5

CHW: Community Healthcare Worker; ENA: Enrolled Nursing Assistant; EN: Enrolled Nurse; PN: Professional Nurse; PA: Pharmacist assistant; PHYSIO: Physiotherapist; MO: Medical Officer

A total of 40 conventional healthcare providers were interviewed. The participants' ages ranged from 21 to 60 years, with many aged 41 to 50 (Table 4.1). Out of the 40 participants, 87.5% (n=35) were females and 12.5% (n=5) were males. Figure 4.1 shows the distribution of participants by sex at each health facility visited. Six facilities had no male participants. Out of the same 40 participants, 12.5% (n=5) were community healthcare workers, 7.5% (n=3) were HIV/AIDS counsellors, 25% (n=10) were enrolled nursing assistants, 2.5% (n=1) were enrolled nurses, 42.5% (n=17) were professional nurses, 2.5% (n=1) were pharmacist assistants, 2.5% (n=1) were physiotherapists and 5% (n=2) were doctors. Figure 4.2 shows the distribution of participants by occupation. Only two healthcare facilities had medical doctors, both male. One facility had a pharmacist assistant, and one facility had a physiotherapist. One facility, considered the biggest of them all, had a greater variety of occupations than the other facilities. In other facilities, there were no doctors or pharmacists. Among the professional nurses (n=17), 24% were also operational managers at these healthcare facilities.

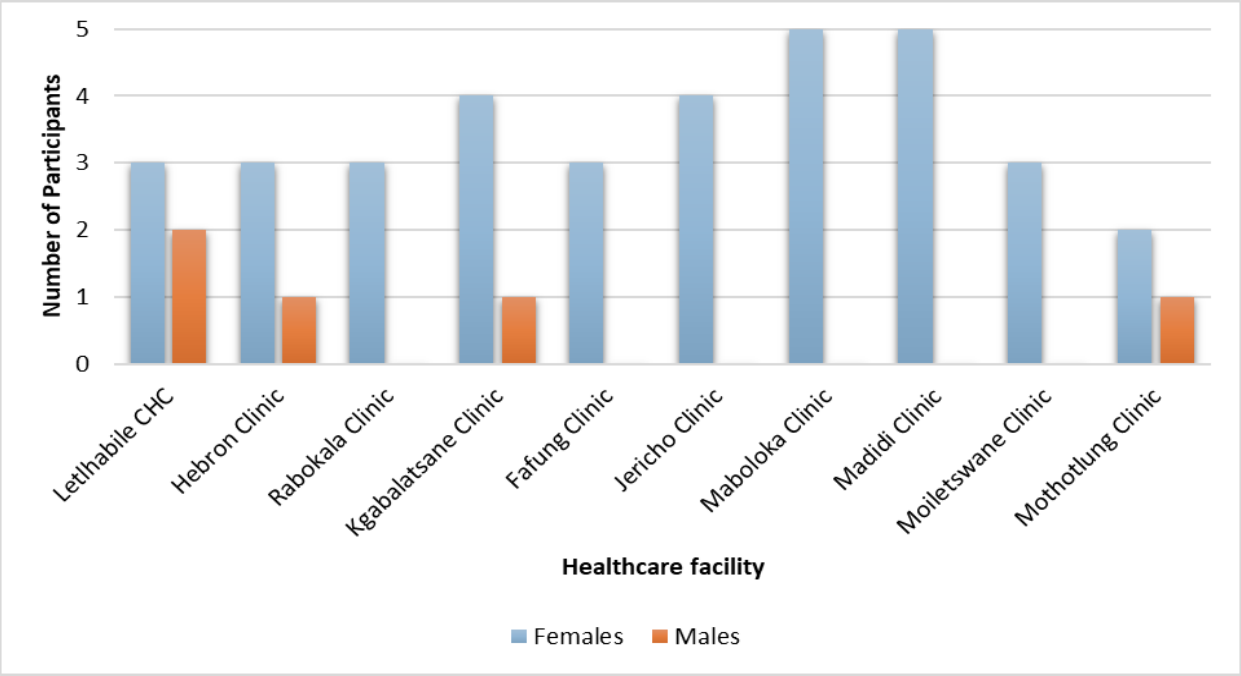

Figure 4.2: Distribution of healthcare professionals according to sex at visited healthcare facilities in Bojanala District, North-West Province, South Africa (n=40)

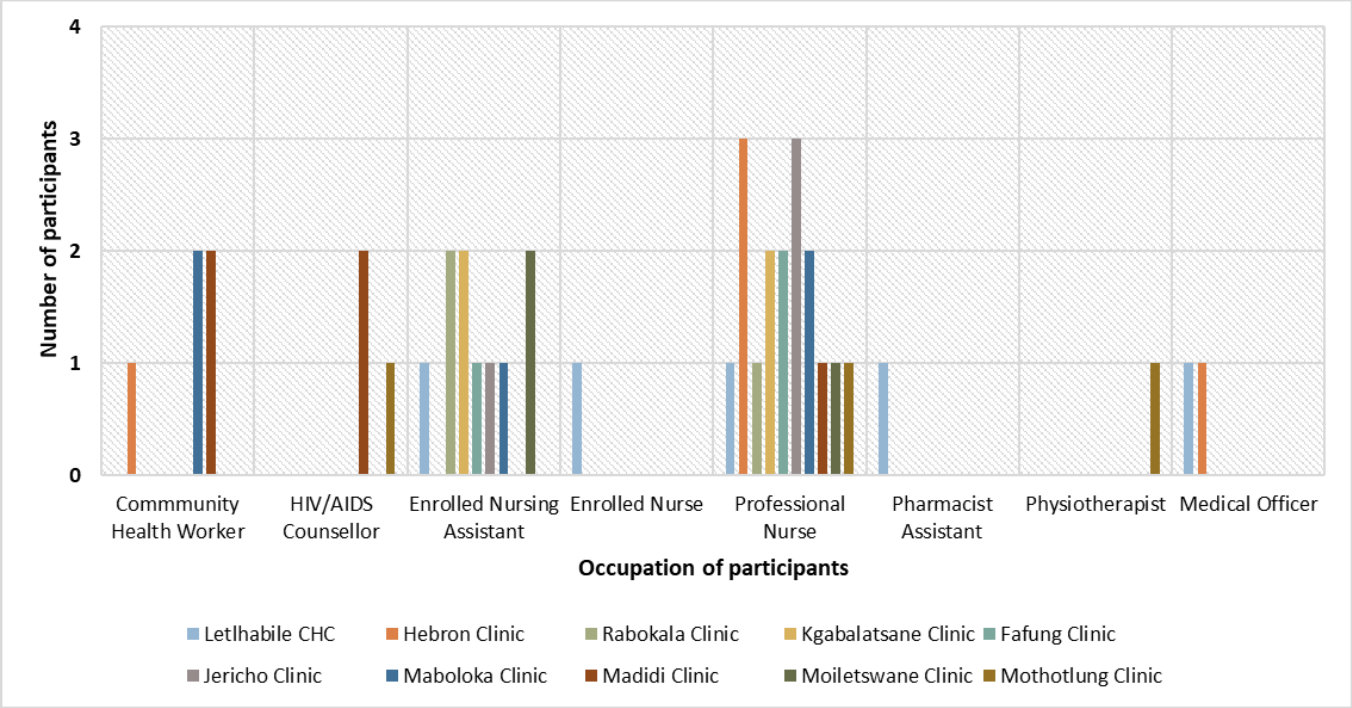

Figure 4.3: Distribution of participants according to occupation at healthcare facilities in Bojanala District, North-West Province, South Africa

4.3.2 Themes

4.3.2.1 Knowledge and awareness of traditional medicine

This theme focused on participants' level of knowledge of traditional medicine. According to the literature, traditional medicine is defined as the health practices, beliefs, and knowledge comprising animal, plant, and mineral resources, as well as spiritual therapies used to diagnose, prevent, or treat illnesses (Telles *et al.*, 2014; Kwame, 2016; World Health Organization, 2023). In this study, a good number of participants indicated they were familiar with traditional medicinal practices, the majority maintained they knew about herbal medicines and, in some instances, spiritual healing. Participants were unaware of other traditional healing practices. Below are some of the excerpts from participants regarding their understanding of traditional medicine:

> Traditional medicine is medication or herbs used by traditional healers to treat sick people.
>
> Traditional medicine is a form of treatment other than clinical medicine, using herbal and spiritual healing practices.

> It is a form of medication practised for centuries by our ancestors, passed down to generations before the practice of Western medicine.
>
> Medication that is naturally dug from the ground has not gone through pharmaceutical research and is usually used by elderly people.

In addition to providing their definitions and understanding of traditional medicine, participants were asked to list a few benefits associated with it. Surprisingly, the majority of participants could not mention any benefits, as they had little information about traditional medicine and had not used it before. This finding is similar to that of previous studies, which found that most healthcare workers did not use traditional medicine (Kretchy *et al.*, 2016; James *et al.*, 2020). Other participants indicated that the benefits of traditional medicine would depend on the beliefs of people using it. Very few participants mentioned the benefits associated with traditional medicine. One of the participants, a professional nurse, indicated as follows:

> "People use traditional medicine because of its easy accessibility. There are no restrictions on anyone; you can go collect them from the wild and prepare them yourself. Even those who are not working and do not have any money can get them easily".

Another participant, also a professional nurse, maintained as follows:

> Most traditional medicines do not contain preservatives, so I would assume they have fewer side effects than our medicine.

Some participants indicated that traditional medicine is less expensive and somewhat effective for treating other illnesses. These findings are consistent with other research, which revealed that affordability, accessibility, and availability are among the reasons why many people use traditional medicine (Ajala *et al.*, 2019; Mmamosheledi and Mncengeli, 2019; Bhuda and Marumo, 2020; Gazi *et al.*, 2024). This observation is attributed to the distance people must travel to reach the nearest primary healthcare facility, the availability of Western conventional medicine, and its costs. Ekor (2014) states that other factors contributing to the high use of herbal medicine by patients or individuals include patients' discomfort discussing their medical conditions and the lack of confidentiality among healthcare professionals in handling health information. Patients also fear being misdiagnosed or being given the wrong treatment for their condition (Ekor, 2014). Even though some participants had a fair understanding of traditional medicine, the majority

seemed to have very little knowledge of it. Most participants understood traditional medicine as the use of herbs but could not mention any advantages associated with it. This may come as a surprise, as almost all participants had African languages as their home languages and worked in areas where traditional medicine is prevalent (Hughes *et al.*, 2013; Nyeko *et al.*, 2016; Ssenku *et al.*, 2022).

4.3.2.2 Attitudes towards traditional medicine: Efficacy and safety

Research shows that one reason people continue to use traditional medicine is its perceived effectiveness (Payyappallimana, 2010a; Gyasi *et al.*, 2011; Ekor, 2014; Mmamosheledi and Mncengeli, 2019). Fifty-seven percent (57%) of participants believed traditional medicine is effective in treating illnesses, 25% were neutral, while 18% did not believe of the effectiveness of traditional medicine (Figure 4.4). The majority of those who were neutral indicated that there are some conditions that cannot be treated with traditional medicine and thus require proper medical intervention. In the same vein, participants acknowledged that some conditions are spiritual and cannot be treated with conventional medicine but can be treated with traditional medicine. Most healthcare workers were open to and had a reasonably positive attitude towards the use of traditional medicine.

For instance, one participant maintained as follows: “I do not really have a problem with people who consult traditional healers or use traditional medicine because, sometimes, you may find that when people go to traditional healers or use traditional medicine, it is because they have sought help from the hospital or the clinic but did not get the help they needed. So, they go to traditional healers with the hope that they might see what professionals could not do”. Another participant indicated as follows: “I do not really mind people who use traditional medicine, and I also do not judge their decision. People have the right to choose where they want to get help, as long as it works for them”. Many other healthcare workers felt the same way. To them, it was just a matter of respecting other people’s beliefs. However, some healthcare workers believed that certain conditions require immediate medical attention and that it would not be a good idea to consult traditional healers first because it will delay them from getting proper help.

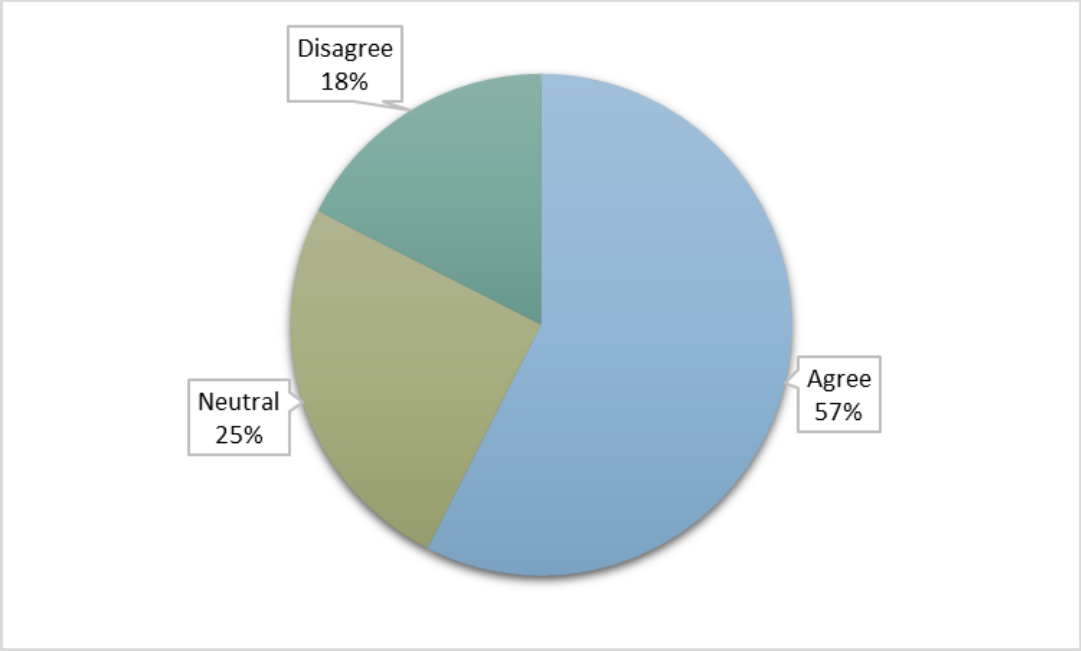

Figure 4.4: Effectiveness of traditional medicine in treating illnesses (n=40)

Even though most healthcare workers believe traditional medicine is effective, they also raised concerns about its safety. Seventeen percent (17%) of healthcare workers were confident in its safety, 45% were neutral, and 38% were not satisfied at all (Figure 4.5). Healthcare professionals were concerned about the lack of proper dosages or measurements for herbal remedies, as captured in the excerpt below.

> Many people don't measure the medicine; they just drink, and this may worsen their conditions or cause new problems altogether because the medicine is too strong.
>
> The problem with herbal remedies is that they lack standardized dosages. Many of them even damage the liver.

These findings are similar to those of other studies (Mokgobi, 2012; Kretchy *et al.*, 2016; Hamanyanga, 2019), which revealed that healthcare workers were concerned about the improper dosing of herbal remedies and the overall safety of traditional medicine. There seems to be a common misconception that traditional medicine or natural products, are non-toxic and lack side effects; thus, the improper use and excessive consumption of traditional medicine can result in severe poisoning and acute health problems. For instance, in a study by Kretchy *et al.* (2016), healthcare workers admitted that patients who had used herbal remedies for extended periods of time presented with multiple organ

damage, especially liver and kidney problems. The general population lacks information about the associated risks of excessive consumption of traditional medicine and believes that, since the products are natural, they will not harm their systems. Perhaps this is why most healthcare workers are not confident in the safety of traditional medicine. This could also be because most of the time, patients present with side effects of excessive and prolonged consumption of improperly dosed remedies. The common belief that herbal remedies are safe and have no side effects is not only false but also very misleading. According to Ekor (2014), in several countries, herbal remedies are introduced into the market without thorough, mandatory safety and toxicological evaluations. This is supported by Hamanyanga (2019), who argues that many herbs are toxic to the body, but people do not know their side effects or what they do to the body because they have not been tested or trialled. Lack of proper dosages and toxicology reports of herbal remedies poses many risks and may produce a wide range of undesirable and adverse reactions to the body. The safety of traditional medicine remains a concern, which should be addressed immediately (Ekor, 2014; Kretchy *et al.*, 2016; Martínez *et al.*, 2016; James *et al.*, 2020).

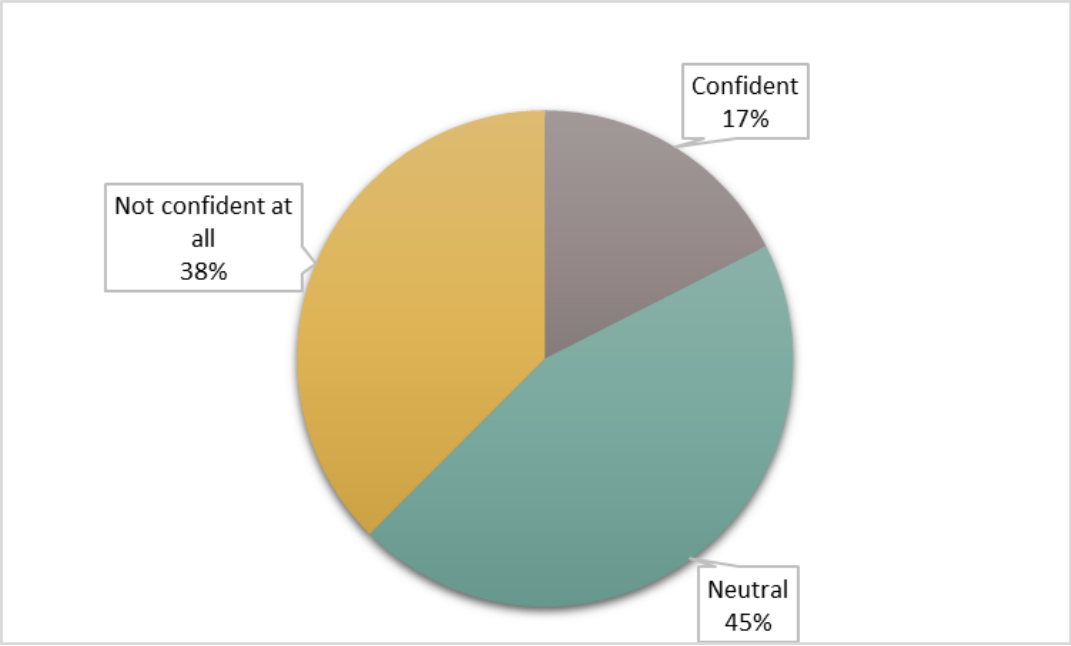

Figure 4.5: Beliefs of healthcare professionals regarding the safety of traditional medicine (n=40)

4.3.2.3 Perception of integration

This theme focused on participants' views and attitudes toward integrating traditional medicine into the mainstream healthcare system. The findings revealed that the majority of healthcare workers in the study area were in favour of incorporating traditional medicine but emphasised the need to improve knowledge between healthcare professionals and traditional health practitioners, and to provide training and education, while also addressing concerns about the safety and efficacy of traditional medicine. Sixty-five percent (65%) of participants agreed to integration, 15% were neutral, while 20% did not agree to integration (Figure 4.6). Some healthcare professionals admitted that conventional medicine cannot treat all illnesses, and that traditional medicine cannot address all conditions. Thus, integration would be a great strategy to address all health conditions. Research reveals there are limited resources available to cater for the healthcare needs of all South Africans (Coovadia *et al.*, 2009; Motloenya, 2016a; Biermann, 2017; Loeffler, 2019; Willie and Maqbool, 2023), thus, many people, especially those from rural areas, resort to using traditional medicine to meet their healthcare needs (Payyappallimana, 2010a). Mmamosheledi and Mncengeli (2019) state that this provides sufficient evidence to support the integration of traditional medicine into the mainstream healthcare system, where conventional healthcare workers and traditional health practitioners can collaborate to improve patient outcomes. In the past years, the South African government, through the National Department of Health (NDoH), has initiated actions for the formal acknowledgement, institutionalisation, and empowerment of African traditional medicine through the establishment of the National Drug Policy of 1996, the Directorate of Traditional Medicine, the Traditional Health Practitioners Act (Act 22 0f 2007), and the draft policy on ATM for South Africa in 2008 (Montshioa, 2012; Motloenya, 2016a; Mmamosheledi and Mncengeli, 2019). South Africa has taken a few steps towards the successful integration of TM into the national healthcare system; however, to achieve this, healthcare professionals in this study raised several concerns that need to be addressed, as captured in the excerpts below.

> Traditional medicine is not scientifically approved, and there is insufficient information about its efficacy. We do not have much knowledge about it, and how the body handles it. Another thing is that they do not have standardised dosages.

> Some traditional healers are poorly educated or poorly trained and do not know how to properly diagnose various conditions.
>
> Traditional medicine should be considered integrated only if there is clear scientific evidence that it can manage or treat illnesses.
>
> Some traditional healers are not truthful with their clients and are only looking to make money from this practice.

Although healthcare professionals support the concept of integration, the lack of scientific evidence on the efficacy of traditional medicine, the absence of proper instructions on dosage, and the lack of education and training for traditional health practitioners remain issues of concern. These findings are consistent with those of other studies, from different parts of the world (Kretchy *et al.*, 2016; Hamanyanga, 2019; James *et al.*, 2020). In addition to these concerns, some participants maintained that integration would be advantageous in some way, as indicated in the excerpts below.

> I think integration is necessary in the sense that traditional healers will be educated on safe practices and how to better care for their clients. In the same way, we will also be educated about traditional medicinal practices.
>
> Not all conditions are treatable with modern medicine, and not all conditions can be treated with traditional medicine. So, integration will definitely help us achieve better patient outcomes. Traditional healers will be able to see things that ordinary healthcare workers cannot see. For instance, those spiritually related sicknesses, *bo sefola so*….
>
> Integration will promote development and research into traditional medicine, potentially helping us find cures for untreatable conditions.
>
> By integrating the two systems, traditional healers will be educated in human physiology and, therefore, in proper dosages. It will also be a great benefit to work with traditional healers because they have a gift for seeing what we cannot see and, sometimes, a better understanding of the problem beneath the surface.

Out of all these comments, the education and training of traditional health practitioners stood out. There is a need to educate traditional healthcare practitioners on safe health practices, such as using sterile gloves, razors, and other equipment used in traditional medicine. Improving the cleanliness of their environments will help control infections that may arise from poor hygiene (Montshioa, 2012). It was surprising to find that, out of all the healthcare professionals in this study, only one healthcare worker indicated their need for education, even though the majority lack knowledge or have very limited knowledge of traditional medicinal practices. It is also essential for them to be educated about

traditional medicine, since many people, especially those in rural areas, resort to it before going to the clinics where they work. Thus, there is a need for adequate knowledge and understanding of traditional medicine and its effects to assist patients who come to healthcare facilities after using it. This finding is in line with the studies conducted by Kretchy et al. (2016) and James et al. (2020), who found that healthcare workers need some knowledge of the traditional medicines commonly used by patients. There is a need for continuous education programmes and training workshops to enhance healthcare workers' knowledge of frequently used traditional medicine. An earlier study by Parker *et al.* (2013) also revealed that healthcare workers with greater knowledge of traditional medicine are more likely to discuss it with their patients. This will also allow patients to be open and honest with their healthcare providers about their use of traditional medicine without fear of being judged. Furthermore, the need for evidence-based traditional medicine knowledge among healthcare workers also demands that thorough research be conducted on the safety and efficacy of traditional medicine to address concerns about a lack of scientific evidence.

On the other hand, the study revealed that in some communities and facilities, traditional healthcare practitioners have been working alongside healthcare professionals. This collaboration appears to be informal yet functional, with only traditional healthcare practitioners referring their clients/patients to clinics and attending in-service training arranged for them. Healthcare professionals also indicated that they notice this trend frequently with HIV patients, where traditional healthcare practitioners send or accompany patients to the clinic when they notice that the patients are weak or need immediate medical attention. Some participants further noted that while this relationship is not officially recognised or structured, it has the potential to strengthen health outcomes if properly supported.

Some healthcare professionals indicated that even though integration could be beneficial, some challenges may also surface. The most frequently mentioned challenge is that traditional and Western medicine are two distinct systems with different worldviews and philosophies. Western medicine relies on scientific, evidence-based approaches, while traditional medicine draws on indigenous knowledge, often rooted in local people's

cultural beliefs and spiritual practices (Hardy, 2008). According to healthcare workers, the two systems cannot work well together because of their different diagnostic methods. Moreover, some practices of traditional healthcare practitioners are often discouraged by healthcare workers. Another challenge is the fact that many traditional healthcare practitioners are not registered or regulated. This is similar to what Mokgobi (2012) found: that the training of traditional healers is presently not regulated and is an issue, since there is no way to verify the quality of the training provided to practitioners. Mokgobi (2012) further states that many traditional healthcare practitioners still practise without proper registration or association membership. Some healthcare workers indicated that "big pharma" may seek to patent compounds derived from traditional remedies, potentially leading to the exploitation of indigenous knowledge and denying indigenous people the benefits of their own medicine. Other healthcare workers maintain that if patients use both systems concurrently, it may lead to worse complications, such as organ damage due to interactions of medicines that should not be taken together. This is consistent with the findings from James *et al.* (2020), Gall *et al.* (2019), and Mokgobi (2012). According to Hamanyanga (2019), challenges such as efficacy, safety, standardisation, regulation of traditional medicine, and intellectual property rights, have been reported to hinder better collaboration among countries willing to achieve a successful integration process.

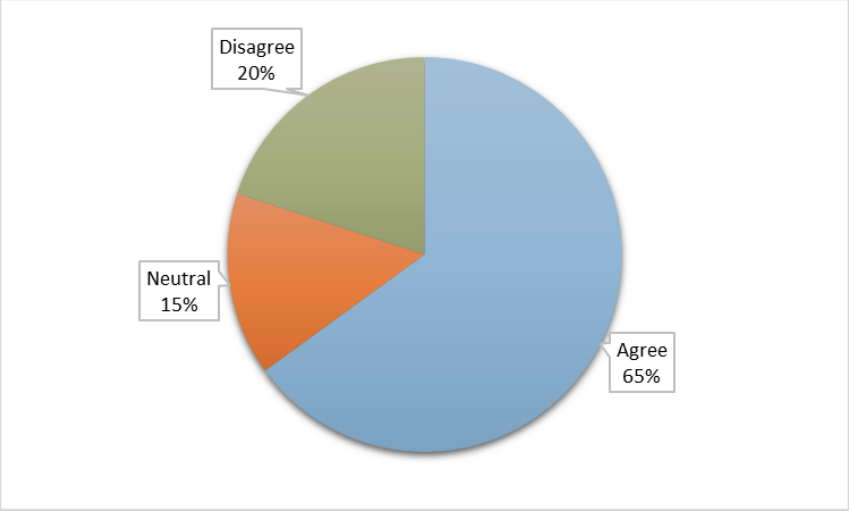

Figure 4.6: Integration of traditional medicine into the mainstream healthcare system

4.3.2.4 Prevalence of use and recommendation

This theme focused on the use of traditional medicine by healthcare workers, their personal experiences, and whether they would recommend it to patients or others. The results revealed that only a small percentage (45%) of participants have used traditional medicine at some point in their lives (Table 4.2). Participants indicated they used it because of its effectiveness, family members' influence, cultural traditions, dissatisfaction with modern medicine during COVID-19 pandemic, and because it was recommended to them by someone else. These findings are similar to those of James *et al.* (2020) and Kretchy *et al.* (2016), who revealed that traditional medicine is infrequently used among healthcare workers. However, a study conducted in Trinidad, Tobago and Mexico found that traditional medicine is highly prevalent among healthcare workers (Martínez *et al.*, 2016; Bahall and Legall, 2017). Fifty-five percent (55%) of healthcare workers had never used traditional medicine before and would not recommend it to anyone. Overall, 67.5% of participants reported they would not recommend traditional medicine to their patients for the following reasons: lack of knowledge about traditional medicine; concerns about its safety; and lack of scientific evidence of its efficacy. This is consistent with the findings of Kretchy *et al.* (2016), which showed that healthcare workers in Accra, Ghana, are hesitant to recommend traditional medicine to others because they are sceptical of its safety, efficacy, unregulated nature, and lack of knowledge and confidence. This suggests that if healthcare workers had adequate knowledge about traditional medicine and sufficient scientific proof of its efficacy, perhaps this pattern might change, and there might be increased popularity of traditional medicine among healthcare workers.

Table 4.2: Reported use of traditional medicine among healthcare workers and recommendations to other people

Reported use of traditional medicine	Reason for use	Recommendation of traditional med
Yes (n=18) = 45% **No (n=22) = 55%**	Personal belief (n=8) Family influence (n=4) Cultural tradition (n=6) Dissatisfaction with modern medicine (n=5)	Yes (n=13) - only if the person believes in traditional medicine and is open to the recommendation. Some herbs are effective.

	Recommended by other people (n=1)	No (n=27) - Traditional medicine is not scientifically proven or approved by medical councils. Lack of knowledge; lack of confidence in the safety of traditional medicine; fear of putting other people at risk because they do not know how other people will react to the medicine. My profession does not allow me.

4.4 Concluding remarks

Integration of traditional medicine into the mainstream healthcare system has received favourable responses, with evidence suggesting that integrating the two systems would enhance healthcare delivery and improve patient outcomes. However, to achieve full integration, it is necessary to enhance healthcare workers' knowledge of traditional medicine and provide appropriate education and training for traditional health practitioners. Additionally, there is also a need for educational interventions, such as workshops for healthcare workers and traditional health practitioners, rigorous research on traditional medicine, and proper regulation of traditional medicine. The next chapter focuses on the summary, conclusion, and recommendations.

Chapter 5: Summary, conclusion and recommendations

5.1 Introduction

This chapter provides a summary of the study's main findings, conclusions, and recommendations, based on the findings presented and discussed in chapters 3 and 4. The main objective of concluding is to demonstrate the extent to which the research questions and objectives have been addressed in the study (Makar *et al.*, 2018; Faryadi, 2019). Additionally, this chapter discusses the significance of the findings in relation to the broader literature and provides recommendations for policy, practice, and further research.

5.2 Summary of the aim and objectives of the study

In South Africa, phytomedicine continues to play a significant role in healthcare systems, with about 80% of the population using it as a primary source of healthcare (Reid *et al.*, 2018; Mmamosheledi and Mncengeli, 2019). This reliance on photomedicine is influenced not only by accessibility and affordability but also by the cultural significance of indigenous healing systems, which are deeply rooted in community life. However, the sustainability of these practices is continually under threat due to the gradual erosion of knowledge transmitted orally across generations. Additionally, there is growing recognition of the potential value of integrating traditional medicine into formal healthcare systems to improve access to healthcare for populations. The two main aims of the study were to: Explore the use of phytomedicine in the Bojanala District, North-West Province, South Africa; and Assess perceptions of the integration of traditional medicine into the mainstream healthcare system. The objectives of the study were to:

1. Generate an inventory of phytomedicinal plants used in Bojanala District, North-West Province, South Africa;
2. Document knowledge and practices associated with the use of phytomedicine in Bojanala District, North-West Province, South Africa; and
3. Evaluate prospects of integrating phytomedicine in the mainstream healthcare system.

By documenting ethnobotanical knowledge in the study area, this research sought to preserve necessary indigenous knowledge and potentially provide valuable leads for

further research. Additionally, by assessing perceptions of integration, the study sought to contribute to conversations or inform the development of policies regarding the safe and effective inclusion of traditional medicine into the healthcare system of South Africa, to improve public health.

5.3 Summary of key findings

5.3.1 Phytomedicinal practices in Bojanala District, North-West Province, South Africa

An ethnobotanical survey was conducted to compile an inventory of medicinal plants used in the Bojanala District, North-West Province, South Africa. The use of phytomedicine in the study area is characterized by significant diversity, as evidenced by the 52 plant species across 28 families used to treat various health conditions, including musculoskeletal disorders, pain and inflammation, cardiovascular conditions, dermatological conditions, and respiratory conditions, among others. The most used families in the Bojanala District are Asteraceae, Fabaceae, and Anacardiaceae, consistent with their recognised importance in Southern Africa. The most popular species based on UV include *A. afra*, *D. anomala*, *S. aethiopicus*, *D. sanguinea*, and *H. hemerocallidea*. These species have been widely reported in South African ethnomedicine and pharmacological studies. Twenty species had an FL of 100%, indicating consistent, culturally trusted applications. In Bojanala District, leaves are the predominantly used plant parts for medicinal use, closely followed by roots and barks, which is consistent with ethnobotanical trends in Southern Africa. Decoction is the most common method of preparation, followed by burning and infusion. Although most of the species used for medicinal purposes in the Bojanala District are classified as 'least concern' by SANBI, concerns exist about the sustainability of species that are experiencing population declines due to overharvesting and habitat degradation.

5.3.2 Perceptions on integration

The study revealed mixed feelings regarding traditional healing. The majority of healthcare workers interviewed recognised traditional medicine as effective in treating various ailments. However, safety concerns were highlighted, with only 17% expressing their confidence in the safety of traditional medicine. Healthcare workers expressed their

concerns about the lack of standardisation and regulation of dosages. Regardless, 65% of participants supported the integration of traditional medicine into the mainstream healthcare system, subject to improved education, training, and safety validation, which align with the WHO recommendations for integration. Only 20% of healthcare workers opposed integration altogether, while 67.5% said they would not recommend traditional medicine to others due to the lack of sufficient scientific evidence and professional restrictions. This disparity highlights challenges of integrating indigenous medicinal practices with biomedical standards.

5.4 Conclusions

This study has successfully addressed the objectives of generating an inventory of medicinal plants used in Bojanala District, North-West Province, South Africa, and documented associated knowledge and practices. The findings of this study and the summary provided shed more light on the cultural heritage of people in the Bojanala District, highlighting the variety of medicinal plant use within the study area and contributing to the knowledge of South African and African literature on the documentation of plants used for medicinal purposes by indigenous people. Ethnobotanical research, such as this study, plays a crucial role in documenting and preserving traditional knowledge systems that have been developed and passed down through generations. By systematically recording the uses of medicinal plants and associated knowledge and practices, this study aims to protect invaluable indigenous knowledge that is at risk of being lost due to cultural changes, urbanization, and the deterioration of oral traditions as Western lifestyles are increasingly adopted. This knowledge, which ought to be protected, serves as a foundation for pharmacological discoveries, as many modern drugs considered basic and essential are derived from traditional medicine. For example, well-known medications, such as aspirin, morphine, and quinine, have come from ethnobotanical leads. It is because of ethnobotanical research, such as this study, that one can harness the therapeutic potential of important plant species, whose chemical compounds form the basis of powerful drugs used to treat or prevent various health conditions.

Furthermore, this study also has significant implications for biodiversity conservation. This study revealed that the growing commercial demand for certain medicinal plants has led to overharvesting and population declines of some important species. Thus, by identifying species that are highly exploited, this study can provide important information for prioritising conservation and implementing sustainable harvesting practices. In addition to the above, this study also contributes to cultural recognition and empowerment by supporting indigenous healing systems and promoting respect for traditional health practitioners and their roles in primary healthcare.

Various factors, including personal experiences, cultural beliefs, and professional training, influence people's perceptions. Understanding perceptions of integrating traditional medicine into the mainstream healthcare system is crucial for identifying areas of convergence and conflict that impact the feasibility and success of the integration process. These perceptions shed light on acceptability, trust, and perceived safety of traditional medicine among healthcare professionals. The majority of participants in this study agreed that traditional medicine is effective, but remain concerned about safety and the lack of standardised dosages. These findings underscore the importance of thorough research, clinical validation, regulatory oversight, and educational interventions before a structured and safe intervention can be implemented.

Additionally, the findings of this study can also inform policymakers about barriers and enablers of integration. These perceptions can help address barriers and concerns, and design collaborative frameworks that contribute to the development of more comprehensive, culturally inclusive healthcare systems, ultimately addressing inequalities in access to healthcare. The concept of integration has its roots in decades of research, and numerous studies have been conducted to support effective and successful integration. However, medical pluralism, characterised by the absence of formal collaboration between the two healthcare systems, will continue for many more years to come. Integration of these two healthcare systems should be treated as a matter of urgency for the benefit of patients.

5.5 Recommendations

Based on the findings of this study, the following recommendations are advised:

Policy and research recommendations

One of the main obstacles to the successful integration of healthcare systems is the lack of scientific evidence on the efficacy and safety of traditional medicine. There is a need for more in-depth pharmacological research, toxicity studies, and clinical trials to test the effectiveness and safety of highly utilised medicinal plants. There is also a need for further studies to assess the long-term effects of consuming phytomedicines and to explore standardization methods for dosages, ensuring patients receive appropriate doses that are not harmful to their bodies. Further research is needed on bioactive compounds and the biological activities of medicinal plants to discover and develop new pharmaceutical products. In essence, the government should establish policies that promote the development of quality assurance systems for medicinal plants, including guidelines for harvesting, preparation, storage and dosage.

Practice recommendations

Conservation and sustainable use of medicinal plants: Overharvesting, unsustainable trade, and habitat loss or degradation have placed intense pressure on the wild populations of many important species, resulting in population declines. One way to preserve critical medicinal plants is to encourage the domestication of high-demand species, thereby reducing pressure on wild populations. Additionally, approaches such as educating local communities about sustainable harvesting practices and the responsible use of medicinal plants, as well as involving local communities in conservation initiatives (community-based conservation programs), are recommended in this study. There is a need for the Department of Forestry, Fisheries, and the Environment (DFFE) to prioritise the conservation of species that are at risk of overharvesting.

Education and training: There is a need to include indigenous knowledge and traditional medicine as modules or short courses in medical schools, taught by qualified traditional health practitioners from recognized traditional healers' organizations. In this way,

Western-trained healthcare professionals will become more open to the discipline of traditional medicine and gain a better understanding of traditional healing practices. Similarly, colleges and universities should offer short courses for traditional healthcare practitioners on basic yet essential medical topics, such as hygiene and infection control. Practicing traditional healthcare practitioners should be awarded a certificate of completion for these courses. This would help address concerns about unhygienic practices raised by healthcare professionals in this study. There is also a need for workshops at healthcare facilities, where healthcare professionals and traditional health practitioners can exchange knowledge and discuss appropriate circumstances to refer patients to suitable healthcare service providers.

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LIST OF APPENDICES

Appendix A: University of Mpumalanga Ethics approval certificate

UNIVERSITY OF MPUMALANGA

Creating Opportunities

MEK Ngcobo

School of Agricultural Sciences

Mbombela Campus.

Dear Maropeng Erica Matlala

Protocol Reference Number: ***UMP/Matlala 220207089/ SBES/MSc/2024/1***

Project Title: Integration of phytomedicine into the main-stream health care system: Perceptions from Bojanala District, South Africa

Approval Notification: In response to your application received on **27/08/2024**, The Research Ethics Committee: Faculty Research Ethics Committee has considered the above mentioned application and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interviews Schedule, Informed Consent form, Title of the project, Location of the study, Research Approach and methods must be reviewed and approved through the amendment/ modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be stored securely in the School/ division for a period of 5 years.

The Ethical Clearance certificate is only valid for a period of 3 years from date of issue. Thereafter, Recertification must be applied for on an annual basis.

Wishing you the best with your study.

Yours faithfully,

MEK Ngcobo (Chair)

Cc: Research Office Administrator: .....

Cc: Faculty Research Committee Chair: .....

DECLARATION OF INVESTGATOR(S)

I/We fully understand the conditions under which I am/we are authorised to carry out the abovementioned research and guarantee to ensure compliance with these conditions. I agree to completion of a yearly progress report.

....

Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix B: Information leaflet and participant consent form

INFORMATION LEAFLET

Researcher: Maropeng Erica, Matlala (220207089)

Supervisors:

Name: Peter Tshepiso Ndhlovu

Telephone: 013 002 0393

E-mail address: Tshepiso.ndhlovu@ump.ac.za

Name: Luambo Jeffery Ramarumo

Telephone: 013 002 0524

E-mail: Luambo.ramarumo@ump.ac.za

Name: Elizabeth Kola

Telephone: 013 002 0146

E-mail: Elizabeth.kola@ump.ac.za

Dear Potential Research Participant,

I am, Maropeng Erica Matlala, a Master of Science student at the University of Mpumalanga, in the School of Biology and Environmental Sciences, Faculty of Agriculture and Natural Sciences. You are invited to participate in a research project titled Integration of phytomedicine into the main-stream health care system: Perceptions from Bojanala District, South Africa.

Research objectives

1. To generate an inventory of utilized phytomedicinal plants in Bojanala District Municipality, North West Province, South Africa.
2. To document the knowledge and practices associated with phytomedicine in Bojanala District, North West, South Africa.
3. To evaluate the prospects of integrating phytomedicines into the mainstream healthcare system in Bojanala District Municipality, North West Province, South Africa.

If you decide to take part in the study, you will be required to do the following:

- Sign this informed consent form
- Share your knowledge by answering the interview questions
- Accompany the researcher to the field and show them the plants that you use for medicinal purposes

The questions are strictly for the purpose of this research study. Please note that your participation in answering these interview questions is completely voluntary and you are allowed to withdraw any time should you wish to. Your name will not be recorded anywhere and no one will be able to connect you to the answers you give. Your answers will be given a code number or a pseudonym and you will be referred to in this way during data analysis and discussion of results in the research report. All responses will be summed together as a group with other respondents with no reference to individuals. This research is strictly for educational or academic purposes.

Your co-operation and participation in the study will be greatly appreciated. Please sign the informed consent below if you agree to participate in the study.

Kindly, answer each question honestly and accurately as your participation in this process is essential to the success of this study.

Yours faithfully

Signature

Maropeng Erica, Matlala

CONSENT FORM

1. I _____agree to and am voluntarily taking part in this research project.
2. I understand that I have the right to withdraw from the study at any time, and may choose no longer to participate without having to explain myself.
3. I am aware that the information I provide on the questionnaire is for educational / academic purposes.
4. I understand that my name will not be recorded.
5. I have been provided with, have read, the information leaflet regarding this research study.
6. I have had the opportunity to ask any questions related to this study, and received satisfactory answers to my questions, and any additional details I wanted.
7. I agree to answer the questions to the best of my ability.
8. I understand that I may refuse to answer any questions that I do not feel comfortable answering.
9. By signing this letter, I give free and informed consent to participate in this research study.

DATE			
PARTICIPANT SIGNATURE			
RESEARCHER NAME	Maropeng Erica Matlala	RESEARCHER SIGNATURE	

This research is being conducted by **Maropeng Erica Matlala**.

Telephone: 076 797 6039 E-mail: 220207089@ump.ac.za

If there are any further questions about the research study or the questions itself, please contact the Supervisors (**Dr. Tshepiso Ndhlovu, Dr. Luambo Ramarumo, Ms. Elizabeth Kola**) at UMP. The Supervisor's contact details are as follows:

Supervisor

Tel: 013 002 0393 Email: Tshepiso.ndhlovu@ump.ac.za

Tel: 013 002 0524 Email: Luambo.ramarumo@ump.ac.za

Tel: 013 002 0146 Email: Elizabeth.kola@ump.ac.za

This research project has received ethical approval from the UMP Research Ethics Committee for Human and Social Sciences.

Appendix C: Semi-Structured questionnaire

School of Biology and Environmental Sciences
Faculty of Agriculture and Natural Sciences

Title of the project: Integration of phytomedicine into the main-stream health care system: Perceptions from Bojanala District, South Africa.

Questionnaire for all participants
Please note that your information will not be sold or given to any outside entities. It is for internal use only.

Section A: Demographic Information

Gender: Female ☐ Male ☐

Age: ☐

Marital status: Married ☐ Single ☐ Divorced ☐ Widowed ☐

Education: Primary ☐ Secondary ☐ Tertiary ☐ Uneducated ☐

Employment: Employed ☐ Unemployed ☐ Retired ☐

Section B

Village/Location…….

1. Ethnobotanical knowledge

i. Do you know any medicinal plants used for healthcare management? ☐Yes ☐No

ii. Source of ethnobotanical knowledge: Parent☐ Grandparents ☐ Ancestors ☐ Other ☐

iii. Have you ever used traditional medicine or sought help from a traditional healer? ☐Yes ☐No, If yes, what can you say about it, how was the experience?.....
.....

.....
.....

iv. What was your reason for using traditional medicine?

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

v. Would you do it again? If yes, why? And if no, why not?

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

Tabulate the types of medicinal that are used to treat or manage diseases or that you have used in the table below:

Botanical Name	**Vernacular Name**	**Plant Part Used**									**Treatment for which disease**	**Method of preparation**
		Stem bark	**Stem**	**Root**	**Leaf**	**Flower**	**Seed**	**Fruit**	**Rhizome**	**Whole plant**		

Questionnaire for traditional healers

i. What type of traditional healer are you?
……
……

ii. How do you heal people?
……
……
……

iii. How do you differentiate between diseases? Who trains you? Do you treat all diseases?
……
……
……
……

iv. Do you make your own medicine or do you have it made for you?
……
……
……

v. Who is your client base? What are their reasons for consulting?
……
……
……
……

vi. Have you ever had cases where clients were not satisfied with the services they got from you? What was the reason?
……
……
……
……

vii. If you were sick, where would you go and why?
……
……
……

Questionnaire for Healthcare professionals

Knowledge:

i. What is traditional medicine?

……
……
……

ii. Which traditional medicine practices are you familiar with? (select all that apply)
   a) Herbal remedies (using plant substances)
   b) Spiritual healing (using rituals)
   c) Acupuncture
   d) Other (specify) ……

iii. What do you think are the benefits of traditional medicine?

……
……
……

Attitudes:

i. Do you believe traditional medicine is effective in treating illnesses?
   a) Agree
   b) Neutral
   c) Disagree

ii. How confident are you in the safety of traditional medicine?
   a) Confident
   b) Neutral
   c) Not confident at all

iii. How would you feel about getting referrals from traditional healers? Would you treat a patient that was referred to by a traditional healer? Do you feel any different to patients who have sought traditional medicine?

……
……
……
……
……

iv. Do you think traditional medicine should be integrated into main-stream healthcare system?
   a) Agree
   b) Neutral
   c) Disagree

v. Give reasons for the answer above.

……
……

……
……

vi. What challenges do you think we will face by integrating the two disciplines?

……
……
……
……

Practices:

i. Have you ever used traditional medicine for a health condition?

……
……

ii. How often do you consult traditional health practitioners?

a) Regularly (5+ times a year)
b) Occasionally (3 – 4 times a year)
c) Rarely (1 - 2 times a year)
d) Never

iii. What motivated you to seek help or consult with traditional health practitioners?

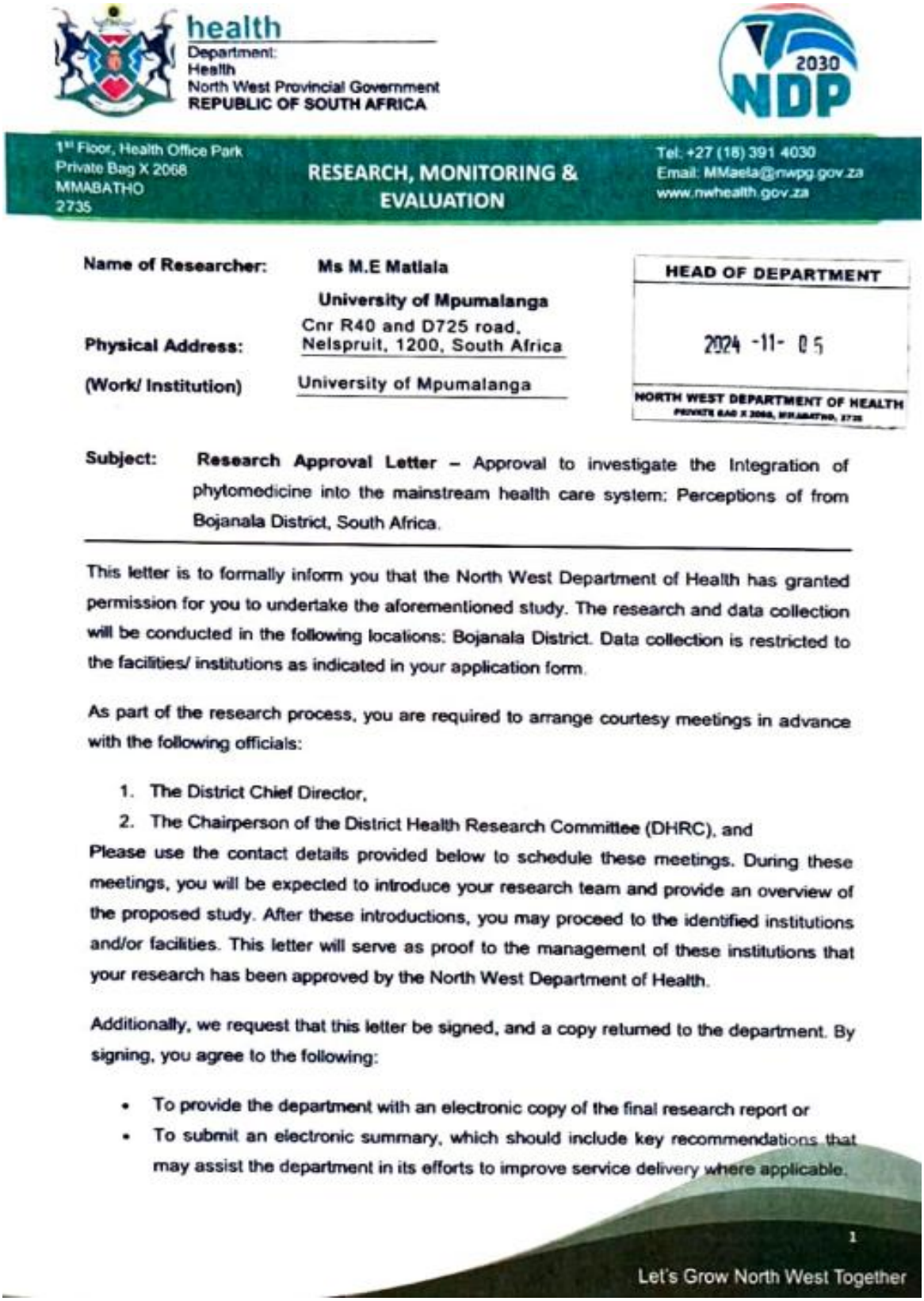
a) Personal belief
b) Family influence
c) Cultural tradition
d) Dissatisfaction with modern medicine
e) Other (please specify)

……

iv. Would you prescribe traditional medicine to a patient? If yes, why and if no, why not?

……
……
……
……

Appendix D: North-West Department of Health research approval letter



health
Department:
Health
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

2030 NDP

1st Floor, Health Office Park
Private Bag X 2068
MMABATHO
2735

RESEARCH, MONITORING & EVALUATION

Tel: +27 (18) 391 4030
Email: MMaela@nwpg.gov.za
www.nwhealth.gov.za

Name of Researcher: Ms M.E Matlala

Physical Address: University of Mpumalanga
Cnr R40 and D725 road,
Nelspruit, 1200, South Africa

(Work/ Institution) University of Mpumalanga

HEAD OF DEPARTMENT
2024 -11- 05
NORTH WEST DEPARTMENT OF HEALTH

Subject: **Research Approval Letter** – Approval to investigate the Integration of phytomedicine into the mainstream health care system: Perceptions of from Bojanala District, South Africa.

This letter is to formally inform you that the North West Department of Health has granted permission for you to undertake the aforementioned study. The research and data collection will be conducted in the following locations: Bojanala District. Data collection is restricted to the facilities/ institutions as indicated in your application form.

As part of the research process, you are required to arrange courtesy meetings in advance with the following officials:

1. The District Chief Director,
2. The Chairperson of the District Health Research Committee (DHRC), and

Please use the contact details provided below to schedule these meetings. During these meetings, you will be expected to introduce your research team and provide an overview of the proposed study. After these introductions, you may proceed to the identified institutions and/or facilities. This letter will serve as proof to the management of these institutions that your research has been approved by the North West Department of Health.

Additionally, we request that this letter be signed, and a copy returned to the department. By signing, you agree to the following:

- To provide the department with an electronic copy of the final research report or
- To submit an electronic summary, which should include key recommendations that may assist the department in its efforts to improve service delivery where applicable.

1

Let's Grow North West Together

Your research will not only contribute to the academic field but will also play a role in enhancing healthcare services, ultimately benefiting the citizens of the North West Province.

Please find the contact details for the relevant officials below:

Office of the Chief Director: Bojanala District	**Chairperson of the DHRC**
Dr. K. Segwai	Dr. C.D. Kabongo
Contact person: Goitsemang Khumalo	**Contact person:** Obakeng Masango
014 592 8906 KhumaloG@nwpg.gov.za	014 592 8906 NMasango@nwpg.gov.za

We wish you every success in your study and look forward to your findings.

Kindest regards,

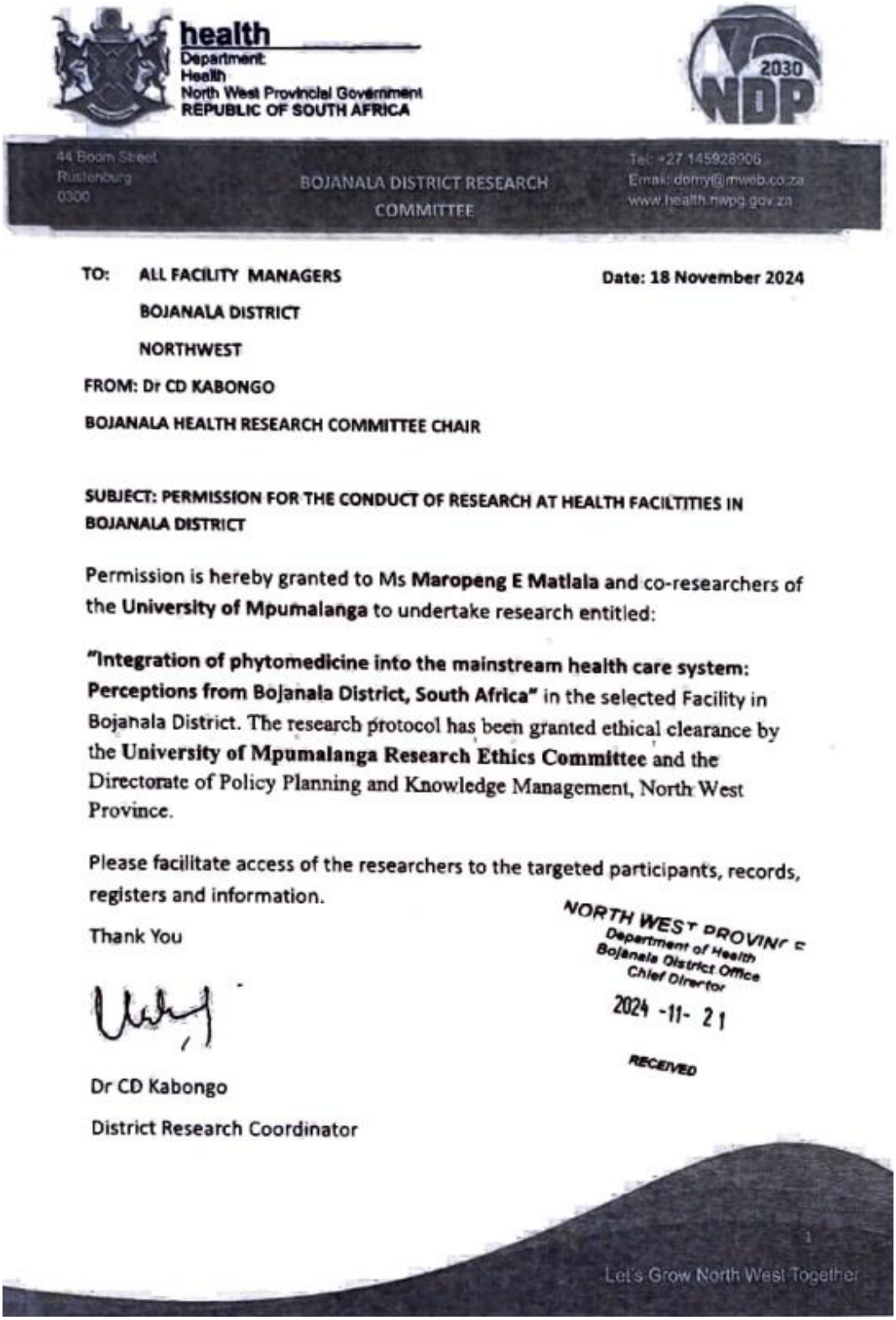
Dr F. R. M. Reichel
Director: RM&E

Date: 5/11/2024

Researcher

Date: 05 / 11 / 2024

Appendix E: Bojanala District permission letter



health
Department:
Health
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

2030 NDP

44 Boom Street
Rustenburg
0300

BOJANALA DISTRICT RESEARCH COMMITTEE

Tel: +27 145928900
Email: domy@mweb.co.za
www.health.nwpg.gov.za

TO: **ALL FACILITY MANAGERS**
BOJANALA DISTRICT
NORTHWEST

Date: 18 November 2024

FROM: Dr CD KABONGO
BOJANALA HEALTH RESEARCH COMMITTEE CHAIR

SUBJECT: PERMISSION FOR THE CONDUCT OF RESEARCH AT HEALTH FACILTITIES IN BOJANALA DISTRICT

Permission is hereby granted to Ms **Maropeng E Matlala** and co-researchers of the **University of Mpumalanga** to undertake research entitled:

"Integration of phytomedicine into the mainstream health care system: Perceptions from Bojanala District, South Africa" in the selected Facility in Bojanala District. The research protocol has been granted ethical clearance by the **University of Mpumalanga Research Ethics Committee** and the Directorate of Policy Planning and Knowledge Management, North West Province.

Please facilitate access of the researchers to the targeted participants, records, registers and information.

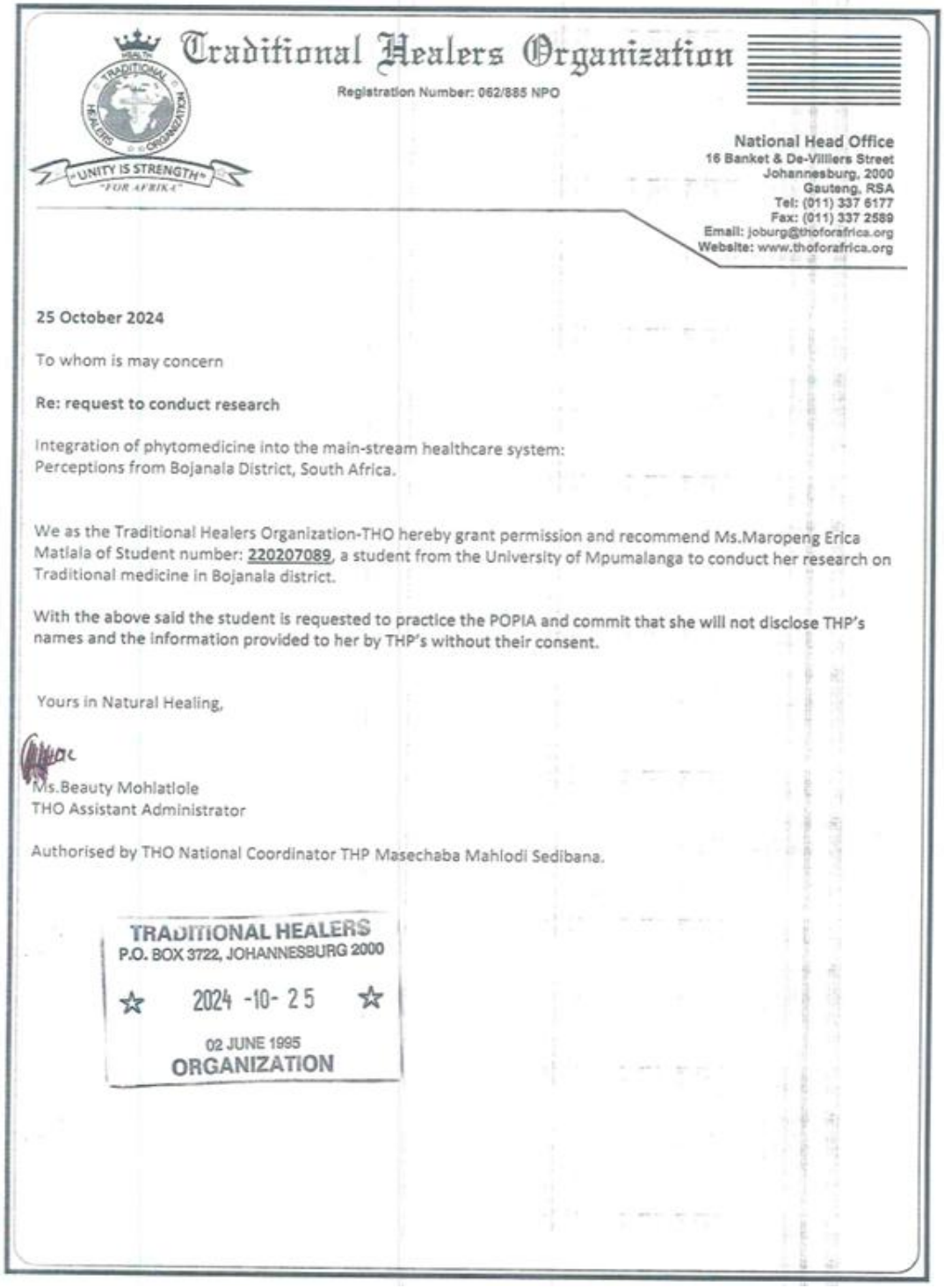
Thank You

NORTH WEST PROVINCE
Department of Health
Bojanala District Office
Chief Director
2024 -11- 21
RECEIVED

Dr CD Kabongo
District Research Coordinator

Let's Grow North West Together

Appendix F: Recommendation letter from Traditional Healers Organization (THO)



Traditional Healers Organization

Registration Number: 062/885 NPO

UNITY IS STRENGTH
"FOR AFRIKA"

National Head Office
16 Banket & De-Villiers Street
Johannesburg, 2000
Gauteng, RSA
Tel: (011) 337 6177
Fax: (011) 337 2589
Email: joburg@thoforafrica.org
Website: www.thoforafrica.org

25 October 2024

To whom is may concern

Re: request to conduct research

Integration of phytomedicine into the main-stream healthcare system:
Perceptions from Bojanala District, South Africa.

We as the Traditional Healers Organization-THO hereby grant permission and recommend Ms.Maropeng Erica Matlala of Student number: 220207089, a student from the University of Mpumalanga to conduct her research on Traditional medicine in Bojanala district.

With the above said the student is requested to practice the POPIA and commit that she will not disclose THP's names and the information provided to her by THP's without their consent.

Yours in Natural Healing,

Ms.Beauty Mohlatlole
THO Assistant Administrator

Authorised by THO National Coordinator THP Masechaba Mahlodi Sedibana.

TRADITIONAL HEALERS
P.O. BOX 3722, JOHANNESBURG 2000
2024 -10- 25
02 JUNE 1995
ORGANIZATION

Appendix G: Permission letter from Bakwena ba Mogopa Traditional Council

BAKWENA BA MOGOPA
TRADITIONAL COUNCIL
LEGONYANE
0210

TO WHOM IT MAY CONCERN

RE: PERMISSION TO CONDUCT RESEARCH IN YOUR AREA

We the above mentioned institude hereby gives Miss Matlala Maropeng Erica (student no. 22020708g), a student from the university of Mpumalanga, permission to conduct her research with the title Integration of phytomedicine into mainstream healthcare system: Perceptions from Bojanala District, South Africa in our area.

Yours faithfully.

MR LESHABALE
Chair person of Traditional Council (078 409 7879)

Chief Weep (078 641 8333)

BAKWENA BA-MOGOPA
TRADITIONAL COUNCIL
JERI[illegible]
04 JUL 2024
OFFICIAL
SIGN

Appendix H: Language editing certificate

Faculty of Humanities **Department of English**

11 November 2025

TO WHOM IT MAY CONCERN

CERTIFICATE OF LANGUAGE EDITING

I, Paul Nepapleh Nkamta, confirm and certify that I have read through and edited the dissertation titled: "**Integration of phytomedicine into the main-stream health care system: Perceptions from Bojanala District, South Africa"** by **Maropeng Erica Matlala**, student number: 220207089.

The views and research procedures detailed and expressed in the dissertation remain those of the researcher/s.

Yours sincerely

Paul Nepapleh Nkamta (PhD; MA; PGCE; BA Hons)
Tel: 018 389 2895
Cell: 073 970 7514

Appendix I: Turnitin report

Integration of phytomedicine into the main-stream health care system: Perceptions from Bojanala District, South Africa

ORIGINALITY REPORT

15%	3%	15%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	univendspace.univen.ac.za Internet Source	1%
2	www.science.gov Internet Source	1%
3	Mullinder, Louis. "An Assessment of the Regulatory Framework Pertaining to Traditional Medicine in South Africa", University of Pretoria (South Africa), 2024 Publication	1%
4	cyberleninka.org Internet Source	<1%
5	Asaye Asfaw, Ermias Lulekal, Tamrat Bekele, Asfaw Debella, Abiy Abebe, Sileshi Degu. "Documentation of traditional medicinal plants use in Ensaro District, Ethiopia: Implications for plant biodiversity and indigenous knowledge conservation", Journal of Herbal Medicine, 2023 Publication	<1%