Socio-economic impact of herbal cosmetics used by women in Vhembe District Municipality, South Africa

P.T Ndhlovu

orcid.org/ 0000-0001-5085-5566

Dissertation submitted in fulfilment of the requirements for the degree *Master of Indigenous Knowledge Systems* at the North-West University

Supervisor: Dr W. Otang Mbeng

Co-supervisor: Dr A.O Aremu

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Student number: 24632082

ABSTRACT

The use of herbal plant species has a long history and has become a significant foundation of welfare and healthcare in South Africa. These plant species and their related indigenous knowledge may be lost due to rapid change in socio-economic and environmental conditions. The aim of the study was to document the plants used as natural-based cosmetics and cosmeceuticals by the Vhavenda women and explore the economic impact of the herbal-based cosmetic and cosmeceutical enterprise to the welfare of the Vhavenda women of Limpopo province, South Africa. Ethnobotanical information such as the Vhavenda names of plants, method of preparation and administration were collected among the Vhavenda women who were knowledgeable in phytocosmestics, using semi-structured questionnaires, and recorded. Thereafter, quantitative ethnobotanical indices, containing frequency of citation (FC) and cultural importance index (CI), were calculated. Purposive (expert) sampling technique was employed to collect data which were analysed with descriptive statistics, Ordinary Least Square, Tobit regression and budgeting analyses. Forty-nine (49) plant species from 31 families were identified as natural-based cosmetics and cosmeceuticals by 79 Vhavenda women in Vhembe district. *Dicerocaryum senecioides* (Klotzsch) Abels (Museto in Tshivenda) and *Ricinus communis* (Mupfure in Tshivenda) were the most commonly cited plant species. In terms of families, Meliaceae and Rhamnaceae had the highest (3) number of plant species. Leaves and bark were the most frequently used plant parts. Furthermore, maceration, poultice and decoction were the most common preparation methods that were used to prepare these plants. The majority (75%) of plant preparations were applied topically. A majority (61%) of the pooled Vhavenda women who were knowledgeable on herbal-based cosmetic and cosmeceutical were married with an average household size of five members. Also, 39% of the participants were already ageing with a range age-group of 56-70 years. The highest (34%) formal educational attainment among the participants was high school certificate. In terms of formal employment, the majority (44%) of the participants were not employed, while the monthly average total revenue of R1841.01 was recorded with an average per capital expenditure of R1438.42. A budgeting cost ratio of 1.28 was recorded, which indicates that for every R1.00 invested in the herbal-based cosmetic and cosmeceutical production an expected return of R1.28 return was realised. The regression results further showed that the average household expenditure (a proxy for welfare) was statistically significant to the income level ($p<0.01$), experience level ($p<0.05$) and educational status ($p<0.05$) of the Vhavenda women who

were knowledgeable about herbal-based cosmetic and cosmeceutical. Thus, herbal-based cosmetic and cosmeceutical enterprise is profitable and is expedient for South Africa towards better welfare in the rural communities. A conscious, introspective and intentional look into this marginalised herbal-based cosmetic and cosmeceutical enterprise as a panacea for improved welfare of rural South Africans should be considered, given the identified ageing, capital, knowledge, educational challenges of the present vulnerable operators. The current findings reveal that plant-based cosmetics and cosmeceuticals among the Vhavenda women, if properly explored, a potential low-cost product can be developed which can strengthen the socio-economic well-being of the Vhavenda women in South Africa. However, there will be a need to conduct laboratory-based experiments to establish the efficacy and safety of these documented plants using relevant biological assays.

Key words: Biodiversity; Budgeting analysis; Environmental resources; Household; Livelihood; Medicinal plants, Ethnobotanical survey; Indigenous knowledge; Phytocosmetics

DECLARATION

Student number: 24632082

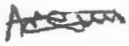
I, **Peter Tshepiso Ndhlovu**, declare that this study on socio-economic impact of herbal cosmetics used by women in Vhembe district, South Africa is my study and all sources utilized and cited have been shown and recognized by methods for finish references and that this study has not been submitted to any institution of higher learning for examination or other reason.

P.T NDHLOVU
(CANDIDATE)

19/11/2018
Date

Dr W.OTANG MBENG
(SUPERVISOR)

19/11/2018
Date



Dr A.O AREMU
(CO- SUPERVISOR)

19/11/2018
Date

DEDICATION

This Master of Indigenous Knowledge Systems (MIKS) degree is committed to the accompanying individuals who assumed an imperative role in my life: the Almighty God and ancestors my strong pillars, my source of encouragement, astuteness, knowledge, wisdom and understanding for being there as the foundation of my strength all the way through this study. I also dedicate this work to my family. God bless you.

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ABS	Access and benefit-sharing
BCR	Benefit cost ratio
CBD	Convention of biological diversity
CI	Cultural importance
FC	Frequency of citations
GM	Gross margin
IK	Indigenous knowledge
IKS	Indigenous knowledge systems
OECD	Organisation of Economic and Co-operation Development
OLS	Ordinary Least Square regression
R&D	Research and development
TC	Total cost
TFC	Total fixed cost
TR	Total revenue
TVC	Total variable cost
SANBI	South African National Biodiversity Institute

CONFERENCES

The following conference outputs were produced from this dissertation

Ndhlovu, P.T., Otang Mbeng, W., Aremu, A.O., 2018. An inventory of plant species used for cosmetic purposes by Venda women in Vhembe District Municipality, Limpopo, South Africa. Indigenous plants use forum 21st Annual conference Surval Boutique Olive Estate, Oudtshoorn, Western Cape Province, South Africa (Oral presentation)

Ndhlovu, P.T., Omotayo, A.O., Aremu, A.O., Otang Mbeng, W., 2018. Economic potential of herbal cosmetic and cosmeceutical to the welfare of the Vhavenda women of Limpopo Province, South Africa, North West University Optentia. North West University Optentia Research Day, Vanderbijlpark, Gauteng Province, South Africa (poster)

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PUBLICATIONS

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Contents

CHAPTER 1: INTRODUCTION

1.1 Background

Since ancient times, people have depended on plant species for different purposes including food, building materials and medicine. Globally, this dependence continues today, particularly for inhabitants of rural areas. Indigenous plants growing as herbs, shrubs and trees are often harvested and used for cosmetics. Poaceae, Euphorbiaceae, Asteraceae, Fabaceae, Mimosaceae and Solanace are the most commonly identified and harvested plant families that are used for skincare in South Africa (Lall and Kishore, 2014). In the Limpopo Province of South Africa, Magwede et al. (2018) identified top ten plant families as Fabaceae/Leguminosae, Asteraceae, Malvaceae, Apocynaceae, Euphorbiaceae, Poaceae, Solanaceae, Amaranthaceae, Rubiaceae and Cucurbitaceae. Plants from most of the aforementioned families are well utilised for medicinal and cosmetic purposes (Shivanand et al., 2010).

Herbal cosmetics date back to the earliest mankind and evolution; cosmetics were made using different plants such as *Sessamum indicum* L., *Albizzia lebbek* Benth., *Pongamia pinnata* Pierr., *Cedrus deodara* Roxb. and *Berberis aristata* DC as well as roasted mixture of dried cakes of Buffalo (*Meadow muffin*) dung (Shivanand et al., 2010). These combinations formed the bases used to cure several skin illnesses and beautify the skin. Herbs are potential sources available to advance new drug products with cosmeceutical and pharmaceutical applications (Xiao et al., 2016). Cosmetics form a continuous narrative throughout the history of mankind and development whereby people used them for various roles such as hunting and celebration of weddings. People in ancient times used colours for beautification to attract and hunt animals as well as camouflage against enemies during warfare (Sumit et al., 2012).

Herbal cosmetics are found across different cultures globally. In the present day Vhembe District Municipality of Limpopo Province, traditional herbs had been a fairly common practice for centuries among the Vhavenda people (Arnold and Gulumian, 1984; Constant and Tshisikhawe, 2018; Maanda and Bhat, 2010; Mabogo, 1990; Magwede et al., 2018). Indeed, the development of human civilizations has been linked to the discovery and use of traditional herbs to manufacture cosmetics which suit their lifestyle. In local communities, traditional herbal cosmetic production is being marginalised and faces various challenges, especially extinction of the knowledge (Rukangira, 2001). Currently, people rely on the already processed materials such as body, hand

and facial lotions for cosmetic purposes (Jones et al., 2015). All conventional production, including natural raw materials (plant materials) for cosmetics, are currently under the control of national government and international communities because they have the right to extract all needed resources to produce sufficient herbs (Hamilton, 2004).

In African setting, herbs have a prolonged history in beauty therapy and have been considered as a survival skill (Keitumetse, 2013). For example, about 5000 years ago, the ancient Egyptians coloured their hair with a mixture of henna and indigo scented with marjoram (Narayanaswamy and Ismail, 2015). Bilal et al. (2016) stated that herbs are global economic contributors to the cosmetic industry because it makes a substantial social and commercial contribution to national and provincial economy. Through purchasing of products, along with the payment of levies and employee remunerations, the cosmetic industry produces multiple rounds of economic spending and re-spending that benefit the economy of South Africans (Ouedraogo et al., 2012). However, traditional herbs are being marginalised and lack recognition by local communities (Gautam, 2009; Mahomoodally, 2013). Traditional herbs are recognised by the international community for the development of pharmaceutical drugs, complementary medicines and cosmetics. One of the global frameworks is the Convention of Biological Diversity (CBD) and Nagoya Protocol which has led to the establishment of legislations and policies, and development of industries based on IK across the globe (Buck and Hamilton, 2011). In South Africa, indigenous knowledge system (IKS) policy and the National Environmental Management Biodiversity Act (NEMBA) of 2004 also established their own legislations and policies which were adopted from the CBD and Nagoya protocol of development and protection of indigenous biodiversity (Chennells, 2013).

1.2 Problem statement

South Africa is rich in plants that are habitually used by indigenous populations as sources of medicines, food and cosmetics (van Wyk, 2015). The use of plant species remains popular and well-enriched in the culture of the Vhavenda, especially among the women who often utilized different natural resources including plants for medicines, food, beverages and cosmetic purposes (Mabogo, 1990; Magwede et al., 2018). In addition, diversity of herbs has cultural and socio-economic values (Ahmad et al., 2017). Even though the actual financial benefits from sale of medicinal plants in the informal sector remain largely undocumented and form part of the 'hidden' economy, it is generally known that trading of medicinal plants contributes substantially to the

economy of local communities (Botha et al., 2004). Researchers have overlooked the broader socio-economic context and how it influences the use and trade of natural resource such as plants used for herbal cosmetics among local communities. Particularly, there is a dearth of information regarding the socio-economic impact of herbal cosmetics among the Vhavenda women in Vhembe district municipality, South Africa. Research endeavours focused along this line will be vital for bridging this existing gap in knowledge.

1.3 Significance of the study

The outcomes of this study revealed the role of plant species used by the Vhavenda women for cosmetic products because there has been a gradual upturn in trends towards preparations of natural-based cosmetics due to their efficacy, sustainability and non-toxicity. Also, it has implications for product development to strengthen the socio-economic development of the Vhavenda women as part of the development of the bio-economy of Vhembe district municipality, South Africa. Furthermore, it will also unearth the knowledge which has been hidden from the public and also to create awareness towards conservation of indigenous species and culture at large.

1.4 Research questions

Do traditional herbal cosmetics have a socio-economic impact for the Vhavenda women in Vhembe District Municipality, South Africa?

The sub-questions:

1. What types of herbs are traditionally used for cosmetics?
2. What are the indigenous knowledge (IK) and practices regarding herbal extracts used by the Vhavenda women for cosmetic purposes?
3. What are the economic benefits of the herbal cosmetics used by the Vhavenda women?
4. Who are the consumers of the herbal cosmetics and what are the consumption patterns?
5. How do herbal extracts contribute to household income?

1.5 Aim and objectives

The study is aimed at exploring socio-economic impact of traditional herbal cosmetics used by the Vhavenda women in Vhembe District Municipality, South Africa.

The objectives of the study are to:

- Assess the contribution of herbal cosmetics to the welfare of the Vhavenda women.
- Document indigenous knowledge (IK) and practices regarding herbal extracts used by the Vhavenda women.
- Identify the different types of traditional plant species used for cosmetics by the Vhavenda women in Vhembe District Municipality.

1.6 Overview of chapters in dissertation

Chapter 1: provides background on herbal cosmetics and significance of the study. In addition, the problem statement, research motivation, aim and objectives are highlighted.

Chapter 2: provides the general orientation of the study via the explanation of the scope and settings of the research.

Chapter 3: Literature review provides an in-depth content which establishes an analytical framework to assess the socio-economic impact of traditional herbal cosmetics among the Vhavenda women in Vhembe district municipality, South Africa.

Chapter 4: focuses on the socio-economic contribution of herbal extracts towards the welfare of the participants. Descriptive statistics such as frequency sum, mean, percentage and inferential statistic, Ordinary Least Square regression (OLS), Tobit regression and Budgeting analysis will be used to analyse and describe the socio-economic characteristics and demographic features of the Vhavenda women that produce and have knowledge of herbal cosmetics in the study area.

Chapter 5: Documents the plants, indigenous knowledge and practices used for natural- based cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality

Chapter 6: Summarizes the main findings from the study and draws conclusions based on the findings. It also gives recommendations on how to enhance the socio-economic impact of herbal cosmetics in Vhembe district.

CHAPTER 2: GENERAL ORIENTATION OF THE STUDY

2.1 Introduction

The importance of general orientation of the study is to systematize the scientific process to produce the end results: there are different types of research methods (Creswell, 2013). This chapter focuses on clarification of indigenous research underpinnings and the general research design of the study. According to Creswell and Creswell (2017), research is "a systematic investigation to find answers to a problem." Gray (2013) highlighted research as "a coherent, shielded empirical and substantial research of propositions about presumed relationships about various phenomena". Then again, Goddard and Melville (2004) voiced that research is not just a method of data gathering, as is sometimes suggested. Rather, research can be viewed as a technique of developing the restrictions of obliviousness. All the above scholars have the same opinion that research is the procedure of gathering information in a systematic and shielded manner. It is a process of inquest to demonstrate, clarify, forecast and administer the realistic understanding.

2.2 Research approach

According to Creswell and Creswell (2017), mixed methods involve gathering, analyzing and incorporating quantitative and qualitative research data in a single study. Mixed methods were employed as the study model through using qualitative and quantitative data. A mixed method is predominantly useful in evaluating the socio-economic impact of herbal cosmetics used by the Vhavenda women in Vhembe District Municipality, South Africa. In order to analyze welfare, the individual has to decide the linkage of factors and procedures involved as well as making comparisons over all encompassing welfare qualities (Mwamfupe, 2017). A welfare study is descriptive in nature, which requires definite quantitative procedures to evaluate appropriate features. Even though qualitative and quantitative methodologies vary, they complement each other in numerous ways (Blaikie, 2009).

A quantitative method frequently creates data according to sets, while using a lesser amount of efforts of revealing the processes involved in the dynamics of the community (Schwegler et al., 2017). For instance, the researcher employs this approach to quantify the economic benefits of herbal cosmetics used by the Vhavenda women. Contrarily, qualitative approach performs comprehensive analyses of cases and procedures in a social life, rather than creating data or tallying

of the different characteristics in a socio-economic. It engages the scholar to attempt and comprehend the behavior of people involved; their values, rituals, etc. (Ritchie et al., 2013).

2.3 Research design

A design is used to organize the study; to display key parts of the research project, the samples or groups, actions or programs, procedures and methods of project work to try to address the central research questions. Saunders (2011) defined a research design as a structure, form and approach of examination that enables the researcher to obtain answers to study questions or problems. It is significant for every study to have a research plan so that it can be achieved. Creswell (2014) agreed with the above mentioned scholar that the rationale for a research design is to design and arrange a research in such a way that the eventual validity of the investigation findings is maximized. The subsequent are components of a research design that were used: population, sampling techniques, and data collection methods and data analysis

Saunders (2011) advocated that a research design is an approach which moves underlying philosophical assumptions to specify the selection of the participants. The design of this study is descriptive (survey research) – a descriptive research which is all about describing people who take part in a study in one of three ways: observational, case study or survey. An ethnobotanical survey is a brief consultation or discussion with a research participant about a precise subject and this is more appropriate for this study.

2.4 Study area

The study was conducted across 16 villages covering four municipalities (Thulamela, Makhado, Collins Chabane and Musina) in Vhembe District Municipality, Limpopo Province **(Table 2.1)**. The area has a land mass covering about 25597 km^2 **(Table 2.2)**, with the majority living in villages (Stats SA, 2012). According to Stats SA (2012), Vhembe is one of the five (5) districts of Limpopo province, South Africa **(Fig 2.1)**. It is the northernmost area of the nation and offers its northern outskirt with Beit-connect region in Zimbabwe. Vhembe comprises all regions that were a piece of the previous Venda Bantustan. Notwithstanding, two extensive thickly populated locale of the previous Tsonga homeland of Gazankulu, specifically, Hlanganani and Malamulele were additionally consolidated into Vhembe, hence the ethnic decent variety of the area. The capital of Vhembe is Thohoyandou, the former capital of the former Venda Bantustan. This area is diverse in heritage and consists of different languages such as Tshivenda (most dominant), Pedi and

Tsonga. Given that Vhembe district area consists of four local municipalities, the research was conducted in all four municipalities. Vhembe consists of significant biodiversity and rich heritage (Stats SA, 2012).The individuals in the study area belong to the Vhavenda ethnic group. This ethnic group is one of the major ones in Limpopo Province, with 67.2% of the population of the province (Stats SA, 2012).

Table 2.1: Selected study villages in four local municipalities in Vhembe district municipality, Limpopo province

Local municipality	**Villages**
1. Thulamela municipality	1. Mphego
	2. Tshimutikili
	3. Levumbhi
	4. Mukomaasaanandou
	5 Mukula
2. Collins Chabane municipality	6. Khakhanwa
	7. Tondoni
	8. Dididi
3. Makhado municipality	9. Tshakuma
	10. Ludanani
	11. Muhovheya
	12. Dovhuni
	13.Tshikonelo
	14. Muguvhumi
	15. Diambele
4. Musina municipality	16. Folovhodwe

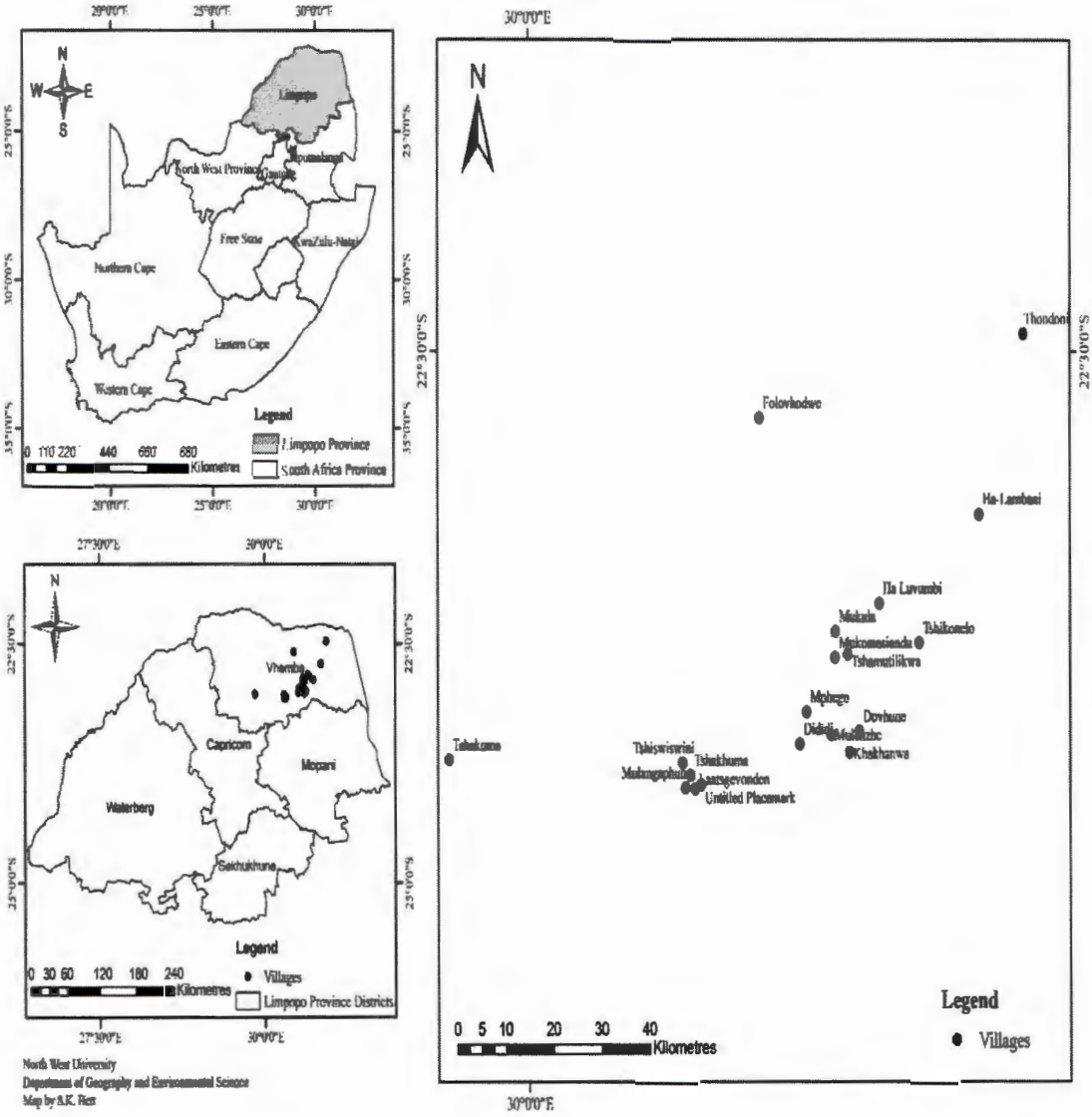

Figure 2.1: Map of selected study villages in the four local municipalities in Vhembe district municipality, Limpopo province, South Africa

2.5 Target population

Population is a total set of group or individual from which the findings of a survey are to be extrapolated (Saunders et al., 2012). The population of this study was all the knowledgeable women in the field of indigenous cosmetics. The District covers 25597 square km^2 of land (Savanah biome) with a total population of 1,294,722 million people (Stats SA, 2012).

Table 2.2: Description of Vhembe district municipality, Limpopo Province, South Africa

Description	Units
Area total	25597 km^2
Population total	1,294,722 million people
Density	51/km^2 (130/sq. mi)
Racial Makeup	Black African 98.2%
	Coloured 0.1%
	Indian /Asian 0.4%
	White 1.1%
Languages	First language–Venda 67.2%
	Tsonga 24.8%
	Northern Sotho (Sepedi) 1.6 %
	Other languages 5.1 %
Gender	Male 590 509 (45.6%)
	Female 704 559 (54.4%)

2.6 Sampling technique

In order to have evocative information in this study, the data were sampled within two major sampling methods, viz. the probability (villages from each municipality were selected randomly from all four municipalities) and non-probability methods; purposive (expert) sampling which is a participant selection tool widely used in ethnobotany (Tongco, 2007). Individuals with a specific profile were selected in order to obtain high quality and consistent data. Participants' ages ranged from 20-year-old; women living in villages and from a variety of socio-economic strata, who were knowledgeable about plants, were contacted. Then the next stage, semi-structured questionnaire was used to probe questions which were related to the contribution of herbal-based cosmetic and cosmeceutical to the welfare of the Vhavenda women.

2.7 Validation and trustworthiness

Prior to the actual research, a pilot study was conducted in Shoshanguve. The selected location is a township (with a sizeable population of the Vhavenda people) located about 45 km north of Pretoria, Gauteng, South Africa. The pilot study ensured the quality and accuracy of the research tools **(Appendix A-C).** Using purposive expert sampling, ten (10) Vhavenda women from Shoshanguve were selected to test the accuracy and trustworthiness of the research tools. In addition, the pilot study ensured the questions were answered within a reasonable time. After that, interviews were held with each pilot participant for response on the tool. The instrument was revised according to the recommendations provided by participants.

2.8 Limitations of the study

2.8.1 Limited geographical scope

The study only concentrated on a specific geographical area: Vhembe district in Limpopo Province. This is a limitation in the sense that the findings of the study cannot be taken as a general representation of the impact of natural-based cosmetics used by the Vhavenda women in the whole of Limpopo Province and of South Africa. The villages are far apart from each other as well as the houses/homes that are scattered at long distances from one another.

2.8.2 Limited sample size

The study focused on the views of only knowledgeable women who were experts in herbal cosmetics in Vhembe district due to time constraints. A larger sample could have given a better insight into the study but only 79 participants were identified. Most of the knowledge holders wanted to be paid for the time that they were interviewed while some traditional leaders disallowed their communities' knowledge holders from participating. Some participants, during the interview sessions, decided to end the interview because they felt the topic was too formal, thus the thinking that the researcher would make lots of money; some even indicated that the research questions were too deep and they were uncomfortable to talk about the topic. This was an obstacle as the potential knowledge experts in indigenous cosmetics were particularly selected through purposive expert sampling.

2.9 Ethical implications of the study

Ethical considerations are an essential part of the study because it pertains to issues such as informed consent with confidentiality and anonymity, non-disclosure agreement and material transfer agreement **(Appendix A-B).** This is a mechanism which safeguards that people understand what it means to take part in a particular research study (Blaikie, 2009). In this study, the informed consent form was distributed to all participants which included the terms and conditions that were expected from both the researcher and participants. It stated that should the participant feel a need to end the interview, she/he should feel free to leave at any given time. An ethical clearance (NWU-00557-18-A9) was obtained from the ethics committee, Faculty of Natural and Agricultural Sciences, while the permit to collect plant species was provided by the Limpopo Environmental Affairs **(Appendix D)**.

Ethical principles were applied when conducting this study; the principle of anonymity was applied whereby the identities of the participants remained confidential. Concerning the principle of autonomy, permission was requested from local chiefs and knowledge holders. The principle of respect also was applied whereby all participants were treated with respect and dignity, and also encouraged to treat others the same as well as respect each other's opinions.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

The major literature themes identified for analytical framework for the research study include types of plant species traditionally used as cosmetics in South Africa, indigenous practices, technologies and socio-economic impacts of herbal cosmetics in various aspects of the socio-cultural, economic and spiritual life of the individuals, with a particular reference to women. The literature review includes a series of empirical literature studies on this subject and explores implications for socio-economic impact.

3.2 Definitions of key concepts

Cosmetics and make-up are materials or products used to enrich or modify the appearance or fragrance of the body (Ahmad et al., 2008). Many cosmetics are designed for the face, body and hair. Cosmetics are "substances of diverse origin, scientifically compounded and used to cleanse, allay skin troubles, cover-up imperfections and beautify" (Encyclopaedia Britannica, 1970).

Culture is emphasized by Taylor and Alexeyeff (2016) as the mutual arrangement of human understanding and behaviour that hinge upon the size for learning and transmitting knowledge to future generations. However, culture can be considered as the customary convictions, social structures, and material qualities of a racial, religious, social gathering or trademark that includes an ordinary presence (for example, modifications or a way to deal with life) shared by individuals in a place or time.

Socio-economic is "a source of opportunities, resources, stock which can be activated (and) used to solve a problem or achieve a certain goal; capabilities of the individual, society and state in a particular field" (Cheymetova and Nazmutdinova, 2015).

Indigenous knowledge (IK): According to Warren (1990), IK is the local, traditional or cultural knowledge that characterises society or ethnic group. Rural communities rely on IK for decision in science and technology, agriculture, education and health. Flavier et al. (1995) stated that IK is the reference point information of a society that is necessary for communication and decision making. Even though there are many definitions of IK, some conceptions of IK that cut across are: local knowledge, ethnic knowledge, customary ecological knowledge and knowledge gained by experience.

Biodiversity: Sumida (2014) refers to the assortment and the fluctuation among living life forms from all sources including earthbound and other sea-going biological systems and the natural edifices of which they are a section; this incorporates decent variety inside species, among species and of the environment or ecosystem.

Welfare: is the provision of an insignificant level of fortune and social help for network and other qualified inhabitants without adequate current intents to help crucial needs. Gautam (2009) defined welfare as a set of activities which involves securing water, food, fodder, medicine, shelter, clothing, and the capacity to acquire these necessities, working either individually or as a group by using benefactions (both human and material), for meeting the requirements of the household on a sustainable basis with dignity.

3.3 Conceptual framework for research

Conceptual framework is an investigative tool with a few varieties and settings. It is used to make applied modifications and arrange views. Solid applied systems catch something genuine and do this in a way that is anything but difficult to recollect and apply in the study.

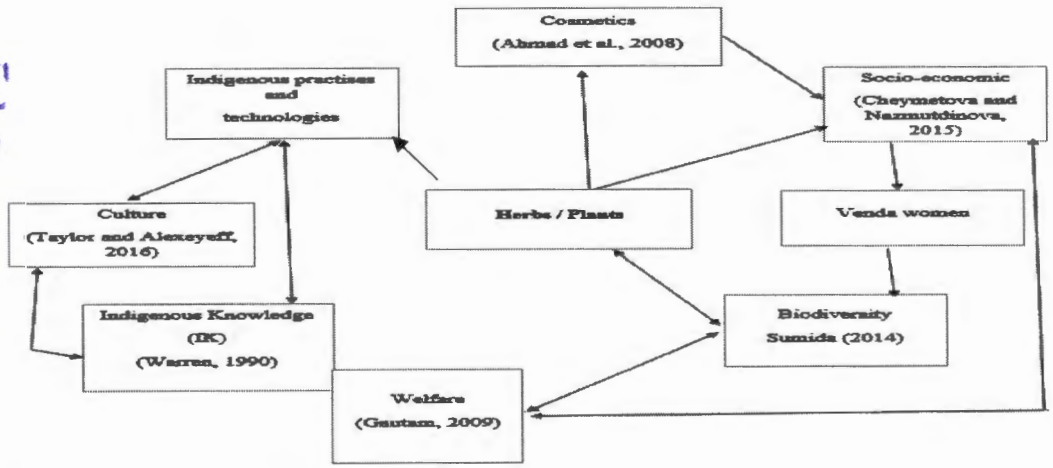

Figure 3.1: Conceptual framework for the study

Plant species play a vital role in the production of cosmetics which have potential to contribute to the socio-economic welfare of the Vhavenda women in Vhembe district **(Fig 3.1)**. Indigenous knowledge (IK) also plays a most imperative role in the wellbeing of the Vhavenda women. There are different types of IK which consists of indigenous practises and technologies that are subjective

to various cultures and belief systems. Vhembe district municipality is the location where the study was conducted. The location has a rich biodiversity, including traditional herbs utilized by different communities. Even though the region of Vhembe in Limpopo is dominated by the Vhavenda speaking people, other languages such as Xitsonga are also spoken. Generally, the Vhavenda consider biodiversity and culture as significant for their welfare. Furthermore, contributions of IK and provision of practices and technologies are used to develop products for skin beauty and economic purposes and to develop the welfare of the Vhavenda women. In the context of this study, this concept creates an overall understanding of the main phenomena from/in which socio-economic impact of herbal cosmetics is used by the Vhavenda women in Vhembe district municipality of Limpopo province, South Africa.

3.4 Theoretical framework

The theoretical framework for the study includes cultural feminism (for economic and socio-economic impact of herbal cosmetics); while ethnography will be used (to identify plants used in cosmetics), and the contribution of traditional herbal cosmetics to the welfare of these women and Afrocentricity theory (to address the indigenous practices and technologies that the Vhavenda women use in the preparation of plant species for cosmetics).

Feminism is essentially a Western concept. According to Alcoff (1988), feminism arose as the greatest development that relatively cleared the literary world. It has been explained contrastingly in various parts of the world (counting Africa) by various individuals, particularly ladies, contingent upon their class, foundation and level of awareness. For this study, feminism believes that women should have economic and social equality with men, given that most of the traditional cosmetics are utilised by women. This study shares concerns on cultural feminism theory, but looking at those distinctive qualities in women. What women share, in this perspective, provides a basis for "sisterhood" or unity, and shared identity, socio-economic, socio-cultural ethics with regard to the traditional herbal cosmetics and its expansion. According to Ambjörnsson and Ganetz (2013), cultural feminism recognizes the importance of critical thinking and self–development .

Afrocentricity is a philosophical and hypothetical worldview whose background is credited to Asante's works on Afrocentricity (Asante, 1988). The theory was used to address objective two (2) which explored indigenous material(s), tools practices and techniques that are used by the

Vhavenda women in Vhembe district Municipality. According to Mkabela (2005), Afrocentricity is derived from the Afrocentricity paradigm which deals with African identity from the standpoint of African people as centred, located, oriented and grounded. However, other scholars stated that Afrocentricity theory seeks to demonstrate clarity by exposing dislocations, disorientations and decentness. Reviere (2001) stated that Afrocentricity is the theory that intends to examine the intricate interrelationships of science and craftsmanship, structure and execution, creation and upkeep, generation and tradition.

Ethnographic theory analyses an arrangement of realities in their connection to each other. Historically, doing ethnography involved living and speaking with people, observing them in an attempt to comprehend how the people interacted with their world. According to Iloh and Tierney (2014), ethnography is a theory of description. On objective one (which assesses the contribution of herbal cosmetics to the welfare of the Vhavenda women), ethnography is involved because the researcher must live and learn from the Vhembe society and cultures.

Herbal-based cosmetics are well-defined as herbal materials that are administered to the skin and may be concoctions of herbal substances and other constituents. Herbal cosmetic is a concept that is tailor-made for specific ethnic groups and gains less recognition in distribution in supermarkets and pharmacy. Cosmetic products compete with other brands for pricing from international competitors and continue to dominate local market; there is lack of innovation of new local brands to match major competitors because local groups are not part of the process of pricing local brands from small local shops to supermarkets. However, the traditional herbal cosmetics which are used by the Vhavenda women are rudimentary and not well explored because of low indigenous workforce requirement and neglect of craftswomen from successive regimes over the years. The socio-economic impact of traditional herbal cosmetics is currently fading as it is with other artisans as well as small and medium scale enterprises (Shivanand et al., 2010).This is because most local products are not recognised and utilized by local consumers.

Herbal cosmetics are natural and often free from all artificial substances that may be toxic to the skin. Herbal cosmetics are the contemporary revolution in the field of beauty, fashion and gaining popularity internationally. Bilal et al. (2016) highlighted that most women currently prefer using herbal cosmetics over the conventional cosmetics for their personal care. This trend appears

from the benefits derived from these nature-based products that help enrich their beauty and health without the fear of detrimental side-effects often associated with conventional cosmetics.

3.5 Importance of indigenous knowledge

Indigenous knowledge (IK) has contributed significantly to global knowledge, especially in medicine, architecture, science and technology. For instance, several ancient African cultures made major discoveries of links between herbal cosmetics and protection of skins. Indigenous knowledge (IK) is an imperative component of the livelihoods in rural areas and it is vital for their survival. Unfortunately, many indigenous knowledge systems (IKS) are rapidly becoming extinct because of massive urbanisation and the import of foreign technologies (Neethling, 2014).

Indigenous knowledge (IK) assumes a vital part in the world economy and it is important, not exclusively to the individuals who customarily rely upon it in their day-to-day lives, yet additionally to current industry, particularly the worldwide biotechnology, pharmaceutical and agribusiness companies. However, the misuse of IK by enterprises does not, as a rule, prompt relating advantages to indigenous networks as either attribution or remuneration.

3.6 Importance of herbal cosmetics

Herbal cosmetics are practiced in numerous parts of the world, especially in Northern Pakistan (Abbasi et al., 2010). There are increasing numbers of consumer concerns like synthetic chemicals and mineral oils which demand more natural products that are free from harmful chemicals and with an emphasis on the properties of botanicals. Herbal cosmetics, when compared to other beauty products, are hypo-allergenic because they are made of natural ingredients; people do not have to worry about getting side-effects such as skin rashes or experience skin itchiness. Women with slick or delicate skin can likewise utilize them and never need to stress over debasing their skin conditions (Kapoor, 2005). One will discover an assortment of establishment, eye shadow, lipstick, redden, mascara, concealer and numerous more which are, on the whole, normally figured. Studies point out that female faces have greater facial contrast than male faces and there is a positive relationship between facial contrast and facial attractiveness. Likewise, views of attractiveness increase when cosmetics are applied; and when wearing cosmetics, females provide higher estimates of their own attraction (Jones et al., 2015).

Herbal cosmetics in the last decade have gained importance in various developed countries. One-third of the American adults, 71% of the United Kingdom's population, and 60% of the population in the Netherlands and Belgium are now utilizing alternative herbal medicinal therapies (WHO, 1996). Herbal or organic products are very popular and much safer than synthetic or chemical based products. Some of the common herbal and natural ingredients for enhancing beauty are Aloe *Vera*, basil, sandalwood, turmeric, calendula and honey.

3.7 Herbal cosmetics in culture and religion

Culture generally influences all facts of social behaviour and interaction. It is embodied in the objects used in everyday life and in modes of communication in society. Cosmetics are ubiquitous elements of women's consumer culture and represent one of the most important ways women present and transform their public personality. In today's society, beauty and physical attractiveness are constantly emphasized as desirable and admirable characteristics (Patzer, 2012). Herbal cosmetics are culture-bound within IK and practices, and have provided the plant-based foundation for many pharmaceuticals. Traditional cosmetics have been practiced from prehistoric period around the globe, including the 'Great Traditions' of Hippocratic-Galenic medicine of ancient Greece, the Unani Tibb of Arabia, the Ayurvedic of India, Chinese medicine in Asia and Africa (Slikkerveer, 2006). It was in the 16th century when European expansions brought a wealth of plants, herbs and spices, and related IK from the tropics to Europe (Ouedraogo et al., 2012). Cosmetics are used to mark the culture class, religion, or other social group to which a person belongs. They are also used to indicate wealth, status or rank within a group as well as other personal information such as age, gender or reproductive status (Jones and Kramer, 2015).

Human civilization has a long history of practice of natural-based cosmetics such as use of essential oils for skincare. Egyptians are known to be one of the first to use cosmetics where they whipped ostrich eggs and olive. Currently, most communal examples of natural skincare components are sesame seed oil, palm oil, linseed, jojoba oil and tea tree oil. Different types of herbal plants used for cosmetics include: *Elaeis guineensis* Jacq (African oil palm), *Adamsonia digitate* L., *Ximenia Americana* L., and *Shinzophyton rautanenii*. Schinz Radcl. -Sm, *Sclerocarya birrea* subsp. Caffra (Sond), *Sesamum radiatum* Schum. & Thonn., and *Citrullus lanatus* Thunb. These plant species have been commonly used in cosmetic preparations due to their moisturizing result. In addition, there are other popular South African plant species such as *Aloe ferox* Mill,

Aspalathus linearis Burm.F. R. Dahlgren, *Calodendrum capense* (L.F.) Thunb., *Cyclopia intermedia* E. Mey., and *Sideroxylon inerme* L.

3.8 African indigenous and socio-cultural environment

Since ancient times, indigenous people have been involved in the sustainable use and management of plant materials as well as devised strategies through which they managed cultural resources using IK (Keitumetse, 2013). Approaches towards preserving plant diversities are based on cultural and religious values and are often more sustainable than those based only on legislations or regulations. Plants still fulfil the needs of local inhabitants in Vhembe district municipality whereby plants are gathered for different purposes such as health, food, fuel and fodder for livestock; and also plants have been the source of income and they are still valued for survival.

3.9 Women and biodiversity

Women have remained custodians of plant diversity from ancient times. They have extensive knowledge concerning the prominence of plant species as food, medicine, clothing and raw materials for various household and cosmetic purposes. Since ancient times, the role of women has been admired by society as collectors and conservators of plant species (Howard, 2003). Semenya and Maroyi (2012) stated that, apart from contributing to daily care and safeguard of the plant diversity, biodiversity is the basis of human well-being. Moreover, women are more religious and actively participating in many religious ceremonies. There are indigenous women who are well-known for a remarkable movement in protecting the biodiversity. Some of these women, including Mililani Trask, Alisi Rabukawaq, Mueda Nawa, Noelani Yamash, Malia Nobrega-Olivera, Polina Shulb, Yeshing Juliana and Lucy Mulenkei, advocated for women rights and focus on collective rights of Indigenous People, especially in relation to natural resources and sustainable development (Coombe, 2005).

3.10 Socio-economic impact (benefit) and traditional herbal medicines

Socio-economic impact refers to the logical analysis used to classify and assess the welfare and cultural influences of a parameter(s) on the lives and circumstances of people, their families and communities (Shiller and Shiller, 2011). Furthermore, socio-economic status can be estimated by the conditions related to both residential and business conditions where an action is expected to create substantial changes in the livelihood. Herbal cosmetic and cosmeceutical industry makes a

significant socio-economic contribution to international, national and local economies (Apaolaza-Ibáñez et al., 2011). Many individuals in Africa use plant species as medicines for their healthcare. Herb-based cosmetics are gaining popularity in rural areas all over the world. Natural cosmetics are frequently bought from herbal vendors or home-based prepared, especially for burns or skin inflammation, and enhancement of the face and skin. The use of medicinal plants for treating dermatological situations is well-enriched among different ethnic groups in South Africa (De Wet et al., 2013).

3.10.1 Socio-economic aspects of Vhembe districts municipality

Based on the information on the website of Municipality (2016), Vhembe district municipality has an established enterprise focusing on agriculture, tourism and forestry; with smooth prioritization and appropriate planning in applicable fields. The achievability has been done on the accompanying activities: Footsteps of ancestors; poultry abattoirs; advancement of sugar industry; agrarian hardware loaning station; improvement of fish cultivate; protection of dried natural product/vegetables; goat drain dairy items; fruit-based soap production; Mutale goat farming; and beneficiation of forestry products. The production of herbal cosmetics has not yet been explored as an enterprise or development project. The vision of Vhembe district municipality is to develop municipalities concentrating on sustainable service delivery and socio-economic development towards an equal society (Municipality, 2016). The popularity of herbal cosmetics in the local society is low because of lack of technological advancement in the industry which has resulted in the flooding of the market with herbal formulations.

Vhembe district municipality endeavours to deliver free rudimentary service delivery to residents with low income level. According to Stats S A (2012), 372 557 people in Vhembe district municipality are without income and 162 764 people earn between R1 and R800. This means that the majority of inhabitants within the district are unable to pay for services. Proper administrative systems need to be applied to manage the provision of free basic services to the population of Vhembe district.

The concept of sustainability is a baseline element of biodiversity; it is recognized that humans, with their cultural diversity, are an integral component of ecosystems (Oberhauser and Pratt, 2004). In conceptual terms, the essence of sustainable well-being expresses the relationship

between people and the ecosystem around it. This entails that, ultimately, one is entirely dependent upon the other, i.e., human, traditional herbs and biodiversity well-being need to be assessed together. The Vhavenda women are known to be sustainable, both on the human condition and the condition of the environment to meet satisfactory or improving standard of livelihood. Vhembe district municipality faces particular constrictions as employment in industry and mining has declined and households increasingly depend on diverse sources of income (Municipality, 2016). Limpopo province, especially Vhembe district, is overwhelmingly rural in South Africa, where women take part in local economic activities that include community-based economic projects and informal sector activities. While these strategies provide economic opportunities for the rural black women, they are embedded in cultural practices and material realities that have historically marginalized these women.

Various types of acts have been made in favour of the preservation and sustainable use of medicinal and cosmetic or cosmeceutical plants. Some of these are undertaken directly at the places where the plants are found, while others are less direct, such as some of those relating to commercial systems *ex sit* conservation and bio-prospecting (Hamilton, 2004).

3.11 Herbal cosmetics at international level

The history of herbal cosmetics in European and Western countries consists of very dark phase in the late 6th century when different concoctions and pastes were used to whiten the face; this practice remained popular for over four hundred years (Chaudhri and Jain, 2014). The early mixtures that were used in Europe for this purpose were so potent that they often led to paralysis, strokes or death (Mansor et al., 2010). Globally, herbal-based cosmetics are gaining popularity as evidenced by rapidly growing global and national markets of herbal products. The global therapeutic market was worth US$550 billion and US$900 billion in 2004 and 2009 respectively (Butler et al., 2014). The present demand for traditional medicine and herbal-based cosmetics is US$14 billion per year and is projected to increase to US$5 trillion by 2050 (Jeelani et al., 2017). Due to high prices and dangerous side-effects of artificial drugs, people are embracing herbal products, and this trend is growing in developing and developed countries. Turnover rate for the herbal and Ayurveda industry in Sri Lanka, which is regarded as one of the leading markets, is approximately US$2.5 billion per year (Booker, 2014). The production and marketing of herbal

products have been growing fast in many major markets like Germany, USA, France, China, Italy, Japan, UK and Spain (Mafimisebi et al., 2013).

Ayurveda cosmetics not only beautified the skin, but acted as shield against any external effects on the body (Pandey et al. (2013). There is a wide range of these cosmetics that are manufactured and commonly used for daily purposes. Herbal cosmetics such as herbal face wash, herbal conditioner, herbal soaps and herbal shampoo are highly appreciated by the masses. Herbal cosmetics are comprised of floras such as ashwa-gandha, sandal (chandan) and saffron (kesar) that are augmented with healthy nutrients and all the other necessary components

3.11.1 Market value of herbal cosmetics

According to Singh (2008), herbal cosmetics are valued and nearly three-quarters of the cosmetics that are used worldwide are discovered from local plants. About 25% of modern cosmetics are derived from plants (Amit et al., 2010). Many others are synthetic replica made on prototype mixtures isolated from plants. Thus, herbs are potential source of therapeutics and have attained a significant role in health systems all over the world for both humans and animals, not only in the diseased condition, but also as an impact material for sustaining healthcare systems and beauty. However, the main factor hindering the development of the herbs is because communities in developing countries have been lacking information on the social and economic benefits that could be derived from the industrial utilization of traditional plants to the local communities. Furthermore, Alves and Rosa (2007) stated that, apart from the use of these plants for local healthcare needs, information has to be available about market potential and trading possibilities.

3.12 Herbal cosmetics in Africa

Herbal cosmetics are an integral part of the African healthcare system since ancient times. It is believed that the ancient science of cosmetology originated in Egypt and Nubia, but the earliest records of cosmetic substances and applications date back to 2500 and 1550 B.C, to the Indus valley civilisation (Patkar, 2008). The earliest known cosmetics came from the First Dynasty of Egypt, about 3100-2907 BC (Dold and Cocks, 2005). Ancient Egyptians used olive oil perfumed with aromatic plants to keep their skins beautiful, and humans have been using plant extracts for cleansing and beautifying purposes. In various rural communities in Africa, traditional herbs are prescribed for skin and hair treatment because they are the most easily accessible and affordable health resource available to the local community. The formulation of all these cosmetic products

includes addition of various natural additives like oils, waxes, natural colour and natural fragrances as well as plant parts such as leaves and flowers by specific formulation.

In most African countries, traditional herbal medicine and cosmetics are popular in their healthcare systems and during cultural and traditional ceremonies or spiritual rituals. It is perceived that most households in Ghana have at least an individual or collective knowledge in herbal medicine and cosmetics (Nicolas and Welling, 2017; Sindiga et al., 1995). Though some herbalists are systematically trained, knowledge used for herbs is mostly inherited or informally and orally carried from generation to generation (Meyers, 2016). Traditional medicine is practiced in line with the socio-cultural background of the people; thus making it an intimate part of their culture.

In addition, herbal cosmetics and medicine, massage, therapeutic dieting, fasting, hydrotherapy and radiant healing therapy are often among other components of traditional medicine practices in many parts of Africa. Nevertheless, given the great diversity of cultures, ethnicities, and geographical regions within Africa, it is extremely difficult to make general overviews about African herbal medicine (Darko, 2009). In West Africa, both Western and traditional herbal cosmetics are used to meet the skin or beauty needs of the people. Although Western cosmetics appear to dominate practices in many countries such as Ghana and South Africa, indigenous herbal practice remains a viable option to the majority.

Africa is viewed as the origin/birthplace/source of humankind with a rich natural and social assortment set apart by regional differences in healing practices (Gurib-Fakim, 2006). The different types of herbal cosmetics that are used include *Acacia Senegal* L.Will: it is native to the semi desert and drier regions of sub-Saharan Africa but widespread from Southern to Northern Africa. It is used as a medicinal plant in parts of West Africa and North Africa, (Gurib-Fakim et al., 2010). The use of *Acacia Senegal* L.Will, which is derived from an exudate from the bark, dates from the first Egyptian Dynasty (3400 B.C). It was used in the production of ink, which was made from a mixture of carbon, gum, and water. Furthermore, *Acacia Senegal* L. Willd is an important naturally occurring oil-in-water emulsifier which is regularly used in food and pharmaceutical industries. Medicinally, *Acacia Senegal* L.Willd is used extensively in pharmaceutical preparations and is a food additive approved as toxicologically safe by the experts (Mahomoodally, 2013).It has been used as demulcent, skin protective agent, and pharmaceutical

aids such as emulsifier and stabilizer of suspensions and additives for solid formulations. It is used to treat bacterial and fungal infections of the skin and mouth.

Many plants found in South Africa are used for natural skin care. *Aloe ferox* Mill, contains more amino acids than *Aloe vera* and it produces almost more sap (Iwu, 2014). Many beauty products on the shelves already incorporate, because of *Aloe ferox* Mill, its healing and restoring properties. *Aspalathus linearis* (Burm.f.) R. Dahlgren) is one of the well-known plants that are used as beverage and possesses a range of cosmetic attributes. The leaves contain antioxidants which ensure younger-looking and flexible skin (van Wyk, 2011). Furthermore, *Adansonia digitate* L. seeds are constituent in beauty products because of its moisturising properties, and powder made from the dried fruits is an excellent skin and hair conditioner (Kamatou et al., 2011). As a result of its rose-like fragrance and cleansing properties, heady scent of *Pelargonium odoratissimum* L. L'Hér. essential oil is a common ingredient in many beauty products ranging from face cream and bath oil to perfume and body wash (Andrade et al., 2011).

3.12.1 Herbal cosmetics in African markets

Nicolas and Welling (2017) asserted that Africa is a perplexing continent; it consolidates ways of life, ethnicities and diverse social formations/shapes and circumstances. By and by, the continent comprises over one billion people, and it is anticipated that the population will rise to three billion inhabitants by 2065. In this way, considering just the evaluated size of the users, the effect of the African market is enormous. As per this statistic profile, it is emphatically corresponded with the ascent in discretionary cash flow. By 2030, eighteen (18) most populated African urban communities could have a joint/collective spending intensity of $ 1.3 trillion, thereby making the continent a focus for organizations trying to develop outside of advanced nations. Most beauty product organizations/concerns/enterprises have executed plans to seize the anticipated/projected growth for beauty and body care; in a market that is envisaged to rise to $1.8 billion by 2018 (African Business Pages, 2017). Economies experiencing rapid growth like Uganda and such thriving markets as Kenya and Ethiopia, with increase in the number of middle income earners, increase in the number of people and massive urbanization, are huge drivers of body care and beauty products (Rukangira, 2001).

3.12.2 Herbal cosmetics in Eastern Africa region

Fongnzossie et al. (2017) argues, that while there is deficiency of such products for hair care and healthy skin, consumers request products that are custom-made to address their issues and necessities; so the interest for conventional home-grown beautifying agents is high. Businesses have noticed that African women could not take the Western or Asian items in Africa, thus the interest in presenting new ranges, particularly intended to meet the peculiar needs of African buyers/users, with costs of mass items and a few brands accessible. The requirement to adequately supply the correct items to African buyers is to sufficiently comprehend the specificities of the African skin and hair.

The producers are given the income threshold of the populace to access more buyers/users. Lately, buyers/users have turned out to be more mindful of the threats of fake corrective items that have taken over the market. It has been evaluated that imitated beauty products, or exceptionally poor unrefined materials, are almost 30% of all items on the East African restorative market (African Business Pages, 2017). Buyers must choose the option to purchase more special items to get a higher value. This circumstance has driven users to contrasting the supply markets; they have started sourcing products from foreign countries.

3.12.3 Herbal cosmetics in West African region

Nigeria is a country in West Africa and one with the largest population in Africa: over 184 million people. According to Sklar (2015), most beauty products in Nigeria are imported, and the weakness of its currency against the dollar has led to higher import costs, which in turn has led to higher prices and a decline in consumer spending power such that the demand has slowed down in most of the types (Redazione, 2017). However, the sector of beauty and personal care in West Africa has continued to record positive growth, mainly driven by increasing urbanization, the growth of the young population and a greater number of women in the active labour force.

There is an expanded focus on young customers, urban and female items with higher quality and worth of various kinds, including healthy skin, oral consideration, and customary home grown beauty care products for cosmetics. Visser (2017) indicated that the population of Nigeria is evaluated to surpass 200 million by 2020; subsequently, it is anticipated that the beauty and body care items will record a positive execution because of the anticipated development. Therefore, Nigeria is turning into a choice destination for many international organizations that seek to seize the opportunity of its bourgeoning beauty and body care market. The competitive growth of the

Nigerian market invigorates advancement; organizations will utilize more gigantic and forceful showcasing techniques. Nigeria's young and vibrant consumers are becoming increasingly savvy in the use of the social media; their smart use of it in marketing and sales promotion is likely going to become a vital instrument for organizations (Redazione, 2017).

3.12.4 Herbal cosmetics in Southern Africa

Southern Africa is an area with more diverse cultures in the world, amalgamating various ethnic clusters, including crossbreed of various cultures (Redazione, 2017). Adding to the diversity of societies and cultures are likewise social peculiarities, income, the connection to infrastructure, and access to learning, and health and medical care. All these have assumed a major part in the advancement of Southern Africa as an indispensable player in the global marketplace. South Africa has assumed the position of Africa's centre of beauty, with the pattern of shoppers progressively concentrating on looking more appealing and smelling lovely (Redazione, 2017). This pattern expands deals in numerous parts, for example, shading beauty care products and aromas.

Notwithstanding the developing statistic weight, as in different territories, another driving component is the expansion in offers of mass market items through drug stores and different mass-advertisement channels, while there is a decrease sought after products of the top-notch division which are blended items. Purchasers are progressively searching for esteem items which are common and that give a progression of joint advantages, typically not accessible in best stocks. A greater percentage of the organizations do not have the necessity of the market since they have made a classification of items called esteemed which have the joint advantages yet have a value nearer to the mass market than the market premium. Natural restorative market in South Africa goes up against a few difficulties to develop, including the mind-boggling expense of the items and the absence of learning by firms of market subdivision based on spending examples and request.

South Africa has a huge diversity of ethnic group which is reflected in the systems of medicine practised. Herbal cosmetics are most commonly known by the Nguni people (Nzue and Pierre, 2009). However, the distinction between the herbal cosmetics and traditional medicine has become distorted, with both using herbs and traditional medicine (van Wyk et al., 1997). Practitioners in other groups are known as ixwele and amaquira (Xhosa), nqaka (Sotho) and ranga, mungome or Maine by the Vhavenda (Masevhe et al., 2015; van Wyk et al., 1997). Most elderly folks in rural

areas have knowledge of herbal folklore which they apply mainly by using plants in the neighbourhood; moreover, there are also faith healers who treat antenatal and other health problems such as skin wounds and beauty in their communities.

As indicated by Lall and Kishore (2014), South African plant species usually used for cosmetics include *Elaeis guineensis* Jacq ,*Adansonia digitata* L., *Trichilia emetic* Vahl., *Ximenia Americana* L.(False, *Schinzio Phyton rautanenii* Schinz, *Sclerocarya birrea* Sond., *Sesamum Indicum* L., and *Citrullus lanatus* Thunb, *Aloe ferox* Mill., *Aspalathus linearis* (Burm.f.) R. Dahlgren, *Calodendrum capense* (L.f.) Thumb, *Cyclopia intermedia* E. Mey. (Honey bush *tea*), *Sideroxylon inerme* L. (White milkwood), and *Salvia stenophylla* Burch. Ex Benth **(Table 3.1)** which are frequently used in different skin creams for anti-acne, anti-wrinkle, anti-aging, and for skin-hyper-pigmentation problems. Lotions made from cape chestnut are used for treating those who suffer from psoriasis, skin cracking, sagging and eczema.

Table 3. 1: Examples of plants used in South Africa for herbal cosmetics. The botanical names were verified using the Plant List (http://www.theplantlist.org/)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Acokanthera oblongifolia (Hochst.)Benth. &Hook.f. Ex B. D. Jacks. *Syn: Acokanthera oblongifolia* (Hochst.)Codd	Ubuhlungu (X.)	Apocynaceae	Leaves	Leaves are infused and taken orally for a smooth skin.	Thibane et al. (2018)
Acokanthera oppositifolia (Lam.) Codd	Bushman's Poison (Eng.), Boesmansgif (Afr.)	Apocynaceae	Leaf/root pulp	For wounds and also applied as a plaster to swollen parts	Watt and Breyer Brandwijk (1962)
Adansonia digitata L. (Afr.)	Baobab (Eng.), Kremetartboom	Malvaceae	Whole plant	For irritation and aging related disorders	Caluwe (2010)
Afzelia quanzensis Welw.	Lucky bean (E), umDlavusa (Z), umHlavusi (X), Peulmahonie (A).	Leguminosae	Bark/ roots	The bark powder is infused, orally taken to heal or treat wounds and warts.	Xaba (2016)
*Agathosma betulina (Berg.)*Pillans *Syn:Bucco betulina* Schult	Buchu, Long-Leaf Buchu (Eng.); Boegoe, Anysboegoe (Afr.);	Rutaceae	Whole plant	The plant is mixed with vinegar and used to clean wounds, and in	Watt and Breyer

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
	Buchu (Kh); Ibuchu (X.)			cosmetics to keep the skin soft and moist in dry climates	Brandwijk (1962)
Alepidea amatymbica Eckl. & Zeyh. Var. amatymbica *Syn: Alepidea amatymbica Eckl. & Zeyh.*	Larger tinsel (E), iKhathazo (Z), Iqwili (X).	Apiaceae	Rhizomes	Rhizomes are applied externally as a substance capable of causing bleeding to stop when it is applied to a wound (styptic).	Xaba (2016)
Aloe aculeata Pole-*Evans*	Red hot poker aloe (Eng.)	Xanthorrhoeaceae	Leaves	The leaves are applied topically on various skin ailments such as blemishes	Mapunya et al. (2012)
Aloe arborescens Mill.	Krantz aloe(Eng.), Kransaalwyn (Afr.)	Xanthorrhoeaceae	Leaves	Applied topically to treat burns and scratches	Mapunya et al. (2012)
Aloe aristata Haw.	Umathithibala (Z)	Xanthorrhoeaceae	Leaves	Aloe is mixed with water to wash wounds and	Xaba (2016)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
				sores for a refreshing effect.	
Aloe ferox Mill	Ikhala (X.)	Asphodelaceae	Leaves	The sap is arranged through maceration and connected topically to effect wanted skin appearance.	Thibane et al. (2018)
Aloe ferox Mill.	Bitter aloe (E) Umhlaba (Z), Ikhala (X).	Xanthorrhoeaceae	Leaves and roots	The fresh juice from root infusion is taken orally or gargled for toothache, and leaf pulp may be applied to treat skin wounds and burns, bruises, scrape, cuts, sunburn, eczema, and other skin conditions.	Xaba (2016)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Aloe greatheadii Schonland	Spotted aloe (Eng.), Transvaalaalwyn (Afr.)	Xanthorrhoeaceae	Leaves	The bitter sap of leaves is applied topically on wounds, sores and burns	van Wyk and Malan (1988)
Aloe pretoriensis Pole-Evans	Pretoria aloe (Eng.)	Xanthorrhoeaceae	Leaves	The juice is applied topically for skin blemishes	Mapunya et al. (2012)
Anacardium occidentale L.	Cashew nut (Eng.)	Anacardiaceae	Leaves	Applied on the skin as a bandage for burns and other skin diseases.	Okoye (2009)
Arctotis arctotoides (L.f) O.Hoffm	Ubushwa (X.)	Asteraceae	Leaves	Leaf sap is applied directly for wound treatment and skin smoothness.	Thibane et al. (2018)
Aristea ecklonii Baker.	Blue stars (Eng.), Blousterre (Afr.)	Iridaceae	Whole plant	Plant is applied topically for shingles	Hutchings and van Staden (1994)

Scientific Name	Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Artemisia afra Jacq. Ex Willd. *Syn: Absinthium ponticum (L.) Garsault*	African wormwood (Eng.), Wilde-als (Afr.)	Compositae	Roots, stems and leaves	It is applied topically as body wash.	van Wyk et al. (1997)
Asclepias concolor (Decne.) Schltr. *Syn: Xysmalobium concolor* (E. Mey.) D. Dietr.	Ishongwe herb (X.)	Asclepiadaceae	Leaves	The leaves are pasted on pimples to remove them.	Afolayan et al. (2014)
Aspalathus linearis (Burm. f.) R. Dahlgren	Rooibos tea (Eng.), rooibostee, bossietee (Afr.)	Leguminosae	Aerial plant part	It is applied topically as an anti-ageing and for clearing eczema.	Jackson (1990)
Asparagus africanus (Lam.) Oberm *Syn: Asparagus africanus var. puberulus* (Baker) Sebsebe	uMathunga (X)).	Asparagaceae	Roots	The roots are boiled in water or milk and usually administered orally for several weeks to treat sores and wound.	Xaba (2016)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
*Asparagus africanus*Lam. *Syn: Asparagopsisjun iperina* Kunth	Bush Asparagus, Wild Asparagus (Eng.); Haakdoring, Katdoring (Afr.); Umathunga,	Asparagaceae	Aerial plant part	Applied topically to stimulate hair growth.	Lohdip and Tyonande (2005)
Athrixia phylicoides DC.	Bushman's tea (Eng.),	Compositae		The herb is infused orally and used to treat sores and boils.	Hutchings et al. (1996)
Ballotaafricana (L.) Benth.	Cape horehound (Eng.), Kattekruie (Afr.)	Lamiaceae	Leaves	Applied topically to treat lesions.	van Wyk et al. (1997)
Bauhinia bowkeri Harv	Kei White Bauhinia (Eng.), Keibeesklou(Afr.)	Leguminosae	Leaves and bark	Used for steaming and bathing.	Ndawonde et al. (2007)
Bauhinia thonningii Schum.	Mukolokote (V),camel's foot tree, monkey bread, and wild bauhinia (Eng.)	Caesalpinoideae	Leaves	Leaves applied topically as soap substitute	Mabogo (1990)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Boophane disticha (L.f.) Herb.	Century plant, poison bulb, sore-eye flower (Eng.); gifbol, seeroogblom, kopseerblom, (Afr.)	Amaryllidaceae	Bulbs	Applied topically to treat wounds, boils and abscesses	van Wyk et al. (1997)
Buddleja saligna Willd.	Igqange tree (X.)	Scrophulariaceae	Leaves and roots	The leaves and roots are infused to protect facial skin	Afolayan et al. (2014)
Bulbine frutescens (L.) Willd *Syn: Anthericum frutescens* L.	Itswela le nyoka (X.)	Asphodelaceae	Leaves	Fresh leaf juice applied topically for wound treatment and skin smoothness.	Thibane et al. (2018)
Bulbine frutescens (L.) Willd. *Syn: Anthericum incurvum* Thunb.	Snake flower (Eng.), Geelkatstert (Afr.)	Asphodelaceae	Leaves	Fresh leaf juice is used topically for burns, cracked lips and spots	(Dyson, 1998); Joffe (1993)
Calendula officinalis L.	Pot marigold, Marigold, Garden Marigold, Ruddles, (Eng.)	Compositae	Flowers	The Tinctures and balms are applied topically to	Mozherenkov and Shubina (1976)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
				heal wounds and damaged skin	
Calodendrum capense (L.f.)	Thunb. Cape Chestnut (Eng.), Wildekastaiing (Afr.)	Rutaceae	Bark	The bark is used as a skin ointment.	Palmer and Pitman (1972)
Calpurnia aurea (Ait.) Benth.	Wild laburnum, Natal laburnum, Cape Laburnum (Eng.); Natalse	Fabaceae	Leaves, roots and seeds	They are applied topically to fasten hair growth, skin irritation and rashes	Afolayan et al. (2014)
Carissa bispinosa (L.) Desf.ex Brenan	Isabetha shrub (X)	Apocynaceae	Fruits	The juice is applied topically to soften facial skin	Afolayan et al. (2014)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Carpobrotus dimidiatus (Haw.) L. Bolus	Natal sour fig (Eng.), Natalsesuurvy/strandvy (Afr.)	Aizoaceae		Covering burns and as an ointment	Joffe (2003)
Carpobrotus edulis (L.) L.B. Bolus *Syn: Carpobrotus edulis (L.) N.E.Br.*	Sour fig/Cape fig (E), Umgongozi/ Ikhambilamabulano (Z), Hottentosvyg (A)	Aizoaceae	Leaves/roots	Are used for various cosmeceuticals such as lotion for burns, sunburn and other skin ailments. And further applied orally for mouth ulcers, burns, bruises, scrape, cuts, eczema, dermatitis and other skin conditions.	Xaba (2016)
Carpobrotus edulis (L.) N.E.Br.	Sour fig, Cape fig (Eng.), Hottentotsvy (Afr.)	Aizoaceae	Leaves	Leaf Juice applied topically as a lotion on burns, bruises, scrape, cuts, sunburn, eczema,	Germishuizen (2003.)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
				dermatitis and other skin conditions	
Cassipoure aflanaganii (Schinz) Alston	UmMemezi (X.)	Rhizophoraceae	Bark	Ground bark powder is infused in water and applied topically as sun block and impact on wanted skin appearance.	Thibane et al. (2018)
Cassipoure aflanaganii (Schinz) Alston	Cape Onionwood, Onionwood (Eng.),	Rhizophoraceae	Bark	Powder made from the bark is applied topically to soften hair and lighten the skin.	Afolayan et al. (2014)
Centella asiatica (L.) Urb	Udingu (Afr.)	Apiaceae	Leaves	The leaves are applied topically on wound for healing	Cheng and Koo (2000)
*Cissampelos capensis*L.f. *Syn: Phyllanthus cinereoviridis* Pax	Dawidjieswortel (Afr.); mayisake (X.)	Menispermaceae	Rhizomes, roots and leaves	They are applied topically for boils, wounds, sores and orally for ulcers	Van Wyk and Gericke (2000)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Citrullus lanatus (Thunb.) Matsum. &Nakai	Wild watermelon (Eng.), Bitterboela (Afr	Cucurbitaceae	Fruit	The flesh of fruits applied topically as an ingredient for sun lotions and other cosmetics	Laghetti and Hammer (2007)
Clausena abyssinica Engl. *Syn: Clausena anisate* (Willd.) Hook.f. ex Benth.	Iperipes (X.)	Rutaceae	Leaves	Leaves are boiled and the mixture is taken orally to have an effect on skin health	Thibane et al. (2018)
Clausena anisata (Willd) Hook. f. ex Benth	Nukamdida (Afr.)	Rutaceae	Leaves	Leaves are applied externally as an antiseptic for wounds, sores and burns	Clarkson et al. (2004)
Cotyledon orbiculata L. *Syn: Cotyledon orbiculata var. flanaganii* (Schönl. & Baker f.) Toelken	Pig's Ear (E), Morianna wa di-tsebe/ sereledi (S)	Crassulaceae	Leaves/ Stem	Fleshy leaves have been used to treat corn and warts. For toothache and as hot poultice for boils.	Xaba (2016)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Crinum moorei Hook.f.	Natal lily (Eng.), Boslelie (Afr.)	Amaryllidaceae	Bulbs	The bulb is orally taken to clean blood and treat infected sores and spots	Hutchings et al. (1996)
Crocus sativus L	Saffron (Eng.)	Iridaceae	Whole plant	It is applied topically for skin blemishes	Assimopoulou et al. (2005)
Cyclopia meyeriana Walp.	Honey bush tea (Eng.), Heuningbos (Afr.)	Leguminosae	Leaves	Are used topically to wash wounds and burns.	Marnewick (2005)
Dioscorea elephantipes (L'Her.) Engl.	Elephant's foot (E), Ingweva (Z).	Dioscoreaceae	Whole plant	The whole plant is placed in water for 3 days before boiling. Peeled or grated root is rubbed on the skin to heal sores, wounds and syphilis.	Xaba (2016)
Dioscorea sylvatica (kunth) Eckl.	Wild Yam (E) Ingefu/Uskolpati (Z), Usikolipati (X), Skilpadknol (A).	Dioscoreaceae	Whole plant	The tuber is topically used to treat sores and wounds.	Xaba (2016)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Diospyros mespiliformis Hochst. ex A. DC.	African ebony (Eng.), Jakkalsbessie (Afr.)	Ebenaceae	Leaves	Leaves are applied topically for skin infections and wounds.	Mohamed (2009)
Diospyros pubescens Pers.	Umbongisa Shrub	Ebenaceae	Leaves	The leaves are pasted on the nails to strengthen the nails	Afolayan et al. (2014)
*Ekebergia capensis*Sparrm	Cape ash (Eng.), Essenhout (Afr.)	Meliaceae	Bark	Infusion is used for boils, acne and abscesses	van Wyk (2011.)
Elaeis guineensis Jacq	African oil palm (Eng.)	Arecaceae	Leaves	Leaf extract is applied topically on fresh wounds and fruit mesocarp oil is used externally as a lotion to treat skin disease	Sasidharan (2010)
Elephantorrhiza elephantina (Burch.) Skeels	Elephant's foot/Mosquito	Leguminosae	Roots	If treating acne, the face is held in the vapour arising from a warm	Xaba (2016)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
	plant/ (E), Mositsane (S), Intolwane (Z			infusion. The underground parts are used to treat sunburn, and root infusions for acne.	
Elephantorrhiza elephantina (Burch.) Skeels	Elephant's root (Eng), Leerbossie (Afr.)	Fabaceae	Underground parts	Applied topical for sunburn, and root infusion is used to treat acne	van Wyk et al. (1997)
Embelia ruminate (E. Mey.exA.Dc.) Mez	False black pepper (Eng.)	Myrsinaceae	Leaves	Leaves are pasted on open wounds and for leprosy related infections	Kumaraswamy (2007)
Erythrina lysistemon	Common coral tree (Eng), Gewone (Afr.)	Fabaceae	Bark	Is applied as a poultice to treat sores, wounds and abscesses.	Pillay et al. (2001)
Eucalyptus camaldulensis Dehnh. *Syn: Eucalyptus acuminate* Hook.	Rostrata gum, (Eng.),Rooibloekom (Afr.)	Myrtaceae	Bark	The bark is applied topically to treat pimples.	Mabona and Van Vuuren (2013)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Euclea crispa subsp. linearis(Zeyh. ex Hiern) F. White	Mutangule-musekene (V),Blue guarri, Blue-leaved euclea (Eng.)	Ebenaceae	Stem	The branches are used orally as a tooth brush.	Mabogo (1990)
*Euclea divinorum*Hiern *Syn: Euclea huillensis* Gürke	Mutangule (V.), Magic Gwarra (Eng.),	Ebenaceae	Stem	The branches or stems are used for tooth brushing.	Mabogo (1990)
Eucomis autumnalis (Mill.) Speta. Chitt	Pineapple flower/Pineapple lily (E),	Asparagaceae	Bulbs/ Roots	Decoctions of warmed bulbs is administered orally for several weeks to treat wounds	(Xaba, 2016)
Eucomis bicolar Baker.	uMbola (Z).	Asparagaceae	Bulbs	The bulbs are used as decoctions and infusions to treat wounds, warts and burns	
Ficus natalensis Hochst.	Natal fig (Eng.)	Moraceae	Leaves	Leaves are used as poultices and applied on wounds and boils	Gerstner (1941)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Grewia occidentalis L	Cross-berry (Eng.), Kruisbessie (Afr.) Malvaceae	Malvaceae	Small twigs and leaves	It is applied topically and orally for wounds	Grierson and Afolayan (1999)
Gunnera perpensa L.	River pumpkin (Eng), Wilde ramenas (Afr.)	Gunneraceae	Root, rhizome, leaf	The decoctions are used for dressing wounds and to treat psoriasis	Van Wyk et al. (2008)
Haemanthus albiflos Jacq *Syn:Haemanthus albomaculatus* Baker	Umathunga (X.)	Amaryllidaceae	Bulb	A decoction is prepared from the bulb and taken orally to treat skin-related disease such as wounds.	Thibane et al. (2018)
Halleria lucida L.	Tree fuchsia (Eng), notsung (Afr.)	Scrophulariaceae	Whole	Used topically for various skin diseases	Hutchings et al. (1996)
Harpagophytum procumbens (Burch.) DC.	Devil's claw (Eng.), Duivelsklou (Afr.)	Pedaliaceae	Leaves	Leaves are used to heal ulcers, boils, skin lesions and wounds.	Neuwinger (2000)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Harpephyllum caffrum Bernh. ex Krauss	Wild plum (Eng.), Wildepruim (Afr.)	Anacardiaceae	Bark	Bark is applied in the form of facial steam bath and skin washes.	Van Wyk and Gericke (2000)
Helichrysum odoratissimum (L.) Sweet	Imphepho (Z.), kooigoed (Afr.)	Compositae	Leaves	Leaves are applied on pimples.	Hutchings et al. (1996)
Hypericum perforatum L.	Goatweed (Eng), johanneskruid (Afr.)	Hypericaceae	Aerial parts	Aerial parts are applied externally to treat wounds.	Van Wyk and Gericke (2000)
Hypoxis hemerocallidea Fisch.Mey. & Ave & & Ave-Lall.	African potato (E), Inkomfe (Z), Ilabatheka (X).	Hypoxidaceae	Corm	The corm is diced, boiled and taken orally; depends on the dosage discretion of the person with sores	(Xaba, 2016)
Ilex mitis (L.) Radlk *Syn: Ilex capensis* Sond. &Harv.	Isidumo (X.)	Aquifoliaceae	Bark	The bark is infused in water and applied topically as sun block.	Thibane et al. (2018)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Ilex mitis (L.) Radlk.	Cape holly (Eng), Waterboom (Afr.)	Aquifoliaceae	Ground bark	The decoction is used for skin rashes and sores on the face.	Mabona et al. (2013)
*Jatropha curcas*L.	Mupfure-donga (V), Verfbol (Afr.) Ugodide (Z.)	Euphorbiaceae	Leaves	The leaves are orally taken to heal toothache.	Mabogo (1990)
Kigelia africana (Lam.) Benth.	Sausage tree (Eng.), Worsboom (Afr.)	Bignoniaceae	Bark	Bark decoctions are externally applied to treat sores and acne.	Gabriel (2009)
Leonotis leonurus (L.) R.Br.	Wild dagga (Eng.), Duiwelstabak (Afr.)	Lamiaceae	Whole plant	The whole plant part is applied topically to treat boils, eczema, skin ailments and for itching.	Frum and Viljoen (2006)
Lycopodium clavatum L.	Clubmoss/ Belly powder (E), uMnwele (Z	Lycopodiaceae	Whole plant	Whole part ground into powder, boiled and taken orally or roots applied externally on burns.	Xaba (2016)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Melianthus major L.	Giant honey flower (Eng.)	Melianthaceae	Leaves	Leaves are infused and applied topically to septic wounds, pimples, sores and bruises.	Van Wyk (2008)
Merwilla plumbea (Lindl.) Speta	Wild squill/ Blue hyacinth (E), Inguduza (Z).	Asparagaceae	Bulbs	Bulb decoctions used as enemas and boils.	Xaba (2016)
Plantagolan ceolata L.	Ubendlela (X.)	Plantaginaceae	Leaves	Leaves are boiled and mixture used for treating wounds.	Thibane et al. (2018)
Rorippa nasturtium aquaticum (L.) Hayek	Uwatala (X.)	Brassicaceae	Leaves	Leaf sap is prepared by infusion and applied topically for a smooth skin.	Thibane et al. (2018)
Sclerocarya birrea (A. Rich.) Hochst.	Marula (Eng.)	Caesalpinoideae	Fruits	The fruits are applied topically to beautify the skin and make it glow.	Mabogo (1990)
Urtica urens L. *Syn:Urtica trianae* Rusby	Uralijan (X.)	Urticaceae	Leaves	Fresh leaves prepared by infusion to treat burns.	Thibane et al. (2018)

Scientific Name	*Common Name	Family	Plants parts	Cosmeceutical relevance and application	Reference
Warburgia salutaris (G. Bertol.) Chiov.	Pepper Bark Tree (Eng.)	Canellaceae	Stem bark	For skin sores.	Hutchings et al. (1996)
Xysmalobium undulatum (L.) W.T. Aiton	White Bush (E), Ishongwe (Z),	Apocynaceae	Roots	The roots are macerated and applied topically as a powder to treat wounds and abscesses.	Xaba (2016)

*Common Name: Afr = Afrikaans, Z = Zulu, X=Xhosa, E=English, V-Venda, NS=Northern Sotho, T=Tswana, Tso=Tsonga

3.13 Types of herbal cosmetic products produced internationally

Personal care products incorporate an extensive assortment of items and definitions; for example, cleansers, shampoos and shower items; sunscreens, skin and hair care; hair colours, make ups, lip sticks, dental consideration items, antiperspirants, individual cleanliness items and numerous others (Antignac et al., 2011). However, not only the afore-mentioned cosmetics are being used; there are also different cosmetics that heal and repair the skin in order to maintain beauty. Globally, different categories of consumable products are defined as cosmetics whereas in other parts of the industrialized world, such as Western countries, herbal cosmetics are increasingly being referred to as personal care products (PCP).

Pimentel et al. (2017) highlighted that consumers have become more aware that the herbal market provides the same quality as the luxury counterparts, especially among the colour cosmetics and skincare products despite the fact that the sales growth is generated mostly by mass-produced products; the innovations are most often introduced by brands in the premium segment. Furthermore, Arato et al. (2017) articulated that in recent years innovations of products are charted through time-saving and long-lasting products. The time-saving products are a response to the needs of today's ever-busy consumers who want to limit the amount of time spent on their daily beauty routine. As a result, several studies have been done in a way which contributed such products as the quick drying nail polish or multi preparations like the 3-in-1 shower gel; facial wash with shaving foam or hybrid products for the face that incorporate elements of make-up; skincare and sun protection.

Pimentel et al. (2017) highlighted that lasting cosmetics are perceived to have a good price-value ratio, as they can be used more occasionally than the conventional products. Examples include long-lasting blushes, nail polishes, and 24-hour lotions for skincare. However, traditional herbs are relatively common now for customers to extend the time between professional skin treatments, which the manufacturers react to by selling do-it-yourself products for application at home; providing an alternative which helps people maintain the effects of professional treatments for a longer time than ever before. Ajitha and Sivakumar (2017) stated that there are more and more visible comprehensive markets producing herbal cosmetic products, manufactured in accordance with the fair-trade attitude. Herbal cosmetics emerged from a niche that was beforehand occupied by small number of companies and got incorporated into the mainstream

market. Therefore, those products are now distributed through standard channels such as supermarkets and department stores.

3.14 Challenges facing traditional herbal cosmetics in Africa

Research and development (R&D) plays an important role in the manufacturing of plant-based cosmetics and issues of benefit-sharing on herbal cosmetic products. Numerous innovations across African countries have attracted the attention of herbal cosmetics (Purwanti et al., 2015). Black women are considered to take average of three times of herbal cosmetics more than white women. African women consume more hair products compared to Western women; more than seven different products of make-up and five more of skin-care. Hence, companies manufacturing the cosmetics are overlooking this area above the entitlement of local companies. International brands are predominantly creating distribution subsidiaries. Some countries in Africa have sought to benefit from this situation by levying heavy taxes on the categories of products related to beauty (Shaheen et al., 2014) . This initiative has caused an outburst of illegal imports and replications, and an absolute lack of control over the products put on the market.

Several policies in different African countries favour local companies, yet consumers still prefer the big international brands; reason being the idea that a successful product that works is made by international brands. Nonetheless, Sanders (2017) stated that the African middle class is growing; it has tripled in size over the last few years and is driving the demand for herbal cosmetics in the continent. The big multinational brands dominate the market in Africa, using the local production capacity in outsourcing. This has indirect consequences on the African market due to local economic difficulties; and people have high demand for premium products.

3.14.1 Commercialization and conservation

Herbs have been harvested for decades and cultivated since the existence of bio-prospecting, or possibly for centuries (van Wyk, 2011). Herbs are used for varied conditions such as cosmetics and medicinal purposes, and they are mainly from plants growing in the wild. Concentrated habitat and increased commercial demand, destructive harvesting from the wild and growing genetic vulnerability to natural disasters are all serious threats to sustainable supply of herbs and survival of genetic material in the wild (Street and Prinsloo, 2012). However, recent efforts in natural plants development have resulted in herbs and medicine being a feasible option for small-scale farming.

Though cultivation of traditional herbs is commercial yield developed, several enquiries need to be addressed to supply the demand of herbs used in South Africa with cultivated material (Moolla 2008). The inappropriate cutting procedures, over harvesting and poor harvesting regimes inhibit plants from producing seed for its next generation.

3.14.2 Access and benefit-sharing

One of the objectives of the CBD is the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of the genetic resource, including by appropriate handover of relevant technologies, and by appropriate funding (Moshi and Mhame, 2013). In recent years, numerous agreements on benefit-sharing and access to genetic resources have been advanced (Rukangira, 2001). In South Africa, the NEMBA No. 10 of 2004 targets to achieve and prevent looting of natural resources while ensuring sustainable use of biological diversity. After its declaration in 2004, the act on bio-prospecting and benefit-sharing came into effect in 2006. This part of the act was written in order to curb bio-piracy. Recent amendments to the South African Patent Act deal with the compensation of indigenous South African communities. The lack of establishment of the act at the local level is as a result of the fact that the local people have become aware of the framework and mechanism when a research is done within the community.

A significant issue in bio-prospecting is benefit-sharing. Nevertheless, much of the discussion on this topic accepts that there are benefits to share. Historical accomplishments in drug and cosmetic discovery based on natural products advocate that there should be continued appetite to gain access to natural products for use of drug discovery and cosmeceutical products (Krause and Tobin, 2013). There are some larger programs based on multi-group collaborations. Furthermore, the South African structure of the botanical market in Southern Africa is vertically oriented, with direction of flow only to the supply and marketing of the products. Ultimately, there is little or no value addition. Traditional herbal cosmetic sector in South Africa is statistically worthless and difficult to acquire, thereby making it improbable to accurately define the fiscal contribution of the burgeoning traditional herbal cosmetic sector to the South African economy (Makunga et al., 2008a).

The impact of the local market is often seen internationally as many companies are guarded with their trade data, fearing competitors becoming conscious of investment opportunities. However,

current worldwide estimates allude to a growth rate in natural products (Makunga et al., 2008b). The exponential demand for phytotherapies encompassing a whole range of products (organics, herbal teas, oils, phytocosmetics, phytomedicinals, herbs and spices) are saturating different outlets such as health shops and conventional pharmacies which are becoming more available for consumers at supermarket chains (Jim et al., 2001).

3.15 Indigenous technologies and tools used for the production of herbal cosmetics

There are different types of indigenous extracts which are obtained using methods such as maceration and percolation. During maceration, the plant materials are finely ground and mixed with specific volume of solvent and kept for several days at room temperature. The mixture is often kept away from light and frequently shaken to enhance the penetration of the solvent. The mixture is withdrawn and the remains (marc or pomace) are pressed, while the extracted solution becomes an extract upon evaporation. On the other hand, percolation involves extraction carried out by a slow and frequent passing of the solvent through the plant powder in a percolator. The quantities of solvents and plants, the duration and the flow rate of the solvent, the temperature and agitation, the particle size of the plant, and the type of apparatus used are all parameters that may influence the extraction (Plaza and Turner, 2015).

The tools used for processing of herbal cosmetics are easily subjected to pest plague, pollution and cross-contamination, hence cleaning of tools is particularly important. Vacuum or wet cleaning methods are preferred. Wet cleaning is applied to the equipment such as extractors, dryers, and pulverisers (Rukangira, 2001). Most of the traditional equipment such as wooden implements, clay pots, pallets and hoppers are more utilised. It is advised not to come into direct contact with chemicals and contaminated material when using traditional herbs; and special consideration should be given to cleaning, as the wooden material may keep smell and colour thus becoming easily contaminated (Ahshawat and Saraf, 2008).

3.16 Epistemological grounding

Walsham (1995) stated that interpretive paradigm is well-known as the interpretivist paradigm which encompasses the researcher to interpret essentials of the study. Interpretivism (or interpretive paradigm) incorporates human interest as reality into a study whereby it guides the researcher's set of beliefs and feelings about the world and how it should be understood and

studied. The interpretive paradigm focuses primarily on recognizing and narrating the meaning of human experiences and actions (Fossey et al., 2002). Furthermore, Mack (2010) articulated that in interpretive paradigm "knowledge is relative to particular circumstances historical, temporal, cultural and subjective, and exists in multiple forms as representations of reality (interpretations by individuals)". Interpretivist accepts multiple meanings and ways of knowing; it also acknowledges reality, but can only be known through representations (Lincoln et al., 2011).

Interpretive paradigm assumes reality is given or socially constructed through social constructions such as language, consciousness, shared meanings and instruments (Bucci, 2002). Thus in this study, herbal-based cosmetic is a natural phenomenon which includes humans interacting with environment, and the reality is well constructed. The use of herbal cosmetics in their daily life in Vhembe district is socially constructed and consists of language, consciousness, shared meanings, and instruments. Interpretivism is an approach based on the naturalistic methodology of data collection such as interviews and observations. In this type of study, meanings emerge usually towards the end of the research process.

This study is underpinned by interpretivism (interpretive paradigm) aimed at exploring the socio-economic impact of herbal cosmetics used by the Vhavenda women in Vhembe district municipality, South Africa. According to Thanh and Thanh (2015), interpretivism (interpretive paradigm) seeks to understand a particular situation and its belief, with its reality which is socially constructed. Since this study explores the socio-economic impact of herbal cosmetics used by the Vhavenda women, the paradigm allows the researcher to understand and accept different perspectives concerning the socio-economic impact of herbal cosmetics used by the Vhavenda women (Thanh and Thanh, 2015).

CHAPTER 4: CONTRIBUTION OF HERBAL COSMETIC AND COSMECEUTICAL TO THE WELFARE OF THE VHAVENDA WOMEN

Summary

This study explored the economic potentials of the herbal-based cosmetic and cosmeceutical enterprise to the welfare of the Vhavenda women of Limpopo province, South Africa. Purposive (expert) sampling technique was employed to collect data, which were analysed using descriptive statistics, Ordinary Least Square obit regression and budgeting analyses. A majority (61%) of the pooled Vhavenda women who were knowledgeable on herbal-based cosmetic and cosmeceutical were married with an average household size of five members. Also, 39% of the participants were already ageing within the range of 56-65 years. The highest (34%) formal educational attainment among the participants was high school certificate. In terms of formal employment, the majority (44%) of the participants were not employed while the monthly average total revenue of R1841.01 was recorded with an average per capital expenditure of R1438.42. A budgeting cost ratio of 1.28 was recorded, which indicates that for every R1.00 invested in the herbal-based cosmetic and cosmeceutical production an expected return of R1.28 return was realised. The Regression results further showed that the average household expenditure (a proxy for welfare) was statistically significant to the income level ($p<0.01$), experience level ($p<0.05$) and educational status of the Vhavenda women who were knowledgeable about herbal-based cosmetic and cosmeceutical ($p<0.05$). Thus, herbal-based cosmetic and cosmeceutical enterprise is profitable and is expedient for South Africa towards better welfare in the rural communities. A conscious, introspective and intentional look into this marginalised herbal-based cosmetic and cosmeceutical enterprise as a panacea for improved welfare of rural South Africans should be considered, given the identified ageing, capital, knowledge, educational challenge of the present vulnerable operators.

Key words: Biodiversity; Budgeting analysis; Environmental resources; Household; Livelihood; Medicinal plants

4.1 Introduction

Globally, the cosmetic industry remains one of the most innovative and lucrative enterprises that have huge patronage from the youth and women. On the basis of the increasing safety concerns associated with the use of synthetic cosmetics, there is a renewed interest in exploring natural sources especially plants for herbal-based cosmetics and cosmeceuticals (Lall and Kishore, 2014; Mahomoodally and Ramjuttun, 2016). South Africa is known to have a remarkable plant diversity which is largely untapped in terms of its potential for medicinal and cosmetic purposes (van Wyk, 2011). Despite being an important centre point of botanical and cultural diversity, only a few plant species have become fully commercialised as medicinal products. According to Mander et al. (2007), the trade of medicinal plants in South Africa is a large and growing industry, with estimated R2.9 billion to the national economy.

South Africa is rich in plant species that are used by indigenous communities as source of cosmetics, medicines and food (van Wyk, 2015). Likewise, among the Vhavenda in Limpopo province, plants remain popular and well enriched in their tradition and culture with diverse uses including cosmetic purpose. Examples of plants that have been documented in Vhembe municiplality include *Cannabis sativa* L, *Dicerocaryum senecioides* (Klotzsch) Abels *Ricinus communis* L., *Sclerocarya birrea* (A.Rich.) Hochst, *Spirostachys africana* Sond, *Trichilia emetica* Vahl, *Ximenia Americana* L. and *Ximenia caffra* Sond. (Arnold and Gulumian, 1984; Mabogo, 1990; Magwede et al., 2018). Thus, plants continue to contribute significantly to the well-being of people in both rural and urban areas. In addition, plants serve as a source of income especially through the sale of wild-harvested material for rural people in various communities (Hamilton, 2004). Generally, the use and the impact of environmental resources have some degree of influence on household welfare among the indigenous communities in southern Africa (Ntuli and Muchapondwa, 2017; Thondhlana and Muchapondwa, 2014). For instance, environmental income from resources such as medicinal plants, fuelwood and wild foods contributed about 20% to the total income of the indigenous San and Mier rural communities of Kalahari drylands in South Africa (Thondhlana and Muchapondwa, 2014).

Even though the actual financial benefits from sale of plants and their products in the informal sector remain largely undocumented and form part of the "hidden" economy, it is generally known that the trade in plants and their products contributes substantially to the economy of local

communities in South Africa (Botha et al., 2004; Makunga et al., 2008a). Furthermore, herbal-based cosmetic and cosmeceutical is part of the socio-economic and socio-cultural heritage in many rural communities.

Research efforts have generally overlooked the broader socio-economic context of herbal-based cosmetics and cosmeceuticals. Particularly, there is a dearth of information regarding the economic potential of herbal-based cosmetics and cosmeceuticals among the Vhavenda women in Vhembe district municipality, South Africa. Research endeavours focused along this line will be vital for bridging this existing gap in knowledge. Thus, this study evaluated the socio-economic characteristics of the selected Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals. In addition, the welfare (proxied by their expenditure) status of the Vhavenda women and the profitability level of the herbal-based cosmetics and cosmeceuticals were analysed. The factors influencing the revenue generated from herbal-based cosmetic and cosmeceutical in the study area were examined with the intention to advocate and motivate for timely policy intervention by the appropriate quarters, in order to drive and sustain funding and support for research on herbal-based cosmetics and cosmeceuticals.

4.2 Materials and methods

4.2.1 Data collection

The data was collected using a semi-structured questionnaire to probe questions which are related to the contribution of herbal-based cosmetic and cosmeceutical to the welfare of the Vhavenda women. Net income and profit index of knowledge holders that deal with herbal-based cosmetic and cosmeceutical were recorded.

4.2.2 Data analysis

Descriptive statistics, such as frequency counts, mean, percentages and standard deviation as well as inferential statistics such as Ordinary Least Square regression (OLS), Tobit regression and Budgeting analysis were used to analyze and describe the socio-economic characteristics of the Vhavenda women who were knowledgeable on herbal-based cosmetics and cosmeceuticals in the study area. Data analysis was done using SPSS version 25 and Stata SE version 11.

4.2.2.1 Ordinary Least-Squares (OLS) regression is a generalized linear modelling technique that may be used to model a single response variable which has been recorded on at least an interval scale (Moutinho and Hutcheson, 2011). Ordinary Least Square (OLS) was modelled on STATA 11 software in order to identify the determinants of the welfare (Proxied by their expenditure) status of the herbal-based cosmetic and cosmeceutical knowledge holders in the selected Vhavenda communities in Limpopo Province, South Africa.

As described by Omotayo and Oladejo (2016), the model is given below:

$Y= \beta_0+ \beta_1X_1+ \beta_2X_2+ \beta_3X_3+ \beta_4X_4+ \beta_5X_5+ \beta_6X_6+ \beta_7X_7+ \beta_8 X_8.....X_n + \varepsilon 0$ .....(1)

Y= Welfare status of the participants (Proxied by their expenditure)

X_1 = Expenditure level of the participants
X_2= Years of experience in herbal-based cosmetic and cosmeceutical
X_3 = Religious affiliation
X_4= Age of the participants
X_5 = Level of education
X_6 = Marital status of the Vhavenda women
X_7 = Number of household
X_8 = Status of employment
Σ_0 = Error term
β_0 = Constant
β = Parameter estimate

4.2.2.2 Gross margin was used to estimate the cost and return on herbal-based cosmetic and cosmeceutical in the study area as presented thus: GM = TR–TVC

$$\text{Benefit cost ratio (BCR)} = \frac{TR}{TC}$$

$$TC = TFC + TVC$$

Where: TC = total cost, TR = total revenue, TC = total cost, TR = total revenue, TFC = total fixed cost, TVC = total variable cost, GM = gross margin:

4.2.2.3 The factors influencing the revenue generated from herbal-based cosmetic and cosmeceutical were analysed using Tobit regression. The total revenue made from the sales of herbal-based cosmetics and cosmeceuticals was the dependent variable. The independent variables used included various socio-economic parameters of the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals. The Tobit regression model is specified thus,

$Yi^* = Xi\beta + \mu i$ ..... (ii)

$_i = 1, 2...n$

Y = total herbal-based cosmetic and cosmeceutical income of the participants (Rand)

Xi = the average independent variables such as experience (years), marital status, educational attainment (years), household size (actual number), age of the participants (years), children under the age of 18, municipalities, tools used for production, market benefits, market trends, and consumption patterns. Others are religious affiliation, expenditure, employment status, household size, children living in the household, products produced, children under the age of 18, benefits of herbal-based cosmetics and cosmeceuticals, payment by consumers, production cost of participants, and consumption patterns of herbal-based cosmetics and cosmeceuticals.

4.3 Results and discussion

4.3.1 Socio-economic/demographic characteristics

4.3.1.1 Age of the participants

In the study, the socio-economic characteristics that were considered included age, household size, employment status, educational level, marital status and years of experience. As indicated in **Fig. 4.1,** the participants were grouped into four age-groups and the majority (39%) of the Vhavenda women who had experience in herbal-based cosmetics and cosmeceuticals fell within the 56-70 years age-group. This implies that the old women might be unable to accommodate new ideas and innovations to enhance productivity, and the legacy of the traditional knowledge of herbal-based cosmetics and cosmeceuticals in Vhembe district municipality might be in danger of being eroded with the passing away of the old women. As asserted by Arthur (2005), old people have a habit of following strictly the traditional methods of production while young people tend to be more willing to adopt new approaches and innovations in order to increase production. These results are also articulated in the study of Thondhlana and Muchapondwa (2014), as any household with older members (60 years and above) was small, in part, due to children moving away to seek new prospects in towns and cities or to start their own households. This also leads to lack of local production of natural-based cosmetics and cosmeceuticals. The current finding on age distribution indicates that majority of the Vhavenda women involved in herbal-based cosmetic and cosmeceutical did not fall within the edge of preferable productive age group.

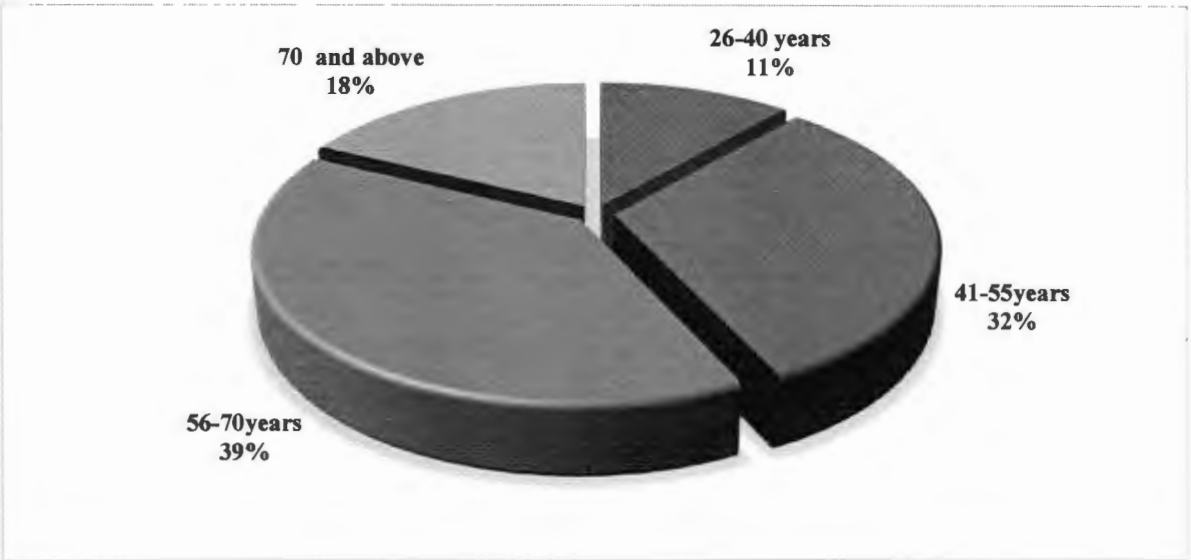

Figure 4.1: Age distribution of the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals production in Vhembe district, Limpopo province (n=79)

4.3.1.2 Household size

In terms of the size of the household, the majority (52%) consisted of 4-5 individuals (Table 4.1). The mean household size was 4.34 (approximately 4) with a standard deviation at 1.413 across the district. These results are in line with various studies such as one by Kyei (2011). Arthur (2005) asserted that the size of the family involves extraordinary significance for the nation in general as well as for the welfare and wellbeing of the individual, the family and community. In this study, 52% of the Vhavenda women in the Vhembe district were committed to small family size **(Table 4.1)**. With 22.8% of participants with a family size of over 6 people, it can be inferred that only a few of the population was in support of large families, although the fact is that 52% responded in favour of a family size of above 4 but fewer children. The analysis shows that the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals in Vhembe district, were committed to a smaller family size.

Table 4.1: Frequency (%) of the households' size of the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals in Vhembe district, Limpopo province (n=79)

Households size	Frequency	Percentage
0-1 Person	3	3.8
2-3 People	17	21.5
4-5 People	41	51.9
6 and more people	18	22.8
Total	79	100%

4.3.1.3 Attainment of formal education among Vhavenda women

In the current study, formal education rate was very low among the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals. For instance, 23% of the pooled Vhavenda women did not receive formal education, while 30% attended primary school only **(Fig. 4.2).** According to Cameron and Harrison (2012), formal education is referred to as an educational model to deliver a pre-defined curriculum offered by institutions with a classroom-based setting and provided by trained teachers. Vhembe is one of the district municipalities in South Africa with the lowest educational attainment among individuals aged 25-64 years (Municipality, 2016). This implies that most of the women with knowledge about herbal-based cosmetics and cosmeceuticals were informally educated, hence the chances of adopting modern technology or different methods from other cultures could be lower (Nmadu et al., 2015). This could have affected their chances of using improved technologies which require training and the reading of manuals in order to master modern techniques of cosmetic formulation. Low-level education negatively affects the success of small and medium scale enterprises and programs because education, particularly training, enhances the adoption of technology and improved methods which are vital means of achieving higher productivity (Organisation of Economic and Co-operation Development (OECD), 2018). Moreover, 34% of the participants had secondary education and 13% of the Vhavenda women attended tertiary education **(Fig.4.2).**

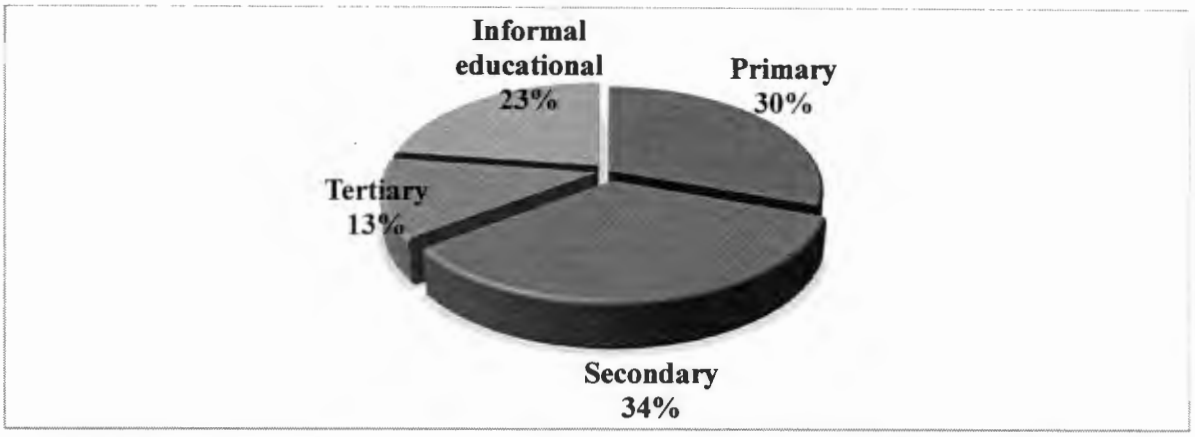

Figure 4.2: Attainment of formal education among the Vhavenda women knowledgeable about herbal-based cosmetics and cosmeceuticals in Vhembe district, Limpopo province (n=79)

4.3.1.4 Marital status of the Vhavenda women

In terms of marital status, the majority (61%) of the Vhavenda women who were knowledgeable about herbal-based cosmetics were married while only 2% were separated (Fig.4.3). Fifteen percent (15%) of the participants were single-parents who were in charge of the well-being of their households.

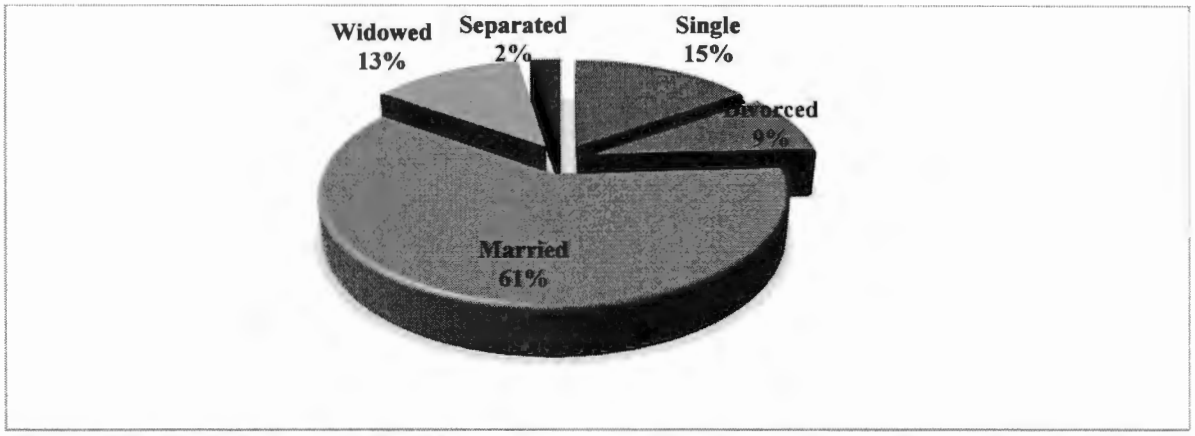

Figure 4.3: Marital status of the Vhavenda women knowledgeable about herbal cosmetics and cosmeceuticals in Vhembe district, Limpopo province (n=79)

4.3.1.5 Formal employment status of the Vhavenda women

In terms of formal employment, 44% of the participants who were knowledgeable on herbal-based cosmetics and cosmeceuticals were unemployed (**Fig 4.4**). Engagement in multiple occupations in Vhembe district municipality suggests a diversified enterprise-oriented economy. Further analysis showed that there were virtually no new innovations of herbal-based cosmetic produced locally

because most people in the communities were shunning and shying away from the locally made herbal cosmetic(s) for contemporary cosmetic(s). This indicates that herbal-based cosmetic and cosmeceutical production and consumption is fast being replaced by the conventional cosmetics which are sold and advertised in all social platforms. According to Statistics South Africa (2018), the unemployment rate has increased from 30.9% in 2008 to 37.2% in 2018. The rate of unemployment amongst women was 29.5% in the second quarter of 2018 compared to 25.3% among men.

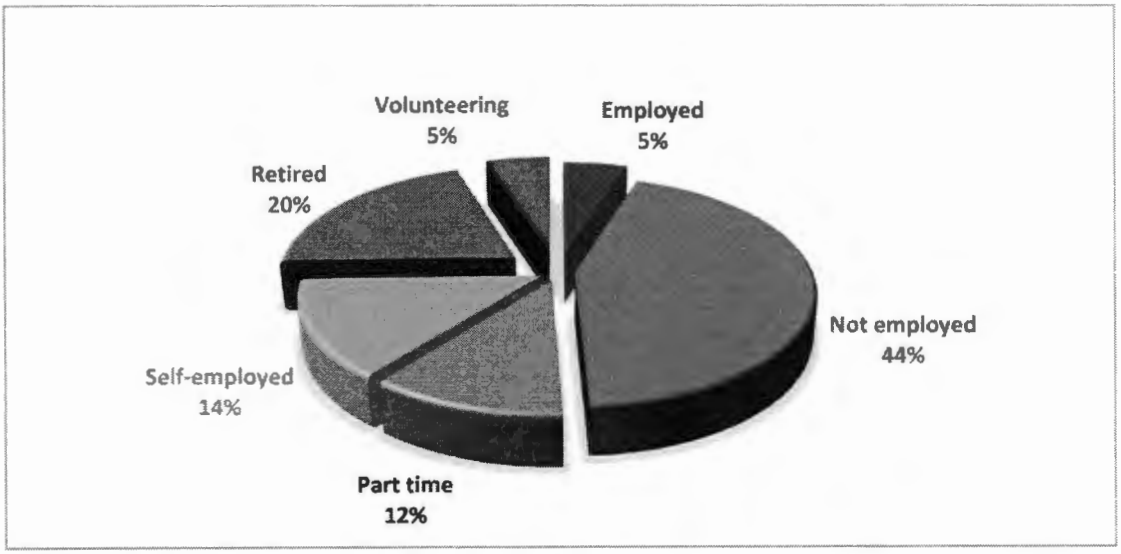

Figure 4.4: Formal employment among the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals in Vhembe district, Limpopo province (n=79)

4.3.2 Income level of the Vhavenda women

Monthly mean per capita income of Vhavenda women in the study area was R1841.01. The results of income level indicate that the average monthly income of women who were knowledgeable in herbal-based cosmetics were not in absolute poverty.

According to Statistics South Africa (2018), poverty can be expressed in absolute and relative terms. Absolute poverty is when people are unable to afford a basic basket of goods deemed necessary for material survival. Nevertheless, expenditure among the participants was much lower than reported monthly income mean (R1438.42.) The most substantial expenditure among the Vhavenda women was for basic needs (food and clothing). Blaauw and Mears (2010), highlighted that the valid generalisation about the poor is that they are disproportionately located in rural areas,

mainly active in agriculture and associated activities, and more likely to be women and children than adult males.

Table 4.2: Descriptive analysis of mean monthly income and expenditure of the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals in Vhembe district, Limpopo province (n=79)

Descriptive Statistics	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Income levels of the participants	79	380	11690	144740	**1841.01**	1541.749
Expenditure levels of the participants	79	420	7000	113635	**1438.42**	950.004
Valid N (list wise)	79					

4.3.3. Linear Regression Analysis of the determinants of welfare status of the Vhavenda women

The dependent variable in the Ordinary Least Square Regression model fitted for this objective was the average per capita monthly expenditure of the participants which served as a proxy for the welfare of the participants; while the statistically significant independent variables were years of experience in herbal-based cosmetics and cosmeceuticals, level of education, income levels of the participants and religious affiliation of the participants. This result indicates an efficient representation of welfare and socio-economic variable interactions among the Vhavenda women who participated in the study **(Table 4.3).** In this model fitted, the R^2 was 0.784, showing that 78.40% of the variations of the Vhavenda women's welfare was explained by the selected explanatory variables. This also shows that the model produced a very good fit for the data because the computed F-value was statistically significant ($p<0.01$).

In the combined dataset, the result shows that the income level of the participants was statistically significant ($p<0.01$), religious affiliation, level of education and experience in herbal-based cosmetics and cosmeceuticals among the Vhavenda women were statistically significant ($p<0.05$). However, the remaining four exogenous variables such as the age of the participants, marital status of the Vhavenda women, number of households and status of employment were not statistically significant ($p>0.10$).

The result shows that the parameter estimate for income level of the participants was statistically significant ($p<0.01$) and positive (0.799), indicating that increase in the monthly income of the

participants increases the welfare of the participants. This is in line with the rule of the thumb, as increase in income is expected to lead to better or improved welfare of the participants. This also implies that herbal-based cosmetic and cosmeceutical income plays a significant role in the socio-economic and welfare of the participants. This is also affirmed by Reyes-García et al. (2018) that income is a carter of utility or personal wellbeing. This means that the increases in welfare are by higher levels of income.

The positive sign of the coefficient of years of experience in herbal-based cosmetic and cosmeceutical parameter (0.131) and significance ($p<0.05$) implies that the more experienced the Vhavenda women got the more plant species they knew that could produce quality herbal-based cosmetics and cosmeceuticals. Loeb and Corcoran (2001) also outlined that income increases with experience. An increase in experience invariably promotes the welfare status because the quality of the products will be good and marketable, which in turn will serve as a good source of income to the Vhavenda women.

Age parameter showed a positive sign (0.027) and significant ($p<0.10$); this implies that ages of the Vhavenda women played a significant role in their welfare status. The higher the ages of the participants the higher the knowledge and years of experience; this would cumulate to give a good welfare status in the study area. Furthermore, the South African government provides social support that comprises social grants to elderly people and children who are unable to provide for themselves (Posel et al., 2006; Van Dijk and Mokgala, 2014). This also assists in the welfare of the Vhavenda women in Vhembe which is an indication that age plays a significant role in their welfare.

An increase in the level of education increases the chances of the participant's welfare. This had a positive (0.113) and significant ($p<0.10$) relationship with the participants' welfare proxies by their average per capita monthly expenditure in the study. According to Hahn and Truman (2015), education improves welfare because it enhances people's effectiveness to achieve social well-being. These results indicate that access to education brings changes in cognitive ability, which is essential to the Vhavenda women's capacity to reflect and act on the conditions of their lives, and to gain access to knowledge and welfare for their sustainability.

Religious affiliation shows the positive sign of the coefficient parameter (0.147) and was a significant ($p<0.01$) factor; this means that the traditional Vhavenda women are religious people and religion plays an important role to their welfare. This is because many of the study participants were traditional healers and their clients usually paid consultation fees because they believed that plant species played a significant role in healing (Mngqundaniso and Peltzer, 2008).

Household size had positive (0.060) and significant ($p<0.01$) coefficients which indicates that the more the household population the better their welfare status. Poor households tend to have proportionately higher environmental income (Thondhlana and Muchapondwa, 2014).This is contrary to the prior knowledge that the more the people in a household the harder it becomes to maintain welfare.

In the study area, the coefficient of determination of employment was positive (0.041) and significant at ($p<0.01$). This implies that, because of the high number of unemployment, people resorted to herbal-based cosmetic and cosmeceutical as income source to contribute to their welfare (Anttiroiko, 2018), especially the women with vast indigenous knowledge.

Table 4.3: Linear Regression Analysis showing the determinants of the welfare of the Vhavenda women who were knowledgeable about herbal–based cosmetics and cosmeceuticals in Vhembe district, *Limpopo province* (*n*=79)

Parameters	Coefficients	t value	Sig
(Constant)		-1.139	0.259
Age of the participants	0.027	0.401	0.690
Employment status	0.041	0.646	0.521
Number of household	0.060	0.972	0.334
Marital status of the participants	0.085	1.332	0.187
Level of education	0.113	1.734	0.088*
Years of experience in herbal-based cosmetics	0.131	2.087	0.041**
Religious Affiliation	0.147	-0.041	0.052**
Income levels of the participants	0.799	12.744	0.000***

a* Dependent Variable: Expenditure levels of the participants as proxy for welfare
Note: *, ** and * indicates 1%, 5% and 10% levels of significance, respectively**

4.4 Budgeting analysis of the Vhavenda women

Gross margin was used to estimate the cost and return on herbal-based cosmetic and cosmeceutical production in the study area as presented thus: GM = TR–TVC

$$\text{Benefit cost ratio (BCR)} = \frac{TR}{TC}$$

$$TC = TFC + TVC$$

Where: TC = total cost, TR = total revenue, TC = total cost, TR = total revenue, TFC = total fixed cost, TVC = total variable cost, GM = gross margin:
TR = R1841.01,
TVC = R918.42,
TFC = R520.00,
TC = R1438.42,

GM = R1841.01– R1438.42 = R402.59

$$BCR = \frac{R1841.01}{R1438.42} = 1.28$$

Given that the BCR is greater than 1, it shows that herbal-based cosmetic and cosmeceutical production is profitable in Vhembe district municipality of Limpopo Province, South Africa. This implies that for every R1.00 invested in herbal-based cosmetic and cosmeceutical production in the Vhavenda communities of South Africa an expected return of R1.28 will be realised *ceteris paribus*. The profitability of herbal-based cosmetic and cosmeceutical enterprise and the producer's income is expected to increase significantly if more capital is ploughed into its production and is enhanced in Vhembe district municipality, Limpopo province.

4.5 Contribution of herbal-based cosmetics and cosmeceuticals to the welfare of the Vhavenda women

Various plant species have contributed to the welfare (as household food and skin cosmeceuticals) of the Vhavenda women for several generations. Among the participants, 64% of them who were knowledgeable about herbal cosmetics and cosmeceuticals agreed that herbal-based cosmetic and cosmeceutical contributes to their welfare (**Fig. 4.5**). However, 36% of the participants who were knowledgeable about herbal cosmetics had a different view by indicating that herbs were, at the time, not really contributing to their welfare as one would expect them to do. The participants identified different challenges that they were experiencing such as illegal harvesting of herbs and the lack of willingness of patrons to pay for services rendered; all of these contributed to low economic returns.

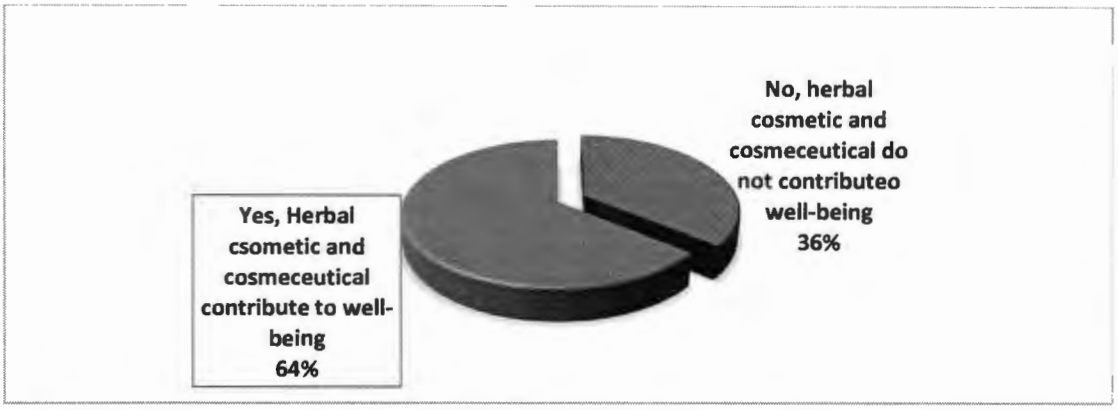

Figure 4.5: Response (%) on contribution of herbal-based cosmetic and cosmeceutical to well-being of the Vhavenda women who were knowledge about herbal-based cosmetics and cosmeceuticals in Vhembe district, Limpopo province (n=79)

4.5.1 Market survey and trends of consumer patterns of herbal-based cosmetics and cosmeceuticals in Vhembe district

Seventy nine (79) participants revealed that the mean monthly sales pattern of herbal cosmetics and cosmeceuticals are low, compared to the synthetic product cosmetics like perfumes. Many of the herbal-based cosmetic and cosmeceutical products that are bought from the Vhavenda women have a low production and lack of standardization; this makes it difficult for them to compete in the local market, or flourish, which leads to low economic income for local business in Vhembe district municipality.

4.5.2 Possible innovative pathways to the production, utilization and marketing of herbal-based cosmetics and cosmeceuticals

Three percent (3%) conceded that they had come across various challenges in herbal-based cosmetic and cosmeceutical production and skincare. These challenges include access to new technological artefacts, payments, trading and manufacture. Moreover, 54% of the participants stated that their biggest challenge was the low sales for their products. The participants mentioned that there were few customers and they also competed among themselves for the few customers because most of their service was based on traditional healing and through referral. According to Mander (1998), plant based products are marketed to consumers as self-medication or as healers' prescriptions. Hence, possible innovative pathways to the production, utilization and marketing

are generally poor; most consumers would prefer more modernized products, resulting in wastage and/or a decrease in product quality.

In addition, new innovative measures such as bottling and packaging of herbal-based products or extracts need to be adopted. According to the participants, the possible and benefiting innovative ways is to produce products that belong to communities with local names so that communities can be familiar with the product. Also, the participants highlighted that products must be marketable because the Vhavenda community were willing to buy but they only needed the standard products with class such as body lotion, facial creams, scrubs and others that could benefit knowledge holders.

4.5.3 Standardization of herbal-based cosmetic and cosmeceutical products of the Vhavenda women

The preparation, standardization and quality control of medicinal plants in Africa are essential to ensure quality control and consistency of traditional medicinal plant products (Nafiu et al., 2017). Based on practical observation made, one of the greatest challenges identified was the absence of a professional organization to govern the local women in the regulation and standardization of herbal-based cosmetics and cosmeceuticals. Therefore, local women had little or no bargaining power regarding the prices of their products. Furthermore, it was revealed that many Vhavenda women produced herbal-based cosmetics and cosmeceuticals that were not suitable for the market. As a result, most products were traditional, unappealing and lacked innovation. Lack of innovation could be attributed to lack of training, and the fact that most women failed to cooperate with their colleagues.

4.6. Tobit Regression Model of Factors affecting revenue generated from herbal-based cosmetic and cosmeceutical income of the Vhavenda women

Result of the factors influencing income of the Vhavenda women was estimated using Tobit regression. However, the F-test result shows that the estimates of an equation of the model are jointly significant at 1%, 5% and 10% level of significance. The pseudo R square is 27.22%. From the 20 variables fitted in the model, years of experience, expenditure and consumption patterns were statistically significant at 1% level. Also, variables such as children under the age of 18 in the household, children under the age of 18, and payments by consumers were statistically

significant at level 5% while total number of children by participants and the age of the participants were statistically significant at 10% level of significance.

There is a negative coefficient (-0.6160918), and 1% significant level of relationship between experience and the income level among the participants. This simply means that the higher the years of experience the lower the income and *vice versa*. This is contrary to the a priori expectation of the study. Ordinarily, it is expected that the higher years of experience should lead to more income, because the participants should have acquired more experience in production and marketing which should have translated into increased income. However, this outcome might be peculiar to the study area; maybe the experiences of the Vhavenda women were not contributing to their income.

The religious affiliation variable of the Vhavenda women had a negative coefficient (-0.6951942) and was significant at 5% level of significance with the income level of the herbal-based cosmetic and cosmeceutical knowledge holders. This means that religious affiliation has a negative and significant relationship or contribution to the income from herbal-based cosmetics and cosmeceuticals. The results of the study are aligned with previous studies as that of Bettendorf and Dijkgraaf (2011); Öhlmann and Hüttel (2018), which opined that religious affiliation has a positive effect in high-income countries. On the other hand, a negative one is found for low-income countries; and because South Africa is a low income country, this finding stands to agree with the finding of other authors (Betterndorf and Dijkgraaf, 2018; Ohlmann and Huttel, 2018).

The estimate for the participant's expenditure was statistically significant at 1% level with positive coefficient (0.6121074) indicating that the expenditure level of the Vhavenda women who were knowledgeable about herbal-based cosmetic and cosmeceutical activity stimulated increase in their income level. As highlighted by Janvry and Sadoulet (2001), education, gender and year of experience played a vital role in determining the income of the participants. This stands to corroborate the basic economic rule of income and expenditure that the more the income level of individual the more the expenditure of such individual.

In addition, the social grants have become an increasingly popular means of improving the welfare of poor households in South Africa (Biyase, 2018; Satumba et al., 2017). The Social Assistance Act of 2004 provides the legal framework for the administration of social grants. One

of the frameworks is that children under the age of 18 are targeted as categories of people who are vulnerable to poverty and in need of state support. In household where there are children under the age of 18, it is applicable that they receive social grants. The coefficient of the participants' accessibility to social grants showed that it was statistically positive (0.041) and significant at 5% level of significance. This means that the participants whose children benefit from the monthly social grant have more income than their contemporaries whose children do not benefit from the grant. This is in line with the expected outcome of this research, as household with more social grants is expected to have more income (Nedombeloni and Oyekale, 2015).

The study further shows that payment by consumers had a negative (-0.0064162) relationship and significant at 5% level of statistical significance with the participants' income level. This means that the payment by consumers did not have a good significant relationship with income. It implies that the Vhavenda women relied on social grants as a source of income (Nedombeloni and Oyekale, 2015). Furthermore, in the study area the Vhavenda women even phrased that "*Vhavenda aba badale*", meaning that the Vhavenda people do not pay; just because herbal-based cosmetics and cosmeceuticals are undermined for lack of packaging and branding, and consumers do not intend to pay. According to Zekiri and Hasani (2015), a good packaging helps to identify and differentiate products to the consumers, packaging is used for easy delivery and safety purpose and helps companies differentiate the product from other brands.

Furthermore, the coefficient of the total number of children by participants was found to be positive (1.05755) and significant at 10% level of statistical significance. This means that the number of children per household remained a key factor for bringing more income for the Vhavenda women in Vhembe district. It stands to support what was earlier discussed: children under the age of 18; that there is a positive relationship between the total numbers of children in each household and income. The age parameter of the respondent was also found to be positive (0.2337287) and significant at 10% level of significance. This means that age of the participants is related to their income level. This could probably be due to the fact that when people age, they acquire more knowledge about herbal cosmetic production, hence more income. This factor was also highlighted by Adelekan and Omotayo (2017); that age was statistically significant to the farmers productivity and income.

Finally, the Tobit regression fitted coefficient for consumption patterns of herbal-based cosmetics and cosmeceuticals was statistically positive (0.0257713) and significant at 1% level of significance on the income of the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals. This indicates that the consumption of the participants increases with increase in their income level. This actually corroborates with the a priori knowledge that consumption of individuals increases with income level (Burger et al., 2015).

Table 4.4: Tobit Regression Model of Factors affecting revenue generated from herbal-based cosmetics and cosmeceuticals by the Vhavenda women who were knowledgeable about herbal–based cosmetic and cosmeceutical in Vhembe district, Limpopo province (n=79)

Parameters	Coefficient	Std. Err.	t-value	p-value	Interval
Experience	-0.6160918	0.1160554	-5.31	0.000***	-0.3829877
Marital status	0.1674765	0.1204115	1.39	0.170	0.4093302
Religious affiliation	-0.6951942	0.3244218	-2.14	0.037**	-0.0435738
Education attainment	0.1532906	0.1133938	1.35	0.183	0.3810487
Expenditure	0.6121074	0.115956	5.28	0.000***	0.8450119
Employment status	0.001468	0.0789941	0.02	0.985	0.1601323
Household size	0.0261993	0.0857474	0.31	0.761	0.1984281
Children under age of 18 in the household	-0.4374788	0.4743294	-0.92	0.361	0.51524
Municipalities	-0.2031099	0.2212987	-0.92	0.363	0.2413816
Tools	-0.1488979	0.1018302	-1.46	0.150	0.055634
Products	-0.0635793	0.1074252	-0.59	0.557	0.1521906
Children under the age of 18	1.05755	0.5049819	2.09	0.041**	2.071836
Benefits of herbal-based cosmetic	0.0047007	0.2131586	0.02	0.982	0.4328424
Market trends	0.0989917	0.0781714	1.27	0.211	0.2560036
Payment by consumers	-0.0064162	0.003018	-2.13	0.038**	-0.0003543
Consumers	-0.0255346	0.0726553	-0.35	0.727	0.1203979
Production cost	0.0257713	0.0725378	0.36	0.724	0.1714678
Total Number of Children by Participants	0.3940138	0.226709	1.74	0.088*	0.8493723
Age of the participants	0.2337287	0.1220305	1.92	0.061*	0.4788343
Consumption patterns	3.156138	0.9300637	3.39	0.001***	5.024226
/sigma	0.7798788	0.0779147			0.936375
Number of obs	69				
LR chi^2(19	56.55				
Prob> chi^2	0.0000				
Pseudo R^2	0.272				
Log likelihood	75.592938				

Note: *, ** and * indicates 1%, 5% and 10% levels of significance, respectively**

4.7. Concluding remarks

The current findings established the link between herbal-based cosmetics and cosmeceuticals and the welfare of the Vhavenda women in Vhembe district municipality. The majority of the participants were over 60 years, which is an indication that the knowledge is held by the older generation. Educational attainment was found to be a key significant variable in the descriptive and inferential model statistics, which implies that formal education should be strongly encouraged as a means to improve their livelihood. Variables such as years of experience in herbal-based cosmetics and cosmeceuticals, expenditure levels of the participants, children under the age of 18 in the household, total number of children by participants, age of the participants, and consumption patterns were the socio-economic independent variables that were statistically significant to income level from herbal-based cosmetics and cosmeceuticals. Based on the Ordinary Least Square Regression model (OLS), the variable such as age (years), employment status, number of households, marital status, and the year(s) of educational attainment of the Vhavenda women consuming herbal-based cosmetics and cosmeceuticals were positively significant in determinants of welfare status of the herbal-based cosmetic and cosmeceutical producers. A budgeting cost ratio indicates that for every R1.00 invested in the herbal-based cosmetic and cosmeceutical production an expected return of R1.28 was realised. These results serve as inputs for the evidence-based policy interventions to promote herbal-based cosmetics and cosmeceuticals and radical socio-economic transformation, particularly in the rural areas of Vhembe district of Limpopo province. The policy makers should encourage the youngsters by implementing policies and incentives that will make herbal-based cosmetics and cosmeceuticals more lucrative and enticing. In addition, an in-depth inventory of herbal-based cosmetics and cosmeceuticals, with associated economic potential, should be taken with more deliberate effort by the government, research and non-governmental organizations to increase funding and support of this underutilized herbal-based cosmetic and cosmeceutical enterprise in the region.

CHAPTER 5: INDIGENOUS KNOWLEDGE AND PRACTICES USED FOR NATURAL-BASED COSMETICS AND COSMECEUTICALS BY THE VHAVENDA WOMEN

Summary

The uses of plant species have a long history and become important sources of welfare and healthcare in South Africa. These plant species and their associated indigenous knowledge may be lost due to rapid change in socio-economic and environmental conditions. The aim of the study was to document the plant species used as natural-based cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality, Limpopo province, South Africa. Ethnobotanical information such as the local names of plants, method of preparation and administration were collected among 79 Vhavenda women who were knowledgeable in phytocosmestics using semi-structured questionnaires. Thereafter, quantitative ethnobotanical indices, including frequency of citation (FC) and cultural importance index (CI), were calculated. A total of 49 plant species from 31 families were identified as natural-based cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district. *Dicerocaryum zanguebaricum* (Museto) and *Ricinus communis* (Mupfure) were the most commonly cited plants. In terms of families, Leguminosae had the highest (4) number of plants while Meliaceae and Rhamnaceae had three (3) plants. Leaves and bark were the most frequent used plant parts. Furthermore, maceration and poultice were the most common preparation methods that were used to prepare these plants. The majority (75%) of plant preparations were applied topically. The current findings reveal the richness of indigenous knowledge on plant-based cosmetics and cosmeceuticals among the Vhavenda women. If properly explored, potential low-cost product(s) can be developed which can strengthen the socio-economic well-being of the Vhavenda women in South Africa. However, there will be a need to conduct laboratory-based experiments to establish the efficacy and safety of these documented plants using relevant biological assays.

Keywords: Biodiversity; Ethnobotanical survey; Indigenous knowledge; Medicinal plants; Phytocosmetics

5.1 Introduction

As the largest organ in human body, the importance of protection and nourishment of the skin cannot be over-emphasized. Globally, skin diseases remain a public health concern and affects

several individuals regardless of the age, sex and gender (Lim et al., 2017). Even though many of the skin diseases have low mortality rate and are often treated with existing medications, their affordability and efficacies remain a major challenge in recent times. As a part of cosmetology, phytocosmetic involves the use of plant species for cosmetic purpose (Pieroni et al., 2004). Generally, natural-based remedies are not limited to the beauty of the skin but also for therapeutics focused on treating various skin diseases. According to Aftel (2002), cosmetics are regarded as "any substance or preparation intended to be placed in contact with the various external parts of the human body or with the tooh (for whitening) and the mucous membranes of the oral cavity with a view, exclusively or mainly, to cleaning them, perfuming them, changing their appearance and/or correcting body odours and/or protecting them or keeping them in good conditions". As highlighted by Costa (2015), natural products have been used for ages and often the only option for most of human necessities. The majority of the traditional cosmetics are employed in enhancing beauty and treating certain skin diseases/disorders in both adults and children. More than 80% of women are common users of herbal-based cosmetics and cosmeceuticals (Corazza et al., 2009; Mahomoodally and Ramjuttun, 2016). However, various cultures have specific beauty recipes. For instance in South West Nigeria; plants, minerals and fats serve as the main composition of the recipes for traditional cosmetics (Fred-Jaiyesimi et al., 2015).

South Africa is a country with high plant diversity of over 30000 species of higher plants, and 3000 of these plant species have been found to be used in traditional medicine (van Wyk et al., 1997). Limpopo province, as one of the provinces in South Africa, is referred to as one of the hotspots due to the rich plant diversity (Mongalo and Makhafola, 2018). The use of plant species remains popular and well-enriched in the culture of the Vhavenda especially among the women who often utilize different plant species for cosmetic and cosmeceutical purposes. Several studies have explored the ethnobotanical diversity in Limpopo province (Arnold and Gulumian, 1984; Mabogo, 1990; Magwede et al., 2018; Mongalo and Makhafola, 2018; van Wyk, 2015); however, there is paucity of information regarding indigenous knowledge and practices on natural-based cosmetics and cosmeceuticals among the Vhavenda women. Documenting plant species used for natural-based cosmetics and cosmeceuticals is expected to have a significant role in increasing public awareness and proper utilization among the Vhavenda women. This may eventually serve as an impetus for more research that will unravel the potential for new phytocosmeticals. Therefore, this study focuses on the documentation of plant species, indigenous knowledge and

practices used for cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality, South Africa.

5.2 Materials and methods

5.2.1 Ethnobotanical survey

The ethnobotanical information was collected from February to March 2018, based on face-to-face interviews using semi-structured questionnaires where information such as the local names of the plant species used for natural-based cosmetics and cosmeceuticals, their preparation and administration methods were recorded. This kind of investigation, in sociological terms, is called "participant observation" (Abbet et al., 2014; Busto et al., 1997; Tuxill and Nabhan, 2001). For the current study, 79 participants with a specific profile (women) were selected in order to obtain high quality and reliable information. The participants ranged from 20 to 65 years; living in a rural environment and from a variety of socio-economic strata, with knowledge of medicinal plants. A digital voice recorder was used to register interviews and to create an audio pool of the information. In addition, photographs of each of the plant species were captured. Plants collected during the field walk were identified and voucher specimens were deposited in the herbarium of the South African National Biodiversity Institute (SANBI), Pretoria, South Africa. Botanical names of the collected plant species were identified in the herbarium using a detailed regional dichotomous key (Khan et al., 2017).

Primary data was collected from experts with experience of natural-based cosmetics and cosmeceuticals with the aid of a semi-structured questionnaire and participants' observation using local languages followed by transcriptions of all data into English. Purposive (expert) sampling was the deliberate choice to sample participants due to the qualities that each participant possesses. This was used to select representative knowledge holders that use and have knowledge about the indigenous preparation and technology on natural-based cosmetics and cosmeceuticals.

Participant observations were used in order to gain first-hand data. Vogl et al. (2004) defined research observation as the orderly selection, observation and recording of behaviour, events and setting related to a problem under investigation. This was done on its natural occurring behaviour and its usual context (Bickman and Rog, 2008). Participant's observations provided the researcher

with a better understanding of the proceedings taking place in the study area. The researcher observed and recorded the attitudes, reactions and non-verbal cues of participants, marketers, buyers, surroundings and other related information during the interviews and visits. Above all, this method of data collection allowed the researcher to obtain a careful description of the program, including activities, members and the significance they attach to their activities. Field notes derived from the observation exercise were recorded in the notebook and images were captured using a camera.

5.2.2 Data analysis

SPSS version 25 was used to perform a statistical analysis of the collected data and two quantitative analytic tools: cultural importance index (CI) (Tardío and Pardo-de-Santayana, 2008). Cultural importance index (CI) was calculated by the sum of the number of participants who mentioned the use of each plant species divided by the total number of participants (N). This index was calculated by the following formula:

$$\mathrm{CI}i = \sum_{u=u1}^{uNC} \sum_{i=i1}^{iN} \frac{URui}{N}$$

According to Tardio and Pardo-de Santayana (2008), cultural importance index takes into account the spread of the use (number of participants) for each species along with its versatility, i.e., the diversity of its applications. First, sum the CIi of all the participants (from ^{i}1to ^{i}N) within each use-category for that species (s), i.e., the number of participants who mention each use-category for the species. Second, we sum all the UR of each use-category (from ^{u}1x to ^{u}NC).

Based on the work of Heinrich et al. (1998), Frequency of citation (FC) of the plant species was calculated as follows: **FC** = (number of times a specific species was mentioned/total number of times that all species were mentioned) × 100. According to Mahwasane et al. (2013), frequency index is a numerical expression of the percentage frequency of citation for a single plant species by informants.

$$\mathbf{FC = (Np / N) \times 100}$$

Where FC is the number of informants who mentioned the use of the plant species, and N is the total number of informants in each area **(Table 3.1)**. The frequency index will be high when there are many participants that mentioned a particular plant species and low when there are few reports.

Thematic analysis was used to examine the semi-structured questionnaires and in-depth interviews; and it emphasizes pinpointing, examining, and recording patterns ("themes") within data (Blaikie, 2009). Themes are patterns across data sets that are important to the description of a phenomenon and are associated with a specific research question.

5.3 Results and discussion

5.3.1 Plant species composition of natural-based cosmetic and cosmeceutical

The immense use of plants in ethno-medicine for skincare is well enriched among different ethnic groups in South Africa (Lall and Kishore, 2014). In the current study, the Vhavenda women who were knowledgeable about natural-based cosmetics and cosmeceuticals indicated that the different types of plant species are inspired mainly by their culture. According to the participants, natural-based cosmetic and cosmeceutical products are mainly used for healing and skin-related issues. The high number (49) of plant species provides an indication that the Vhembe district municipality has diverse flora used as cosmetics and cosmeceuticals **(Table 5.1)**. The number of plants specifically used for cosmetics and cosmeceuticals documented in the study area is found to be higher than that of the other reports in Limpopo province, particularly in Vhembe district municipality (Arnold and Gulumian, 1984; Mabogo, 1990; Magwede et al., 2018). The biodiversity, including plant species, had been widely used a long time ago. It has played a key role in preserving the culture of the Vhavenda community and as source of welfare; it is strictly prohibited to cut or collect any plant species in the study area, except by knowledge holders (Bomaine).

Table 5.1: Ethnobotanical information on plant species used for cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality, Limpopo province, South Africa.

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Acanthospermum hispidum DC. (TN 014)	Tshidavhula	Compositae/ Astereaceae	Leaves, Maceration	The leaves are burned and applied topically on the wound.	H	W	0.08	2.9	7
Adansonia digitata L. (TN 032)	Muvhuyu	Bombacaceae	Bark, Maceration	It is applied topically on wounds.	T	W	0.02	0.8	2
Aloe aageodonta L.E. Newton (TN009)	Tshikhopha tshituku	Xanthorrhoea ceae	Leaves, Poultice	The sap or gel is applied as a paste on skin sores and wounds	H	W	0.05	1.7	2
Aloe marlothii A. Berger (TN 030)	Tshikhopha	Xanthorrhoea ceae	Leaves, Poultice	The sap from the plant is squeezed directly on skin wounds.	S	W	0.07	2.5	4
Annona senegalensis Pers.(TN 018)	Muembe	Annonaceae	Seeds, Maceration	Mixed with soil for cleaning tooth. It is used orally as toothpaste	S	W	0.02	0.8	2

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Bidens pilosa L. (TN010)	Mushidzhi	Asteraceae	Leaves, Poultice	The leaves are applied topically on wounds and sores.	H	D	0.07	2.5	4
Brackenridgea zanguebarica Oliv. *Syn:Brackenridgea bussei* Gilg (TN 048)	Mutavhatsindi	Ochnaceae	Bark, Maceration	Bark is used for wounds and it rejuvenates the skin. Furthermore, it is applied topically on the skin or wounds.	S	W	0.02	0.8	2
Cannabis sativa L. (TN 031)	Mbanzhe	Cannabaceae	Seeds, Maceration	Stimulate hair growth; it is applied topically.	H	D	0.05	1.6	2
Cassia petersiana Bolle (TN 033)	Munembenembe	Caesalpiniaceae	Roots, Maceration	It is taken orally as a mouthwash.	T	W	0.03	1.2	1
Cassine transvaalensis (Burtt Davy) Codd (TN 034)	Mulumanama	Celastraceae	Bark, Maceration	Bark is taken orally because it is believed the skin is affected from the inside.	T	W	0.01	0.4	1

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Catharanthus roseus (L.) G.Don (TN 002)	Liluvha	Apocynaceae	Flowers, Decoction	It is taken orally as a mouthwash.	H	D	0.02	0.8	1
Citrus assamensis R.M.Dutta & Bhattacharya (TN 049)	Tshikavhavhe	Rutaceae	Fruit, squashed as sap	Fruit sap are administered topically as a facial wash.	T	D	0.02	0.8	2
Commiphora mollis (Oliv.) Engl.(TN024)	Muukhuthu	Burseraceae	Bark, Maceration	Bark is applied topically on burn wounds (burns).	T	W	0.02	0.8	1
Dicerocaryum senecioides (Klotzsch) Abels (TN001)	Museto/Dinda	Pedaliaceae	Leaves, Poultice	The leaves are applied topically as a substitute for soap.	C	W	0.5	17.7	44
Dichrostachys cinerea (L.) Wight & Arn (TN 016)	Murenzhe	Leguminosae	Leaves, Poultice	The leaves are applied topically via sprinkling on wounds and pimples.	H	W	0.06	2.1	3

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Diospyros mespiliformis Hochst. Ex A. DC. (TN 011)	Musuma	Ebenaceae	Stem, Fruit, Poultice	The fruit is applied topically on ringworms while the stem is used orally as toothpaste.	T	W	0.07	2.5	5
Ehretia rigida (Thunb.) Druce (TN 025)	Mutepe	Boraginaceae	Leaves, Poultice	The leaves are applied topically on wounds resulting from burns.	S	W	0.01	0.4	1
Ekebergia capensis Sparrm (TN 047)	Mutobvuma	Meliaceae	Leaves, Maceration or poultice	Leaves are applied on wounds topically by sprinkling.	T	W	0.01	0.4	1
Ensete ventricosum (Welw.) E.E. Cheesman (TN 046)	Mulala	Musaceae	Leaves, Poultice	Leaves are applied orally and as lotion on burn skin (burns) and wounds.	T	W	0.01	0.4	1
Euclea divinorum Hiern (TN 023)	Mutangule	Ebenaceae	Leaves, Poultice	Leaves are applied topically on wounds.	T	W	0.07	2.5	6

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Eugenia capensis subsp. *natalitia* (Sond.) F.White (TN 035)	Tshitanzwa-tanzwane	Myrtaceae	Bark, Maceration Roots, infusion	Bark is applied topically for washing wounds, and the roots are soaked in water before being utilized.	T	W	0.01	0.4	1
Euphorbia cupularis Boiss. L.C. Wheeler (TN027)	Muswoswo	Euphorbiaceae	Roots, Maceration	The roots are mixed with *Ricinus communis* (Mupfure) oil and applied topically for swelling body.	S	W	0.02	0.8	2
Helinus integrifolius (Lam.) Kuntze (TN 012)	Mupupuma	Rhamnaceae	Whole herb, Poultice	The herb is applied topically as a substitute for soap.	S	W	0.1	5.0	11
Lippia javanica (Burm.f.) Spreng. (TN015)	Musudzungwane	Verbenaceae	Leaves, Poultice and maceration	Leaves are applied topically on wounds.	H	W	0.03	1.2	2

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Musa paradisiaca L. (TN 045)	Muomva	Musaceae	Leaves, Poultice	Leaves are applied topically to repair damaged skin and wounds.	S	W	0.08	2.9	7
Parinari curatellifolia Planch. ex Benth. (TN 041)	Muvhula	Chrysobalanaceae	Leaves, Decoction and poultice	Leaves are administered orally to rinse the mouth and topically on wounds. Used as mouthwash.	T	W	0.01	0.4	1
Peltophorum africanum Sond. (TN020)	Musese	Leguminosae	Bark, Maceration	The powder from the bark is applied as a paste on the mouth sores.	T	W	0.1	3.3	7
Persea americana Mill. (TN 042)	Afukhuda	Lauraceae	Fruit, Poultice	Fruit is applied topically to soften the skin and as nourishment of the hair	T	D	0.1	3.3	3

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Phyla nodiflora (L.) Greene (TN 007)	Tshishengel aphofu	Verbanaceae	Flowers, Poultice	Leaves or roots are taken orally through chewing to treat oral thrush.	H	W	0.06	2.1	5
Piper capense L.f. (TN 044)	Mulilwe	Piperaceae	Bark, Maceration	Bark is applied orally and topically on wounds, sore throat and tongue sores	H	W	0.01	0.4	1
Prunus persica (L.) Batsch (TN 043)	Muberegisi	Rosaceae	Bark, Maceration	Bark is applied topically on wounds.	T	D	0.01	0.4	1
Pterocarpus angolensis DC. (TN021)	Mutondo	Leguminosae	Leaves are poultice and the stem just harvested and used directly.	Stem is used to wash or clean the skin, while the leaves are applied topically on rashes	T	W	0.01	0.4	1
Ricinus communis L. (TN005)	Mupfure	Euphorbiacea e	Seeds, Poultice or Maceration	The oil is extracted from the seeds and	H	W	0.3	10.1	20

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
				applied topically to repair and beautify the skin.					
Salacia rehmannii Schinz (TN 036)	Phatatshimima	Celastraceae	Bark, Maceration	Bark is applied topically through washing of wounds and sprinkled to dry the wound.	T	W	0.01	0.4	1
Sclerocarya birrea (A.Rich.) Hochst. (TN 040)	Mufula	Anacardiaceae	Fruit, Maceration	Fruit is applied as lotion and taken orally as drink for skin to glow.	T	W	0.08	2.9	7
Searsia lancea (L.f.) F.A. Barkley (TN 039)	Mushakaladza	Anacaraceae	Leaves, Poultice or paste	The leaves are pasted, sprinkled topically on pimples, sores, skin irritation and wounds.	S	W	0.01	0.4	1
Senna obtusifolia (L.) H.S.Irwin & Barneby. (TN 028)	Mutshekets heke	Leguminosae	Leaves, Poultice	Leaves are applied topically on burn skin (burns) and further	S	W	0.03	1.2	3

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
				used as soap substitute.					
Solanum incanum L. (TN004)	Mututulwa	Solanaceae	Fruit, Decoction	The fruit is applied orally for cleaning the tooth.	S	W	0.12	4.2	11
Striga asiatica (L) Kuntze (TN008)	Vhuri	Orobanchaceae	Whole plant, Marection	The whole plant is applied topically on burn wounds (burns) by burning the herb and applying it as a paste on wounds.	H	D	0.08	2.9	8
Strychnos aculeata Soler. (TN 038)	Mukwakwa	Loganiaceae	Roots, Maceration	Roots are applied topically on burns as lotion.	T	W	0.01	0.4	1
Tabernaemontana elegans Stapf (TN 006)	Muhatu	Apocynaceae	Roots, Maceration	Roots are applied topically as lotion on burnt skin (burns).	S	W	0.02	0.8	2

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
Terminalia sericea Burch. ex DC (TN 017)	Mususu	Combretacea e	Leaves, Poultice and maceration	The leaves are applied topically for cuts and sprinkled on burns as powder.	T	W	0.07	2.5	5
Trichilia emetica Vahl (TN013)	Mutshikili	Meliaceae	Leaves, Poultice	The leaves are used as toothpaste, while others apply it topically on wounds.	T	W	0.02	0.8	2
Xanthoxylum fagara Sarg. (TN 037)	Mununguu	Rutaceae	Bark, Maceration	Bark is applied topically and orally for mouth sores and as toothpaste.	S	W	0.07	2.5	7
Ximenia caffra Sond. (TN 019)	Muthanzwa	Oleaceae	Roots, Maceration and poultice	Roots are applied topically to rejuvenate the skin, wounds and pimples.	S	W	0.05	1.6	2
Ziziphus mucronata Willd.	Mutshetshet e	Rhamnaceae	Leaves, Poultice	Leaves are applied topically on burns and pimples *(Maphodo).*	T	W	0.02	0.8	2

Scientific name (voucher number)	Vernacular name (Vhavenda)	Family	Plant part and method of preparation	Administration	*Plant form	**Occ	CI	FC	Frequency (N)
(TN 026)									

Note: *Plant form: T = Tree, S = Shrub, H = Herb and C = Creepers.

**Occurrence: W=Wild, D=Domesticated. N= Number of participants

5.3.2 Plant species, knowledge and cultural practices used for natural-based cosmetics and cosmeceuticals by the Vhavenda women

The Vhavenda women believe that the plant species should not be harvested from the north and south sides because they bring uncertainty to the people who will use them. Constant and Tshisikhawe (2018) highlighted that some villages in Vhembe district municipality such as Tshidzivhe, Lwamondo and Tshiendeulu, the Khosi and Mukoma continue to play an important role in monitoring compliance of rules to harvesting indigenous plant species in an area under jurisdiction and the reporting of unsustainable harvesting practices. Same results are found in some of the villages like Mukoma, where the plant species are collected from the east side if they are about to cure someone below the age of 60; it is assumed that the person still has a long life to live. Whereas it is believed that those over 60 years have short time to live, and that they might even just rest. Plant species that are used for cosmetics among the Vhavenda women are most used as an aspect of healing and not to enhance the skin only. Hence, the Vhavenda women who had herbal knowledge articulated that herbal cosmetics are an inter-disciplinary practice which heals the skin and promotes beauty.

5.3.2.1 Plant form of plant species used for natural-based cosmetics and cosmeceuticals

Analyses of the data in **Table 5.1** provide interesting insights into the main patterns of plant use. For example, **(Fig. 5.1)** shows the top life-form of useful plants (i.e., those contributing the largest number of plant species used for natural cosmetics and cosmeceuticals). It is noteworthy that the trees have 22 recorded species, nearly double the number of next most important life-form, the shrubs (12 species). The remaining habits in descending order are herbs (11 species) and creeper (1 species). This could be related with the floristic composition of the vegetation of Vhembe district municipality which is dominated by trees and shrubs (Constant and Tshisikhawe, 2018; Mabogo, 1990; Magwede et al., 2018). A high usage of trees, shrubs and herbs in Vhembe district municipality is also likely associated with the ability of Vhembe as a tropical region which, in turn, helps the plants to be widely available and abundant in the study areas.

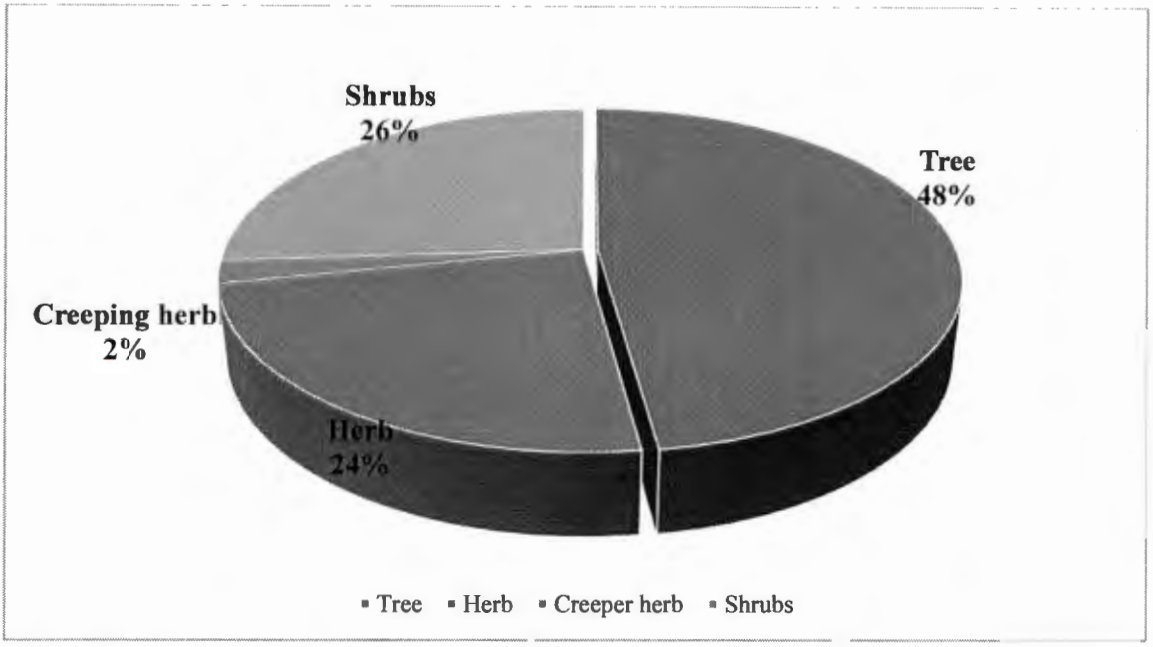

Figure 5.1: Distribution of the habits of plant species used for natural-based cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality, Limpopo province

5.3.2.2 Plant species parts used for cosmetic and cosmeceutical by the Vhavenda women

Interestingly, the most popularly utilized part of the plant was the leaves (41%) as shown in **Figure 5.2**. Similar observation of the dominance of the leaves over other plant parts have been recorded by other researchers (Afolayan et al., 2014; Mahomoodally and Ramjuttun, 2016; Saikia et al., 2006). Generally, the leaves are the most popular plant parts used to treat skin infections in southern Africa (Mabona and Van Vuuren, 2013). The authors also highlighted that many other indigenous communities worldwide, including India, utilize mostly leaves for the preparation of traditional medicines used for natural-based cosmetics and cosmeceuticals. On the other hand, Fongnzossie et al. (2017) highlighted that fruits were the most commonly used plant parts for cosmetics and cosmeceuticals among the Gbaya ethnic group in Eastern Cameroon. Thus, indigenous knowledge on plant-based cosmetics and cosmeceuticals differs across different communities and ethnic groups globally.

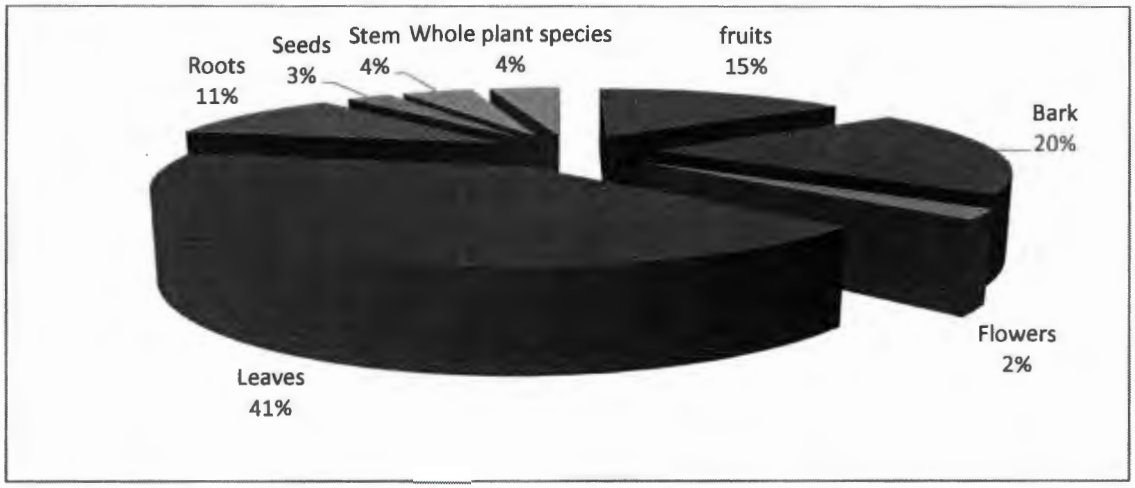

Figure 5.2: Distribution of the plant parts for plant species used for cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality, Limpopo province, South Africa

5.3.2.3 Habitations of plant species used for natural-based cosmetic and cosmeceutical

According to Legwaila et al. (2011), harvesting and collection of plants in most developing countries is done by women and children. The present study indicated that the Vhavenda women use various harvesting methods which are influenced by culture and belief (Constant and Tshisikhawe, 2018).This study clearly indicated that most (91%) of the plant species are harvested from the wild (forest) **(Fig. 5.3)**. Most of the Vhavenda women preferred to collect various plant species from natural forest because they worried that some patients might use the plants incorrectly, and those plants from the forest are not contaminated by the communities. Collection from the wild is a common practice in Limpopo Province (Arnold and Gulumian, 1984; De Wet et al., 2013; Mabogo, 1990).

Figure 5.3: Distribution of habitats for plant species used for natural-based cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality, Limpopo province

Nowadays, many plant species are being studied for their medicinal and cosmeceutical purposes and for commercialization (van Wyk, 2011). The range of natural-based cosmetics and cosmeceuticals in this study is similar to a study in Amatole district where 106 plant species from 61 families were identified as being used to treat one or more skin disorders (Afolayan et al., 2014). According to Lall and Kishore (2014), almost 35 out of the 117 species are totally unexplored in the area of skincare in South Africa. Plants from families such as are Asteraceae, Euphorbiaceae, Lamiaceae, Rubiaceae, Fabaceae and Anacardiaceae were used by traditional healers to manage skin ailments. An inventory of all recorded Vhavenda plants used for natural-based cosmetics and cosmeceuticals is presented in **Tables 5.1**. A total of 31 families are used for natural-based cosmetics by the Vhavenda, of which 40 species (81%) are recorded for the first time as having ethnobotanical relevance in natural-based cosmetics and cosmeceuticals.The plant families mostly represented included Leguminosae with 4 plants, Rhamnaceae and Meliaceae with 3 plants, while other families had 1 or 2 plants **(Fig. 5.4).** However, the plant families in Vhembe district municipality in Limpopo province used for natural-based cosmetics and cosmeceuticals are different from other provinces in South Africa (Afolayan et al., 2014; De Wet et al., 2013; Thibane et al., 2018).

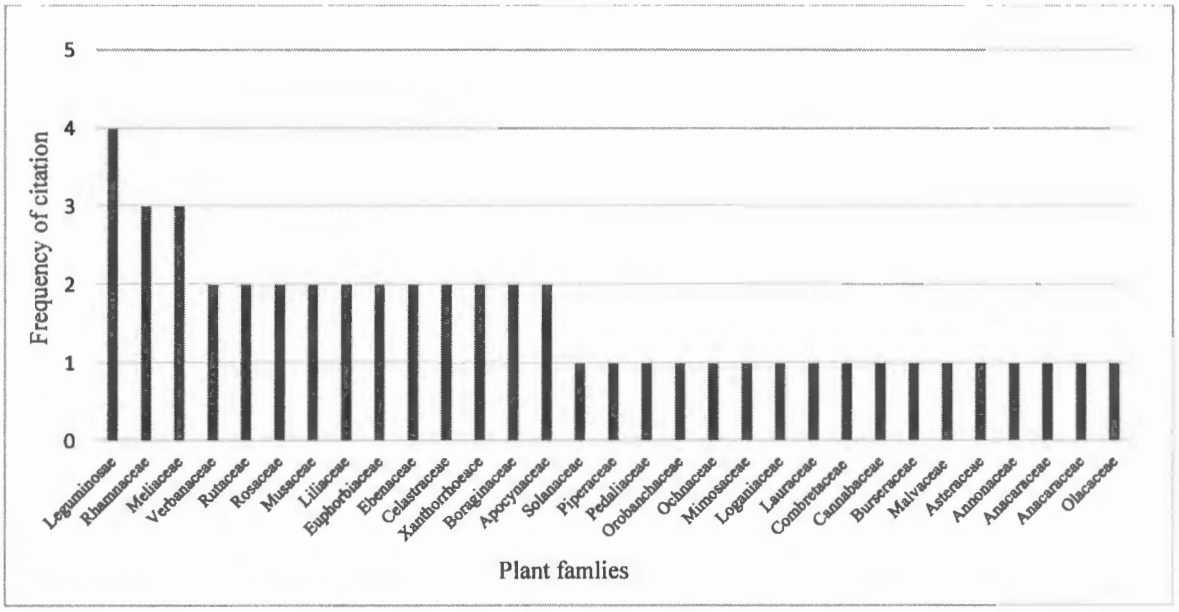

Figure 5.4: Frequency of plant families used for cosmetic and cosmeceutical purposes in Vhembe district municipality, Limpopo province.

In the present study, the majority of the identified plant spices were used for wounds and skin burns **(Fig. 5.5).** Other studies in South Africa have also reported that plant species are frequently used as natural-based cosmetics and cosmeceuticals (Afolayan et al., 2014; Thibane et al., 2018; Xaba, 2016). This could be due to the prevalence of the use of medicinal plants to treat skin infections which is very common in many rural areas (Naidoo and Coopoosamy, 2011). South Africa is an important focal point of botanical and cultural diversity but only a few plant species have previously become fully commercialised as medicinal products (van Wyk, 2011). Plant species are highly sought after to treat dermatological disorders due to their ability to stop bleeding, speed up wound healing, as treatments for burns and to alleviate other skin conditions.

Different types of skin diseases/disorders, including abscess, boils, burns eczema, pimples, ringworms, toothache and wounds, were managed using different plant-based cosmetics and cosmeceuticals. Particularly, 24 plant species were used to heal wounds, followed by boils, pimples, toothache, burns which were treated with 3 plants each. Wound healing is the most dominating ailments in the study area. According to Jarić et al. (2018), wound is disruption to the normal anatomic structure of the tissue which leads to the loss of epithelial continuity as well as the anatomical and functional integrity of the living tissue.

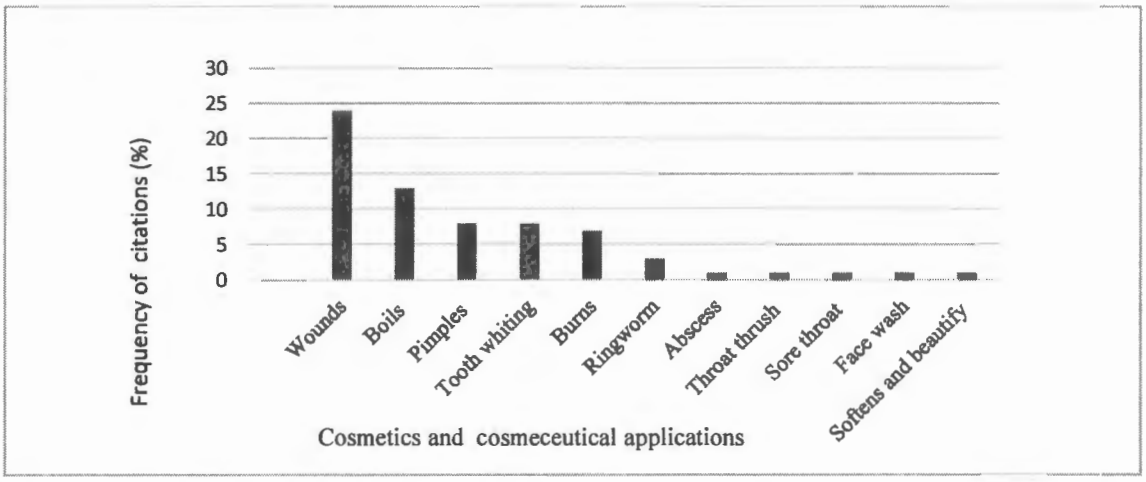

Figure 5.5: Cosmetic and cosmeceutical applications treated with different plant species by the Vhavenda women in Vhembe district municipality, Limpopo province

5.3.2.4 Cultural importance of plant species that are used by the Vhavenda women

The comparison of earlier ethnobotanical studies conducted in Vhembe district municipality and other parts of South Africa with present study showed that many plant species were confirmed for

different use **(Table 5.1)**. Plant species such as *Adansonia digitata, Aloe marlothii, Diospyros mespiliformis, Lippia javanica, Sclerocarya birrea and Ziziphus mucronata* have similar uses (Arnold and Gulumian, 1984; De Wet et al., 2013; Mabogo, 1990). However, the preparation and application methods were different. The value of each plant species was studied via the use of cultural importance index, and plant species with the highest cultural importance index were *Dicerocaryum senecioides* (17.7) and *Ricinus communis* (10.1). These high values strongly support the extent to which these plant species were most cited. Indeed several published literatures are available for these plants which are an indication of their potential as natural-based cosmetics and cosmeceuticals. For instance, the leaves of *Dicerocaryum senecioides* are applied topically as a substitute for soap (Mabogo, 1990; Rambwawasvika et al., 2017). Furthermore, *Ricinus communis*, known locally as Mupture has a high cultural importance (10.1) and the seeds are applied topically as lotion. In addition, it is topically applied for treating wounds, burns and skin ulcers in Vhembe district (Arnold and Gulumian, 1984; Mabogo, 1990; Magwede et al., 2018). As documented in the current study **(Fig. 5.6)**, *Ricinus communis* is well-known among the Vhavenda women and traditional healers for its effectiveness in healing burns and wounds. *Striga asiatica* plays a substantial role in healing wounds or burns as the herb is burned and applied to the skin. *Solanum incanum* is a herb used to heal and cure toothache, and as tooth antiseptic when mixed together with *Commiphora mollis*. Both are used simultaneously on burns and wounds. The current therapeutic uses for these aforementioned plants demonstrate the importance of collecting new ethnobotanical information even on well-known plant species (Demie et al., 2018).

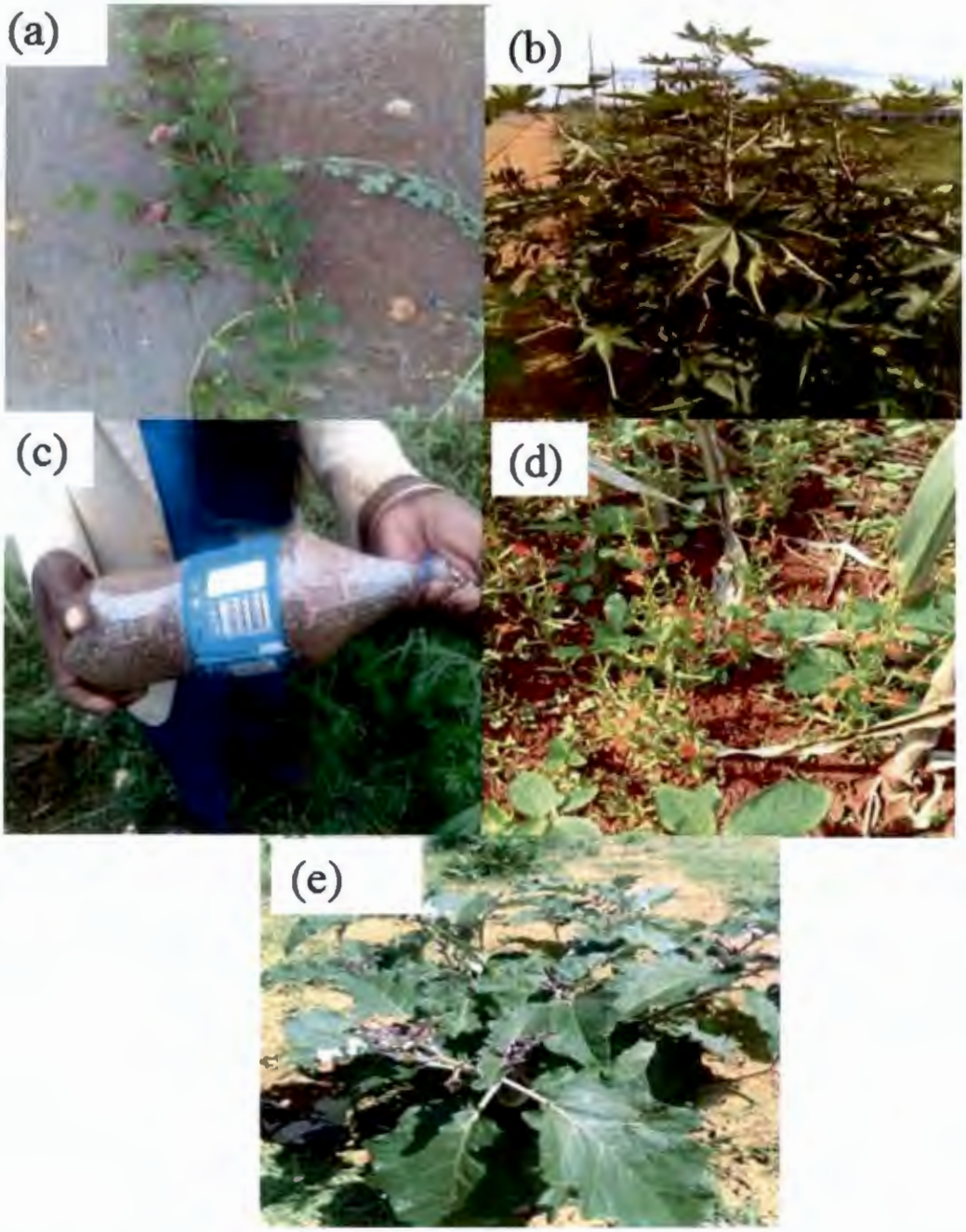

Figure 5.6: Examples of plant species (a) *Dicerocaryum senecioides* (Klotzsch), (b) *Ricinus communis* L, (c) *Ricinus communis* L. (Seeds), (d) *Striga asiatica* (L) Kuntze and (e) *Solanum incanum* L.) with high cultural importance for natural-based cosmetics and cosmeceuticals by the Vhavenda women in Vhembe district municipality, Limpopo province, South Africa

5.3.3 Method of preparations for cosmetics and cosmeceuticals

Maceration of plant species is the most recurrent method of preparation employed **(Fig 5.8)**. In addition to poultice, plant is taken raw and applied as a decoction **(Figure. 5.7)**. Moreover, water was the common medium used in most types of preparations of the cosmetics, whether grinding to paste or infusion. The findings of previous studies showed variations towards methods of preparations mentioned in the present study, among which decoction was the most frequently mentioned, followed by paste and infusion (Afolayan et al., 2014; Tadesse et al., 2005). Most of the plant remedies are prepared as a decoction or concoction by pounding, boiling and/or squeezing the plant parts either individually or, in some cases, by having the combination of them. Furthermore, in the current study, another method such as squashing had a low percentage as 1% of the plant-based cosmetics and cosmeceuticals. This finding has a unique contribution when compared with related literature on plant-based cosmetics and cosmeceuticals in South Africa.

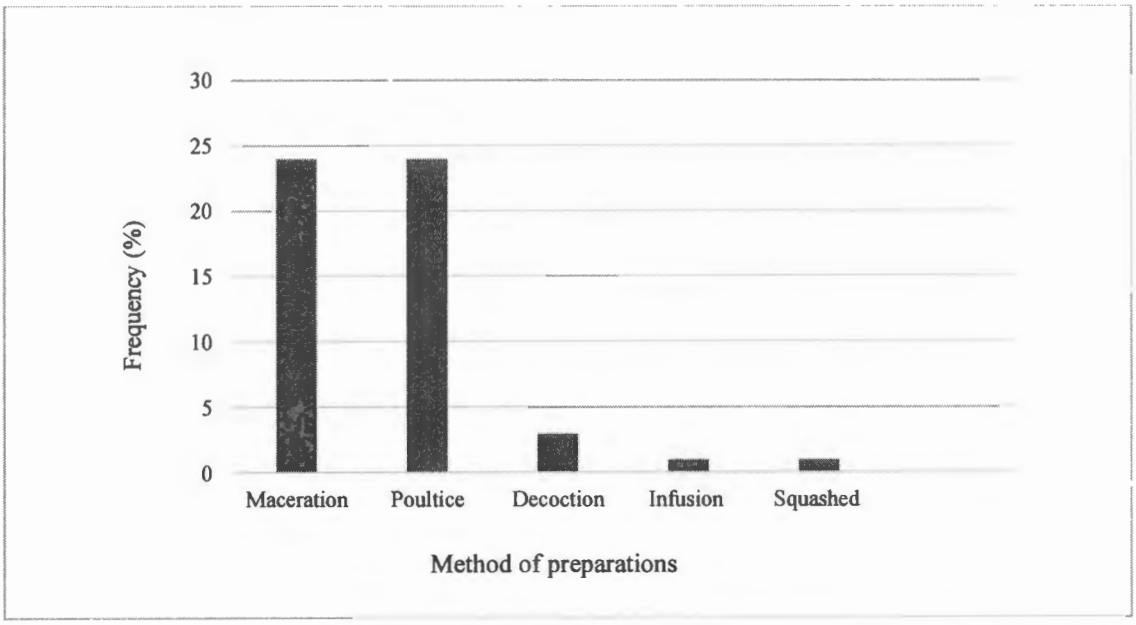

Figure 5.7: Frequency of the methods used for preparation of plants used for natural-based cosmetic and cosmeceutical purposes in Vhembe district, Limpopo province

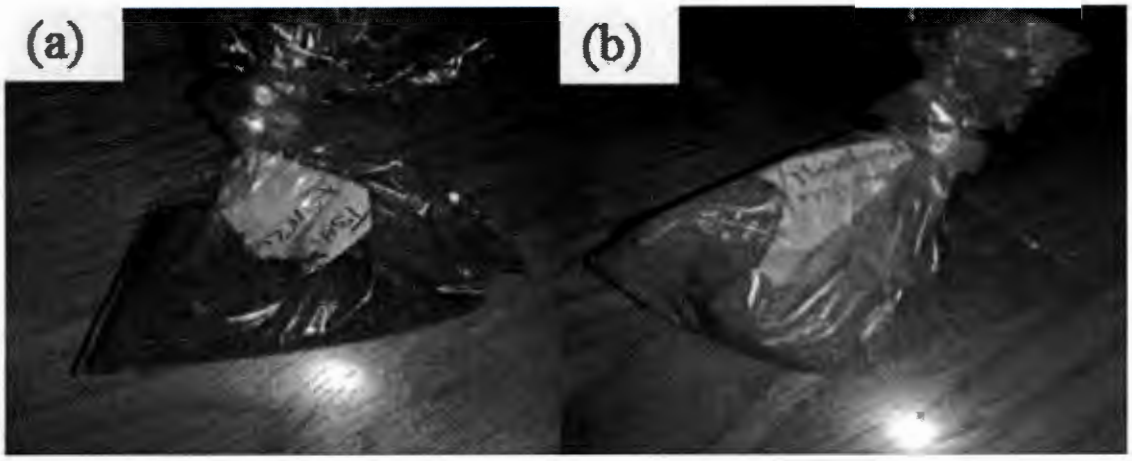

Figure 5.8: Examples of macerated plant materials (a) *Eugenia natalitia* Sond; (b) *Salacia Rehmannii*

Schinz) that are used for natural-based cosmetics and cosmeceuticals by the Vhavenda women

5.3.3.1 Mode of applications

In the current study, 75% of plant species were administered topically (**Fig 5.9**). The results of the study corroborate with other authors who reported the topical route as the most common mode of administration of natural-based cosmetics and cosmeceuticals (Saikia et al., 2006). Furthermore, this mode of administration was illustrated with 11 different cosmetic applications (**Fig. 5.5**). Interestingly, this endorses the fact that plant species are deeply rooted in the cosmetic world with various types of cosmetic and cosmeceutical use. Application of natural-based cosmetics and cosmeceuticals such as paste, powder or sap (topically) applications were also in alignment with the studies of (Saikia et al., 2006).

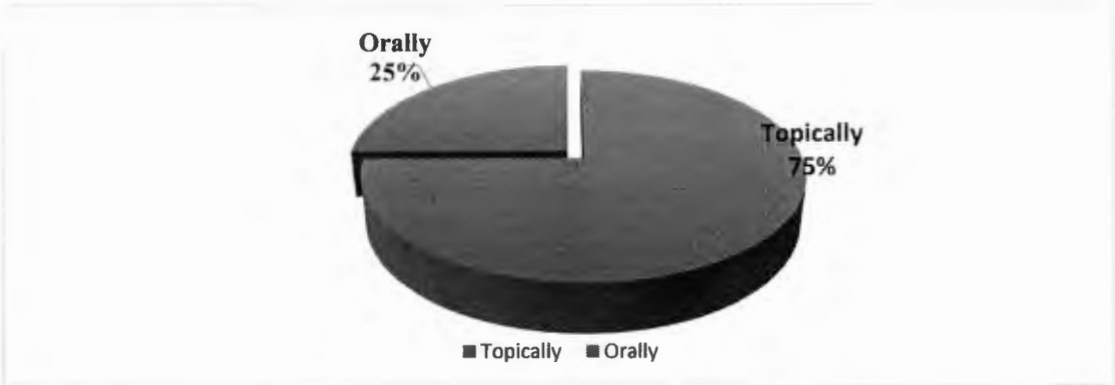

Figure 5.9: Distribution of the mode of applications of natural-based cosmetics and cosmeceuticals used by the Vhavenda women in Vhembe district municipality, Limpopo province

5.3.3.2 Materials, tools and machines used to produce natural-based cosmetic and cosmeceutical by the Vhavenda women

A variety of equipment and implements that range from hand-held manually operated equipment are used by the Vhavenda women. The main tools that were mentioned are mortar and pestle, slash, etc. **(Figs 5.10 and 5.11).** Mortar and pestle is a useful and ancient technology artefact which has become an additional tool in modern-day technology for maceration and poultice. Furthermore, there are two types of mortar and pestle: wood and iron **(Fig 5.10).** They are used to grind plants. Nevertheless, there are no machines that are used to produce herbal extracts. Most of the tools used by the Vhavenda women are home-made while others are purchased once from various hardware stores.

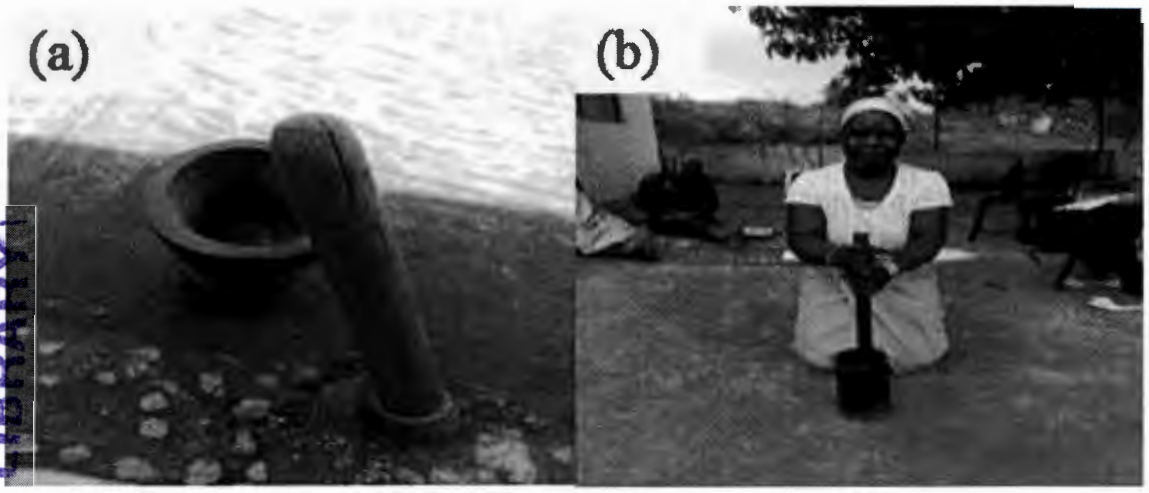

Figure 5.10: Representation of (a) Mortar and pestle and (b) the Vhavenda woman using mortar and pestle in Vhembe district, Limpopo province

A variety of tools such as mortar and pestle is employed for grinding mechanism. Stainless steel sharpener and carbon steel hoe **(Fig. 5.11)** have been used as harvesting tools for many years. The natural-based cosmetic and cosmeceutical market in Vhembe district is not supplied from local production because there is a lack of interest of the locals, and they are not well advanced to match the standard of the synthetic cosmetics and cosmeceuticals.

Figure 5.11: Tools used to harvest plants used for natural based cosmetics and cosmeceuticals (Non-ferrous metals including stainless steel Sharpener, Carbon Steel Hoe, and Machete)

5.3.3.3 Products commonly produced from natural-based cosmetic and cosmeceutical

Natural-based cosmetic and cosmeceutical has the ability to maintain and generate sufficient revenue to meet the short and long-term obligations in the welfare of the Vhavenda women. Therefore, the impact of natural-based cosmetics and cosmeceuticals is determined by the development of the products. The positive implication of the products is that they must be in a market value to be sold in order to generate income for the welfare of the communities or individuals. Natural-based cosmetics and cosmeceuticals among the Vhavenda women are not likely to be more common due to the negative perception among their own communities and individuals who are currently shifting to factory-made cosmetic products which their efficacy is more scientifically proven.

5.3.3.4 Non-plant components used for natural-based cosmetic and cosmeceutical by the Vhavenda women

Most of the plant species that are used by the Vhavenda women are non-compounded because they do not require any compounded recourses except water; though not all of the plant species or herbs require water as non-plant substances. Ninety-six percent (96%) of the Vhavenda women stated that no materials and other non-plant compound are used for the production of their cosmetics and therapeutic products. Water is the main primary resource used in the production of

natural based cosmetics and therapeutic products. Additionally, pork fats and snake oil from python have a long history in the making of beauty and therapeutic preparations.

5.4 Concluding remarks

The current ethnobotanical survey revealed that a total of 49 plants from 32 families are used as sources of natural-based cosmetics and cosmeceuticals by 79 women in Vhembe district municipality, Limpopo province. This is the first ethnobotanical study of natural-based cosmetics and cosmeceuticals in Vhembe district municipality. This result provides a relevant contribution of novelty to the knowledge of plant species in Vhembe district municipality. Infusions, decoctions, poultice or juice from fresh plants are methods for preparing the natural-based cosmetics and cosmeceuticals. The results also indicated that five (5) plant species were mentioned by the participants and have a high cultural use. The Vhavenda women believe that the plant species, according to their culture, are not harvested from the north and south parts because they bring uncertainty to the people who are to use them. Findings from this study provide rich biodiversity of a number of plants. Further studies are to progress and investigate the antimicrobial activity of the extracts of the most cited plants against bacterial and fungal pathogens implicated in natural-based cosmetics and cosmeceuticals. Scientific validation of the bio-activity of the selected plants will justify the incorporation and use of these natural-based cosmetics and cosmeceuticals for the local market and welfare of local inhabitants.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

South Africa has a vast amount of knowledge on plant-based medicine, food and cosmetics residing in different regions of the country (van Wyk, 2011). According to Bilal et al. (2016), the trends of natural-based cosmetic consumption have increased worldwide; however, the exact amount of usage is not researched well because of lack of awareness on the proper use of herbal-based cosmetics and cosmeceuticals, particularly in local communities.

6.2 Highlights of the research findings

The majority of the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals were no longer of active age, not married, and are therefore expected to have low productivity when producing herbal-based cosmetics. However, herbal-based cosmetic and cosmeceutical is profitable in the study area. For instance, inferential statistics such as OLS regression shows that herbal cosmetics and cosmeceuticals significantly contributes to the welfare of the Vhavenda women in the study area.

The Vhavenda women who were knowledgeable about herbal-based cosmetics confirmed that herbal-based cosmetics contributed to their socio-economic status within their villages since the healthcare facilities and services were far. Based on the results from participants, it is evident that some of the Vhavenda women are still relying on their indigenous knowledge for food, medicine and cosmetics purposes in various villages in Vhembe district municipality. However, some participants confirmed that herbal-based cosmetics did not contribute to their welfare.

In the budgeting analysis of herbal-based cosmetics and cosmeceuticals in Vhembe district of Limpopo Province, South Africa, the Gross margin estimate, the cost and return on herbal cosmetic production indicated that herbal-based cosmetics and cosmeceuticals was a profitable venture among the Vhavenda women in Vhembe district municipality. Ordinary Least Regression (OLS) was used to determine the welfare status of the Vhavenda women who were knowledgable about herbal-based cosmetics and cosmeceuticals in Vhembe district municipality, Limpopo province, South Africa. The dependent variable in the model was the average per capita monthly expenditure of the participants which served as proxy for the welfare of the participants, while the statistically significant independent variables were years of experience on herbal-based cosmetics and

cosmeceuticals. This model produced a good fit for the data because the computed F-value was statistically significant ($p<0.01$). This result indicates an efficient representation of welfare and socio-economic among the Vhavenda women who participated in the study. The R^2 was 0.784, showing that 78.40% of the variations of the Vhavenda women's welfare was explained by the selected explanatory variables.

In addition, the study further fitted two-stage Probit model to analyse factors affecting income level of herbal-based cosmetics and cosmeceuticals produced by the Vhavenda women in Vhembe district, Limpopo province, South Africa. Years of experience in herbal-based cosmetics and cosmeceuticals, expenditure levels of the participants, children under the age of 18 in the household, children under the age of 18 years, total number of children by participants, age of the participants, and consumption patterns were the socio-economic dependent variables that were statistically significant to the Vhavenda women's income level of herbal-based cosmetics and cosmeceuticals.

Ethnobotanical survey was used to document and collect plants used for herbal-based cosmetics and cosmeceuticals in the study area. In total, 49 plants belonging to 32 families were recorded in the current study. High number of the plants used for natural-based cosmeceuticals are prescribed to alleviate skin problems such as burns and wounds.

The study provided an indication of the rich indigenous knowledge on plant-based cosmetics and cosmeceuticals among the Vhavenda women. If properly explored, potential low-cost products can be developed; this can strengthen the socio-economic well-being of the Vhavenda women as part of the development of the bio-economy of Vhembe district municipality, South Africa.

6.3 Recommendations

These results can serve as inputs for the evidence-based policy interventions to promote herbal-based cosmetics and cosmeceuticals and radical socio-economic transformation, particularly in the rural areas of Vhembe district of Limpopo province. The study shows that the Vhavenda women who were knowledgeable about herbal-based cosmetics and cosmeceuticals vulnerability to low level of income, low production and low level of consumption was articulated previously in spite of the existing bio-economy laws and standards or other trade production. The National Research Foundation, Department of Science and Technology and its Trade and Industry counterpart are

working hard to advance the intellectual property rights (IPR) and standard policies which signify the importance of indigenous knowledge by formulating workable specific policy strategies in order to achieve the national development plan (NDP) of 2030 and to meet the radical socio-economic transformation. This endeavour could invariably guarantee appropriate and more effective interventions which will steer up the support and uptake by the local stakeholders (indigenous knowledge experts such as the Vhavenda women, agricultural extension expert, and Non-Governmental Organization). Based on the outcomes of this study, the following policy recommendations are suggested:

- From the current findings, the majority of the participants were over 60 years; this simply means that the Vhavenda women with herbal-based cosmetic and cosmeceutical knowledge across the selected villages were found to be ageing. The government should encourage the young by implementing policies and publicity that will make herbal-based cosmetics more lucrative and enticing so that the ageing women can be replaced by the youths who are presently migrating to urban areas.
- Educational attainment was found to be a key (significant) variable in the descriptive and inferential model statistics. Formal education should be encouraged by the local government through entrepreneurial workshops, capacity buildings and other source(s) of education.
- Income level of the participants affected their welfare. The Vhavenda women need more capital from the local government or national because more women need to participate in the economy; this will allow the Vhavenda women to venture into business so that the larger the capital the more their income will better their welfare.
- This study found that herbal-based cosmetics and cosmeceuticals is a profitable venture, which for every R1.00 invested in the production in the Vhavenda communities, an expected return of R1.28 will be realized *ceteris paribus.* It simply shows that the revenue of 30% per R1.00 is a good outcome for the Vhavenda women.
- Furthermore, more focus must be around R&D on product development for the local market. The community, government and private stakeholders must make sure that they bring innovations, inventions or ideas that can be commercialized through the access and

benefit-sharing model which recommends trained personnel and technology transfer rather than the royalties.

- Implementation facilities to manufacture local products through the frameworks of access and benefit-sharing (ABS) with accessibility to the latest technological and market information should be made accessible for local women in Vhembe district. The provisions to regulate frameworks and various measures put in place by the South African policy makers to enhance the services of conventional cosmetics must also be given to traditional or natural-based cosmetics and cosmeceuticals.

6.4 Future research directions

Future research could be conducted as a sequel to this study:

- Monitoring and evaluation of local market of herbal-based cosmetics and cosmeceuticals in Vhembe district of Limpopo province, South Africa;
- Documentation of ethnobotany of natural-based cosmetics and cosmeceuticals in other areas of Vhembe district, Limpopo Province using the Rapid Rural Appraisal method (RRAM); and
- Biological evaluation of the herbal-based cosmetics and cosmeceuticals in relevant bioassay (e.g. antimicrobial and wound healing) in order to provide scientific basis for their utilization in folk medicine.

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List of appendices

Appendix A:Consent form

Socio-economic impact of traditional herbal cosmetics used by the Venda women in Vhembe district municipality in Limpopo province of South Africa

My name is Peter Tshepiso Ndhlovu, Student No 24632082, I am a student at the North West University, doing research on socio-economic impact of traditional herbal cosmetics used by Venda women in Vhembe District Municipality in Limpopo Province of South Africa, I am fully responsible for the information that I will be given thus will assure you that the information given to me will not be used for profit nor sold or given to other entities, it will be for internal use only.

If you have any other concerns about your rights as a research participants that have not been answered by me, you may contact my supervisor Dr W.O Mbeng (0130020235/Wilfred.Mbeng@ump.ac.za), co-supervisor Dr O.A Aremu (018 3892573/Oladapo.Aremu@nwu.ac.za) or Professor S.A Materachera (018 389 2294/albert.materachera@nwu.ac.za), the Director of Indigenous Knowledge Systems Centre, North West University, Mmabatho

Consent

Your signature or thumb print below indicates that you have decided to volunteer as a research participant for this study, and that you have read and understood the information provided above. You will be given a signed and dated copy of this form to keep, along with any other printed materials deemed necessary by the study investigators.

Participants name:_____

Signature of the participant:_____Date:_____

Researcher's signature_____ Date _____

Appendix B: Non-disclosure agreement tool

Title: Socio-economic impact of traditional herbal cosmetics used by Venda women in Vhembe district municipality in Limpopo province of South Africa

This Nondisclosure Agreement (the "Agreement") is entered into by and between _____ with intended participants _____ ("Disclosing Party") and _____, located at _____ ("Receiving Party") for the purpose of conducting research on "Indigenous beverages used in selected communities in the North West province South Africa" preventing the unauthorized disclosure of Confidential Information as defined below.

a. **Exclusions from Confidential Information.** Receiving Party's obligations under this Agreement do not extend to information that is: (a) publicly known at the time of disclosure or subsequently becomes publicly known through no fault of the Receiving Party; (b) discovered or created by the Receiving Party before disclosure by Disclosing Party; (c) learned by the Receiving Party through legitimate means other than from the Disclosing Party or Disclosing Party's representatives; or (d) is disclosed by Receiving Party with Disclosing Party's prior written approval.

b. **Obligations of Receiving Party.** Receiving Party shall hold and maintain the Confidential Information in strictest confidence for the sole and exclusive benefit of the Disclosing Party. Receiving Party shall carefully restrict access to Confidential Information to employees, contractors, and third parties as is reasonably required and shall require those persons to sign nondisclosure restrictions at least as protective as those in this Agreement. Receiving Party shall not, without prior written approval of Disclosing Party, use for Receiving Party's own benefit, publish, copy, or otherwise disclose to others, or permit the use by others for their benefit or to the detriment of Disclosing Party, any Confidential Information. Receiving Party shall return to Disclosing Party any and all records, notes, and other written, printed, or tangible materials in its possession pertaining to Confidential Information immediately if Disclosing Party requests it in writing.

c. **Integration.** This Agreement expresses the complete understanding of the parties with respect to the subject matter and supersedes all prior proposals, agreements, representations, and understandings. This Agreement may not be amended except in a writing signed by both parties.

Disclosing Party	Receiving Party
By: _____	By: _____
Printed Name: _____	Printed Name: _____
Title: _____	Title: _____
Dated: _____	Dated: _____

Appendix C: Semi-structured questionnaire
SECTION A

Please note, your information will not be sold or given to outside entities. It is for internal use only.)

Demographic Information Questionnaire

Date.....

Respondent's name.....

1. Age

25years / less		26-40		41-55		56-70		71 and above	

2. Marital status

1.single		2.divorced		3.married		4.widowed		5.separated	

3. Race:

1.African		2.European		3.Indian		5.Other	

. 4. Religious affiliation

1.Christianity		2.Traditional		3.Islam		4.Hindu		5.Other	

5. Education level

Primary		Secondary		Tertiary		None		Other	

6. Income levels

1.R0-R500		2.R500-R1000		3.R1000-2500.00		3.R2500-R5000		R5000-R10000		R10000 & More	

7. Employment

Employed		Not employed		Part time		Self employed		Retired	

8. Children under the age of (18)

Yes		**No**	

SECTION B

2.1 Mention or list the types of traditional herbs that are used for herbal cosmetics in Vhembe District, Limpopo province

---

2.2What are the main traditional herbs used for cosmetics?

2.3 Which materials other non-plants compounded are used for herbal cosmetics preparation?

2.4 Which tools do you use in this production?

List tools and that are used by knowledge holders

2.5 Which indigenous machines are used to produce these herbal cosmetic

---

2.6 Where are these tools sourced?

From hardware stores or are self-made tools

2.7 Which products are commonly produced from this herbal cosmetics?

SECTION C

3.1 What is the indigenous knowledge and practices regarding herbal extracts used by the Vhavenda women?

3.2. How do herbal extracts contribute to household food security among the Vhavenda women?

3.3 How much are consumers willing to pay for herbal extracts?

3.4 What are the economic benefits of the herbal extracts used by the Vhavenda Women?

3.5 What are the market trends and consumer patterns of the herbal extracts?

3.6 How do herbal extracts contribute to household income?

3.7 Which are the possible innovative pathways to the production, utilization and marketing of herbal extracts?

3.8 Who are the consumers of the herbal extracts and what are the consumption patterns?

3.9 What are the advantages and disadvantages of traditional herbal cosmetics?

Advantages	Disadvantages

3.10 What are your recommendations towards the impact of traditional herbal cosmetics?

Thanks for participating in this research

Appendix D: North West Univeristy ethics approval

NWU®
NORTH-WEST UNIVERSITY
NOORDWES-UNIVERSITEIT
YUNIBESITI YA BOKONE-BOPHIRIMA
Private Bag X6001, Potchefstroom,
South Africa, 2520
Tel: (018) 299-4900
Faks: (018) 299-4910
Web: http://www.nwu.ac.za
Research Ethics Regulatory Committee
Tel: +27 18 299 4849
Email : Ethics@nwu.ac.za

ETHICAL APPROVAL LETTER OF STUDY

Based on approval by the Health Science Ethics Committee (FAST-HSEC) on 07/08/2018 after being reviewed at the meeting held on 07/08/2018, the North-West University Research Ethics Regulatory Committee (NWU-RERC) hereby approves your project as indicated below. This implies that the NWU-RERC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

Project title: Socio-economic impact of herbal cosmetics used by women in Vhembe District Municipality, South Africa.

Project Leader/Supervisor: Dr. Mbeng W.O. & Dr. Aremu O.A
Student: P.T. Ndhlovu

Ethics number: NWU-00515-18-A9
(Institution / Year / Status. S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation)

Application Type: Single study
Commencement date: 2018-08-08 **Expiry date:** 2021-08-07 **Risk:** Minimal

Special conditions of the approval (if applicable):

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- *The project leader (principle investigator) must report in the prescribed format to the HSEC:*
  - *annually (or as otherwise requested) on the progress of the project, and upon completion of the project;*
  - *without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project; and*
  - *Annually a number of projects may be randomly selected for an external audit.*
- *The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the HSEC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-RERC via HSEC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility, the NWU-RERC and HSEC reserves the right to:*
  - *request access to any information or data at any time during the course or after completion of the project;*
  - *to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process;*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the project are revealed or suspected;*
    - *it becomes apparent that any relevant information was withheld from the HSEC or that information has been false or misrepresented;*
    - *the required annual report and reporting of adverse events was not done timely and accurately; and/ or*
    - *new institutional rules, national legislation or international conventions deem it necessary.*
- *HSEC can be contacted for further information via Lesetja.Motadi@nwu.ac.za or 018 299 2508.*

The HSEC would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the NWU-RERC or HSEC for any further enquiries or requests for assistance.

Yours sincerely

Prof Lesetja Motadi
Chair NWU Health Science Research Ethics Committee (FAST-HSEC)

Appendix E: Access latter from traditional council

LIMPOPO
PROVINCIAL GOVERNMENT

DEPARTMENT OF
CO-OPERATIVE GOVERNANCE,
HUMAN SETTLEMENTS & TRADITIONAL AFFAIRS
TSHAKHUMA TRADITIONAL COUNCIL

Ref No:CH 11 5
Enq: Admin

P.O.Box 193
Tshakhuma
0951
Tel: 083 6640 786
Date:22 02 2018

"Committed to serve the Community"

TO WHOM IT MAY CONCERN

RECOMMENDATION OF CONDUCTING RESEARCH IN OUR AREA

The above matters refers

We of the above mentioned institution hereby recommend the students of North-West University to conduct research of Socio-economic impact of traditional herbal cosmetic used by Venda women in our area.

The request is strongly recommended

Please allow them to research in your village and give them information

Your attention will be highly appreciated

Yours faithfully

.....
Chairman of Traditional Council

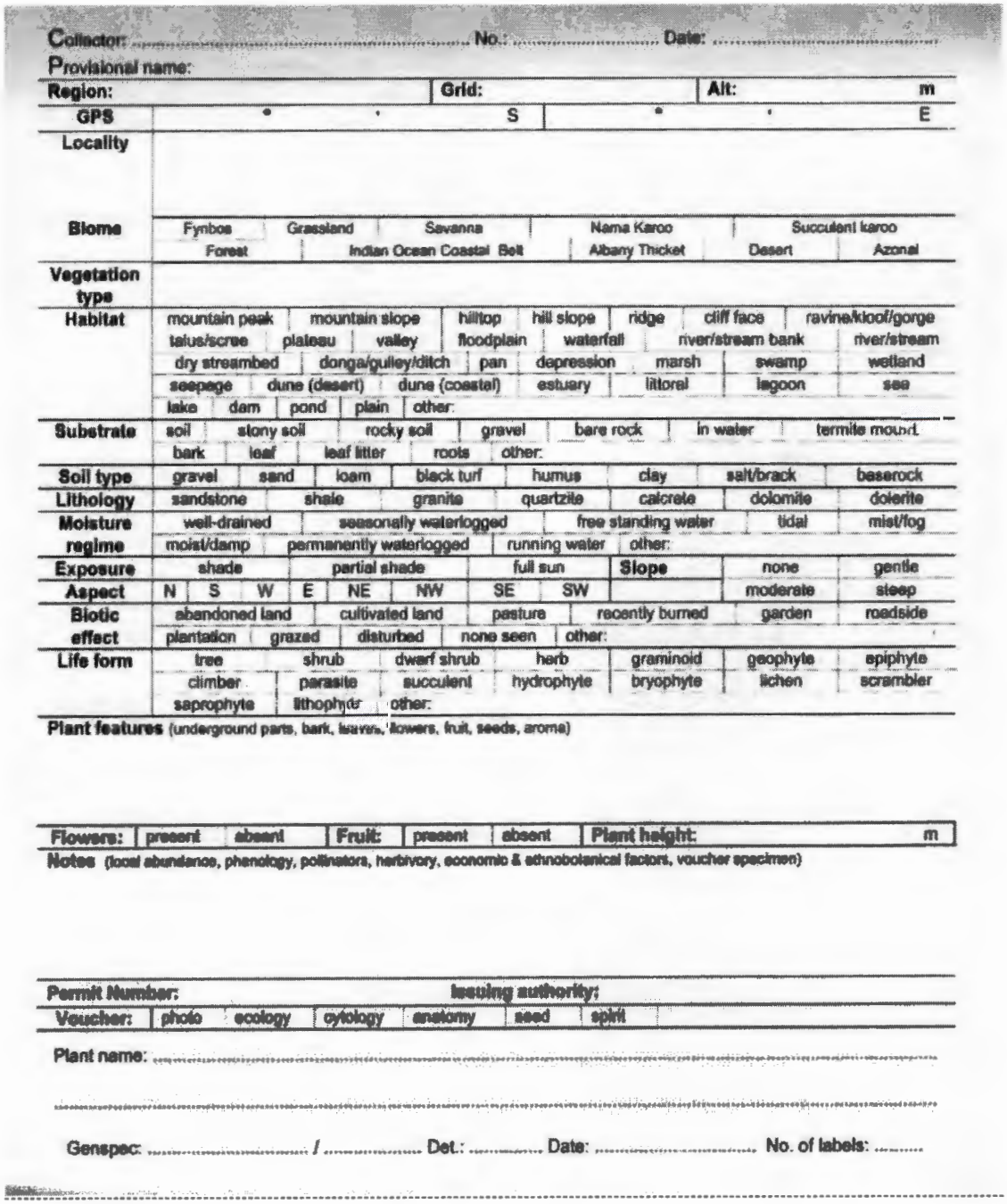
.....
Admin Officer

.....
Councillor T/C

DEPARTMENT OF CO-OPERATIVE GOVERNANCE HUMAN SETTLEMENTS & TRADITIONAL AFFAIRS
TSHAKHUMA
TRADITIONAL COUNCIL
2018 -02- 22
P.O. BOX 193
TSHAKHUMA, 0951
VHEMBE DISTRICT SUPPORT CENTRE

Development is about the

Appendix F: South African National Boideversity Institute's field label for plant collection



Collector: ..... No.: ..... Date: .....

Provisional name:

Region:				**Grid:**			**Alt:**	m
GPS	°	'	S	°	'	E		
Locality								
Biome	Fynbos	Grassland	Savanna	Nama Karoo	Succulent karoo			
	Forest	Indian Ocean Coastal Belt		Albany Thicket	Desert	Azonal		
Vegetation type								
Habitat	mountain peak	mountain slope	hilltop	hill slope	ridge	cliff face	ravine/kloof/gorge	
	talus/scree	plateau	valley	floodplain	waterfall	river/stream bank	river/stream	
	dry streambed	donga/gulley/ditch	pan	depression	marsh	swamp	wetland	
	seepage	dune (desert)	dune (coastal)	estuary	littoral	lagoon	sea	
	lake	dam	pond	plain	other:			
Substrate	soil	stony soil	rocky soil	gravel	bare rock	in water	termite mound	
	bark	leaf	leaf litter	roots	other:			
Soil type	gravel	sand	loam	black turf	humus	clay	salt/brack	baserock
Lithology	sandstone	shale	granite	quartzite	calcrete	dolomite	dolerite	
Moisture regime	well-drained	seasonally waterlogged	free standing water	tidal	mist/fog			
	moist/damp	permanently waterlogged	running water	other:				
Exposure	shade	partial shade	full sun	**Slope**	none	gentle		
Aspect	N S W E NE NW SE SW				moderate	steep		
Biotic effect	abandoned land	cultivated land	pasture	recently burned	garden	roadside		
	plantation	grazed	disturbed	none seen	other:			
Life form	tree	shrub	dwarf shrub	herb	graminoid	geophyte	epiphyte	
	climber	parasite	succulent	hydrophyte	bryophyte	lichen	scrambler	
	saprophyte	lithophyte	other:					

Plant features (underground parts, bark, leaves, flowers, fruit, seeds, aroma)

Flowers:	present	absent	**Fruit:**	present	absent	**Plant height:**	m

Notes (local abundance, phenology, pollinators, herbivory, economic & ethnobotanical factors, voucher specimen)

Permit Number:			**Issuing authority:**			
Voucher:	photo	ecology	cytology	anatomy	seed	spirit

Plant name: .....

.....

Genspec: ..... / ..... Det.: ..... Date: ..... No. of labels: .....

Appendix G:Editor's Certificate

Dreamedge

Centre for Leadership Development

REG. NO: 2014/050907/07

TO WHOM IT MAY CONCERN
CONFIRMATION – EDITING OF DISSERTATION

I, the undersigned, duly acknowledge that I have read and edited the dissertation titled:

Socio-economic impact of herbal cosmetics used by women in Vhembe District Municipality, South Africa

By

P.T. Ndhlovu

Student number: 24632082

The following aspects were thoroughly covered during the editing process:

- Headings and page numbers in the document
- Spellings
- Grammatical errors
- Punctuations
- Formatting of numbers and units of measure
- Tables in the dissertation for both the layout and totals
- List of abbreviations with the abbreviations in the text
- References and cross-references
- Bibliography (consistency and style)
- Ensure that all references in the text appear in the bibliography

Sincerely

19/11/2018
Tope Momoh
CONSULTANT

102, Rosebridge, Joe Hanna Street, White River, South Africa
Email: dreamedgecentre@gmail.com