



**Ethnobotanical Study of Medicinal Plants of the Gamo People, Arbaminch Zuria
Woreda, SNNPR, Ethiopia.**

By: Salilish Elto Dirgo



Addis Ababa University

Addis Ababa, Ethiopia

September, 2019



**Ethnobotanical Study of Medicinal Plants of the Gamo people, Arbaminch Zuria
woreda, SNNPR, Ethiopia**

By: Salilish Elto Dirgo

**A Thesis Submitted to
The Department of Biology**

**Presented in Partial Fulfillment of the Requirement for the Degree of Master of Science
(Biology)**

**Addis Ababa University
Addis Ababa, Ethiopia**

September, 2019

ADDIS ABABA UNIVERSITY
GRADUATE PROGRAMES

This is to certify that the thesis prepared by Salilish Elto Dirgo, entitled: Ethnobotanical Study of Medicinal Plants of the Gamo People, Arbaminch Zuria woreda, SNNPR, Ethiopia and submitted in partial fulfillment of the requirements for the degree of master of science (Biology) complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Signed by examining board:

Name	Signature	Date
1. Ermias Lulekal (Advisor)		
2. -----	-----	-----
3. -----	-----	-----
4. -----	-----	-----
5. -----	-----	-----
6. -----	-----	-----

Abstract

Ethnobotanical Study of Medicinal Plants of the Gamo People, Arbaminch Zuria Woreda , SNNPR, Ethiopia

Salilish Elto Dirgo, MSc Thesis

Addis Ababa University, August, 2019

The study was conducted with aim of documenting the plant diversity used for human and livestock ailments by Gamo people of South Ethiopia particularly in Arbaminch zuria woreda, Gamo Zone, SNNPR. Data on the ethnobotany of herbal medicine were collected mainly using semi structured interview, field observation, group discussion. A total of 112 informants from 14 woreda were interviewed for the study Descriptive statistical analysis including preference ranking, direct matrix ranking and fidelity level index (FL) were employed. A total of 102 medicinal plants species used for treatment of human and livestock ailments were documented. Of these 68 (66.66%) were used as human medicine, 16 (15.68%) were used as livestock medicine and the remaining 18 (17.64%) were used for treating both. The medicinal plants collected belong to 95 genera and 54 families. Out of the whole plants species the Lamiaceae 10 species (9.8%) with regard to followed by Solanaceae 8 species (7.84%). Most of the plant species 38 (37.3) were collected from forest. Herbs constituted the highest number of species, 42 species (41.2%), The highest proportion of plant parts utilized for medicinal preparation were leaves which account for 82 (56.2%).The major routes of administration was oral 92(68.14%) followed by dermal 34(25.2%). Regarding preparation, pounding method took the highest value with about 46 (45.09%) (13).The highest informant consensus was documented for the plant *Allium sativum* cited by 64 (87.6%) informants for its medicinal value, *Acmella caulirhiza* 60 (60.82%), *Ruta chalepensis* and *Withnia somnifera* were cited by 57 (78%) and 54 (73.9%), respectively. *Acmella caulirhiza* were the most preferred species to treat tonsillitis of human. *Juniperus procera* was found to be the top multipurpose species. The highest FL values were obtained for *Acmella caulirhiza* (100%) against tonsillitis. Environmental degradation, deforestation, overgrazing, expansion of crop land, excessive use of plant parts for various uses were found to be major threats to traditional medicinal plants. Both in-situ and ex-situ conservation, good agricultural practices and sustainable use solutions is recommended. If the recommendation are put in place conservation and utilization will be enhanced in the study area

Key words: Ailments, Ethnobotany, Healers, Indigenous Knowledge, Traditional medicine.

Acknowledgements

I wish to thank Dr. Ermias Lulekal, my research advisor, for encouraging, continuously supporting, guiding and constructively correcting me throughout the paper working. His firm direction, constructive criticism enabled me to complete the work in the given time. Had it not been to his encouragement, constrictive comments and follow up, my research work wouldn't have reached to the current level.

I want to thank Ato Lemma Kebede, the Executive Director of Centre for Indigenous Question (CIQ), a local NGO which is interested in indigenous knowledge, who provided me a car to carry out the field research. The generosity of Ato Lemma made the field work enjoyable given the hot weather of Arbaminch and the rough high land road to some of the Kebeles in Arbaminch Zuria woreda. I am also grateful to Abyot Abera who is staff of CIQ and served in the field as driver who worked with me from morning to late afternoon.

Filmon Gobe is a high school teacher, traditional healer and community elder who is really a local Doctor in traditional medicine and who has passion to traditional medicine and served me as a field assistant. He was key person in the field work and shared his knowledge without any limit, helped me to press the specimen of MP species after tiresome field work. He also helped me to be connected with other healers. Dr. Abera Uncha, geographer and assistant professor in Arbaminch University, helped me in doing the location map of the study area. Thank you for the support.

I also appreciate the overall support of my husband Tarekegn Shado who was beside me in all the ups and downs of intensive MSc. Class work and field research. I am thankful to my daughters Tinsa'e, Amen and Kina'b who endured my absence from home during all the day in the class work as well as in the field research.

Mamo Shado, a young Engineer who was beside me taking care of my children and supporting me in the field research as well as helped me writing the manuscript while I was having time shortage. Thank you so much Mamo for what you did to me. My Mam, Abebech H/ Geberale thank you so much as you are all the time beside me encouraging me to learn more.

Ato Tesfaye Koyra and Dr. Abaynehu who are nurse and veterinary doctor respectively helped me validate some of the technical terms and information's collected from the field,

I highly appreciate and acknowledge all my informants and the traditional healers in Gamo zone of Arbaminch Zuria woreda as it is their knowledge and experience that I documented. I do not have words to thank the healers who frankly shared their wisdom.

Finally, I am thankful to Addis Ababa University and the Education Bureau of Addis Ababa for supporting the field research financially and all the staff members of Ethiopian National Herbarium particularly to Ato Shambel Alemu and Melaku Wondafrash I also thank staffs in Arbaminch Zuria woreda Office of Agriculture and Office of Health and to all the key staffs in the study kebeles who helped me in the data collection process.

Table of contents

List of figures	x
List of Tables	xi
List of appendices	xii
ACRONYMS	xiii
1. INTRODUCTION	1
1.1 Background	1
1.2 Statement of the Problem	3
1.3. Research questions	3
1.4 Objectives	4
1.4.1. General objective	4
1.4.2. Specific objectives	4
2. LITERATURE REVIEW	5
2.1. The importance of Ethnobotanical study	6
2.2. Traditional Medicine	7
2.3. Traditional Medicine Practices in Ethiopia	8
2.4 Distribution of Traditional Medicinal Plants in Ethiopia	9
2.5. Ethnoveterinary Practices in Ethiopia	10
2.6. Conservation and Sustainable Use of Traditional Medicinal Plants	12
2. 7. Review of Researches on Medicinal Plants of Ethiopia	14
2.8. Major Threats to Medicinal Plants in Ethiopia	20
2.9. Challenges to Traditional Herbal Medicine Practice in Ethiopia	20
3. MATERIAL AND METHODS	22
3.1. Description of the Study Area	22
3.2. Population	23
3.3. Climate	23
3.4. Livelihood	23
3.5. Major vegetation Types	25
3.6. Human and Livestock Health Services	25
3.7. The Study Kebeles	27
3.8. Methodology	27
3.8.1. Reconnaissance survey	27
3.8.2. Informant selection	28
3.8.3. Data collection	29

3.8.4. Specimen Collection	29
3.8.5. Specimen identification.....	30
3.8.6. Data Analysis	30
3.8.6.1. Descriptive statistics	30
3.8.6.2. Informant consensus	31
3.8.6.3. Preference ranking	31
3.8.6.4. Direct matrix ranking	31
3.8.6.6. Fidelity level index.....	32
4. RESULTS	33
4.1 General Information of Informants	33
4.1.1 Sex and Age of Informants	33
4.2. Medicinal Plants in Arbaminch Zuria Woreda	34
4.2.1. Habit of medicinal plants to treat human and livestock ailments in Arbaminch zuria woreda.....	35
4.2.2 Habitat of medicinal plants to treat human and livestock ailments in Arbaminch zuria woreda.....	35
4.2.3. Parts of medicinal Plants to treat human and livestock ailments in Arbaminch Zuria woreda.....	36
4.2.4. Route of Administration of medicinal Preparation to treat human and livestock ailments in Arbaminch Zuria woreda	36
4.2.5. Preparation of Herbal Remedies to Treat Human and Livestock Ailments	37
4.3. Medical Plant Species Used To Treat Human, Livestock and Both Human and Livestock Ailments.....	37
4.3.1. Medical Plant Species used to Treat Human Ailments in Arbaminch Zuria woreda.....	38
4.3.1.1 Habit of medicinal plants to treat human ailments in Arbaminch zuria woreda.....	38
4.3.1.2. Habitat of medicinal plants to treat human ailments in Arbaminch zuria woreda	38
4.3.1.3. Parts of medicinal Plants to treat human ailments in Arbaminch Zuria woreda.....	39
4.3.1.4. Method of preparation of Medicinal Plants used to Treat Human Ailments	40
4.3.1.6. Major Human Diseases and Plant Species used by Local People.....	41
4.3.2 Medicinal Plant Species Used To Treat Livestock Ailments in Arbaminch Zuria woreda	42
4.3.2.1. Habits of medicinal plants to treat livestock ailments in Arbaminch zuria woreda.....	43
4.3.2.2 Habitats of Medicinal Plant to Treat Livestock Ailments in Arbaminch Zuria woreda.....	43
4.3.2.3. Parts of Medicinal Plants to Treat Livestock Ailments in Arbaminch Zuria woreda	44
4.3.2.4. Methods of Preparation and Routes of Administration of Medicinal Plants to Treat Livestock Ailments	45
4.3.2.5. Major Livestock Diseases and Number of Plant Species Used in the Study Area	46

4.3.3 .Medical plant species used to treat both livestock and human ailments	46
4.3.3.1. Habits of medicinal plants to treat both human and livestock ailments in Arbaminch zuria woreda.....	47
4.3.3.2. Parts of Medicinal Plants to Treat both human and Livestock Ailments in Arbaminch Zuria woreda	48
4.3.3.3 Method of preparation of medicinal Plants for both human and Livestock	48
4.3.3.4. Route of administration of medicinal plants used for both human and livestock	49
4.4 Ranking of Most Important Medicinal Plants.....	49
4.4.1. Informant consensus	49
4.4.2 Preference Ranking	50
4.4.3 Direct Matrix Ranking	51
4.4.4 Fidelity Level.....	53
4.5 Threats to Medicinal Plants and Indigenous Knowledge to TM.....	54
4.6 Management and Conservation of Medicinal Plants	54
4.7. Transferring Knowledge of Traditional Medicinal Plants	55
4.8. Marketing Medicinal Plants.....	55
4.9 .The Challenges of the Traditional Herbal Healers.....	56
5. DISCUSSION, CONCLUSION AND RECOMMENDATION	58
5.1 DISCUSSION	58
5.1.1 Diversity of Medicinal Plants in the study Area	58
5.1.2 Habits of Medicinal Plants	58
5.1.3 Habitat of Medicinal Plants.....	59
5.1.4 Plant Parts Used of Medicinal Plants	59
5.1.6 Route of Administration of Medicinal Plants	60
5.1.7 Preference Ranking	60
5.1.8 Direct Matrix Ranking of Medicinal Plants	61
5.1.9 Knowledge Transfer of Medicinal plants	62
5.2 Conclusion	63
5.3 Recommendation	64
Reference	66

List of figures

Figure 1 Map Ethiopia showing SNNPR and the study district22

Figure 2: Habits of medicinal plants to treat human and livestock ailments in Arbaminch Zuria woreda.....35

Figure 3: Habitats of medicinal plants to treat human and livestock ailments in Arbaminch Zuria woreda.....35

Figure 4: Parts of medicinal Plants to treat human and livestock ailments in Arbaminch Zuria woreda36

Figure 5: Route of Administration of medicinal Preparation to treat human and livestock ailments in Arbaminch Zuria woreda.37

Figure 6: Habit of medicinal plants to treat human ailments in Arbaminch zuria woreda.....38

Figure 7: Habitat of medicinal plants to treat human ailments in Arbaminch zuria wored.....39

Figure 8: Parts of medicinal Plants to treat human ailments in Arbaminch Zuria woreda.....39

Figure 9: Routes of Administration of medicinal Preparation to treat human ailments in Arbaminch Zuria woreda.....41

Figure 10: Habits of medicinal plants to treat livestock ailments in Arbaminch zuria woreda.43

Figure 11: Habitats of medicinal plant to treat livestock ailments in Arbaminch Zuria woreda,44

Figure 12: Parts of medicinal plants to treat livestock ailments in Arbaminch Zuria woreda.44

Figure 13: Route of administration of medicinal preparation to treat livestock ailments in Arbaminch Zuria woreda only.....45

Figure 14: Habits of medical plants to treat both human & livestock ailments in Arbaminch zuria woreda47

Figure 15: Plant Part Used to treat both human and livestock ailments in Arbaminch zuria woreda48

Figure 16: Route administration medicinal plants used for both human and livestock ailments49

List of Tables

Table 1: Livestock Type and number in Arba Minch Zuria Woreda 2010, Source: Arbaminch Zuria.....	26
Table 2: The study kebeles Arbaminch Zuria woreda	27
Table 3: Age structure of the study population.....	33
Table 4: marital status of informants	33
Table 5: Study Populations by Education	33
Table 6: Family, Genera and Species distribution of plants in the study area.....	34
Table 7: Method of preparation of traditional medicine to treat human and livestock ailments	37
Table 8: method of traditional medicinal plant human only.....	40
Table 9: Major human diseases and plant species used by local people	42
Table 10: Mode of preparation of medicinal plants for Livestock only	45
Table 11 : Major livestock diseases and number of plant species used.....	46
Table 12; Distribution of medicinal plants to treat both, human & Livestock	47
Table 13 : Method of preparation of medicinal Plants for both human and Livestock	48
Table 14: Ranking of Most Important Medicinal Plants	50
Table 15 : Preference ranking of eight selected medicinal plants	51
Table 16 : Direct Matrix Ranking of ten medicinal plant species	52
Table 17 : fidelity level.....	53

List of appendices

Appendix 1: List of Medical Plants Used For Human, Ailments in Arba Minch Zuria Woreda	74
Appendix 2: List of Medical Plants Used For Livestock, Ailments in Arba Minch Zuria Woreda:	82
Appendix 3: List of Medical Plants Used For both Livestock and Human, Ailments	84
Appendix 4: Checklist of questions which will be used during interviews with key informants/ healers	90
Appendix 5: List of informants contacted in the study	94
Appendix 6: photos from the field	97

ACRONYMS

a.s.l	Above Sea Level
AAU	Addis Ababa University
AMU	Arba Minch University
CM	Complementary Medicine
DVM	Doctors for Veterinary Medicine
FL	Fidelity Level
LSD	Lumpy Skin Disease
MP	Medicinal plants
NCD	New Castle Disease
SNNPR	South Nations Nationalities and Peoples Region
TM	Traditional Medicine
WHO	World Health Organization
AMM	Arbaminch Municipality
HH	House Hold

CHAPTER ONE

1. INTRODUCTION

1.1 Background

Traditional medicine (TM) is an important and often underestimated part of health services. By understanding the importance of TM, WHO has developed the second TM Strategy 2014–2023 in response to the World Health Assembly resolution on traditional medicine (WHA62.13) (WHO, 2013). The goals of the strategy are to support Member States in harnessing the potential contribution of TM to health, wellness and people centred health care; promoting the safe and effective use of TM by regulating, researching and integrating TM products, practitioners and practice into health systems, where appropriate (WHO, 2013). It seeks to build upon the first WHO Traditional Medicine Strategy 2002–2005, which reviewed the status of TM globally and in Member States. Currently, different countries of the world both developed and less developed countries including Ethiopia have given recognition and incorporated the TM in their national health policy documents though the level of implementation varies from country to country.

Using of plants is among different categories of traditional medicine and traditional healing practices. Human beings have used plants for medicinal purposes since time immemorial. Historical accounts of traditionally used medicinal plants depict that different medicinal plants were in use as early as 5000 to 4000 BC in China, and 1600 BC by Syrians, Babylonians, Hebrews and Egyptians (Dery *et al.*, 1999). Use of plant and plant products for healing human diseases and of livestock ailments have passed mainly orally from generation to generation in native and indigenous communities throughout the world (Martin, 1995, Getu Alemayehu, 2017). Significant numbers of people still depend on traditional herbal medicine side by side with modern health care system globally. Traditional medicine has maintained its popularity in all regions of the developing world and its use is rapidly

spreading in the industrialized countries. In China, for example, traditional herbal preparations account for 30%- 50% of the total medicinal consumption. In Ghana, Mali, Nigeria and Zambia, the first line of treatment for 60% of children with high fever resulting from malaria is the use of herbal medicines at home (WHO, 2003).

In Ethiopia before the opening of the first Hospital by Russian Red Cross society in 1897, almost all the public health care was carried out by traditional healers.(Abera Balcha,2015) Later in 1908 Emperor Menelike II opened the first Hospital, to take care of the public health side by side with the traditional health care system (Abera Balcha, 2015). It means before this all the public health care system was shoulder on the traditional healers of various kinds. Herbalists were among the various healers who mainly use plants to take care of public health matters.

In Ethiopia the majority of rural people which is about 83 percent of the total population; still depends much on traditional herbal medicine and traditional healers in their community (Lambert, 1995; kebede Derebe *et al*, 2006, Dawit Abebe and Ahadu Ayehu, 1993, Dawit Abebe; 2001, Getu Alemayehu; 2017). Different ethnic groups in Ethiopia are rich with regard to traditional herbal based health care system and still use the traditional herbal medicine in compliment in their health care system. Traditional herbal medicine and the plants used in the process by different ethnic groups are not exhaustively researched as noted from the number of research output and products from TM and documented despite their vital importance. Thus, recently there is interest to document the ethnobotanical knowledge of medicinal plants of different ethnic groups and communities for conservation and sustainable use for posterity. Among the indigenous ethnic groups of Ethiopia, the Gamo are one with rich wisdom of traditional medicine but not well researched and documented except few attempts (Yarcho Yaya and Birhanu Gameda, 2017). The study was performed with major purpose of contributing to the national effort of documenting traditional medicine as

indigenous knowledge regarding TM was not studied in Arbaminch Zuria before. Thus, it is believed that the study will fill gap by documenting the practice and knowledge of TM of the Gamo Community in Arbaminch Zuria woreda.

1.2 Statement of the Problem

Ethiopia is a country with multi-ethnic and multilingual communities with ancient history and civilization. Among others the use of herbs and other substances for treating and healing diseases for humans and animals is indigenous wisdom, ancient traditions and culture of many communities in the country. (Abera Balcha, 2015) The use of Traditional herbal medicine as health care system still plays major role side by side with the conventional health care system in many rural communities and in urban areas as well (Kebede Derbe *et al.*, 2006, Lambert,1995). However, given the various ethnic groups and indigenous peoples the so far research and documentation of the indigenous knowledge of traditional medicine in general and the plants used for treating particular disease by a given community is not yet fully captured. Moreover, because of lack of policy focus the traditional medicine knowledge of various communities and the knowledge holders are regarded as backward and obstacle for “modernization.” Furthermore, the plants used for treating various diseases are being eroded due to a number of factors like environmental degradation, expansion of farming, population pressure, drought, erosion of the knowledge, (Ermias Lulekal *et.al.*, 2008, Getu Alemayehu, 2017). Thus, this research will contribute to the ongoing efforts in documenting the indigenous knowledge of traditional herbal medicine in general and identifying plant varieties used for treating human and livestock ailments focusing with Gamo people of South Ethiopian Arbaminch Zuria woreda.

1.3. Research questions

- I. What types of plants are used for medicinal purpose for both humans and animals by Gamo Communities in Arbaminch Zuria woreda?

- II. What is the indigenous knowledge practices used in the traditional health care system in the community?
- III. How is the management and conservation practice of medicinal plants in the community?
- IV. What are the major challenges that the traditional herbalists of Gamo community in Arbaminch Zuria woreda face whilst providing their services?
- V. What are the major threats to medicinal plants in the community?

1.4 Objectives

1.4.1. General objective

The main aim of this research is documenting the plant diversity used for human and livestock disease by Gamo people of South Ethiopia particularly in Arba Minch Zuria woreda.

1.4.2. Specific objectives

1. To document the plant diversity used as medicinal plants for both humans and livestock in the district by traditional herbal healers
2. To document the indigenous knowledge on how the herbal healers prepare and administer herbal medicine.
3. To assess the management and conservation practices of medicinal plants in the community.
4. To identify some of the challenges the traditional herbal healers face in the study community to operate or to provide their services and the current threat to MPs in the locality

CHAPTER TWO

2. LITERATURE REVIEW

Ethnobotany is an interdisciplinary science mainly based on the methods from anthropology and botany, which studies the interaction of people and plants i.e. how people use plants in various cultures (Nolan, and Turner, 2011; Balick and Cox, 1996; Hamilton,*et.al.*, 2003). According to Martin (1995), ethnobotany is conceptualized as how the local people classify, manage, and use plants available in their environment.

It is believed that John William Hershberger was the first to propose the idea of ethnobotany in 1896 in its current form. His idea of ethnobotany was mainly recording the uses of plants by “primitive” peoples was considered to be limited in scope, but it was recognized as foundation for the current status of the discipline. Some of his suggestions, such as creating ethnobotanical gardens, and providing specimens and opportunities for scientific study, are as relevant today as they were over a century ago (Harsberger, 1896 cited in Hamilton *et al.*;1995; Nolan, and Turner, 2011) .Though he did extensive ethnobotanical research in areas like North Africa, Mexico, Scandinavia, and Pennsylvania, the science of ethnobotany was not well known till the works of Richard Evans Schultes (Harsberger, 1896 cited in Hamilton *et al.*; 1995; Nolan and Turner, 2011).

Ethnobotany today is a well-developed field of study encompassing multidisciplinary subjects cutting across natural as well as social sciences like ecology, chemistry, taxonomy, conservation biology, pharmacognosy, etc. from natural science, and anthropology, geography, economics, linguistics, environmental studies, etc. from social science fields (Balick and Cox, 1996). In the 21st century ethnobotany as a discipline is said to be well matured where by it is said to be positioned at strategic place of interactions of disciplines, knowledge systems, culture and regions (Nolan and Turner, 2011).According to Hamilton *et*

al., (2003) In the beginning of 21st century the major developments of ethnobotany as discipline are widening of focus from indigenous people to include all human being a greater use of anthropological methods to understand better how and why people classify, value, and give symbolic significance to plants a growing awareness that ethnobotanical knowledge should be appreciated as part of wider knowledge-systems. Besides, greater scientific rigour in terms of setting and testing hypotheses, and quantification; more of conservation and sustainable development, Finally, greater recognition of the intellectual property rights of local and emphasis on participatory research aimed directly at the identification and finding solutions to practical problems indigenous people, and a fair benefit sharing to local people are key among others (Hamilton *et al.*, 2003). Moreover, it is said that contemporary ethnobotany study and practice need to follow holistic and multidisciplinary approach to advance human wellbeing on multiple levels like physical, spiritual, nutritional and emotional (Nolan and Turner, 2011).

2.1. The importance of Ethnobotanical study

Ethnobotany studies so far have contributed and will contribute in the future too in finding and development of new drugs. Moreover, it is important to evaluate the trend of natural vegetation and forest resources which are source of MPs for designing conservation strategies for purposes of sustainable development. The other importance of Ethnobotanical study is the urgent need for documentation of the indigenous knowledge of MPs of various communities as it is being lost due to external and internal forces like globalization , westernization, breakdown of traditional cultures (Pandey.and Tripathi, 2017).Sustainability in supplies of wild plant resources, including of non-timber products and enhanced food security, nutrition and healthcare are among the importance of ethnobotanical studies (Campbell and Luckert, 2002;Cruells, 1994; Cunningham, 2001; Laird, 2002; Martin, 1995; Schulte's and von Reis, 1995 cited in Nolan.and Turner. 2011).

2.2. Traditional Medicine

TM is the sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness (WHO, 2013). In some countries, traditional medicine or non-conventional medicine may be termed complementary medicine (CM) (WHO, 2001).

TM has a long history of use in health maintenance and in disease prevention and treatment, particularly for chronic disease (WHO, 2013). Over 100 million Europeans are currently Traditional and Conventional Medicine (T&CM) users, with one fifth regularly using T & CM and the same number preferring health care which includes T & CM. There are many more T&CM users in Africa, Asia, Australia and North America (WHO, 2013; Cunningham, 1993, cited in Getu Alemayehu, 2017).

TM is an important and often underestimated part of health services. By understanding the importance of TM, WHO has developed the second TM Strategy 2014–2023 in response to the Sixty-second World Health Assembly resolution on TM (WHA62.13) (WHO, 2013). The goals of the strategy are to support Member States in harnessing the potential contribution of TM to health, wellness and people centered health care; promoting the safe and effective use of TM by regulating, researching and integrating TM products, practitioners and practice into health systems where appropriate (WHO, 2013). It seeks to build upon the first WHO Traditional Medicine Strategy 2002–2005, which reviewed the status of TM globally and in member States. Currently, different countries of the world both developed and less developed countries including Ethiopia have given recognition and incorporated the TM in their national health policy documents though the level of implementation varies from country to country (FDRE, Health Policy, 1993).

2.3. Traditional Medicine Practices in Ethiopia

In Ethiopia there are a various types of traditional medicine practitioners and practice. According to (Kebede Deribe *et al.*,2006) Bone setters (*Wogasha in Amharic*), Birth attendants (*Yelimed awalajoch*) , tooth extractors, herbalists, other spiritual healers like Debtera, Tenquay (which doctor), wuqabe, and Kalicha are the major categories of traditional medicine practitioners in Ethiopia in different cultures and religious groups In addition to this, other groups of healers are those who perform surgical operations such as cauterization, bleeding, cupping, circumcision, cutting the uvula, scarification, opening abscesses, removing tumor's and bullets, and extracting carious tooth. The various literature available show the significant role of medicinal plant in primary health care delivery in Ethiopia where 80% of human and 90% of livestock population depend on traditional medicine similar to many developing countries particularly that of Sub-Saharan African countries (Asfaw Debela, 2015).Other traditional treatments also include a variety of medical practices such as purging, bleeding and cupping, steam baths and immersion in hot, often thermal, water, and counter-irritation (Asfaw Debela, 2015).

Using of plants is among different categories of traditional medicine and traditional healing practices. Human beings have used plants for medicinal purposes since time immemorial. Historical accounts of traditionally used. Use of plant and plant products for healing human diseases and diseases of livestock have passed mainly orally from generation to generation in native and indigenous communities throughout the world (Martin, 1995;GetuAlemayehu, 2017). Significant number of people still depended on traditional herbal medicine side by side with modern health care system globally. Traditional medicine has maintained its popularity in all regions of the developing world and its use is rapidly spreading in the industrialized countries. In China, for example, traditional herbal preparations account for 30%-50% of the total medicinal consumption. In Ghana, Mali, Nigeria and Zambia, the first line of treatment

for 60% of children with high fever resulting from malaria is the use of herbal medicines at home (WHO, 2003).

In Ethiopia the western health care system was first introduced by establishing Hospital by Russian Red Cross society in 1897. Not much later a national Hospital by Emperor Menelik II was established in 1908 to take care of the public health side by side with the traditional health care system (Abera Balcha, 2015). It means before this time all the public health care system was shoulder by the indigenous traditional healers of various kinds. Herbalists were among the various healers who mainly use plants to take care of public health matters.

In Ethiopia the majority of rural people which is about 84 percent of the total population; still depends much on traditional herbal medicine and traditional healers in their community (Lambert, 1995; Kebede Derebe *et al.*, 2006; Dawit Abebe and Ahadu Ayehu, 1993; Dawit Abebe, 2001).

Different ethnic groups in Ethiopia are rich with regard to traditional herbal based health care system and still use the traditional herbal medicine in compliment in their health care system. Traditional herbal medicine and the plants used in the process by different ethnic groups are not well documented and researched despite their vital importance. Thus, recently there is interest to document the ethnobotanical knowledge of medicinal plants of different ethnic groups and communities for conservation and sustainable use for posterity.

2.4 Distribution of Traditional Medicinal Plants in Ethiopia

Various ethnic communities in Ethiopia have their own unique culture, tradition, language and way of life intertwined to their landscape. As a result these people have developed in their century's old interaction with their environment their own unique ways of using range of plants species for various purposes including for treatment of human and animal ailments (Endashaw Bekele, 2007). Generally, it is agreed by different scholars that the knowledge of

medicinal plants in the country is communicated from generation to generation orally. However, there are few exceptions where Ethiopia's ancient churches and other religious organization in different parts of the country have documented some of the wisdom as inscribed in parchment in Geeze manuscripts of the 15th century (Gelahun Abate, 1989; Dawit Abebe and Ahadu Ayehu, 1993). Moreover, according to Fekadu Fullas (2001), important written evidence is the book of remedy (Metsafe fews) of the 17th century which contains a wide range of medicinal plants prescription. These are mainly traditional medicine practice and Indigenous knowledge of the Orthodox Christians of the northern Ethiopia.

In Ethiopia the south and south west of the country is said to be relatively rich in terms of cultural, linguistic and ethnic diversity. It is believed that areas with high cultural and linguistic diversities overlap with high biodiversity. According to (Edwards, 2001), the south and south west Ethiopia has relatively high concentration of medicinal plants as compared to north and central part of the country. This is mainly because of high biological diversity and cultural and ethnic diversity in south and south west of the country. A study on Bale Mountains National Park, South East Ethiopia, has revealed that it is biodiversity hot spot area and equally found to be a medicinal plants hot spot. According to the study 337 medicinal species were identified of which 24 are endemic. The species comprised of 283 used as human medicine, 47 used as livestock medicine and 76 species used for both human and livestock by the community healers, harvesters, traders and users (Ermias Lulekal, 2005; Haile Yineger, 2005).

2.5. Ethnoveterinary Practices in Ethiopia

Modern veterinary medicines are not well developed in Ethiopia, nor are modern drugs available adequately to fight livestock diseases. It is estimated that about 90% of the livestock population are treated with traditional medicines. In some parts of the country, livestock diseases such as anthrax (quruba), black leg (aba gurba), anaplasmosis (afreera), ascariasis

(wosfat), abscess (ebach), leeches (alqt), trypanosomiasis, lymphangitis (gubgub), stomatitis (yafqusil), and coccidiosis (fengel) have been treated using various natural plant product combinations (Fekadu Fullas, 2010).

In different parts of Ethiopia farmers and pastoralists rely on traditional knowledge, practices and locally available materials, plants in particular, to control and manage domestic animal diseases. A comprehensive compilation of medicinal plants used in animal healthcare in Ethiopia is lacking; however, a number of plants have been widely reported as having utility for treating animals (Fekadu Fullas, 2010). Mirutse Gidey and Tilahun Teklehaymanot (2013) have made ethnobotanical study of medicinal plants used in management of livestock health problems of Afar people in Ada'ar District of Afar Region. They found 49 different plants used for treatment of various ailments of Livestock in the District. According to the writers Shrubs were the largest source (67.3%). Medicinal plants in their study site were used to treat livestock diseases like black leg, sudden sickness, contagious caprine pleuro pneumonia, pneumonia. The writers found that *Cissus quadrangularis* and *Solanum incanum* were the plants scoring the highest fidelity levels values for their use to treat blackleg and respiratory tract problems, respectively. Similarly Tilahun Tolossa (2015) in Bereber District of Bale Zone, Oromia region documented twenty four medicinal plants distributed in 18 genera and 17 families that are used to treat livestock ailments. According to the writer Shrubs found the dominant growth form of medicinal plants used for preparation of livestock traditional remedies followed by herbs and trees (Tilahun Tolossa, 2015). Tafesse Mesfine and Samson Shiferaw (2009) have documented the indigenous ethno veterinary knowledge and practice of agro pastoral communities of South Omo zone in SNNPRS. The study documented various diseases of livestock that is locally mentioned and its English equivalent if any, the symptoms observed by the local healers, cause, season of occurrence, prevention if known and treatment methods used by the local healers and the community.

2.6. Conservation and Sustainable Use of Traditional Medicinal Plants

After having clear understanding of the importance of TMPs in the primary health care system globally, governments of various countries as well as different Global Organizations like WHO, IUCN and WWF have started paying attention for conservation and sustainable use of TMPs. According to WHO report (1993), many medicinal plants face extinction or severe genetic loss in plant rich habitats such as the tropical forests, wetlands, Mediterranean ecosystems and parts of the arid zone due to increasing demand, ever increasing human population and extensive destruction. For most of the endangered medicinal plant species no conservation action has been taken. For example, there is very little material of them in gene banks. Thus, since 1993 the WHO has provided basic guidelines how each country's government could design strategies to conserve and sustainably use TMPs given the rapid decline of Medicinal plants resources globally. According to the WHO Guideline the vegetation of the world is being changed or destroyed at an alarming rate. The tropical moist forests, home to about half of the world's plants, are in particular danger, declining at an estimated 16.8 million ha/annum. Combined with exploitation, this is putting many medicinal plants in grave risk of genetic erosion and even extinction. The guideline asserts the best means of conservation is to ensure that the populations of species of plants and animals continue to grow and evolve in the wild in their natural habitats (WHO Guideline. 1993).

Similarly, a study by (Chen *et al.*, 2016) supports this by confirming that globally the MPS are disappearing at a high speed. According to the study although the threats have been known for decades, the accelerated loss of species and habitat destruction worldwide has increased the risk of extinction of medicinal plants, especially in China ,Kenya ,Nepal, Tanzania and Uganda. For conservation and sustainable use of MPs the study pointed out conservation and management strategies (e.g. in situ and ex situ conservation and cultivation practices) and resource management (e.g. good agricultural practices and sustainable use

solutions) should be adequately taken into account. Furthermore, the study recommends biotechnical approaches (e.g. tissue culture, micro propagation, synthetic seed technology to be applied to improve yield and modify the potency of medicinal plants (Chen *et al.*, 2016).

The problems associated with conservation and sustainable use of MPs in Ethiopia is not much different than the global trend. A study by Endashaw Bekele (2007) on the actual situation of MPs in Ethiopia has shown that the bulk of the plant matter used for medicinal purposes is collected from natural vegetation stocks that are shrinking with degraded environment and to substantial reduction or dwindling of species of medicinal plants. According to Ensermu Kelbessa *et al.* (1992) and (Edwards,2001) habitat and species are being lost rapidly as a result of the combined effects of environmental degradation, agricultural expansion, deforestation and over harvesting of species and this is further enhanced by human and livestock population.

Some medicinal plant species of Ethiopia are reported to have been threatened by the overuse over harvesting for marketing as medicine. A good example is *Taverniera abyssinica* Rich whose slender roots are swathed and small coiled bundles presented for market. *Taverniera abssyinica* is a popular traditional medicine for what is known as sudden disease. The species is labelled as critically endangered in the Red List of Endemic Trees and Shrubs of Ethiopia (Vivero *et al.*, 2003). It has been reported that Ethiopia has 40 species of Aloe where the sap of some species is used for medicinal, food and cosmetic application and is widely used internationally. Of these 20 species are endemic and 18 are threatened. The 1997 IUCN Red List gives threatened Plants by International trade in Kenya through smuggling and this might soon pose a threat to Ethiopia if appropriate control methods and propagation are not timely put in place. *Prunus africana* is another medicinal plant threatened like the *Taverniera*.

abyssinica. Endemic medicinal species restricted to Ethiopia are of primary concern to Ethiopia and to the world as well and thus need serious attention (Endashaw Bekele, 2017).

2. 7. Review of Researches on Medicinal Plants of Ethiopia

Various researchers have made field study with the main aim of documenting ethnobotanical knowledge and practice in different parts of the country with range of ethnic groups. Among others, Abera Balcha (2003) conducted a study on medicinal plants used in Jimma Zone, Oromia, documented thirty-nine medicinal plants that are used for the treatment of various diseases. He found that the leaf parts were widely used (42%), followed by roots (18%) and stems (18%), fruit (12%), bark and flower (2%) as a means and source of medicine. According to the writer few plants (31.0%) needed other ingredients either for taste preference or as a portion of medicine. Regarding the method of preparation, the writer found that decoction and vegetable drug constituted 3.9.0% and 37.0%, followed by concoction and infusion in 22.0% and 2.0% respectively. According to the writer the major uses of the medicinal plants ranged from pain killer to malaria and cancer treatment.

Tizazu Gebere (2005) in Konso Woreda, South Ethiopia documented a total of 70 medicinal plant species belonging to 64 genera and 30 families of angiosperms useful to treat various ailments of human. Debela Hunde *et al* (2006) in their study in Boosat sub District; Central Eastern District documented fifty-two medicinal plant species, which are used to treat 43 human diseases. The category of medicinal plant species includes shrubs (46%), herbs (25%), trees (19%), climbers (8%) and hemi parasites (2%). Roots (38%) and leaves (23%) are the most frequently used plant parts. The method of preparation is by crushing, pounding and mixing with cold water to serve as a drink and chewing to swallow the juice, which accounted for (17%) each. Fisseha Mesfin (2007) documented a total of 198 plant species in Wonago Woreda with Gedeo community, South Ethiopia. Of these, 58 medicinal plant

species belonging to 39 families and 55 genera were useful for treatment of human health problems.

Similarly, Endalew Amenu (2007) documented a total of 188 plant species (145 from wild, 31 from home garden and 12 plant species from crop field and agricultural field) distributed in 70 families and 151 genera with indigenous people of Ejaji area, Chelya District, west Shewa. Out of these, a total of 89 medicinal plants distributed in 75 genera and 46 families were recorded, of which 48 species (53.9%) were used for treatment of various human and 27 species (30.3%) for livestock ailments, while 14 species (15.7%) were used to treat both livestock and human ailments. According to his finding herbaceous species constitute the largest number with 28 species (31.5%) followed by shrubs 27 species (30.3%) and trees made up the third growth form with 24 species (26.9%) harvested for medicinal value. The highest informant consensus was documented for the plants *Ocimum urticfolium* (Hancabbiadii) cited by 64 (88.8%) informants for its medicinal value treating febrile illness. According to the writer oral administration was the dominant route (60.3%), followed by dermal route (20.1%) in which pounding, powdering, crushing, squeezing, smashing, chewing, burning, steam bath, dry bath and rubbing were recorded methods of preparation techniques.

Similarly, Ermias Lulekal *et al.*, (2008) documented the utilization, management and threats of medicinal plants in Mana Angetu district, South-eastern Ethiopia. They documented 230 plant species used as medicinal plants. From what they collected total, the large majority (78%) were used for treating human ailments. They found that the most used plant part in their study site was root (33.9%), followed by leaves (25.6%). The main source of medicinal plant in their study site was from the wild.

Moa Megersa (2010) documented a total of 126 MPs for their medicinal uses in Wayu Tuka Woreda, East wollega Zone of Oromia Region, Ethiopia. He was able to find that medicinal

plant species are distributed in 108 genera and 56 families in his study site. Fabaceae consisted of 15 species while Solanaceae, were recorded 8 species. He was able to collect large number of MPs from natural habitat 86(68%), whereas 33(26%) from home gardens and 7(5.5%) were found from both in the home gardens and natural habitat. About 78(62%) of medicinal plants were reported for treatment of human, while 23 (18.2%) were for livestock ailments. In addition, 25(20%) were reported for treatment of both human and livestock ailments. His analysis of preference ranking showed, *Acmella caulirhiza* was the most preferred medicinal plant by people of the study area to treat tonsillitis. Similarly, Eskedar Abebe (2011) documented a total of 126 plant species, representing 114 genera and 57 families, and 122 of them were claimed to be traditional medicinal plants. The family Asteraceae, which contributed 12 (9.52%) species, stood first followed by Fabaceae, Solanaceae and Euphorbiaceae with 11, 9 and 7 species respectively in Debark woreda North Gonder of Amhara Regional State, Ethiopia.

Mohammed Adefa and Seyoum Getaneh (2013) documented 89 MP species used for both human and livestock disease treatment in Chencha district, south Ethiopia. Of these MP Species 42(47%) are harvested only from the wild whilst 19 species (21%) are collected from homestead and farm areas the rest 28 species (32%) were collected from both. According to the writers, from the identified MPs 64 (72 %) were herbs, 16 species (18%) were shrubs, 8 species (9%) were trees and only one succulent. According to them leaves and roots was the most important part of plant used to treat disease with 44% and 16%, consequently. Regarding MP processing Concoction forms account 30% while infusion is 21%.

Fernandez. *et al.* (2013) identified a total of 58 medical species of which 48 species, and 44 genera, belonging to 27 families were in Tigray, northern Ethiopia, The most representative families according to the authors were Fabaceae and Solanaceae comprising 9 and 6 species,

respectively, followed by Asteraceae and Boraginaceae (3 species each) and Acanthaceae, Cucurbitaceae, Malvaceae and Polygonaceae (each comprised 2 species). The most frequently used species were *Achyranthes aspera* L. Plant parts used in preparation of remedies were mostly roots (65 %) and leaves (38 %). According to the writers Majority of plants were used for various gastrointestinal disorders, sprains treatment or to heal bronchitis, however, interesting aspects are the uses of plants to cure prostate disorders, syphilis and milk ingest disorders.

Kalayu Mesfin (2013) documented total of 31 medicinal plant species for treating 32 human ailments by Indigenous People of Gemad District, Northern Ethiopia. Out of these 18(58%) were wild whereas 11(35.48%) of them were cultivated and 2(6.44%) were wild and cultivated plants. The most dominant plant part was leaf (50 %). The route of administration was oral administration about 20 (64.5%) and the most common method of preparation is grinding about 7 (22.5%)

Abera Balcha (2003) documented a total of 49 MP species (belonging to 31 families and 46 genera) used to treat various human ailment by Oromo People, in Ghimbi District, south west Ethiopia. The majority of which 40 (81.6%) species were collected from wild while the rests from home garden Herbs constituted the largest growth habit (18 species, 37%) followed by trees (16) species, and leafy&stem 5(10%) and seed 6 (12 %). Oral administration was the dominant route (63%) followed by dermal route (22%) and nasal (11%).

The highest number of plant species being used for infectious (48%) followed by two or more diseases and non-infectious disease. Of five and seven medicinal plants of preference ranking the highest ranks were given first for *croton macrostaychus* used for malaria treatment and for *prunus africana* as rare for immediate collection and use in the traditional treatment.

Assegid Assefa and Tesfaye Abebe (2014) made Ethnobotanical Study of Wild Medicinal Trees and Shrubs in Benna Tsemay District, Southern Ethiopia. They identified and documented Ethno medicinal uses of 23 trees and shrubs, of which 56% were used to treat human ailments, 35% to treat livestock disease and 9% to treat both. Root was the most frequently used plant part used to treat human disease, followed by leaf. Human diseases like malaria, wound, tapeworm and stomachache were treated using MPS. Oral applications were widely used, followed, in frequency of prescription, by dermal applications. The most commonly treated animal diseases were external parasites, constipation and anthrax.

Tadesse Birhanu *et.al.*, (2015) documented a total of 81 major considerable medicinal plant species belonging to 43 families in selected Horro Gudurru Woredas, Western Ethiopia. According to the Asteraceae family was constituted the highest proportion (11.6%) followed by Solanaceae (9.60%). They found that rabies and wound are the most commonly treated diseases by traditional healers in their study area. Herbs (46.4%) followed by shrubs (28.6%) and tree (25%). Oral route of administration (57.1%) was the most commonly used followed by topical (33.9%). About 75.8% of the plant taxa were available every time.

Traditional medicinal plants used by Kunama ethnic group in Northern Ethiopia was documented by Meaza Gidey *et.al.* (2015). The writers collected a total of 115 species of medicinal plants and identified for treating 59 humans and livestock ailments. According to them the most commonly used plant parts for herbal preparations were roots (35.5%) and leave (21.74%) and were administered through oral, dermal, ocular, nasal and vaginal routes in decreasing order. Oral application (58 preparations, 50.43%) was the highest and most commonly used route of application followed by dermal application (35 preparations, 30.43%). Kunama tribes are rich in medicinal plant species and the associated indigenous knowledge.

Atinafu Kebede *et al.*, (2017) made Assessment on the use, knowledge and conservation of MPs in selected Kebeles of Dire Dawa Administration, Eastern Ethiopia. They documented a total of 129 plant species in 61 families and 109 genera constituting herbs (50%), trees (24%), shrubs (23%) and climbers (3%) that were reported in the treatment of various health problems. Family Fabaceae was dominant representing 8.5 % of the plant species documented. Leaves (29.4 %) were the most frequently used parts in preparing herbal remedies. Crushing (29 %) and oral route (61%) were commonly used methods of herbal remedy preparation and administration, respectively.

Getu Alemayehu (2017) by studying plant diversity and Ethnobotany documented 180 species belonging to 121 genera and 58 families in Amaro and Gelan Abaya Districts of South Ethiopia. Out of the whole plant species, eight were found endemic to Ethiopian. The Asteraceae and Fabaceae stood first contributing 15 (8.33%) species each followed by the Lamiaceae (12, 6.66%). Five plant community types were identified in each district. A total of 147 plant species were recorded that are used to treat 66 human and 28 livestock ailments in the two districts. Of the total species, 90 (61.22%) of them were obtained from natural habitats. The families best represented were Fabaceae and Lamiaceae 12 (8.16%) species each followed by Asteraceae (11, 7.48% species). Of the total number of medicinal plants, 112 (76.19%) species were reported to be used to treat human ailments and 42 (28.57%) for livestock ailments. Common diseases in the study area were wound for which 19 (7.88%) species were reported and 15 (6.22%) species for stomachache. The local people of Amaro and Gelana districts use *Myrica salicifolia* to treat the highest number (10, 4.14%) of ailments followed by *Phytolacca dodecandra* and *Solanum incanum* 7 (2.90%) each Getu Alemayehu (2017). Fitsumbirhan Tewelde *et al.* (2017) documented a total of 37 medicinal plant species belonging to 37 genera and 24 families in LaelayAdi-yabo District, Northern Ethiopia. In his finding most frequently used plant part were leaves (34%) followed by roots (24%), seed

(6%) and the remaining were other parts. Crushing was the most common way of remedy preparation. The sparsely distributed forest was important resources of healers and repositories of medicinal plants gene pools.

2.8. Major Threats to Medicinal Plants in Ethiopia

Significant number of research out puts have documented and unanimously agreed that the MPs in Ethiopia are being threatened like other natural vegetation of the country due to a number of reasons. The most commonly cited reasons as threats to medicinal plants were found to be deforestation, agricultural expansion as well as forest fire in Mana Angatu District, South-eastern Ethiopia (Ermias Lulekal *et al.* 2008). Similarly, Moa Megersa (2010) in Waay Tuka District, West Wellega found that Deforestation (agricultural expansion, construction and wood material for fire) urbanization and over collection was responsible as major threats to medicinal plants. Aseged Assefa and Tesfay Abebe (2014) in BennaTsemay district, south Ethiopia found that expansion of agriculture was a major threat to the existence of wild medicinal trees and shrubs. Tadesse Birhan *et.al*, (2015), in Horro Guduru, west Ethiopia reported that agricultural expansion was found to be the first main threat followed by deforestation.

2.9. Challenges to Traditional Herbal Medicine Practice in Ethiopia

Many writers have not given due attention to study some of the challenges that the traditional healers face in general and that of the herbalists in particular. The problems that the traditional herbal healers face in different communities could range from inadequate police and subsequent policy instruments like rules and regulations, incapable institution to implement even the available policies as well as attitude of individuals and institutions towards traditional medicine and traditional healers in various communities. Abera Balcha (2015). Ethiopia has policies and strategies that support the development and utilization of plant resources in a sustainable manner. The policies are reflected under various sectors

including environmental protection, development of the natural resources and diversification of the domestic and export commodities. Medicinal plants fit in the development activities that support public efforts in meeting livelihood requirements (FDRE, Environmental Policy, 1997, FDRE, RDPSI, 2001). Similarly, the health sector strategy of Ethiopia declares that structural, functional traditional medicine into the official health care system is advantageous for improving the health coverage in the country (Ministry of Health, 1995). However suitable institutional mechanisms and detailed implementation strategies and action plans have not yet put in place (Endashaw Bekele, 2007). Similarly, Abera Balcha in his recent book in Amharic: *A century journey of traditional medicine of Ethiopia* stated that despite the policy provisions of Traditional Medicine in the 1993 Health Policy Ethiopia, putting in place the necessary rules and regulations to implement policy provisions, like registering the traditional health practitioners and efforts to integrate the TM practice and the western medicine are not carried out yet (Abera Balcha, 2015). The adverse effect of westernization and globalization on the knowledge and use of the Traditional medicinal practice especially by the young generation considering it as backward practice is mentioned as a profound problem for the continuity of the knowledge of medicinal plants (Moa Megersa 2010).

UNIT THREE

3. MATERIAL AND METHODS

3.1. Description of the Study Area

Location

The study is conducted in Arba Minch Zuria Woreda of Gamo Zone, South Nations, Nationalities and Peoples Regional State. Arbaminch town is the seat for Arbaminch Zuria woreda, which is 454 Km south from national capital Addis Ababa. Arbaminch Zuria woreda is also located in the Great Rift Valley, bordered on the south by the Derashe woreda on the west by Bonke, on the north by Dita and Chench, on the northeast by Mirab Abaya, on the east by the Oromia Region, and on the southeast by the Amaro woreda. The woreda is also includes portions of two lakes and their islands, Abaya and Chamo. Nachisar National park is located between these lakes. Arbaminch municipality, (2018).

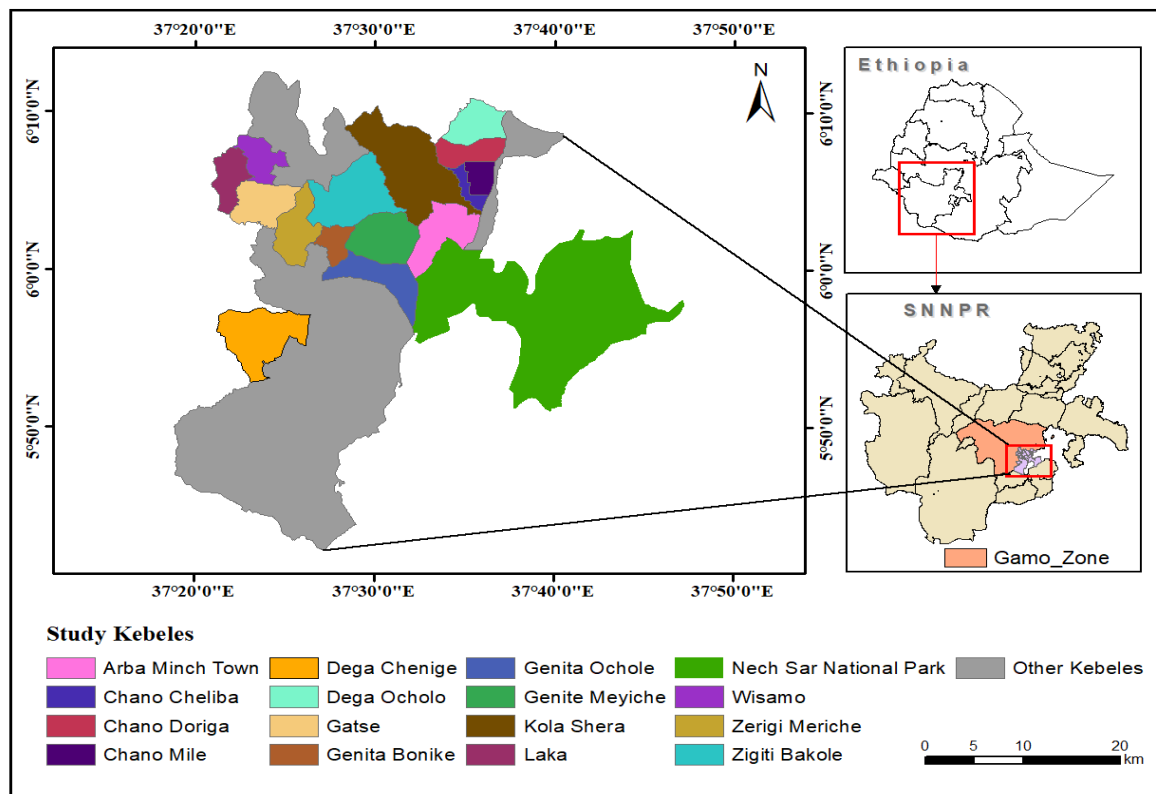


Figure 1 Map Ethiopia showing SNNPR and the study district

The study woreda has about 29 rural Kebeles. Out of the total area 33 % low land (Kolla), 53% are mid-land or woinadaga agroecology, whereas 14 % area is within highland or Dega agroecology (AMZW Office of Agriculture Unpublished Document, 2018). The study Kebeles are taken from all agro ecologies across the landscape including from lowlands with Kola agroecology, midlands with Winadega agro-ecology and highlands with Dega agro ecology characterized by a bi-modal pattern of rainfall.

3.2. Population

Arbaminch Zuria woreda has a projected population of 217, 282 for the year 2018/19 according to the woreda Health Office report (Unpublished Document, 2018). Out of these total 49.8 % were females and the remaining were male population. As the woreda does not have urban Kebele per say all of the population are regarded as rural despite some rural villages/ hamlets which act as market centres or seats of Peasant Associations with some urban infrastructures like electricity and water points. Regarding distribution high population concentration is still found relatively in the highlands as permanent settlement in the low lands is very recent phenomena with large cotton and banana farming and foundation of Arbaminch as permanent seat of Administrative region and seat of the Local government in different periods since 1962 (Arbaminch Municipality: Unpublished Document,2018).

3.3. Climate

Arbaminch Zuria woreda has a bi-modal rain fall pattern. The small rainy period is locally called Gabba (Belge) which is from March to May and the main growing season is known as Sila (Mehere) which is from July to September (USAID/SNNPR, 2005).

3.4. Livelihood

In terms of livelihoods, the study area is located within three distinct livelihood zones. The first is **Chamo-Abaya Irrigated Banana Livelihood Zone**. This livelihood zone is

characterized by irrigated banana production and production of Mango (*Mangifera indica*) and Papaya (*Carica Papaya*) as well as food crops like maize. In this livelihood zone not all house hold has access to irrigation. Some HH also produce cotton as cash crop. The main source of income in this zone is sale of Fruits like Banana, Mango etc. and cotton, livestock, etc (USAID/ SNNPR , 2005) . Some of the kebeles which fall in these livelihood zones are Lantte, ChanoChalba, Chano Mille, ChanoDorga, Shara, Ganta Ocholle, Shele, Wazaka, Zayse Elgo etc.

Maize and Root Crop Livelihood Zone: is hilly and undulating midland and upper lowland terrain. It is highly food insecure due to a combination of factors: high population density, small landholdings for the majority of households, low soil fertility, frequent rainfall irregularities, endemic trypanosomiasis, and relative isolation with poor roads and market access, as well as poor coverage with health and education services. The food crops are maize, Enset, sweet potatoes, taro, teff, and yams. Enset and root crops is an important hedge against losses of the less drought-resistant maize; but need forces the poorer majority of households to cut their Enset before it mature. The main source of Income in this livelihood zone is sale of livestock & products like maize, teff , and grasses, firewood as well as local and migrant casual works (USAID/ SNNPR ,2005).

Enset and Barley Livelihood Zone, This is a mountainous and densely populated zone that includes the wet midland and highland agro-ecological zones of Arbaminch Zuria woreda. The Enset and barley are complemented by wheat, sweet or Irish potatoes, horse beans and field peas as food crops, together with some maize and haricot beans mainly consumed green. There is no specialized cash crop, and only a limited capacity, even amongst the better off, to sell food crops; and this is often aimed at exchanging one food for another (USAID/ SNNPR ,2005).

3.5. Major vegetation Types

Ecological study of the vegetation in lowlands of Arbaminch Zuria around Lake Chamo, in southern Ethiopia by Teshome Soromessa *et al.*, (2004) has found seven plant community types. *Heteropogon contortus* Roem & Sch *Acacia hockii* De Wild, *Hyparrhenia filipendula* (Hochst) Stapf-*Combretum molle* G.D on, *Achyranthu saspera* L.-*Acacia tortilis* Hayne, *Acacia mellifera* Benth-*Acalypha fruticosa* Forssk-*Acacia brevispica* Harms community types, are few among others. According to the study altitude was the most important factor in determining community type. In Arbaminch Zuria, along the two lakes we can find also ever green Riparian and swamp forest that is to some extent disturbed by local people's intervention (Field Observation). On other side, along the foot hills of Ganta Mountain which face Arbaminch City we can find also small leaved deciduous woodland disturbed again by human and livestock intervention (Field Observation) . At higher altitudes with Dega agroecology it is possible to observe patches of Bamboo which the community uses for construction of their houses as well as fencing and production of household utensils including cereal storages (From Field observation).

3.6. Human and Livestock Health Services

According to the Woreda Health Office report, Arbaminch Zuria woreda has forty health posts and seven health centres administered by government and 29 clinics and one drug shop administered by private. Major human health problems within rural lowlands are malaria, typhoid fever where as in the rural highlands malnutrition, diarrhea, and trachoma are reported by the Woreda Health Office (AMZHO, unpublished document, 2010).

Table 1: Livestock Type and number in Arba Minch Zuria Woreda 2010, Source: Arbaminch Zuria

Livestock	Type by Sex	Number for the year 2010
Ox	M	36, 868
Cow	F	46420
Bull	M	20703
Heifer	M	18,315
Calf	M	10, 416
	F	10910
Sheep	M	9369
	F	18203
Goat	M	18627
	F	18005
Poultry	M	40098
	F	150500
Equine		
Donkey	M	3898
	F	2192
Mule	M	1462
	F	836
Horse	M	1793
	F	1275

Most prevalent livestock disease At Arbaminch Zuria District Of Gamo Zone these are: trypanosomiasis (Gendi), internal and external parasite both small and large ruminants, black leg (Abagorba), contagious bovine pleuropneumonia (CCPP), foot and mouth disease (FMD) of large ruminants, paste despite's ruminants (PPR) in sheep, mastitis, lumpy skin disease (LSD), anthrax (Abasenga), new castle disease (NCD) in poultry, dystocia and others.

As per the woreda Agricultural Office main cattle diseases in the lowland areas in Arbaminch Zuria woreda are Trypanosomiasis, Ectoparasite, Endo Parasite, Blackleg and Pasteurellosis where as in the highlands except Trypanosomiasis the other four prevail. Regarding distribution of Livestock health post and clinics in the woreda Livestock health Post are actively functioning in two Kebeles namely in Dega Chenge and in KollaShara. The woreda Agricultural Office reported that two clinics are under construction in Zegite Merche and wusamo Kebeles. Regarding human resource there are three DVM (Doctors for Veterinary

Medicine) and twenty eight assistant veterinarians in the Arbaminch Zuria woreda which give service to farmers who need the western veterinary service.

3.7. The Study Kebeles

Out of the twenty nine Keble's within ArbaminchZuriaworeda, a total of fourteen Kebeles were purposefully selected for this research (see the table 2).

Table 2: The study kebeles Arbaminch Zuria woreda

.No.	Name of kebeles	Agro ecology	No.	Name of kebele	Agroecology
1	ChanoChalba	Kolla	8	Wussamo	Dega
2	ChanoDorga	Kolla	9	Gatse	Dega
3	Chano Mille	Kolla	10	KollaShara	Kolla
4	Zegitebakole	Dega	11	Laka	Dega
5	DegaOcholo	Dega	12	ZegiteMerche	WoinaDega
6	DegaChenge	Dega	13	GantaBonke	WoinaDega
7	GantaMeche	WoinaDega	14	GantaOchole	Woindega

A total of 112 people were interviewed for the study. From the total respondents 65 (58%) were males and the remaining 47 (42 %) were female.

3.8. Methodology

For the study a purposive sampling was employed to select the particular kebeles within the Woreda Arbaminch Zuria woreda has about twenty nine rural kebeles. Among these fourteen rural kebeles were purposely selected taking in to account range of agro ecological zones, distance from the main road, and altitudinal differences. From these kebeles a total of 112 informants were purposefully and randomly selected and interviewed. Ethnobotanical data were gathered using semi-structured interview, group discussion and field observation, and analysed using descriptive statistics, informants' consensus and fidelity level index

3.8.1. Reconnaissance survey

The first reconnaissance survey was conducted In January 2018 to see some of the kebeles in Arbaminch Zuria woreda as first reconnaissance to my study. It gave me first time exposure

to the research site. Arbaminch Zuria woreda is a district where you can find kebeles stretching from the rift valley bottom with average altitude of 1500 m.a.s.l. to as high as 3000 m.a.s.l. in the western part of the study area. So, efforts were made including Kola, Wenadega and Dega agroecologies. Kebeles which are near from the main road, near the forest areas, Kebeles in different agroecologies and altitudes were considered while selecting particular study sites. The second field visit was made before going to the actual field work to decide the exact kebeles within the Woreda. During this time consultative formal and informal meeting and discussions were made with local government officials mainly Woreda Agricultural Office and Woreda Administration office, people who are working at Woreda Line Offices, other individuals who have interest on Traditional medicine were consulted. During this time, permission paper to each study kebele was written to facilitate entrance and get rapport. Having those support letters made to the field work very effective.

3.8.2. Informant selection

From 14 kebeles, a total of 112 informants (65 males and 47 females) were selected out of these, 52 key traditional healers both for humans and animal ailments were purposefully selected. While other 60 were selected with snowball sampling efforts were made to include all age categories youth, adults and elders (28 up to 85 years old).The Kebele leaders, the local elders, development agents, health extension workers were source of information in identifying the traditional herbalists in their community and kebeles. Accordingly, on average five to seven herbalist healers and other beneficiaries and community members were selected for gathering information. Furthermore, experts working in woreda line Offices were also interviewed.

3.8.3. Data collection

Data on the ethnobotany of herbal medicine were collected mainly using semi structured interview. It is used to conduct in-depth individual interview with men and women traditional healers. How each type of medicine were processing, and way of utilization, parts of the plant they are using for particular and the local name of each plant they use for a particular disease whenever possible was captured in the field. Moreover, semi structured interview was employed to conduct A five focus group discussion was made in five kebeles namely Chano mille, Ganta Bonke, Dega Ocholo, Chano Chalba, Ganta Ochole. The size of the focus group was from five to seven people in each focus group. All in all twenty nine people participated in the focus group. Twenty one of them were male and eight were females. Participants were selected based on their rich experience which I observed during the individual interview to get information on what kind of support they so far got from the local government, what other challenges they face in their daily work, what is the attitude and perception of the community towards their services, etc. The semi structured interview was prepared in English language and translated to Gamotso i.e. the local language the discussion with all the herbalists was directly with their vernacular language without any translator. That was an advantage to solicit information directly. Moreover, it gave chance to read the body languages from the informant. Similarly, the local health extension workers as well as woreda level health care experts were interviewed using semi structured interview to triangulate some of the information collected from the traditional healers. Moreover, field observation and Medicinal plant inventory were among the main ways of collecting primary data Martin (1995); Cotton (1996) and Cunningham (2001).

3.8.4. Specimen Collection

Plant specimens that are used as medicine for both humans and animals were collected from the study kebeles. In order to classify and describe plant communities by dominant and co-

dominant plant species and assess the distribution of medicinal plants in the study area, specimen collection was carried out. Based on ethnobotanical information provided by informants specimens collected were numbered and catalogued in the field, and pressed every day before the next field trips, and dried for identification.

3.8.5. Specimen identification

Based on Ethnobotanical information provided by informants' specimens were collected, numbered, pressed, and dried for identification in the field. Preliminary identifications were done in the field. In addition, identification of unidentified specimens were done here in Addis Ababa after the field work by comparison with authenticated specimens, illustrations and taxonomic keys, and with the assistance of experts at Addis Ababa University, National Herbarium. The identification process was based on the works of Sebsebe Demissew (2003), Friis (1995), Tewolde B. Gebregziabeher and Edwards (1997), Friis and White (2003) and Gilbert (1995). Voucher specimens with scientific name, vernacular name, families and collection numbers for all medicinal plants and plants recorded from the study area, home gardens from the plots were stored at the National Herbarium, Science Faculty. All identified specimens were verified by advisor.

3.8.6. Data Analysis

The data collected in the form of interview from individual herbalist, from group of herbalists, and sometimes beneficiaries, community members as well as experts working at woreda, and kebele level were categorized and analysed using range of techniques as follows:

3.8.6.1. Descriptive statistics

Different descriptive statistical method such as percentage and relative frequency were employed to analyse and summarize the data on medicinal plants, associated knowledge, management methods, use and local conservation. Key information collected on medicinal plants reported by local people among others were medicinal value, application, methods of preparation, route of application, disease treated, plant part used, habit and habitat were

analysed using descriptive statistical methods. In addition, Different categories of plant use reports and relative frequency of tree species were tabulated and analysed statistically.

3.8.6.2. Informant consensus

In order to assess the reliability and dependability of information solicited during the interview, informants were contacted at least two times for the same ideas and the validity of the information was proved and recorded. If the idea of the informant diverges from the original information, it was rejected since it was considered irrelevant information. Only the relevant ones were taken into account and statistically analysed. This method was adopted from Alexiades (1996).

3.8.6.3. Preference ranking

Preference ranking was conducted following Martin (1995) for eight most important medicinal plants used often by traditional healers in treating Tonsillitis. Ten informants were selected to identify the best preferred medicinal plant species for treatment of Tonsillitis. Each informant was provided with eight medicinal plants reported to cure this disease with each leaf of medicinal plant used being paper tagged name, and asked to assign the highest value (8) for plant species most preferred, against this illness and the lowest value (1) for the least preferred plant and in accordance of their order for the remaining ones. These values were summed up and ranks given to each plant species.

3.8.6.4. Direct matrix ranking

Direct matrix ranking exercise was done following Martin (1995) in order to compare multipurpose use of a given species and to relate this to the extent of its utilization versus its dominance. Based on information gathered from informants, ten multipurpose tree species were selected out of the total medicinal plants and six use diversities of these plants were

listed for 10 selected key informants to assign use values to each species (Table 17). The six use values include medicinal, farm tool, construction, fire wood, charcoal, and furniture.

Ten key informants were chosen to conduct this activity and each key informant was asked to assign use values (5 = best, 4 = very good, 3 = good, 2 = less used, 1 = least used and 0 = not used). Accordingly, each key informant's use values for the ten multipurpose medicinal plant species, average value of each use-diversity for a species was taken and the values of each species were summed up and ranked.

3.8.6.6. Fidelity level index

Fidelity level index quantifies the importance of a given species for a particular purpose in a given cultural group (Friedman *et al.*, 1986; cited in Cotton, 1996). Confirmation or consensus could not be taken as a single measure of the potential efficacy of any medicinal plant. Thus, efficacy is not the only factor that influences the informant choice but prevalence of a given plant and disease in the area can affect informants' choices.

FL was used to determine the relative healing potential of 7 medicinal plants against human ailments based on the proportion of informants' agreement or commonly prevailing disease on the use of a given medicinal plant against a given ailment category. The fidelity level index was calculated for Evil eye, Dysentery, Tonsillitis, Leshemianiasis, Snake bite, Febrile, and Haemorrhoids.

UNIT FOUR

4. RESULTS

4.1 General Information of Informants

4.1.1 Sex and Age of Informants

A total of 112 people were interviewed for the study. From the total respondents 65 (58%) were males and the remaining 47 (42 %) were female. Regarding age structure of the study population, it ranges from 28 to 85. Most of the informants fall in the age category of 41- 60.

Table 3: Age structure of the study population

Age	Frequency	%
28-40	29	25.9
41-50	31	27.9
51-60	31	27.9
60 and above	21	18.8
Total	112	100

Regarding marital status of the informants 105 (93.75%) were married 4(3.57%) were single and the remaining 3 (2.67 %) were divorced.

Table 4: marital status of informants

Marital status	Sex		Total	%
	Male	Female		
Married	62	43	105	93.75
Single	2	2	4	3.57
Divorced	1	2	3	2.67
	65	47	112	100

Regarding the level of education of the informants their levels of education range from illiterate to above secondary education. Most informants fall within the category of illiterate (See the Table 5).

Table 5: Study Populations by Education

Roll. No.	Education level	Female	Male	No. of people	Percent %
1	Illiterate	20	22	42	37.5
2	Able to Read and write	11	13	24	21.4
3	Primary education	9	10	19	17
4	Secondary	3	13	16	14.3
5	Above secondary	4	7	11	9.8

4.2. Medicinal Plants in Arbaminch Zuria Woreda

From the study area a total of 102 medicinal plant species used for treatment of human and livestock ailments were collected. Of these 68 (66.66%) were used as human medicine, 16 (15.68%) were used as livestock medicine and the remaining 18 (17.64%) were used for treating both human and livestock ailments. The medicinal plants collected belong to 95 genera and 54 families. The leading family was Lamiaceae with 10 species, followed by Solanaceae 8 species, Asteraceae 7 species, (see the following Table 6)

Table 6: Family, Genera and Species distribution of plants in the study area

<i>No.</i>	<i>Family name</i>	<i>Number of species</i>	<i>Numbers of genera</i>	<i>Genera in %</i>	<i>Species in %</i>
1	Lamiaceae	10	8	8.42	9.8
2	Solanaceae	8	7	7.36	7.84
3	Asteraceae	7	7	7.3	6.86
4	Fabaceae	5	5	5.26	4.9
5	Euphorbiaceae	6	6	6.31	5.88
6	Apiaceae	4	4	4.21	3.92
7	Urticaeae	2	2	2.1	1.96
8	Rubiaceae	3	3	3.15	2.94
9	Anacardiaceae	3	3	3.15	2.94
10	Malvaceae,	2	1	1.05	1.96
11	Myrtaceae	2	2	2.1	1.96
12	Rutaceae	2	2	2.1	1.96
13	Rosaceae	2	2	2.1	1.96
14	Menispermaceae	2	2	2.1	1.96
15	Balanitaceae	2	1	1.05	1.96
16	Polygonaceae	2	1	1.05	1.96
17	Combretaceae	2	2	2.1	1.96
18	Capparidaceae	2	1	1.05	1.96
19	Rest 36 Families	36	36	37.89	35.29
<i>Total</i>		<i>102</i>	<i>95</i>		

4.2.1. Habit of medicinal plants to treat human and livestock ailments in Arbaminch zuria woreda

The results of growth habit analysis of medicinal plants showed that herbs constituted the highest species i.e. 42species (41.2%), followed by shrubs (29 species, 28.45%), trees (27 species, 26.5), and climbers (4 species, 3.9%).

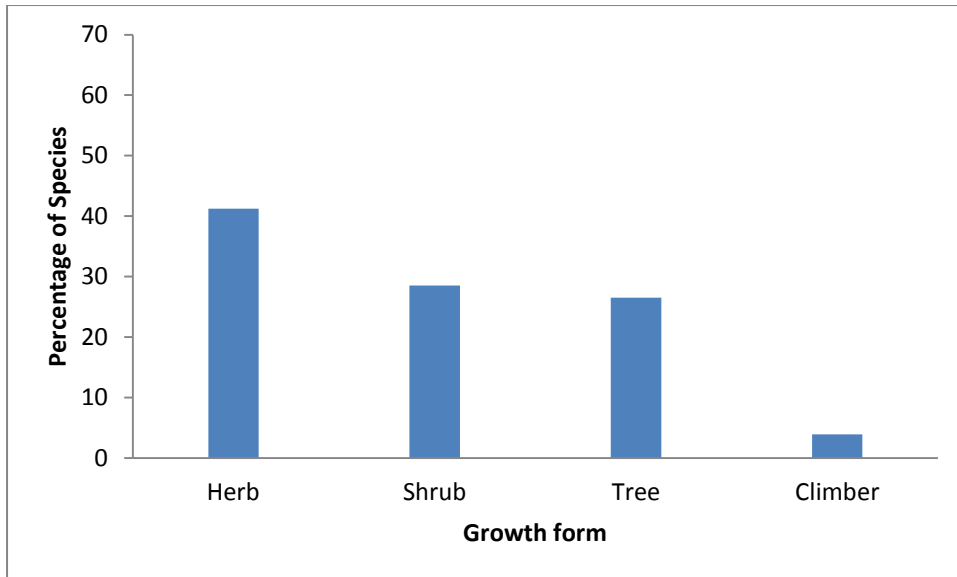


Figure 2: Habits of medicinal plants to treat human and livestock ailments in Arbaminch Zuria woreda

4.2.2 Habitat of medicinal plants to treat human and livestock ailments in Arbaminch zuria woreda

From the 102 medicinal plants collected 38 species (37.3%), were collected from the forest while 31 species (30.4%), were obtained from farm land and the remaining 33 species (32.4%) from home garden.

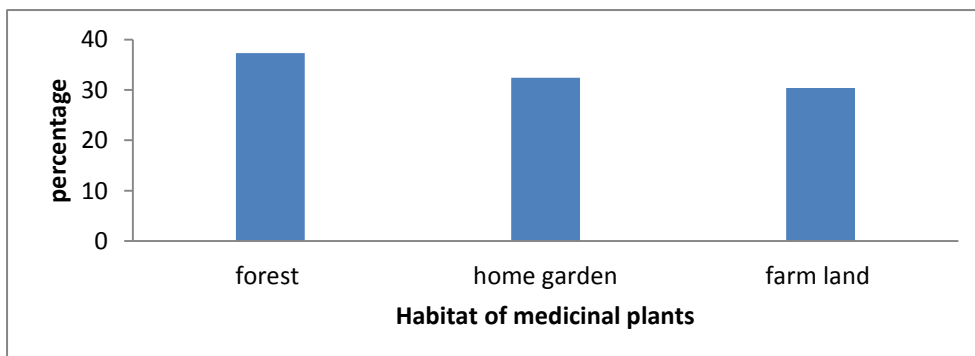


Figure 3: Habitats of medicinal plants to treat human and livestock ailments in Arbaminch Zuria woreda

4.2.3. Parts of medicinal Plants to treat human and livestock ailments in Arbaminch Zuria woreda

Different parts of plants were used for preparation of remedies to treat various types of diseases. The most commonly used plant part for herbal preparation in the area were leaves which account 56.2% (82) of the plant parts used for preparations, followed by roots and seeds each with 8.9% (13), flower 6.84% (10) and bark 5.47% (8) as indicated in the (Fig 4).

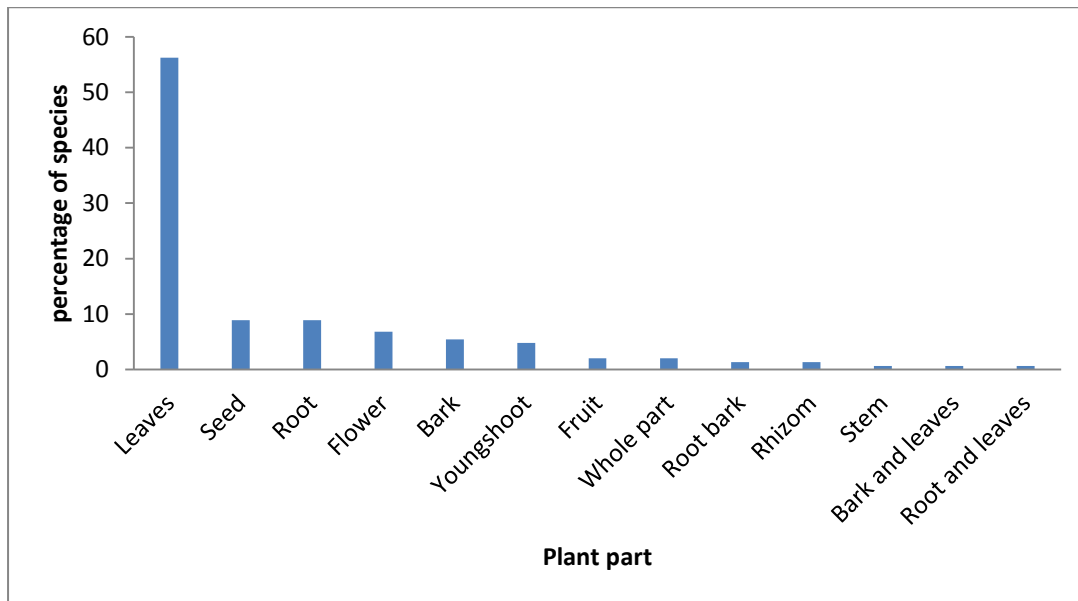


Figure 4: Parts of medicinal Plants to treat human and livestock ailments in Arbaminch Zuria woreda

4.2.4. Route of Administration of medicinal Preparation to treat human and livestock ailments in Arbaminch Zuria woreda

There are various routes of administration of traditional medicinal plants prepared products by the local community. The major routes of administration in the study area were oral, dermal, nasal, anal and ocular. Oral administration is the highest which is 68.14% (92) followed by dermal 25.2% (34), nasal 2.96% (4), ocular 2.22% (3), both anal and tide in the neck account 0.74% (1).

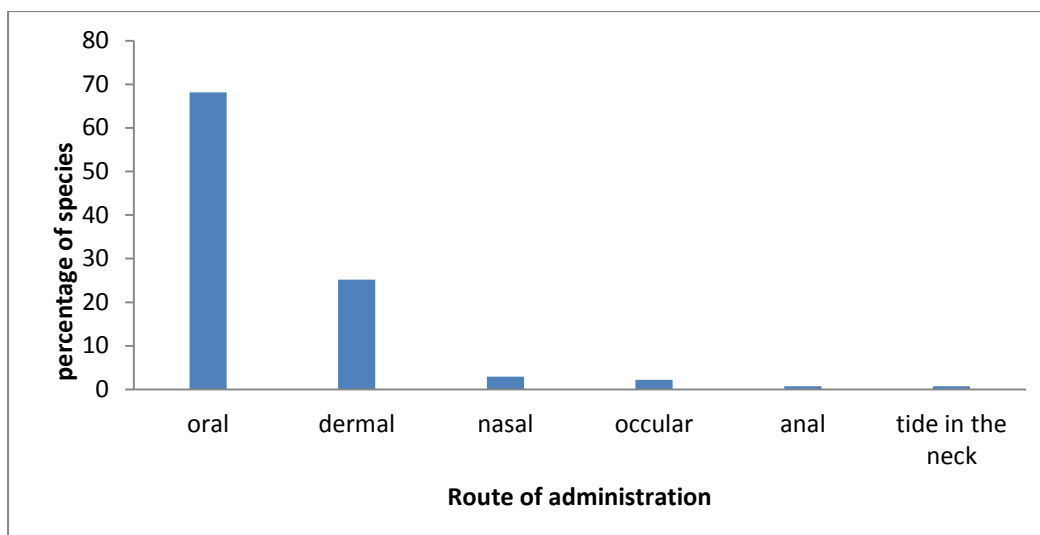


Figure 5: Route of Administration of medicinal Preparation to treat human and livestock ailments in Arbaminch Zuria woreda.

4.2.5. Preparation of Herbal Remedies to Treat Human and Livestock Ailments

Analysis of the methods used by the healers in the study indicated different forms in accordance with the type of ailment to be treated. In this regard, from a total of 102 medicinal plants used to prepare medicine pounding method took the highest value with about 45.09% (46) followed by crushed having a total of 12.74% (13) and others (see Table 7) .

Table 7: Method of preparation of traditional medicine to treat human and livestock ailments

Method of preparation	No. Preparation	%	Method of Preparation	No. of preparation	%
Crushed	13	12.74	Pounded &Crushed	7	6.86
Powdered	4	3.92	Chewing	12	11.76
Exudation	7	6.86	Pounded &Chewing	4	3.92
Concoction	2	1.96	Squeezing	3	2.94
Pounded	46	45.09	Fumigating-	1	0.98
Pounded &Exudation	2	1.96			

4.3. Medical Plant Species Used To Treat Human, Livestock and Both Human and Livestock Ailments

Among the collected 102 medicinal plants 68 (66.78%) used to treat human disease, whilst 16 (15.7%) were used to treat livestock ailments and the remaining 18(17.6%) were reported to be used to treat both human and livestock's ailments.

4.3.1. Medical Plant Species used to Treat Human Ailments in Arbaminch Zuria woreda

In the study area, the local people utilize 68 medicinal plant species 66.7% to treat 58 human ailments. These plants belong to 74 genera and 42 families. The Family Lamiaceae contributed 9 species followed by Solanaceae, Asteraceae, Euphorbiaceae and Apiaceae with 4 species each where as Anacardiaceae and Combretaceae with 3 species each., Fabaceae and Rubiaceae with 2 species each and the remaining species all with 1 species each.

4.3.1.1 Habit of medicinal plants to treat human ailments in Arbaminch zuria woreda

From the medicinal plants that were reported for human ailments herbs constituted 33 species 48.8%, shrub 19 species 27.9%, trees 14 species 20.6%, climber 2 species 3%

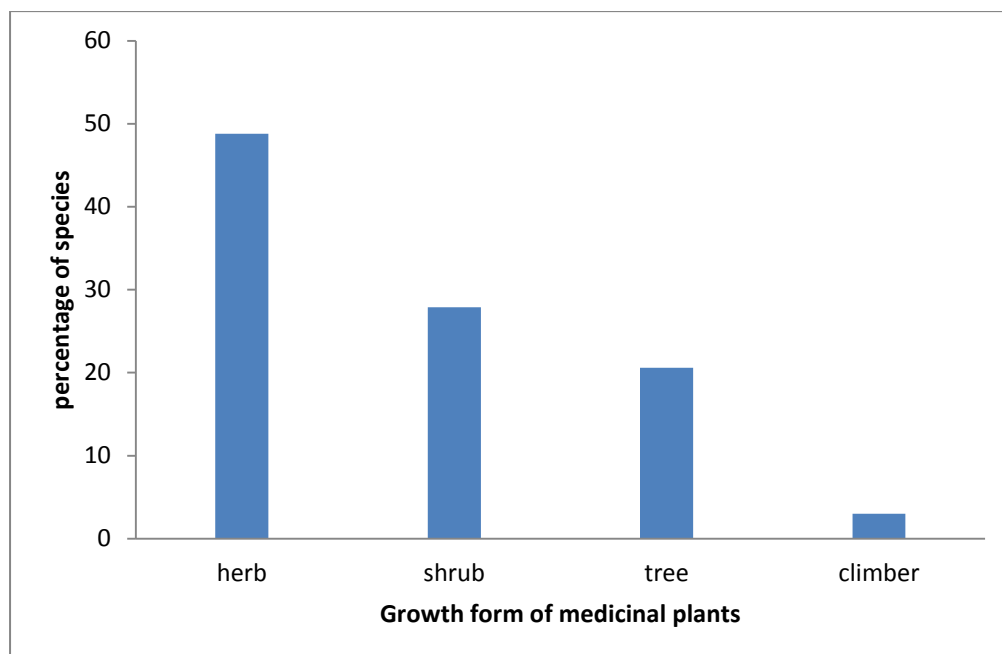


Figure 6: Habit of medicinal plants to treat human ailments in Arbaminch zuria woreda

4.3.1.2. Habitat of medicinal plants to treat human ailments in Arbaminch zuria woreda

From the medicinal plants used for human ailments treatment 26 species (38.2%) were collected from home garden and 21 species (30.9%) each were collected from forest and farm land.

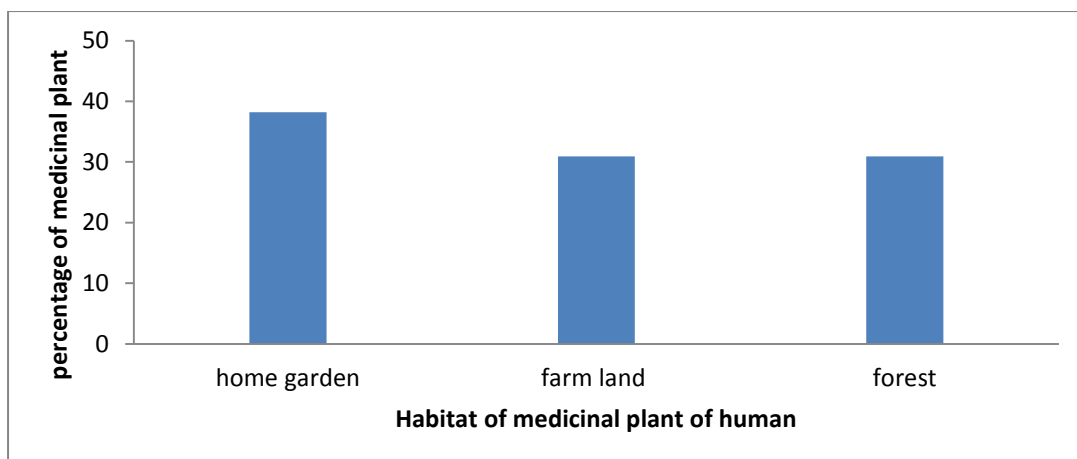


Figure 7: Habitat of medicinal plants to treat human ailments in Arbaminch zuria woreda

4.3.1.3. Parts of medicinal Plants to treat human ailments in Arbaminch Zuria woreda

With regard to the plant parts used for medicinal purposes, different parts of the plants were reported to be used for medicines in the study area. The highest proportion of plant parts utilized for medicinal preparation were leaves accounted for 46 (53.48%) followed by seed 11(12.79 %), root 5(5.81%), flower 7 (8.13%) , bark 5 (5.81),whole part 3 (3.48%),young shoot 3(3.48%),root bark 2(2.32%),latex, fruit, and stem have 1(1.16%) each.

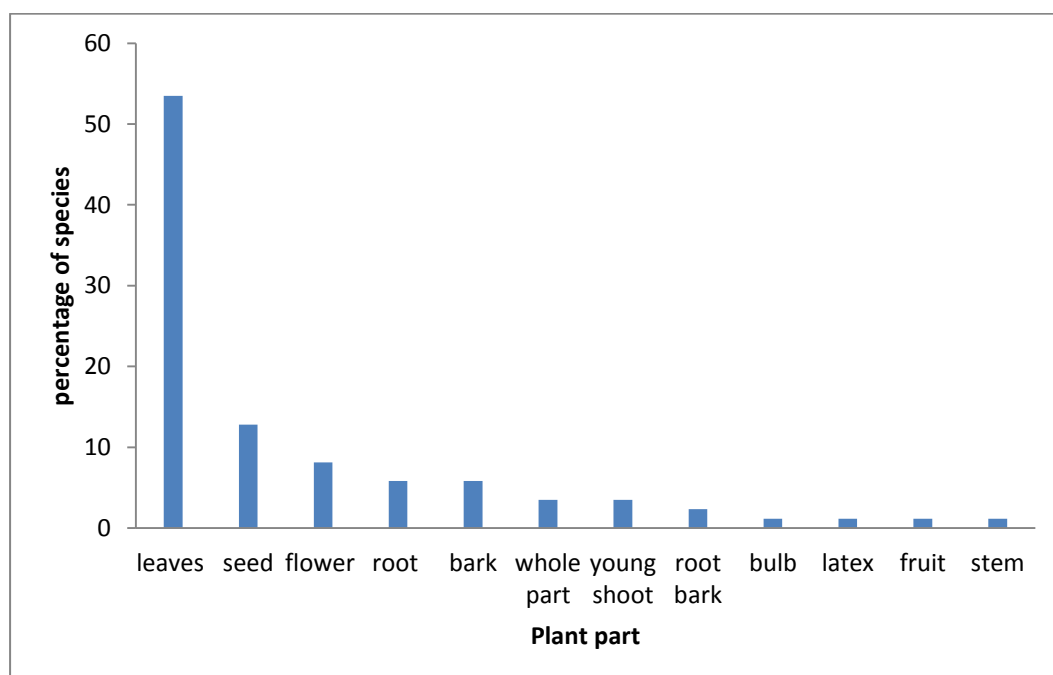


Figure 8: Parts of medicinal Plants to treat human ailments in Arbaminch Zuria woreda

4.3.1.4. Method of preparation of Medicinal Plants used to Treat Human Ailments

Regarding the preparation of medicine for human, the local community employs various method of preparation of traditional medicines for different types of ailments. The preparations vary based on the types of disease treated and the actual site of the ailments

Table 8: method of traditional medicinal plant human only

Method of preparation	Number Preparation	%	Method of preparation	Preparation	%
Crushed	10	14.7	Pounded &Crushed	2	2.94
Powdered	4	5.88	Chewing	12	17.64
Exudation	3	4.41	Squeeze	1	2.94
Concoction	2	2.94	Tie	1	1.47
Pounded	30	44.11	Total	68	100
Pounded &Exudation	2	2.94			

4.3.1.5. Routes of Administration of medicinal Preparation to treat human ailments in Arbaminch Zuria woreda.

There are various routes of administration of traditional medical plants prepared product by the local community. The major routes of administration in the study area were oral, dermal, nasal, and ocular. In the study area oral administration was the dominant route 55 (67.9%) followed by dermal 20 (24.7 %), nasal 2(2.5 %), ocular 2 (2.5%), both anal and tide in the neck 1(1.2%), (Figure 9).

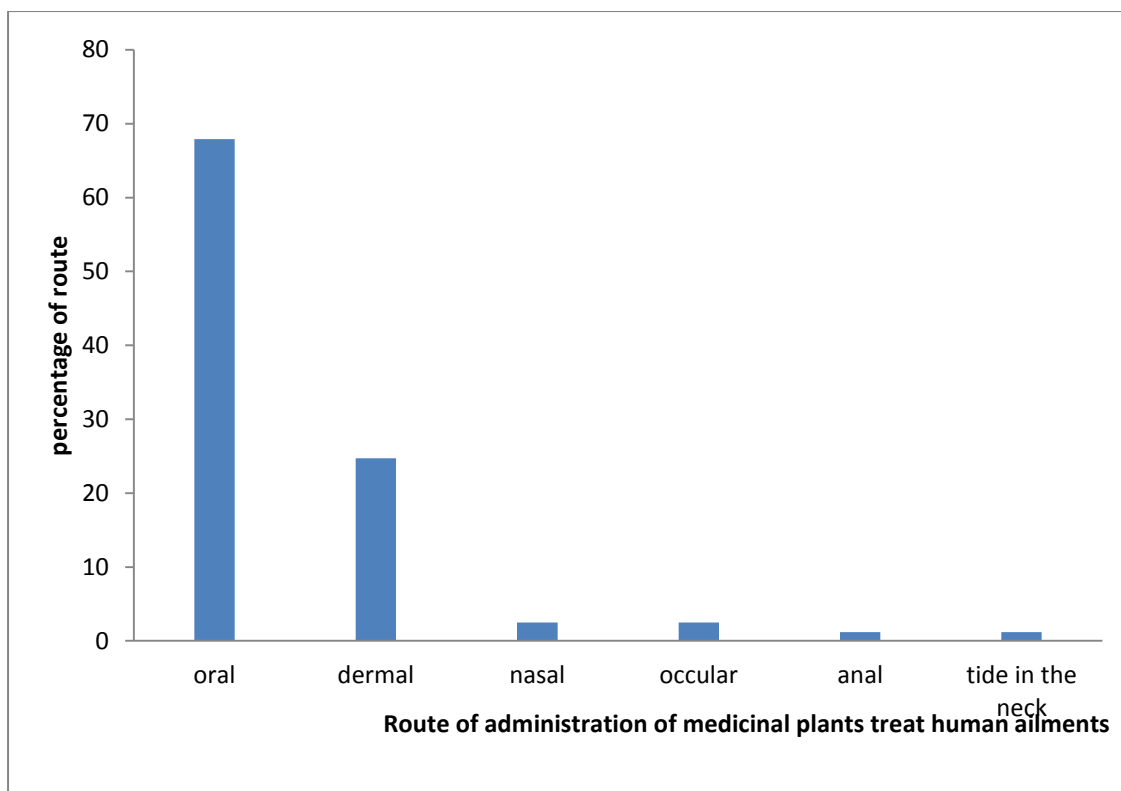


Figure 9: Routes of Administration of medicinal Preparation to treat human ailments in Arbaminch Zuria woreda

4.3.1.6. Major Human Diseases and Plant Species used by Local People

In the study area a total of 58 diseases of humans were recorded and treated with a total of 68 plant species. One species could treat a single disease or a number of diseases. According to the informants the highest number of species used to treat stomach-ache was 21 species followed by wound 12 species. Malaria and intestinal parasite each of them had 8 species, toothache, hepatitis, evil eye and constipation each of them having 7 species;

Table 9: Major human diseases and plant species used by local people

Disease treated	Total number of species	Disease Treated	No of Species	Disease Treated	Number of Species
Wound	12	Teeth ache	7	Alta (infection inside mouth)	2
Tonsillitis	8	Amoeba	3	Leishmaniasis (Locally called Bolebo)	2
Stomach ache	21	Swelling	5	Head ache	2
Dysentery	8	Eye infection	8	Cancer	2
Hepatitis (Locally called Wuluwsha)	6	Skin disease	3	Flatulence of bell	3
Trypanosome	8	Dandruff	2	Common cold	2
Malaria	9	Febrile disease	4	Urine difficulty	2
Haemorrhoid	5	Rabies	3	sudden sickness	3
Intestinal parasite	9	Typhoid	2	Constipation	6
Evil eye	6	Syphilis	2	Others	25
Snake bite	4				

4.3.2 Medicinal Plant Species Used To Treat Livestock Ailments in Arbaminch Zuria woreda

Medicinal plants that were collected and identified in the study area reported to be used for livestock ailments were 16 (15.68%) species. They were grouped in to 14 genera and 12 families. The family Fabaceae contributed 3 species followed by Cappardaceae and

Urticaceae with 2 species each and Malvaceae, Rubiaceae, Asteraceae, Ericaceae, Rhamnaceae, Sapindaceae, Cucurbitaceae and Lamiaceae with 1 species each.

4.3.2.1. Habits of medicinal plants to treat livestock ailments in Arbaminch zuria woreda

The habits of medicinal plant that are used for livestock ailments were shrubs 7 species (43.8 %), herbs and trees with 4 species each (25 %) and climber 1 (6.3 %) species in the study area.

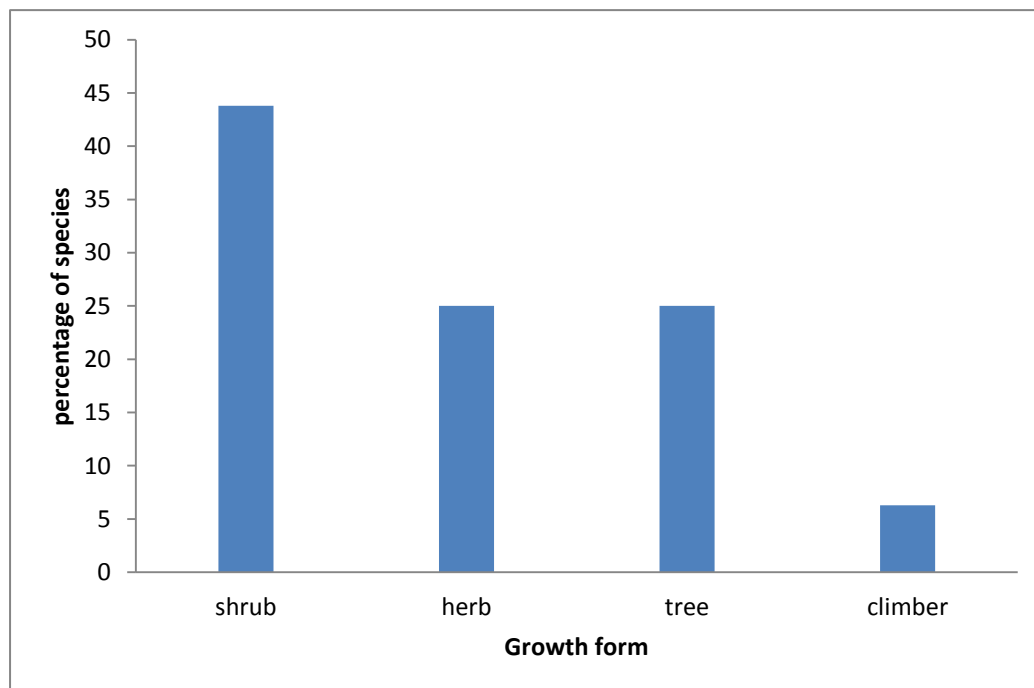


Figure 10: Habits of medicinal plants to treat livestock ailments in Arbaminch zuria woreda.

4.3.2.2 Habitats of Medicinal Plant to Treat Livestock Ailments in Arbaminch Zuria woreda

From the medicinal plants that were reported to be used for livestock ailments 8 species (50 %) were collected from forest followed by farm land 5 species (31.2 %) and from home garden 3 species (18.8 %).

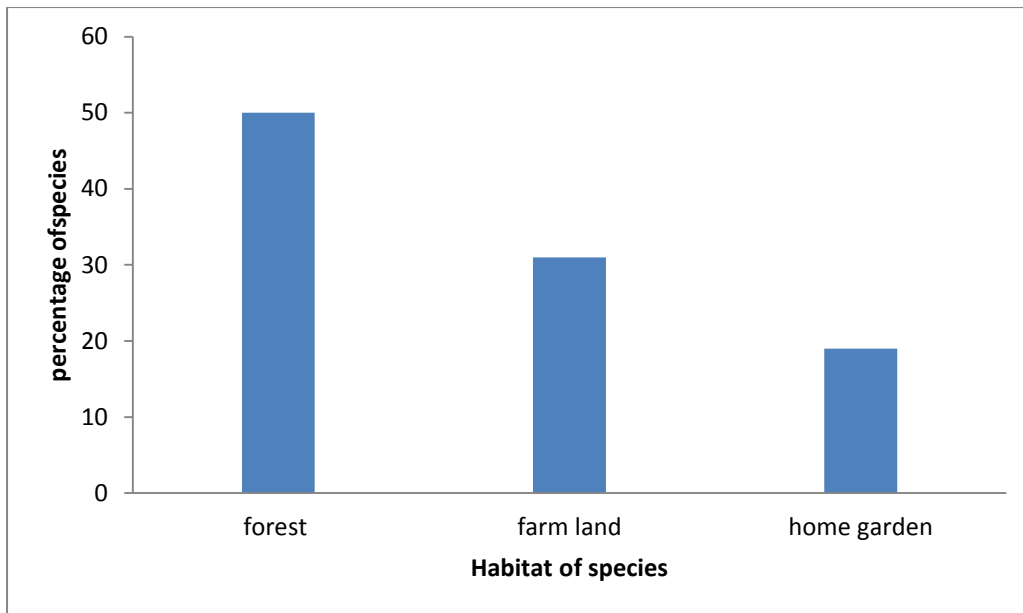


Figure 11: Habitats of medicinal plant to treat livestock ailments in Arbaminch Zuria woreda,

4.3.2.3. Parts of Medicinal Plants to Treat Livestock Ailments in Arbaminch Zuria woreda

With regard to plant parts used for livestock health treatment in the study area leaves accounted for 17 (85%) followed by root and leaves, flower and bark each with 1 (5%).

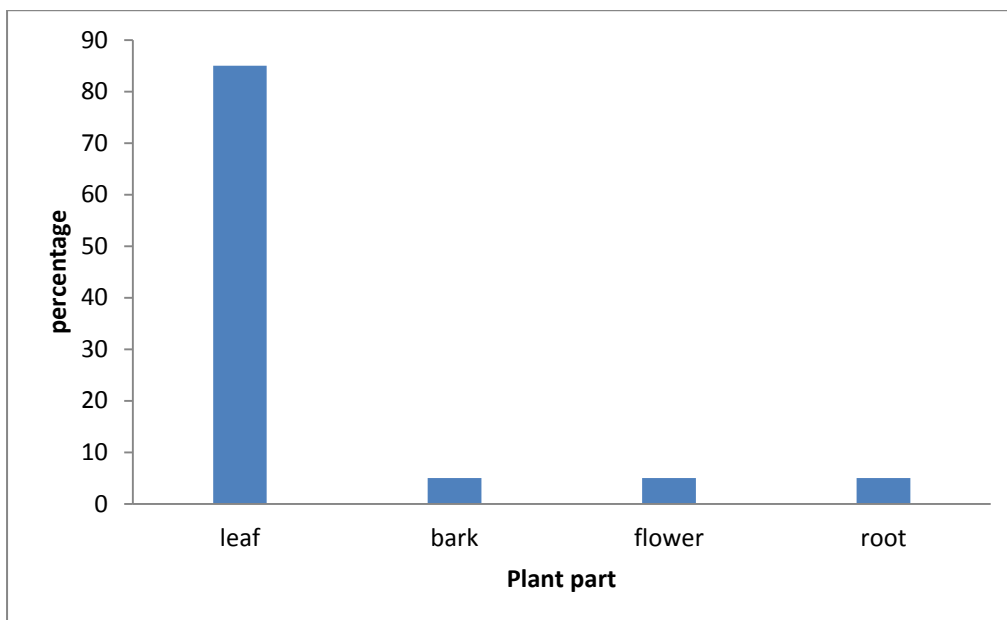


Figure 12: Parts of medicinal plants to treat livestock ailments in Arbaminch Zuria woreda

4.3.2.4. Methods of Preparation and Routes of Administration of Medicinal Plants to Treat Livestock Ailments

The local people use different forms of remedy preparations and applications to treat livestock diseases as well. The most frequently applied modes of preparation for ethnoveterinary medicine include pounding 10(62.5%) followed by exudation 3 (18.5 %), crushed 2 (12.5 %) and pounded& crushed 1 (6.25 %).

Table 10: Mode of preparation of medicinal plants for Livestock only

Method of preparation	preparation	Percentage
Pounded	10	62.5
Exudation	3	18.57
Crushed	2	12.5
Pounded & Crushed	1	6.25
	16	100

Medicinal plant preparations were administered through different routes based on the nature of the ailment. Oral application of the remedies was found to be the highest 10 (55.6 %), followed by dermal 8 (44.4 %).

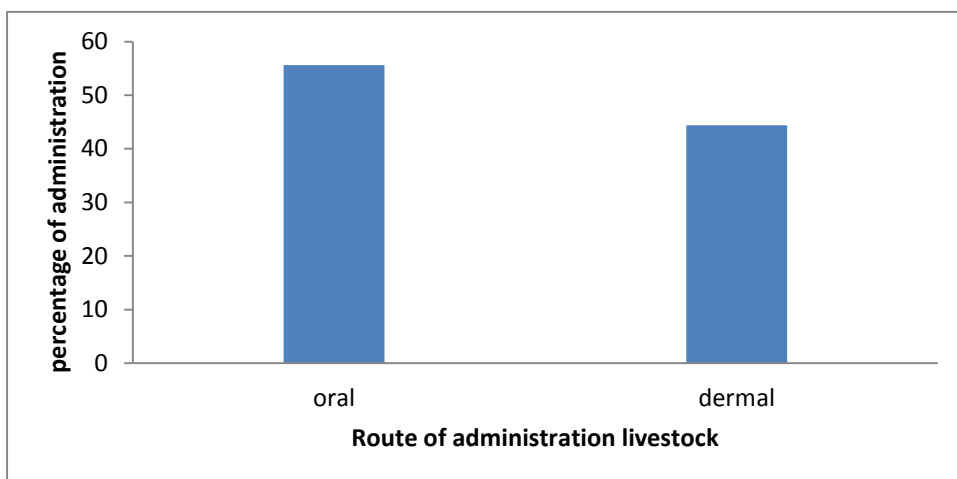


Figure 13: Route of administration of medicinal preparation to treat livestock ailments in Arbaminch Zuria woreda.

4.3.2.5. Major Livestock Diseases and Number of Plant Species Used in the Study Area

In the area a total of 14 diseases of livestock were recorded and treated with a total of 16 plant species. The highest number of species used to treat Dysentery and Itching 5 (16.1%) species followed by Lice 4 species and Others (See Table 12).

Table 11 : Major livestock diseases and number of plant species used

Disease treated	Total species	percent	Disease Treated	Total Species	percent
Dysentery	5	16.1	Cough	2	6.5
Itching	5	16.1	Intestinal parasite	1	3.2
Constipation	3	9.67	Wound	1	3.2
Lice	4	12.9	Tape worm	1	3.2
Trypanosomiasis	2	6.5	Stomach ache	1	3.2
Leech	2	6.5	Shivering of cattle	1	3.2
Black leg	2	6.5	Sudden illness	1	3.2

4.3.3 .Medical plant species used to treat both livestock and human ailments

In the study area, a total of 18 medicinal plant species were reported to be used for the treatment of both human and livestock ailments. These plants were found to belong to 12 families and 17 genera, the family Solanaceae was represented by 3 species followed by Euphorbiaceae, Polygonaceae, Asteraceae and Myrtaceae was represented by 2 species each and other's (Table 13). The majority of these plants are collected from forest 9 species (50 %), 5 species (27.8 %) cultivated from farm land and 4 (22.2%) species from home garden.

Table 12; Distribution of medicinal plants to treat both, human & Livestock

Family	Number of genera	Species	Family	Number of Genera	Species
Solanaceae	3	3	Rosaceae	1	1
Euphorbiaceae	2	2	Simaroubaceae	1	1
Polygonaceae	1	2	Oleaceae	1	1
Asteraceae	2	2	Cupressaceae	1	1
Myrtaceae	2	2	Rutaceae	1	1
Menispermaceae	1	1			

4.3.3.1. Habits of medicinal plants to treat both human and livestock ailments in Arbaminch zuria woreda

The habits of medical plants that are harvested for both the treatment of human and livestock ailments were trees 9 species (50 %), herbs 5 species (27.7 %), shrubs 3 species (16.7 %) and climber 1 species (5.6 %).

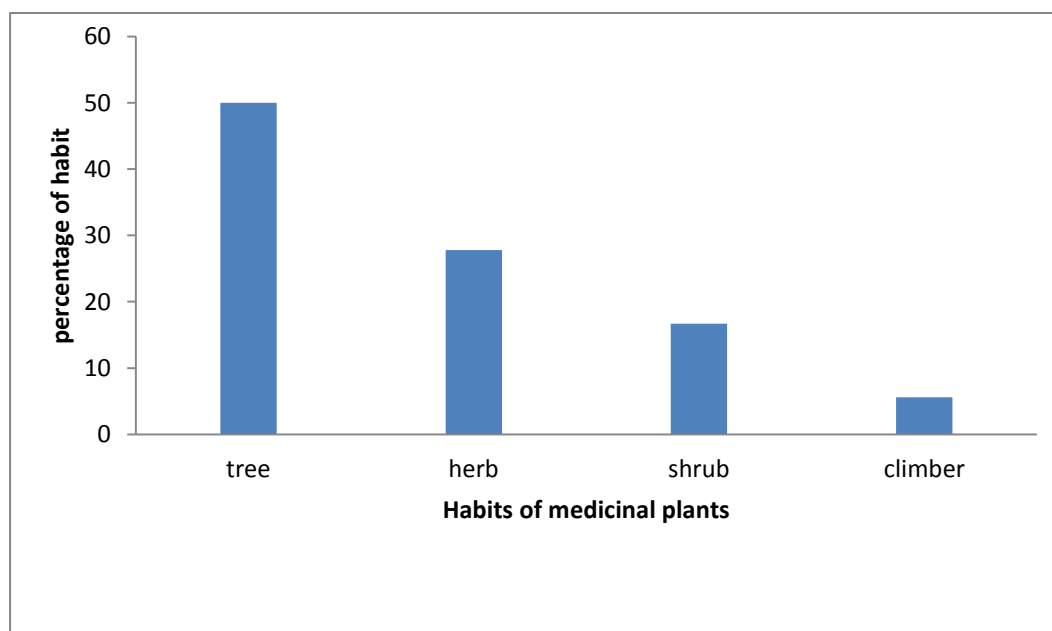


Figure 14: Habits of medical plants to treat both human & livestock ailments in Arbaminch zuria woreda

4.3.3.2. Parts of Medicinal Plants to Treat both human and Livestock Ailments

The plant part used for both of human and livestock treatment in the area were leaves accounts 19 (44.18%) followed by root 8 (18.6%), young shoot 4 (9.3%), fruit 3 (6.97%), seed, flower, bark and rhizome with 2 (4.65%) each and bark & leaves 1 (2.32%).

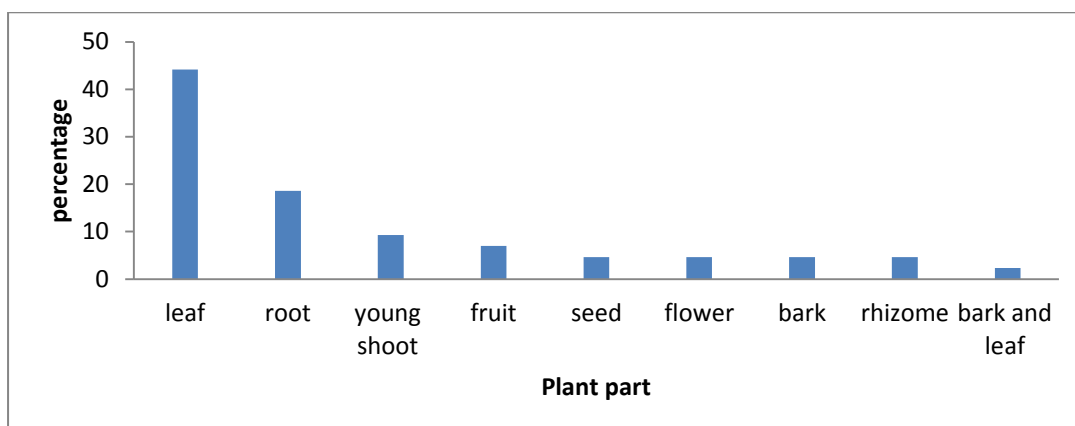


Figure 15: Plant Part Used to treat both human and livestock ailments in Arbaminch zuria woreda

4.3.3.3 Method of preparation of medicinal Plants for both human and Livestock

The local people use different forms of preparation to treat both human and livestock ailments. The most frequently applied modes of preparation of medicine were reported to be pounding and crushed, pounding and chewing each with 6 (33.3%) preparation whilst pounding 4 (22.2 %) followed by, crushing, and exudation, squeezing and fumigating each with only one (5.5 %) preparation.

Table 13 : Method of preparation of medicinal Plants for both human and Livestock

Method of Preparation	Number of preparations	%	Method of Preparation	Number of preparations	%
Pounding	4	22.2	Exudation	1	5.5
Pounded and crushed	6	33.3	Squeezing	1	5.5
Pounded and chewing	6	33.3	Fumigating	1	5.5
Crushing	1	5.5			

4.3.3.4. Route of administration of medicinal plants used for both human and livestock

Based on the nature of the ailments the remedies were applied through different routes. Oral route was the major route accounting 27 preparations (75%), followed by derma 6 preparations (16.7%), ocular 1 preparations (2.8) and nasal 2 preparations (5.5%).

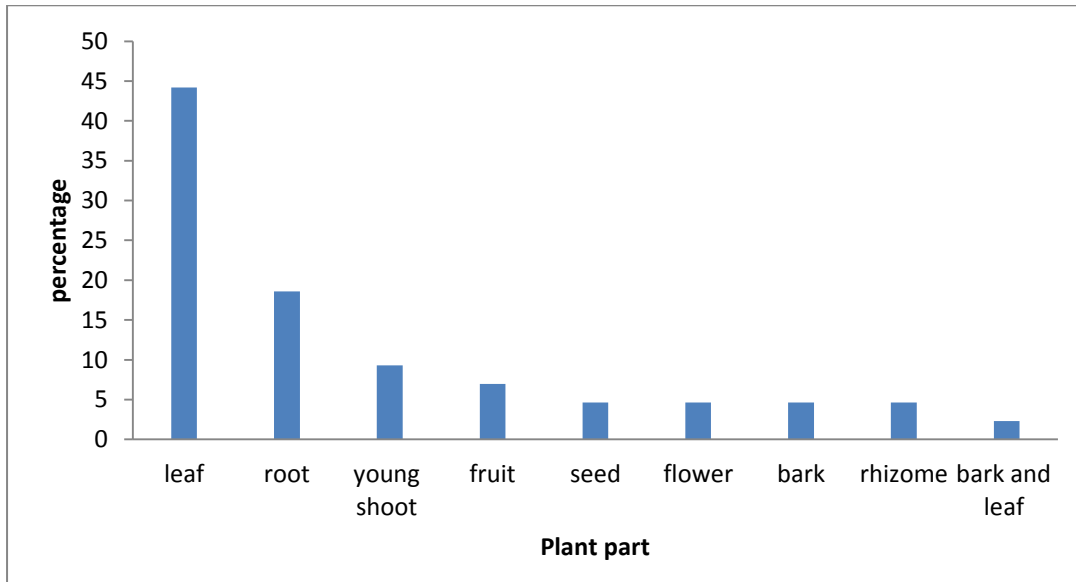


Figure 16: Route administration medicinal plants used for both human and livestock ailments

4.4 Ranking of Most Important Medicinal Plants

4.4.1. Informant consensus

The result of the study has showed that some medicinal plants species are more popular than others. The informant consensus obtained from this study showed that some plants were cited by more than 40% of the informants. *Allium sativum* took lead where it was cited by 64 respondents (87.67%) for its Popularity of being medicinal plant. in the area.

Table 14: Informant Consensus of Most Important Medicinal Plants

No.	Scientific Name	Total Infor.	%	No.	Scientific Name	Total Infor	%
1	<i>Allium sativum</i>	64	87.6	11	<i>Plantago lanceolata</i>	40	54.7
2	<i>Acmella caulirhiza</i>	60	82	12	<i>Kalanchoe petitiiana</i>	39	53.4
3	<i>Ruta chalepensis</i>	57	78	13	<i>Bothriocline schimperia</i>	38	52
4	<i>Withania somnifera</i>	54	73.9	14	<i>Balanites aegyptica</i>	36	49.3
5	<i>Brucea antidysenteria</i>	51	69.8	15	<i>Solanum incanum</i>	35	47.9
6	<i>Ocimum lamiifolium</i>	50	68.4	16	<i>Lepidium sativum</i>	34	46.5
7	<i>Croton macrostachyus</i>	49	67.1	17	<i>Coriandrum sativum</i>	33	45.2
8	<i>Datura stramonium</i>	47	64.3	18	<i>Dodonea angustifolia</i>	32	43.8
9	<i>Rumex nepalesis</i>	43	58.9	19	<i>Eucalyptus globulus</i>	30	41
10	<i>Nicotinia tabacum</i>	42	57.5	20	<i>Solanecio gigas</i>	29	39.7

4.4.2 Preference Ranking

Preference ranking was carried out on medicinal plants used to treat tonsillitis. Ranking of 8 medicinal plants that were reported as effective for tonsillitis (Table 16) ten respondents were asked to compare the given medicinal plants based on their efficacy and to give the highest number (7) for the medicinal plant which they thought most effective in treating the disease and lowest number (1) the least effective plant in treating the disease. The table showed that *Acmella caulirhiza* scored 71, *Brucea antidysenterica* scored 60, *Ajuga integrifolia* scored 52 *Melia azedarach* scored 42 and other (see table 16).

Table 15 : Preference ranking of eight selected medicinal plants

No	Plant species	Respondents										Total	Rank
		R 1	R 2	R3	R4	R 5	R 6	R7	R8	R 9	R1 0		
1	<i>Acmella caulirhiza</i>	7	8	6	6	7	8	6	8	7	8	71	1
2	<i>Melia azedarach</i>	4	3	7	4	3	6	4	4	3	4	42	4
3	<i>Ajuga integrifolia</i>	5	6	5	7	5	5	7	5	2	5	52	3
4	<i>Solanum incanum</i>	3	4	1	1	2	4	3	2	4	6	30	8
5	<i>Brucea antidysenteria</i>	6	7	8	5	6	7	2	6	6	7	60	2
6	<i>Kalanchoe petetiana</i>	8	5	3	8	4	3	1	1	1	3	37	5
7	<i>Rumex napalesis,</i>	1	2	4	3	8	2	5	3	5	2	35	6
8	<i>Schinus molle</i>	2	1	2	2	1	1	8	8	8	1	33	7

4.4.3 Direct Matrix Ranking

Direct matrix ranking was performed to assess the relative importance of each of the plant used as medicine. The result of the direct matrix ranking showed that *Juineperus procera* has multipurpose use of total value 24, *Hagenia abyssinica* 22 total values, *Myrica salicifolia* 21 total value and others (see table17).

Table 16 : Direct Matrix Ranking of ten medicinal plant species

<i>Use</i>	<i>Agarista salicifolia</i>	<i>Balanite saegyptica</i>	<i>Calpurnia aurea</i>	<i>Croton macrostachyus</i>	<i>Eucalyptus globulus</i>	<i>Hagenia abyssinica</i>	<i>Juniperus procera</i>	<i>Myrica salicifolia</i>	<i>Olea europaea subsp.cuspidata</i>	<i>Terminalia macropetal</i>	<i>Total</i>	<i>rank</i>
Farm tools	2	2	2	3	3	3	3	1	2	1	22	6
Construction	3	4	1	1	3	4	5	5	5	4	35	2
Fire wood	2	3	3	3	2	3	5	4	2	3	30	4
Charcoal	1	4	3	5	1	4	3	4	5	3	33	3
Furniture	3	2	3	3	1	4	4	3	0	0	23	5
Medicine	5	5	5	3	3	4	4	4	5	4	42	1
Total	16	20	17	18	13	22	24	21	19	15	185	
Rank	8	4	7	6	10	2	1	3	5	9		

Based on the criteria (5=Best, 4=Very Good, 3= Good, 2=Less Used, 1=Least Used)

4.4.4 Fidelity Level

The Fidelity Level (FL) is the percentage of informants claiming the uses of a certain plant species for the same major purposes or ailments to treat as described by Alexiades (1996). So, FL was calculated as $FL = (NP/N \times 100)$, Where NP is the number of informants that claims the use of a plant species to treat a particular disease and N is the number of informants that use the plants as a medicine to treat any disease. Fidelity level gives the importance of plant species in treating the mentioned specific conditions. In this study *Acmella caulirhiza* against Tonsillitis, *Withania somnifera* against Evil eye, *Brucea antidysenter* against Dysentery, *Oxalis corniculata* against Leshemianiasis, *Terminalia macropetala* against Snake bite. *Acmella caulirhiza* showed the highest fidelity level value 100% for Tonsillitis followed by *Withania somnifera*.

Table 17 : fidelity level

Medicinal plant	Therapeutic use	NP	N	FL=NP/N
<i>Withania somnifera</i>	Evil eye	19	20	0.95
<i>Brucea antidysentrica</i>	Dysentery	17	18	0.94
<i>Acmella caulirhiza</i>	Tonsillitis	20	20	1.00
<i>Oxalis corniculata</i>	Leshemianiasis(Locally called Bolebo)	22	24	0.91
<i>Terminalia macropetala</i>	Snake bite	23	25	0.92
<i>Ocimimu lamiifolium</i>	Febrile	14	15	0.93
<i>Daturastramonium</i>	Haemorrhoids	17	20	0.85

4.5 Threats to Medicinal Plants and Indigenous Knowledge to TM

According to informants, the availability, abundance and proximity of medicinal plants have declined from time to time. Most of the respondents unanimously agreed that they walk longer distance to get plant parts for treating their patient than what they used to some 10 /20 years ago. According to most of the informants the main factors that threatened medicinal plants in the study area were environmental degradation, deforestation, overgrazing, expansion of crop land, excessive use of plant parts for various uses including medicinal. Moreover, the impact of climate change was also reported as an adverse effect on the general environment and medicinal plants in the study area. This is observed by appearance of alien species in the farm and other parts constraining the growth of smaller herbs and shrubs that were used for medicinal purposes.

Regarding the Indigenous knowledge of herbal Medicine both for humans and livestock, I observed the rich wisdom in the study Gamo community both men and women. The wisdom and people with accumulated knowledge were not well mapped, documented and given attention by the local government.

4.6 Management and Conservation of Medicinal Plants

Despite the general trend of decline in terms of availability, abundance and proximity of medicinal plants some healers and beneficiaries plant few medicinal plant species in their homestead and take care. Besides, some farmers keep few trees as agroforestry practices that are used for medicine and other multiple uses. Furthermore, patches of community forests and sacred groves and burial grounds are traditionally conserved which harbour some of the key traditional medicinal plants Except such efforts, there is as such no organized, and coordinated work for managing and conserving medicinal plants by different relevant stakeholders in the study area per say. However, the researcher was able to observe some

efforts by researchers of ArbaMinch University showing interest to traditional medicine and medicinal plants which may yield fruits in the future.

4.7. Transferring Knowledge of Traditional Medicinal Plants

Generally, the knowledge of traditional medicine is passed from generation to generation orally. There is no documented manuscript regarding the knowledge of traditional medicine in the study area except few studies conducted very recently (Mohammed Adefa and Seyoum Getaneh, 2013 Yarcho Yaya and Birhanu Gemed, 2017). The respondents were asked as from who they acquired the knowledge TM the majority (67.3%) responded that they got from their father. Among the respondents 23.1% replied that they got the TM knowledge from their mother. The remaining, 5.8 %, and 3.8% of my respondents replied that they acquired the Knowledge of TM from none relative healers and self-trail respectively.

Regarding the transfer of Indigenous herbal medicine knowledge to the young generation, the respondents were asked whether they are worried about threat to the knowledge in their community. All of the respondents unanimously agreed that the knowledge is not passing to the young generation as it should be due to a number of reasons like lack of interest to TM by the young generation, less reward of the knowledge in terms of money to the healers, influence of modernization, etc. The key human and livestock healers in the study community were asked to respond their personal plan to transfer the TM knowledge. Accordingly, 69.23% of the respondents were planning to transfer to their Eldest son or Daughter where as 15.4 % to a family member, 11.53% replied that they want to transfer to anyone who is interested even outside the family member 3.84 % not decided yet.

4.8. Marketing Medicinal Plants

In my study area I was attempted to visit some markets to investigate the marketability of traditional medicine and medicinal plants. The market survey showed that most of the medicinal plants are sold in the market either as food stuff or spices but not sold as ready-

made processed medicine. Some of the medicinal plant parts sold in the local market in the study area are *Allium sativum*, *Ruta chalepensis*, *Citrus limon*, *Coffee arabica*, *Brassica carinata* and *Capsicum annum*.

4.9 .The Challenges of the Traditional Herbal Healers

Traditional healers in the study area face a number of challenges while they perform their daily routine in their community. Many of the key healers both for humans and livestock have responded that the reward they get in the form of income for the service they give is not satisfactory. One Key healer in Zegite Merch Kebele said that when one patient visits his home to get medicine, he often walks long distance to get some of the plants which are not around and as a result he misses a lot of his farm work that he should do to his family. He told that he is not happy as people are paying very less or want to get the service for free. Finally he said, he does not want to be known as traditional healer. He said, I only want to give the service to the very poor that cannot pay. When he was asked why not he charge fair price considering the time and energy he spent? He said, he cannot do that because the people who get the service are mainly his community members, and charging them at market price could lead to social exclusion from the community.

The other challenge that some of the traditional healer face in the study community is low attitude of certain community members towards the healer, This is true to those healers who do not have sufficient land (the main asset of rural livelihoods) and mainly depend on providing the treating service as main source of livelihoods of their families. As the healing service pays less and if the healer has less land and considered as poor and dependant he / she tend often to be looked down by other wellbeing farmers despite his/ her importance in the community health.

The other challenge of the traditional healers in their daily work is declining trend of the availability of the plants that are used for preparation of various medicines. This is mainly

associated with deforestation and degradation of the local environment. Most of the key healers unanimously agree that they walk long distance to get some medicinal plants than they used to do some 10/ 20 years back.

The other key challenge the traditional healers face in the community is the little or no support from the local as well regional government bodies and line office like Health Office, and Office of Agriculture and Livestock. Most of the healers were asked whether they get any form of assistance or support for the work they do in the community from any local government. Almost all of them responded that they did not get any support or encouragement from the local government. Experts working at woreda health and agricultural office were similarly asked whether they give any training or effort to register and establish healers association in the woreda as per the health policy. All of the experts agreed that they did not give any support to the healers in the woreda. However, they know their importance in the community. Some, experts even considered the practice of the healers as back ward and harmful practice rather than looking as complimentary practice to the modern health service.

UNIT FIVE

5. DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 DISCUSSION

5.1.1 Diversity of Medicinal Plants in the study Area

In the study area a total 102 medicinal plants have been documented. Plants are distributed under 54 families and 96 genera. Family Lamiaceae was represented by 10 species followed by Solanaceae 8 species. Family Lamiaceae was found to be the highest contributor for medicinal purpose than other plant families in the study area. This finding is in line with findings of Getu Alemayehu (2017). The number of medicinal plants and their medicinal as well as other uses by the people of the woreda indicates the depth and breadth of the indigenous knowledge as well as medicinal plant diversity in the study area

Many of the medicinal plant species used to treat human and livestock ailments in the study woreda were also documented as remedies in other parts of Ethiopia by different scholars such as Tizazu Gebere (2005) 20 Species , Endalew Amenu (2007) 28 Species , Moa Megerssa (2010) 46 Species , Eskedar Abebe (2011) 31 species , Fisseha Mesfin (2007) 20 species , Getu Alemayehu (2017) 25 and 18 in Amaro and Gelan Districts , respectively. The finding showed that relatively less number of plant numbers was used to treat livestock ailments compared to those used for humans'. Similar finding were reported by Endalew Amenu (2007), Ermias Luelkal *et. al.*, (2008), Moa Megerssa (2010), Eskedar Abebe (2011), Getu Alemayehu (2017).

5.1.2 Habits of Medicinal Plants

The most widely used medicinal plants in the area were obtained from herbs which account the lion share with 42 species (41.2%). The dominance of herbs is due to its relative abundance and ease of availability to the people. This finding is agreed with prior findings by

kalayu Mesfine (2013), Endalew Amenu (2007), Tadesse Birhanu *et al.* (2001), Fisseha Mesfin (2007) , Eskedar Abebe (2011), Mohammed Adefa & Seyoum Getaneh, (2013) .However, it disagree with Ermias Lulekal *et al.* (2008) indicated that shrubs are the most frequently used.

5.1.3 Habitat of Medicinal Plants

In the study community people harvest medicinal plants fairly from all habitats namely from forest (37.2%), from home garden (32.4 %), from farm land (30.4%). Even if the source of medicinal plant from forest habitat is relatively high as compared to home garden and farm land in the study area, there is no as such significant proportional disparity that is found in other studies like Fisseha Mesfin (2007) , Getu Alemayehu (2017), Ermias Lulekal (2008), Moa Megersa (2010), Mohamed Adefa and Seyoum Getaneh (2013). The faire source of medicinal plants from all habitats needs to be maintained in the study area. If we sum up the habitats from home garden and farm land which are role of human activity, the sources of medicinal plants from these were highest (62.8 %) as compared to natural habitat (37.2 %).

5.1.4 Plant Parts Used of Medicinal Plants

Regarding plant parts used, people of the study area prepare their remedy from leaves, roots, stems and others. The most commonly used plant parts for herbal preparation in the area were leaves accounting for 82 (56.2 %). The finding of this study agrees with the finding of Endalew Amenu (2007), Abera Balcha (2003), Atinafu Kebede *et al.* (2017), Moa Megersa (2010), It is not in line with findings of Ermias Lulekal *et al.*, (2008), and Meaza Gidey *et al.* (2015). Itis agreed that a general truth that collection of root, bark and whole plants might kill plants in harvest. In this study however, leaves were reported to be the most utilized plant part for preparation of remedy. Therefore, collecting leave is better to the maintenance of the life of individual plant as compared with the collection of stem, root or whole parts.

5.1.5 Methods of Preparation of Herbal Remedies

The key healers reported that they prepare medicine in different ways including pounding, crushing, powdered, exudation, chewing, squeezing, mix with water, latex and others. The major modes of preparation of remedy in the study community were pounding and mixed with cold water 46 (45.09%), crushing and mixed with cold water 13 (12.7%). This finding agrees with prior study by Endalew Amenu (2007). Pounding method of medicine preparation is high in the area most probably due to its ability to extract nutrients that have medicinal values from the plant parts and its efficacy.

5.1.6 Route of Administration of Medicinal Plants

Regarding routes of administration, there are various ways of administering traditional medicine in the study area. The main routes of administration of medicinal plant are Oral, Dermal, Ocular, Anal, and others, among these; Oral administration is the highest with 62 species (60.8 %) from the total 102 documented medicines. The finding regarding routes of administration goes with findings in other areas of Ethiopia like Ermias Lulekal (2008), Meaza Gidey *et al.* (2015) Atinafu Kebede *et al.* (2017) and Getu Alemayehu (2017). The Oral route of administration is significantly higher than other ways in the study community probably due to the fact that most prevailing disease in the area are associated with internal disorders like Stomach ache, Intestinal Parasite, Malaria, and Tonsillitis, etc. For which oral administration was more efficient.

5.1.7 Preference Ranking

In the study community, the prevailing human disease in the low lands was malaria and typhoid fever where as in the highlands malnutrition, diarrhoea, and Trachoma were reported commonly. Almost all of the prevailing diseases reported by the woreda Health Office were also reported by the study community and key healers who also attempt to give remedy to these prevailing diseases and others much more. The community members mainly visit their

local traditional healers particularly for disease like Leshmansis, Tonsillitis, Wounds occurring in and between fingers and Toes commonly called Shosha Mata locally as the healers were believe to be more effective for these particular disease and others than the conventional medicine in the area.

Ten respondents were asked to compare and prefer among 8 medicinal plants to treat tonsillitis, which was quite often prevailing disease and large number of patients visited the traditional healers in all agroecology. *Acmella caulirhiza* scored 71 has ranked first indicating that it is the most effective in treating tonsillitis followed by *Brucea antidysenteria*, 3rd *Ajuga integrifolia*, 4th *Malia azedarach*, 5th *Kalanchoe petetiana* while the least effective species compared to other five species were *Rumex nepalensis*, *Schinus molle* and *Solanum incanum* according to the informants.

5.1.8 Direct Matrix Ranking of Medicinal Plants

In this study, a number of medicinal plants were found to have multipurpose species being utilized. The common uses include farm tool, fire wood, charcoal, construction, medicinal and furniture making the multipurpose plants was selected from the others species based on their high number of uses as compared to others. Hence, direct matrix ranking was performed to assess the relative importance and adverse impact of the multipurpose use on those plant species relative abundance and availability.

Ten commonly reported multipurpose species and six use categories were involved in direct matrix ranking with respondents. Respondents evaluated the relative importance of the multipurpose plant species and they were summed up and ranked. Thus, the result of the direct matrix ranking showed that *Juineperus procera* has multipurpose use were ranked 1st followed by *Hagenia abyssinica* and hence were the most preferred medicinal plants by the local people for various uses and are the most threatened species. *Myrica salicifolia*, *Balanities aegyptica*, *Olea europaea*, and *Croton macrostachyus* were the other multipurpose

medicinal species ranking 3rd, 4th, 5th and 6th respectively. The least ranked species for their multipurpose uses were *Eucalyptus globules*, the least ranked species are the less threatened and relatively dominantly distributed species in the area.

Regarding dosage used traditional healer used different units of measurement to measure the dosage of traditional medicines. From these such as number of leaves and seeds, tea cup, small pieces, cup of glass, tea spoon, one litter, and bottle half litter. Traditional healers give medicine by estimation and fix the dosage of medicine. This dosage was based on age, type of illness, pregnancy. Traditional healer recommended using antidotes for any adverse effect caused by some medicinal plants. For example, milk, barely flour (Beso), bread made from Kocho were few among others.

5.1.9 Knowledge Transfer of Medicinal plants

Regarding indigenous knowledge transfer according to data obtained from the study, traditional healers who were illiterate 40 (37.5%), 24 (21.4%) had able to read and write, 19 (17%) had primary school, 16 (14.3%) had secondary school and 11(9.8%) attend college and above. Illiterate informants found to be very rich in the TM knowledge than those who were educated. Moreover, key informants in my study area were richer with TM knowledge than the general informants who participated in the study. This finding agrees with the finding of (Debela Hunde *et al* 2004; Moa Megersa, 2010). Thus, Ethnobotanical knowledge of traditional medicine is relatively rich within age group 41-60. Young people did not have much knowledge compared with elders. The knowledge tends to diminishes with the aging and pass away of elderly knowledgeable members of the society. This is mainly because young people are willing less to acquire the knowledge tending to be attracted more to the influence of ‘modernization’ and ‘westernization’ in the name of civilization. Particularly, erosion of knowledge on medicinal plants is more significant in species collected from forest for use in treating rare and unusual ailments.

5.2 Conclusion

The Ethnobotanical study finding of medicinal plants of the Gamo community of Arbaminch Zuria woreda clearly showed that the study area is rich in medicinal plants composition and associated indigenous wisdom. The study documented a total of one hundred two medicinal plants of which 66.6% species are used to treat human ailments whilst 15.68% species are used to treat livestock ailments and 17.64% species are used to treat both human and livestock ailments. The medicinal plants collected belong to 96 genera and 54 families. The leading family was Lamiaceae.

The growth habit analysis of medicinal plants showed that herb constituted the highest species 41.2%, followed by shrubs 28.45%, trees 26.5 %, and climbers 3.9%. Regarding habitat of MP species (37.3%) were collected from the forest while 31 species (30.4%), were obtained from farm land and the remaining 33 species (32.4%) from home garden.

The most commonly used plant part for herbal preparation in the area were leaves which accounted 50% of the plant parts used for preparations, followed by roots 6.9%, seeds 5.9%, and fruit 3.9%. The greater number of preparations was found to be pounding followed by crushed. The larger proportions of remedies were administered for internal ailments through oral routes, while some external infections are treated commonly using dermal route.

The support from local government bodies to traditional healers both livestock and human healers were found to be very poor. No effort was seen by the local government to register and map the traditional healers and give them support to compliment the conventional health care system with the traditional medicine. Moreover, the knowledge transfer of medicinal plants to the younger generation is declining due to lack of interest, less reward to works of healers in terms of income and influence of modernization and westernization. The major threats to medicinal plant in the study area were environmental degradation, deforestation, over grazing, expansion of crop land, fire wood collection, charcoal making, and use of plants for construction.

5.3 Recommendation

Based on the findings of this study the following key points are recommended:

The study findings have shown that the trend of natural vegetation and forest resource status which is the main source of herbal medicine is declining from time to time in the study area due to internal and external factors like deforestation, expansion of agricultural land, poor management practice, over exploitation of natural vegetation, and climate change, etc. Thus, holistic conservation and management measures that involve both in-situ and ex-situ conservation and good agricultural practices and sustainable use solutions should be put in place as soon as possible by local communities with technical and financial support from the woreda, Zonal and regional governments.

The Gamo community in Arbaminch Zuria woreda has a rich wisdom of both livestock and human traditional healing for range of diseases and endowed with plant species that are used as MP. Currently, there is an urgent need of comprehensive documentation and further research on molecular levels for posterity as significant number of key healers are aging and lacking interest as their work is not rewarding in terms of income. In this regard, Arbaminch University could take the lead and coordinate other relevant stakeholders in the further research and documentation.

Though the country at national level has formulated a policy to integrate the traditional medicine with the modern health care system by regulating, and researching TM, the study findings on the ground have shown that effort by the local government in promoting safe and effective use of traditional medicine side by side with modern health care system. Thus, Gamo zonal and Arbaminch Zuria woreda level relevant government stakeholders in the health sector should give due attention to map the local healers, organize them in to association , introduce their rights and responsibilities as well as lay foundation for

integration of the traditional and modern health care systems which are currently going parallel instead of integrating and making synergy.

Further Phytochemical studies are recommended for medicinal plants in the study area particularly for *Acmella caulirhiza* and *Brucea antidysenterica* as these MPs have high informant consciences and fidelity value. Moreover, MPs such as *Withania somnifera*, *plantago lanceolate* and *Rumex nepalensis* need particular attention and conservation because they are relatively highly threatened due to use of their roots for medicine.

Reference

- Alexiades, M. (1996). Collecting ethnobotanical data. An introduction to basic concepts and techniques. In: Alexiades, M.() and Sheldon J.W.ed.s.). *Selected Guideline for ethnobotanical research: A field Manual*, pp.58-94. The New York. Botanical Garden, U.S.A
- AMZW (2018). Arbaminch Zuria Woreda Office of Agriculture Unpublished document
- AMZW (2018). Arbaminch Zuria Woreda Health Office Unpublished document
- Arbaminch Municipality (2018). Unpublished document
- Asefaw Debela,(2015) Overview on the status of Traditional Medicine in Ethiopia and Prospects for its Development in Negero Gemedda, Ashenif Tadele , Biruktawit Girma , Frehiwot Teka Edi :Proceeding of the Workshop on “Ethiopian Traditional Medicine: Past, Current and Future” , Adama, Ethiopia, Abera Balcha (2015): A century journey of Ethiopian Traditional Medicine and Treatment, a book written in Amharic language.
- Assegid Assefa and Tesfaye Abebe (2014): Ethnobotanical Study of Wild Medicinal Trees and Shrubs in Benna Tsemay District, Southern Ethiopia, *Journal of Science & Development* 2(1) 2014
- Atinafu Kebede, Shimels Ayalew, Akalu Mesfin, and Getachew Mulualem (2017): Assessment on the Use, Knowledge and Conservation of Medicinal Plants in Selected Kebeles of Dire Dawa Administration, Eastern Ethiopia, *Journal of Plant Sciences* 5(2): 56-64.
- Balcha Abera (2003) Medicinal Plants used in Traditional Medicine in Jimma Zone, Oromia, South West Ethiopia, *Ethiopia Journal Health Science. Vol. 13, No. 2, July 2003.*

- Balick, M. J. and Cox, P. A. R. (1996). *Plants People and Culture: The Science of Ethnobotany*. Scientific American Library, New York, USA
- Chen S., Yu H., Luo H., Wu Q., Li C. and Steinmetz A. (2016): Conservation and sustainable use of medicinal plants problems, progress, and prospects, *Chin Med* 11:37.
- Cotton, C.M. (1996). *Ethnobotany: Principles and Applications*. John Wiley and Sons, New York, 412pp
- Cunningham, A.B. (2001). *Applied ethnobotany: People, Wild plant use & conservation*. London: Earthscan.
- Dawit Abebe (2001). The role of medicinal plants in Health care Coverage of Ethiopia, the possible benefits of integration. In: (Medhin Zewdu and Abebe Demissie (eds.)). *Conservation and Sustainable Use of Medicinal plants in Ethiopia*. Proceeding of the National workshop on Biodiversity Conservation and Sustainable use of medicinal plants in Ethiopia, 28 April- 01 May 1998, pp.107-118. IBCR, Addis Ababa.
- Dawit Abebe and Ahadu Ayehu (1993). *Medicinal Plants and Enigmatic Health Practices of Northern Ethiopia*. B.S.P.E, Addis Ababa, 511pp
- Debela Hunde, Zemedet Asfaw and Ensermu Kelbessa (2006). Use of Traditional Medicinal Plants by people of Boosat sub District, Central Eastern Ethiopia, *Ethiopian Journal of Health Science*. Vol.16, No. 2
- Dery B., Otsynia, R. and Ng'ativa, C. (1999). *Indigenous Knowledge of Medicinal Trees and setting priorities for their Domestication in Shinyanga Region, Tanzania*. International Centre for Research in Agroforestry, Nairobi, Kenya, pp.87.
- Edwards, S. (2001). The Ecology and Conservation Status of medicinal Plants on Ethiopia. What do we know? pp. 46-55, In: Medhin Zewdu and Abebe Demissie

(eds.) Conservation and Sustainable use of medicinal plants in Ethiopia, Proceedings of National Workshop on Biodiversity Conservation and Sustainable use of medicinal plants in Ethiopia, Institute of Biodiversity Conservation and Research, Addis Ababa.

Endalew Amenu (2007). Use and Management of Medicinal Plants By Indigenous People Of Ejaji Area (Chelya) Woreda West Shoa Ethiopia: an Ethnobotanical Approach. M.Sc. Thesis. Addis Ababa University

Endashaw Bekele (2007). Study on Actual Situation of Medicinal Plants in Ethiopia , Prepared for JAICAF (Japan Association for International Collaboration of Agriculture and Forestry) pp.73.

Ensermu Kelbessa, Sebsebe Demissew, Zerihun Woldu and Edwards, S. (1992). Some threatened Endemic plants of Ethiopia. In: (Edwards, S. and Zemedu Asfaw eds.). *The status of some plants in parts of tropical Africa*. pp. 35-55. NAPRECA, No.2. Botany 2000: East and Central Africa.

Ermias Lulekal, Ensermu Kelbessa, Tamrat Bekele and Haile Yineger (2008): An ethnobotanical study of medicinal plants in Mana Angetu District, south eastern Ethiopia, *Journal of Ethnobiology and Ethnomedicine*. 4:10.

Ermias Lulekal (2005). Ethnobotanical study of medicinal plants floristic composition of Manna Angetu Moist Montane Forest, Bale Ethiopia. MSc Thesis. Addis Ababa University.

Eskedar Abebe (2011). Ethnobotanical Study on Medicinal Plants used by Local Communities in Debark Woreda, North Gondar Zone, Amhara Regional State, Ethiopia, MSc Thesis, AAU,

Federal Democratic Republic of Ethiopia (FDRE, 1993). Health Policy of Ethiopia, Addis Ababa, Ethiopia

- Federal Democratic Republic of Ethiopia (FDRE, 1995). Health Sector Strategy of Ethiopia, Addis Ababa, Ethiopia.
- Federal Democratic Republic of Ethiopia (FDRE,1997). Environmental Policy of Ethiopia, Addis Ababa.
- Federal Democratic Republic of Ethiopia (FDRE,2001). Rural Development Policy, Strategies and Instruments, Addis Ababa
- Fekadu Fullas (2010). Ethiopian Medicinal Plants in Veterinary Healthcare, a Mini-Review. Ethiopian e journal for research and innovation foresight ,Vol 2, No. 1 - Health Issue pp (48 - 58).
- Fekadu Fullas (2001).Ethiopian Traditional Medicine: Common Medicinal Plants in Perspective, Sioux City.
- Fernández E.,Vlkova M., and Milella L.(2013). Ethnobotany of medicinal plants of northern Ethiopia in Boletin Latinoamericano y del Caribe de Plantas Medicinales y Aromaticas .
- Fisseha Mesfine (2007). An Ethnobotanical Study of Medicinal plants in WonagoWoreda, SNNPR, Ethiopia. M Sc Thesis Addis Ababa Universty .
- Fitsumbirhan Tewelde, Mebrahtom Mesfin, and Semere Tsewene (2017): Ethnobotanical Survey of Traditional Medicinal Practices in LaelayAdi-yabo District, Northern Ethiopia .*International Journal of Ophthalmology & Visual Science*; **2(4)**:
- Friis, I. (1995). Canellaceae. In: Edwards, S., Mesfin Tadesse and Hedberg, I. (eds.). Flora of Ethiopia and Eritrea, Volume 2, part 2. Canellaceae to Euphorbiaceae. The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia and Uppsala, Sweden.
- Friis, I., and White, F. (2003). Ebenaceae. In: (Hedberg, I., Edwards, S. and SileshiNemomisa (eds.)). Flora of Ethiopia and Eritrea, Volume 4. Apiaceae to

- Dipsacaceae. The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia and Uppsala, Sweden. Pp.258-358.
- Gelahun Abate (1989). EtseDebdabe (Ethiopian traditional medicine) (in Amharic).
- Getu Alemayeh. (2017), Plant Diversity and Ethnobotany of Medicinal and wild edible plants in Amaro District of Southern Nations Nationalities and Peoples Region and Gelan District of Oromia Region , South Ethiopia..
- Gilbert, M.G. (1995). Euphorbiaceae. In: Edwards S., Mesfin Tadesse and Hedberg I. (eds.). Flora of Ethiopia and Eritrea, Volume 2 part 2: Canecellaceae to Euphorbiaceae. The National Herbarium, Addis Ababa University, Addis Ababa, Ethiopia and Uppsala, Sweden. Pp.268-380.
- Haile Yineger (2005). A study of Ethnobotany of Medicinal plants and Floristic Composition of the Dry Afromontane Forest at Bale Mountains National Park. M.Sc. Thesis. AddisAbaba, Ethiopia.
- Hamilton, A.C., Pei Shengji, P., Kessy, J., Khan, Ashiq A., Lagos-Witte, S. and Shinwari, Z.K.(2003): The purposes and teaching of Applied Ethnobotany. People and Plants working paper 11. WWF, Godalming, UK.
- International Union for Conservation of Nature and Natural Resources (IUCN) (1993): Guidelines on the Conservation of Medicinal Plants , in partnership with The World Health Organization (WHO), and WWF World Wide Fund for Nature, Gland, Switzerland.
- Kalayu Mesfin, Gebru Tekle , and Teklemichael Tesfay (2013). Ethnobotanical Study of Traditional Medicinal Plants Used by Indigenous People of Gemad District, Northern Ethiopia, Journal of Medicinal Plants Studies, Vol: 1, Issue: 4

- Kebede Deribe, Alemayehu Amberbir, Binyam Getachew, and Yunis Mussema (2006). A historical overview of traditional medicine practices and policy in Ethiopia: *Ethiopian Journal of Health Development*
- Lambert J. (1995). *Ethnobotany: A method manual*. Royal botanical garden, Chapman and Hall, Kew, London.
- Lambert J. Ethiopia: Traditional medicine and the bridge to better health. World Bank, available at: <http://www.worldBank.org/afr/ik/dfefault.htm>.
- Martin, G.J. (1995). *Ethnobotany A method Manual*. Chapman and Hall, London. Pp. 265-270
- Martin, G.J. (1995). *Ethnobotany A method manual*. Royal botanical garden, Chapman and Hall, Kew, London.
- Meaza Gidey, Tadesse Beyene, Signorini M., Bruschi P. and Gidey Yirga (2015): Traditional Medicinal Plants used by Kunama Ethnic Group in Northern Ethiopia, *Journal of Medicinal Plants Research*, Vol. **9(15)**, pp. 494-509.
- Mirutse Gidey and Tilahun Teklehaymanot (2013). Ethnobotanical Study of plants used in the management of Livestock Health Problems by Afar people of Ada'ar District, Afar Regional State, Ethiopia, *Journal of Ethnobiology and Ethnomedicine* **9: 8**.
- Moa Megersa (2010). Ethnobotanical Study Of Medicinal Plants In Wayu Tuka Woreda, East Wolega Of Oromia Region, Ethiopia.
- Mohammed Adefa and Seyoum Getaneh (2013). Medicinal Plants Biodiversity and Local Healthcare Management System in Chencha District; Gamo Gofa, Ethiopia, *Journal of Pharmacognosy and Phytochemistry* .Vol. **2** No. **1**.
- Nemarundwe, N. and Richards, M. (2002). Participatory methods for exploring livelihood values derived from forests: potential and limitations. In: B.M. Campbell and

- M.K.Luckert (eds.), *Uncovering the Hidden Forest: Valuation Methods for Woodland and Forest Resource*. Earth scan Publications Ltd, London. Pp. 168-198
- Nolan M. & Turner N. (2011). *Ethnobotany: The Study of People–Plant Relationships*.
- Pandey A. and Tripathi Y. (2007). *Ethnobotany and Its Relevance in Contemporary Research*, in *Journal of Medicinal Plants Studies*
- Sebsebe Demissew (2003). Myrsinaceae. In: (Hedberg, I., Edwards, S. and Sileshi Nemomissa (eds.)). *Flora of Ethiopia and Eritrea. Vol.4. Apiaceae to Dipsacaceae*. Pp. 64-69. Addis Ababa University. Addis Ababa, Ethiopia and Uppsala, Sweden.
- Tadesse Birhanu, Dereje Abera and Eyasu Ejeta (2015). *Ethnobotanical Study of Medicinal Plants in Selected Horro Gudurru Woredas, Western Ethiopia*, *Journal of Biology, Agriculture and Healthcare* , Vol.5, No.1.
- Tafesse Mesfine and Samson Shiferaw (2009). *Indigenous veterinary Practices of South OmoAgropastoral communities*.
- Teshome Soromessa , Demel Teketay &Sebsebe Demissew (2004).*Ecological study of the vegetation in Gamo Gofa zone, southern Ethiopia*, *Tropical Ecology* **45(2)**: 209-221, 2004
- TewoldeBerhan GebreEgzibher & Edwards, S. (1997). Alliaceae. In: (Edwards,S., Sebsebe Demissew&Hedberg, I. eds.). *Flora of Ethiopia and Eritrea.Vol.6: Hydrocharitaceae toArecaceae*, pp.148. Addis Ababa, Ethiopia; Uppsala, Sweden
- Tilahun Tolossa (2015).*Medicinal Plants Used in the Treatment of Livestock Diseases in Berbere District of Bale zone, Oromia Region, Ethiopia*, *Journal of medicinal plant research*.
- Tizau Gebre (2005).*An Ethnobotanical Study of Medicinal Plants in Konso Special Woreda, SNNPR, Ethiopia*.

USAID (2006).Southern, Nation Nationalities and People's Region, Ethiopia: Livelihood Profiles.

Vivero, J.L. Ensermu Kelbessa and Sebsebe Demessew (2003). The Red List of Endemic Trees and Shrubs of Ethiopia and Eritrea. IUCN.

WHO (2001). Alternative Medicine: A World Wide Review. Geneva 2001.

WHO (2001). Legal Status of Traditional Medicine and Complementary

WHO (2001). Legal Status of Traditional Medicine and Complementary/Alternative Medicine: A World Wide Review. Geneva 2001.

WHO (2003). Fact Sheet, Traditional Medicine, Geneva, May 2003.

WHO (2013): Traditional medicine strategy: 2014-2023.(www.who.int)

WHO (2013): Traditional medicine strategy: 2014-2023.(www.who.int)

Yarcho Yaya and Birhanu Gameda, (2017). Useful Vascular Plants of Gamo Area

Appendix 1: List of Medical Plants Used For Human, Ailments in Arba Minch Zuria Woreda

Habitat Forest (F), Home Garden (HG), Farm Land (FL), Growth Habitat: Herb (H), Shrub (SH), Tree (T), Climber (CL), Part Used: _Bark (BA), Latex (LA), Root (R), Leaf (L), Fruit (FU), Flower (FL), Seed (SE), Whole Part (WP), Bulb (BU), Young Shoot (YS), latex (LX) stem, (ST) Route Of Administration: Oral (OR), Nasal (NA), Dermal (DR), Ocular, Anal (AN), Tooth (TS), Gamtso (GA), Amharic (AM)

Scientific name	Family	Local name	Growth habit	Habitat	Disease treated	Part used	Mode of preparation	Route	Collection no.
<i>Acmella caulirhiza</i> Del	Asteraceae	Aydama /GA Yemdr Berberie/AM	H	Hg	Tonsillitis coughs Strained eye Teeth ache Leishmanial Pick out dust particle	L F	Young shoot chewed Young shoot sniffed through nostrils Leaves are chewed Leaves are pounded with juniperus procera leaves and in improving healing of wounds caused by leshemania Flowers are used to pick out dust particles from eye	O D	SE 015
<i>Agrocharis incognita</i> (Norman) Heyw. &Jury,	Apiaceae	Quarda GA /anazegy//A M	H	FL	Swelling of lower part of Tounge	L	Leaves are pounded and mixed with water and drunk	O	SE 064
<i>Ajuga integrifolia</i> Buch .-Ham.ex D.Don	Lamiaceae	Dorth /GA aremagusa /AM	H	FL	Blood pressure Tonsillitis Malaria	L	pounded leaves are mixed with water and drunk	O	SE O85
<i>Ajuge leucantha</i> Lukhoba,	Lamiaceae	Mecha talle	H	FL	Infection around mouth part	L	Pounded leaves are mixed with water and drop decoction of leaves	N D	SE 091
<i>Allium sativum</i> L.,	Alliaceae	Tumo /GA nech shinkurt /AM	H	Hg	Malaria Bone ache Snake repellent	Bu	Bulb are pounded and eaten with injera. The crushed bulbs are mixed with water and sprayed as snake repellent	O	SE 098
<i>Althernanthera</i>	Amaranthac	Kindicho/GA	H	F	Kidney	WP	The whole part cooked and the remaining	O	SE 082

<i>pungens</i> kunth ,	eae	Kurenchit/A M			infection Urination problem		fluid is drunk		
<i>Annona squamosa</i> L.,	Annonaceae	Ambashuka Gishita	T	Hg	Cancer	S	Seed are crushed and mixed with water and boiled and drunk	O	SE 056
<i>Antospermum</i> <i>herbaceum</i> L.f.,	Rubiaceae	Bangayo	H	FL	Snake bite	L	Leaves are pounded and applied on the wound	D	SE 092
<i>Balanites aegyptiaca</i> (L.) Del	Balanitaceae	Domaye /GA /beddeno/AM	T	Ft	Blood urination	L	Leaves are crushed mixed with water and drunk	O	SE 016
<i>Balanites</i> <i>rotundifolia</i> (van Tieghem)Blatter	Balanitaceae	Kuze /GA Bedeno/AM	T	F	Amoeba	L	Pounded leaves with water and drunk	O	SE 028
<i>Bothriocline</i> <i>schimperii</i> Oliv,&Hiern ex Benth.,	Asteraceae	Susa	S	FL	Intestinal disorder Dysentery and gastritis “mich” Hepatitis	L	Pounded leaves are boiled with butter and used Leaves are squeezed and the resulting solution is sniffed Extract of the pounded leaves is drunk	O N	SE 071
<i>Brassica carinata</i> A. Br.,	Brassicaceae	Santha ayfe /GA gomen zer /AM	H	Hg	Epilepsy dynesenery	S	The seed is roasted and ground in to flour, mixed with either water or milk and then drunk	O	SE 049
<i>Buddleja</i> <i>polystachya</i> Fresen.,	Loganiaceae	Amefar/GA Shanka /AM	S	F	Wound	L	leaves are dry and powdered and applied on wound	D	SE 074
<i>Capsicum annuum</i> L.,	Solonaceae	Qariya yeferenge	S	Hg	Flatulence of belly	L	Pounded leaves and mixed with water and drunk	O	SE 029
<i>Carica papaya</i> L.,	Caricaceae	Papaya	T	Hg	Wound dressing	S	Roasted seeds	D	SE 008
					Amoeba gardia intestinal parasite	S	Seed chewed	O	

					Tape worm	F	Making hole of immature fruit and drunk white fluid		
<i>Carissa spinarum</i> L.,	Apocynaceae	Ladea/GA agamAM	S	Ft	Stomach-ache Snake bite Malaria,	S YS RB	Chewing seed Infusion made of shoots Decoction of root bark	O	SE 033
<i>Catha edulis</i> (Vahl)Forssk.ex Endl	Celastraceae	Jima/GA katheAM	S	Hg	Diarrhoea Deficiency Of Vit. C	L	Leaves chew Leaves chewed once in a week	O	SE 014
<i>Cissampelos mucronata</i> A.Rich,	Menispermaceae	Change	F	CL	Syphilis, Stomach ache, Dysentery Vomiting	R	Root is pounded mixed with water and refined solution is drunk	O	SE 039
<i>Clerodendrum myricoides</i> (Hochst.) vatke,	Lamiaceae	Katinakaytse /GA Miserich/AM	H	FL	Swelling of hands and legs	L	Leaves are pounded and mixed with water and drunk	O	SE 030
<i>Clutia abyssiniaca</i> Jacq.,	Euphorbiaceae	Totilashe	S	F	Skin disease	Lx	Latex is applied on the skin	D	SE 048
<i>Coffea Arabica</i> L.,	Rubiaceae	Tukke Buna	T	Hg	Sharp pain / kurtet Wound dressing	L	Leaves are pounded boiled with butter and drunk Seeds are roasted	O D	SE 0
<i>Combretum oculateum</i> Vent.,	Combretaceae	Kamrekash/GA Ungoy/AM	H	F	Intestinal parasite Remove ascaris	RB,F, FR S	Root bark, flower and fruit are pounded together and mixed with coffee and drunk early in the morning Seeds are eaten to remove ascaris	O	SE 0
<i>Corandrum sativum</i> L.,	Apiaceae	Debo /GA Dimbilal /AM	H	Hg	Malaria Tapeworm	S	Seeds are ground into flour and boiled together with curry powder and drunk Powdered seeds are drunk	O	SE 065
<i>Cymbopogon martini</i> (Roxb.) Wats.	Poaceae	Gucheche /GA	H	Hg	Stomach ache Blood	L	An infusion from the pounded leaves	O D	SE 102

		tej sar /AM			pressure Dandruff				
<i>Cyostemma adenocaula</i> (steud.ex A.Rich)	Vitaceae	Asa ayfe	CL	F	Fasten labour of pregnant women	R	Root are pounded and mixed with water and boiled and then drunk	O	SE 076
<i>Dicrocephala integrifolia</i> (L.f.) kuntze	Asteraceae	Dhoshuma	H	FL	Cancer	L	Extract of the pounded leaf is drunk	O	SE 081
<i>Discopodium penninerviium</i> Hochst.,	Salanaceae	Mazho/GA Ameraro /AM	H	FL	Stomach ache Constipation hemorrhoids	L YS	Pounded leaves mixed with water and given Extract of pounded leaves Young shoots are inserted into rectum	O Anal	SE 061
<i>Ehretia cymasa</i> Thonn.,	Boraginacea e	Itriwanje	T	FL	Flatulence of bell Liver disease Evil eye	L	An infusion of pounded leaves	O	SE 070
<i>Foeniculum vulgare</i> .Miller,	Apiaceae	Katikala /GA insila /AM	H	Hg	Stomachcom plaints Epilepsy, Fever Tooth ache	S	The seeds are roasted, ground and mixed with milk And drunk		SE 021
					Amoeba	L		An infusion from pounded leaves and seeds are used	
<i>Galiniara saxifraga</i> (Hochst.) Bridson	Lamiaceae	Buna mesay/AM Darume/GA	S	Hg	Strengthening Bone seating	L	Crushed leaves and mixed with water and refined solution is drunk	O	SE 068
<i>Geranium aculeolatum</i> Oliv.,	Geraniaceae	Laso	H	FL	Eye infection	L	Extract of pounded leaves and drop in the eye	Oc	SE 052
<i>Grewia flavescens</i> Juss.,	Tiliaceae	Tseha	S	F	Dandruff	B	Wash hair with bark	D	SE 080
<i>Helichrysum traversii</i> chiov	Asteraceae	Asa ayfe	H	F	Evil eye	L	Crushed leaves and mixed with water and drunk	O	SE 038

<i>Hypericum sp.</i>	Guttiferae	erka	H	FL	Swelling	L	Pounded leaves are mixed with water	O	SE 077
<i>Hypits pectinata (L) poit</i>	Lamiaceae	Asa ayfe Aynetila	H	FL	Evil eye	L	Pounded leaves are mixed with water	O	SE 094
<i>Indigoera spicata</i> Forssk.	Fabaceae	Zida /GA Yeayt Mssr'AM	H	FL	Stomach ache	R	Chewing root	O	SE 037
					Stomach ache during menstruation Nail wound	L	Crushed leaves Crushed leaves	D	
<i>Jantropa curcas L.</i>	Euphorbiaceae	Tsedake	S	Hg	Wound	L	Latex applied on wound	D	SE 024
<i>Justica schimperiana</i> (Hochst.ex nees)T.Anders.	Acanthaceae	Guluboncho/ GA sensal /AM	S	FL	Trypanosoma Hepatitis stomach ache Gum bleeding	L YS	Extract from pounded leaves given to humans An infusion of the crushed shoot and drunk The shoots are also squeezed and the resulting juice is applied on gum	O	SE 101
<i>Kalanchoe petitiiana</i> A.Rich.,	Crassulaceae	Murmuta	H	F	Intestinal parasite Stomach ache Tonsillitis	L	Leaves are squeezed and resulting juice is drunk with milk	O	SE 058
<i>Lepidium sativum L.</i>	Brassicaceae	Sibika/GA	H	Hg	Trypanosoma Intestinal problems Common cold Stomach ache Flatulence	S	The seeds are grounded into flour mixed with water and given	O	SE 099
		Feto/AM					The crushed seeds are placed in the nostrils The powdered seeds is mixed with water and drunk	D	
<i>Lippia javania</i> (Burm.f.)spreng.	Verbenaceae	Koseret	S	Hg	Stomach ache in child conjunctivitis	L	pounded leaves are mixed with water and drunk leaves are used for scratching the inner part of eye lid to bleed conjunctivitis in	O	SE 097

							human		
<i>Maesa lanceolate</i> forssk.,	Myrsinaceae	Gergecho	T	F	Haemorrhoids	L	Leaves making small and cooked		SE 010
					Stomach ache after delivery		Leaves cooked and drunk		
					Ascaris in human		Extract of the leaves mixed with butter and drunk		
<i>Melia azedarach</i> L.,	Meliaceae	Mimo nime	T	Hg	Tonsillitis Tooth ache	L	Chewed Chewed	O	SE 022
<i>Mangifera indica</i> L.,	Anacardiaceae	Mango	T	Hg	haemorrhoids	L	Pounded leaves are applied on infected part.	D	SE 053
<i>Morus mesozygia</i> staps	Moraceae	Odeda	S	FL	Malaria , Gastrointestinal Problems Dysentery Constipation Thypoid Wound dressing	L	Extract of the pounded leaf is drunk	O	SE 089
							Extract of the pounded leaves is applied on wound	D	
<i>Moringa stenopetala</i> (Bak.f.) cufod.,	Morineaceae	Halako /GA Shiferaw/AM	T	Hg	Diabetes	L	Fresh leaves cooked and eaten	O	SE 001
					Constipation	S	Dried seed is chewed and swallowed		
					Rahematism	B	Bark is crushed and mixed with water and food oil and rubbed on the body	D	
					Common cold	F	Flower part is crushed and boiled with water and used		
					Loss of weight malaria	R	Root is cooked and drunk the water Root bark is cooked and the water part is drunk		
Sexual impotency in	L	Fresh leaves cooked and drunk the water part							

					men				
<i>Ocimum lamiifolium</i> Haehst.ex Benth	Lamiaceae	Gullo	S	Hg	Febril disease	L	Juice of squeezed leaves are drunk	O	SE 002
					Headache		The juice is sniffed through nostrils		
					Eye infection		The juice is also swabbed on the eye		
<i>Ocimum urticifolium</i> Roth,	Lamiaceae	Gullo	S	Hg	Febril disease Fever , Sweating Eye infection	L	Fresh leaves are squeezed and the juice is sniffed through nostrils The juice is also swabbed on the eye lids	O Oc	SE 084
<i>Oxalis corniculata</i> L.,	Oxalidaceae	Zille mata /GA yefiyel chew/AM	H	F	Leishmaniosi s	L	Crushed leaves and hold on wound	D	SE 067
<i>plantago Lanceolata</i> L.,	Plantaginac eae	Gortteb/AM tautauo /GA	H	FL	Retained placenta	R	Leaves are pounded and mixed with warm water and drunk	O	SE 063
<i>Persea Americana</i> Mill.,	Louraceae	Avocado	T	Hg	Constipation	F	Fruit eaten	O	SE 006
<i>Phyllanthus sp.</i>	Euphorbiac eae	Megaga mata	H	FL	Sudden illnes	R	Chewing	O	SE 087
<i>Physalis peruviana</i> L.	Solanaceae	Kujlkule	H	F	Loss of appetite	S	Seed chewed	O	SE 019
<i>Phytolacca dodecandra</i> L'H'erit.	Phytolaccac eae	Hadinche	S	F	Swelling Hepatitis Rabies	L B	Infusion of the leaf then drunken water part. Leaves are pounded mixed with water filtrated and drunk Crushed bark and mixed with milk and drunk	D O	SE 012
<i>Pimpinella heywoodii</i> Abebe	Apiaceae	Acheto Dafo	ST	F	Tooth ache	St	Chewing stem and hold on the teeth	O	SE 066
<i>Ranunculus multifidus</i> Forssk,	Ranunculac eae	Cheka	H	FL	Flatulence	L	Pounded leaf and mixed with water and drunk	O	SE 069
<i>Rhus natalensis</i> A.Rich	Anacardiace ae	Ongafire	S	F	Wound haemorrhoids	L	Leaves are pounded, mixed with butter and put on wound	D	SE 003

<i>Ricinus communis</i> L.,	Euphorbiaceae	tsema	S	FL	Dysentery	L	Leaves are pounded with water and refined solution is drunk	O	SE 034
					Hepatitis				
					Skin disease	S	Roasted seeds are ground into flour applied on the skin	D	
<i>Rubus apetalus</i> Poir.,	Rosaceae	Tera	S	F	Stomachache	S	Eating seed	Or	SE 011
<i>Ruta chalepensis</i> L.,	Rutaceae	Tsalota	S	Hg	Stomach ache evil eye	L	Leaves Small parts chewed and swallowed	O	SE 009
<i>Salvia nitotica</i> Jacq.,	Lamiaceae	Berbere	H	F	Tumer Yechinkilat eti	L	Root	Tide neck	SE 060
<i>Solanum nigrum</i> L.,	Solanaceae	Bedena /GAtikurawit t /AM	H	FL	Dysentery Itching	L F	Leaves are warmed in fire and used Crushed fruits are rubbed on skin	O D	SE 083
<i>Satureja paradoxa</i> (Vatke) Engl.ex Seybold,	Lamiaceae	Ficho /GA Nado/AM	H	Hg	Intestinal parasite	L	Pounded leaves are mixed with water and drunk	O	SE 078
<i>Schinus molle</i> L.,	Anacardiaceae	Kundo berbere	T	Hg	Tonsillitis	F	Fruits chewed and swallowed	O	SE 0
<i>Senna occidentalis</i> (L.) Link,	Fabaceae	Kassia	H	F	Constipation	L	Leaves are crushed and mixed with water and drunk	O	SE 018
<i>Sida ternate</i> L.f.,	Malvaceae	Litea	CL	F.L	Alta Vomiting Diarrhoea	WP	Whole part of the plant crushed and mixed with water and drunk	O	SE 059
<i>Terminalia macroptera</i> Guill& Perr.,	Combretaceae	Webeta /AM Galalo /GA	S	FL	Stomach- ache Tounge infection snake biting	B	Bark scrapings are chewed An infusion of the young shoot is drunk	O	SE 090
<i>Stellaria media</i> (L.)	Caryophyllaceae	Outsuma	H	FL	Stomach- ache Constipation	WP	The whole part is pounded , mixed with water and the refined solution is drunk	O	SE 072

Appendix 2: List of Medical Plants Used For Livestock, Ailments in Arba Minch Zuria Woreda:

Habitat Forest (F), Home Garden (HG), Farm Land (FL), Growth Habitat: Herb (H), Shrub (SH), Tree (T), Climber (CL), Part Used: Bark (BA), Latex (LA), Root (R), Leaf (L), Fruit (FU), Flower (FL), Seed (SE), Whole Part (WP), Bulb (BU), Young Shoot (YS), latex (LX), Stem (ST) Route Of Administration: Oral (OR), Nasal (NA), Dermal (DR), Ocular, Anal (AN), Tooth (TS)

Scientific name	Family	Local name	G. hab	Ha	Part used	Disease treated	Mode of preparation	Route	Collecti on no.
<i>Agarista salicifolia</i> (comm.ex lam.)Hook.f.,	Ericaceae	Gasso /GA Ketem /AM	T	F	L	Itching	The crushed leaves are mixed with water and rubbed on the skin of the pack animals	D	SE 036
<i>Calpurnia aurea</i> (Ait.) Benth,	Fabaceae	Birbira/G A Ttobia /AM	T	F	L	Dysentery expel tapeworm lice	Leaves are pounded and mixed with water and drunk. The leaves are pounded and mixed with water and the refined solution is rubbed	O D	SE 051
<i>Cassia arereh</i> Del	Fabaceae	Talahe/G A Qerqay/A M	T	F	L	Lice	The leaves are pounded and mixed with water and the refined solution is rubbed	D	SE 017
<i>Dodonea angustifolia</i> L.f.,	Sapindaceae	Sankara/ GA Ketekala/ AM	S	F	L	Dysentery	The leaves are pounded mixed with water given to animals		SE 041
						Lice	Swabbed on the skin to get rid of lice..		
					L	Intestinal parasite	Pounded leaves only given to animals.		
<i>Erythrina brucei</i> schweinf.,	Fabacea	Bortto/G A Korch/A M	T	F	L	Lice itching	An extract made from young shoots is rubbed.	D O	SE 035
					B	For cow coughing disease	Pounded bark and mixed with water given to animals.		
<i>Leucas deflexa</i> Hook.f.,	Lamiaceae	Gulo	H	FL	F	Sharp pain	Pounded flower are mixed with water given to animals	O	SE 073
					L	Blackleg Cough	Pounded leaves are mixed with water given to animals.		

						Stomach ache			
<i>Maerua angolensis</i> Dc.,	Capparidaceae	Talahe/G A Agatechil al /AM	S	F	L	Itching	Pounded leaves are mixed with water rubbed on animals.	D	SE 086
<i>Maerua oblongifolia</i> (Forssk)A.Rich.	Capparidaceae	Kundoro	S	FL	L	Shivering of cattle	Pounded leaves are mixed with water given to animals.	O	SE 093
<i>Nicotiana tabacum</i> L.,	Solanaceae	Tambo/ GA Tembaho/ AM	S	FL	L	Expel leech Black leg	An extract of the pounded leaves is sniffed through nostrils of the animals. Pounded leaves are mixed with water given to animals.	O	SE 031
<i>Pentas schimperiana</i> (A.Rich.) vatke,	Rubiaceae	Daransha/ GA Weynaget t/AM	S	Hg	L	Preventing constipation Dressing wound Created by Leishmaniasis.	The pounded leaves are given to animals The leaves are sun dried, crushed and used for wound dressing	O D	SE 023
<i>Rhamnus prinoides</i> 'Herit.,	Rhamnaceae	Gesho	S	Hg	L	Itching	The crushed leaves are mixed with water and rubbed	D	SE 040
<i>Sida rhombifolia</i> L.,	Malvaceae	Dandertha /GA gorjejit/A M	H	Hg	L	Constipation	Leaves are pounded and mixed with water and given to animals.	O	SE 005
<i>Solanecio gigas</i> (Vatke) C.Jaffrey,	Asteraceae	Olomo/G A Yeshkoko gomen/A M	S	F	L	Dysentery Trypanosomi asis	Young shoots are pounded with bitter leaves and given to animals	O	SE 025
<i>Urera hpyselodendron</i> (A. Rice.) Wedd.,	Urticaceae	Halilo /GA Lanqish/ AM	CL	FL	L	Intestinal Parasite Dysentery Constipation	Pounded leaves are mixed with water given to animals. Pounded leaves are mixed with ado (mineral soil) and given to animal.	O	SE 075

<i>Urtica dioica</i> L.,	Urticaceae	Puudo /GA Yeferenj sama /AM	H	F	L	Itching	Pounded leaves with water and rubbed on animals.	D	SE 088
<i>Zehneria scabra</i> (Linn.f.)sond.,	Cucurbitaceae	Echa/GA Aregress/ AM	H	FL	L & R L	Expel leech Dysentery Trypanosomi asis	Leaves and roots are pounded mixed with water and given to animals. the pounded leaves are mixed with water and drunk.	O	SE 062

Appendix 3: List of Medical Plants Used For both Livestock and Human, Ailments

Habitat Forest (F), Home Garden (HG), Farm Land (FL), Growth Habitat: Herb (H), Shrub (SH), Tree (T), Climber (CL), Part Used: Bark (BA), Latex (LA), Root (R), Leaf (L), Fruit (FU), Flower (FL), Seed (SE), Whole Part (WP), Bulb (BU), Young Shoot (YS), latex (LX), Route Of Administration: Oral (OR), Nasal (N), Dermal (DR), Ocular (OC), Anal (AN), Tooth (TS)

<i>Scientific name</i>	Family	Local name	G. ha	Ha	Use	Disease treated	Part used	Mode of preparation	R. A	Collecti on no.
<i>Aloe debrana</i> christian	Aloaceae	Godare utsa/GA Eriet/A M	H	Hg	Hu	Wound dressing Conjunctiva skin infection	L	The latex of the leave is used	D Oc	SE 050
					Ls	Retained placenta Trypanosomiasis	L	The pounded leaves are mixed with water and given to cows to remove Pounded leaves are sniffed through nostrils	O N	
<i>Artemisia absinthium</i> L.,	Asteraceae	Natira Ariti	H	Hg	Hum	Facilitate delivery and remove waste things after delivery Sore throat Flatulence of the	L	Leaves are pounded and boiled together with butter and drunk The boiled leaves are used Fresh leaves are smelled against strained eye	O	SE 100

						body Strained eye Stomach ache		Extract from Pounded leaves are drunk.		
					Ls	Stomach ache		Extract from pounded leaves		
<i>Brucea antidysenteri ca</i> J.F.mill	Simaroubaceae	Shurshu dhe	S	F	hum	Typhoid Rabies Intestinal disorder Dysentery Tonsillitis	L YS	An infusion is made of pounded leaves Leaves are pounded mixed with water and refined solution is drunk Young shoots are chewed	O	SE 045
					Ls	Dysentery Black leg Lice Itching	Fr	The fruits are pounded mixed with water and refined solution is given Refined solution is also rubbed on livestock's	O	
<i>Citrus lemon</i> (L.)Burm.f.,	Rutaceae	Lome	T	Hg	Hu	Stomach ache Common cold	Fr	The juice squeezed from the fruits And drunk.	O	SE 055
					Ls	Expel leech	Fr	The juice sniffed through nostrils of livestock.	D	
<i>Croton macrost achyus</i> Del;	Euphorbiaceae	Anka/G A Bisana/ AM	T	F	Hu	Stop bleeding from wound Subsequent infection Eye disease Abscess Swollen parts to shrink Malaria Tapeworm	L	Juice squeezed from its leaves The leaves are warmed in fire and rubbed on the swollen body parts. The leaves are powdered with <i>vernonia amygalina</i> and water then drunk The leaves are also pounded with <i>Embelia schimperi</i> leaves and drunk	O	SE 047
					Ls	Dysentery Anthrax	L	The pounded leaves are mixed with water and drunk		

						Trypanosoma	B	An infusion of the bark alone used The bark is also crushed with <i>Eucalyptus globulus</i> shoots and mixed with water and drunk.		
<i>Dutara stramonium</i> L.,	Solanaceae	Machara	H	FL	Hu	Rabies Haemorrhoid Hepatitis Tooth ache	L S	An infusion of pounded leave is drunk The crushed leaves are inserted into rectum An extract of seed is used for treating hepatitis. The seed fumigating to relieve	D A	SE 027
					Ls	Wound dressing Pancreases swelling	L	Crushed leaves are used Leaves are pounded, mixed with water and drunk	D	
<i>Eucalyptus globulus</i> Labill	Myrtaceae	Both barzafe	T	F	Hu	Common cold Head ache	L	Leaves cooked and the smoke inhaled	D	SE 007
					Ls	Trypanosomiasis Tonsillitis	YS	Young shoot is pounded and mixed with water and drunk	O	
<i>Euphrasia abssinica</i> Gmel	Euphorbiaceae	Akirssa/ GA Qulqual /AM	T	F	Hu	Intestinal disorder Hepatitis Tooth ache	L	Latex is mixed with “kocho” and eaten to relieve intestinal disorders Latex is used to treating	O	SE 032
					Ls	Itching	L	Latex is mixed with water and rubbed on the pack animals	O	
<i>Hagenia abyssinica</i> (Brace) J.F Gmel	Rosaceae	Zodho/ GA Koso/A M	T	F	Hu	Tape worm	F	An infusion made from dried flower head is drunk		SE 043
					Ls	Black leg Dysentery	L	The leaves are pounded mixed with water and given to animals	O	

<i>Juniperus procera</i> Hochst.ex Endi.,	Cupresaceae	Tseeda/ GA Tsid/A M	T	F	Hu	Dressing wound by created by Leishmanial Urination problem	B/L YS	The dried bark or leaf is pounded And used An infusion of the young shoot is drunk	D O	SE 095
					Ls	Bloating	L	The leaves are mixed with water and minerals soil locally”Ado” and given to animals.	O	
						Black leg		The leaves are crushed with solanium incanum leaves and fern, mixed with water and given to animals		
<i>Myrica salicifolia</i> A,Rich	Myrtaceae	Bundo	T	FL	Hu	Evil eye Cough	L B	An infusion made of the leave is drunk The bark is pounded ,mixed with water and the refined solution is drunk	O	
					Ls	Trypanosomiasis Cough Urination difficulty	B	The bark is pounded, mixed with water and the refined solution is given to animals.	O	
<i>Olea europea</i> L.subsp.cuspi data	Oleaceae	Gulita/ GA weyra/A M	T	F	Hu	Stomach ache Gum bleeding	L	An infusion of the crushed leaves are used	O	SE 054
						Urination difficult	YS	The extract of the crushed shoot is drunk		
						Tooth ache	S	The wood is warmed in fire for treating		
					Ls	Black leg	L	An infusion of the crushed leaves are used		

<i>Rumex abssinicus jacq.,</i>	polyganaceae	Col'e	H	F	Hu	Blood pressure	R	Root dry and grind the powder is mixed with water and boiled and drunk Rhizome is crushed, boiled with butter and drunk	O	SE 046
						Intestinal worm	Rh			
					Sore throat Stomach ache		Rhizome is chewed			
					Ls	Intestinal worm Trypanosomiasis in cattle	Rh	An infusion of the rhizome is used.	O	
<i>Rumex nepalensis spreng</i>	Polygonaceae	Sholo/G A Tult/A M	H	FL	Hum	Tonsillitis	R	Root is chewed to relieve	O	SE 020
						Tuberculosis +Intestinal disorder Stomach ache		Decoction made from boiled root is drunk		
					Ls	Expel intestinal worm Trypanosomiasis	R	The root is pounded and mixed with water and givento calves	O	
<i>Solanum incanum L.,</i>	Solanaceae	Bullo/G A Emboi/ AM	S	FL	Hum	Stomach ache	R	The root is chewed	O	SE 042
						Dysentery	F	The root infusion		
						Wound dressing Tonsillitis		The ripe fruit		
					Ls	Trypanosomiasis Black leg	L	An infusion of the pounded leaves is given to the cattle	O	
<i>Stephania abyssinica (Dillon&A.R ch.)Walp.</i>	Menispermaceae	Kelela	C L	F	Hum	Syphilis Stomach ache Dysentery Vomiting	R	The root is pounded, mixed with water and the refined solution is drunk	O O	SE 013
					Ls	Sharp pain	R	The root is pounded, mixed with		

								water and the refined solution is drunk		
<i>Vernonia amygdalina</i> Del.,	Asteraceae	Gara/G A Grawa/ AM	T	Hg	Hu	Gastro intestinal Malaria Haemorrhoids	L	Leaves are pounded mixed with water the resulting solution is drunk Crushed leaves are given	O O	SE 044
					Ls	Trypanosomiasis Dysentery Constipation Intestinal parasite	L	Pounded leaves are mixed with water and given		
<i>Withania somnifera</i> (L..)Dunal,	Solanaceae	Gizawa	S	FL	Hu	Evil eye Gum bleeding Stomach ache Malaria	R L	Root chewed Pounded leaves are mixed with water and the resulting solution is drunk An infusion made of root is drunk	O	SE 057
					Ls	Lung fluke Bloating	R	Pounded root is mixed with water and given to cows		

Appendix 4: Checklist of questions which will be used during interviews with key informants/ healers

I. Background Socio-demographic information

1.1 Date of interview _____

1.2. Name of the interview kebele _____ and site _____

1.3. Name of the informant (with Consent) _____

1.4. Age of the informant _____

1.5. Sex of the informant _____ Female Male

1.6. Level of education of the informant

Literate (able to read and write) illiterate (unable to read and write) ; primary education

Secondary education above secondary

II. Information related to the medicinal use of the plants

1. What are the most common diseases of humans in your area that people visit you to get your assistance? -----

2. To how many different type of diseases do you give herbal medicine? Would you please list them all?

3. Which type of medicinal plants do you use for each disease?

4. What are the most common diseases of livestock's in your area? (For livestock healer)

5. Mention plant types used to treat a given disease in the area (give local names).

5.1 Plant used to treat only human diseases

5.2 Plants used to treat only livestock diseases

6. What part/ parts of the medicinal plant (s) is/are used? (Mark an "X" on one

Of the give alternatives)

Flower (FL) Latex (Lt)

Fruit (Fu) Whole plant (WP)

Seed (Se) Leaf (L)

Sap (Sp) Root (R)

Bark (B) Stem (St)

7. What is the habit of the plant?

Tree (T) Shrub (S)

Climber (Cl) Herb (H)

8. Where do the medicinal plants grow? (Place of collection?)

8.1. In home gardens

7.2. Fallowed land

8.3. Arable land

7.4. In the forest

9. What method of preparation do you use for each disease / the method of preparation of medicinal plants for each and every disease you provide? (Mark "X")

Fresh (F) Dried (D)

Crushed (C) Powdered (P)

Used alone (UA) Exudation (Ex)

Concoction (Cn) Mixed with others or water (Mw)

10. Does the amount you provide (dose) vary among different age groups, sex? If yes, state for each age groups and sex.

11. Is there any noticeable adverse effect (side effect) caused by the medicine you provide? If yes, is/ is there any antidote (s) for those adverse effects?

12. How does the prepared remedies taken by the patient for each disease(s)/routes of administration? (Mark "X"). Dermal (D) , Anal (A) , Nasal (N) Oral (O)

Ear (E) F. Other Specify _____

13. Generally which Season of the year is preferred for collection of medicinal plants in your area?

13.1. Wet season

12.2. Dry season

12.3. All-the-year round

14. Why you prefer that particular season?

15. Are there seasons where you do not get sufficient amount of medicinal plant parts to your customers? Mention the season and why? _____

16. How is the plant parts collected? (Including the amount collected at a time)

17. Do you store the medicine? If yes, how and for how long?
18. Are there conditions (example like pregnancy, menstruation ...) that forbids the patient?

Taking the medicine

19. Are there economic groups who mostly or occasionally use these medicinal plants?
20. Are there social groups that often use Medicinal plants?
21. Is/Are the medicinal plant (s) marketable in your area? If so,
22. Which age group sells and exchanges them most often?
23. Which plant species are more common on a market?
24. Where are their sources?
25. What are their benefits?
26. Are the medicinal plants easily accessible for you to prepare herbal medicine? Yes
No , If not, why?
27. How abundant is medicinal plants in your community/ area, its trends when compared to the past ten/20 years back (is it Increasing? how far do you travel to get the medicinal plants in the past and now. Tell me the difference by comparing?
28. What is the outlook of the conventional health care providers / government people to traditional herbal health care that you are providing? Are they supportive or discouraging? If discouraging why you do think?
29. Are there community members who frequently depend more on traditional medicinal plants as compared to modern medicine? Why?
30. Would you please tell me if there are taboos associated with the utilization, collection date and time, date and time of providing herbal medicine, method of collection, sex, age storage etc? of some medicinal plants in your community ? If any)
31. Are there threat to the medicinal plants in your area? If so what are the major problems associated with them in the area?

If so include the management practices by the indigenous people in general and what you do as healer in particular?

32. How is the availability (abundance) of medicinal plants in your area as compared to the past some 10/20 years period? : More _____, Same_____, and Less/ decreasing _____ . If less why tell me the reason please?

33. Do you think that the medicinal plants in your area are threatened? Yes, No.

What are threatening factors of medicinal plants in your area? For medicinal Use , Food , Firewood collection , Charcoal making , Fence,

Construction , Furniture, Edible fruit

36. Which particular medicinal plants species is commonly threatened in study area?

37. Would you please tell me as how the local people manage and conserve medicinal plants through their traditional practices? Tell me your experience

38. Does the medicinal plants of your area have any use other than medicine? If yes, state them please?

39. Do you worry about the loss of the traditional Medicinal knowledge and practice that you maintained from your forefathers?

40. To whom you want to pass the knowledge of Traditional medicine and the practice you acquired?

41. Do you get any support from the local government? If yes, would you tell me more about the support you got?

42. What kind of support do you need from the government as traditional healer in your community?

43. What are the main challenges you face while you practice your healing practice in your community?

Date_____ time_____

Appendix 5: List of informants contacted in the study

Name of informants	Sex	Age	Kebele	Occupation	Other Identity
Abayne Adeno	M	46	Chano Mile	Merchant	
Abayneh Zadala	M	45	Chano Chalba	Carpenter	Healer
Aboite Salile	F	45	Chano Mile	House Wife	Healer
Aboynesh Goyre	F	42	Dega Ocholo	Nurse	-
Aboyte Adarso	F	62	Chano Chalba	Carpenter	Healer
Abriham Ganamo	M	48	Ganta Bonke	Farmer	Healer
Ajote Kuwa	M	62	Ganta Bonke	Farmer	-
Alaha Alba	F	65	Ganta Meyche	House Wife	Healer
Alemitu Zemedikun	F	35	Shara	Farmer	-
Alemu Gorgisa	M	36	Ganta Kanchama	Farmer	-
Altaye Bikire	M	68	Dega Ocholo	Carpenter	Healer
Amane An'aa	F	56	Wusamo	House Wife	-
Ankale Zardo	F	49	Ganta	House Wife	-
Aregash Asire	F	48	Dega Ocho,Lo	House Wife	Healer
Aregash Urage	F	56	Ganta Kanchama	Farmer	-
Arjotte Masala	F	47	Gatse	Farmer	-
Asefa adeto	M	37	Chano Mile	House Wife	Healer
Asegedech Kaltsa	F	60	Chano Mile	House Wife	-
Atumo Kappo	M	45	Ganta	Teacher	Healer
Awake Chuba	M	39	Ganta	Farmer	-
Aydiko Aytalo	M	56	Chano Mile	Farmer	Healer
Azaze Agarcho	F	50	Wusamo	House Wife	-
Bakalu Zeleke	M	62	Ganmta Kancham	Farmer	-
Balesha Makura	F	40	Wusamo	House Wife	Healer
Bante Badeno	F	37	Chano Shara	House Wife	-
Bashikala Gale	M	33	Chano Mile	Student	
Bekele Geza	M	62	Ganta	Student	Healer
Birke Dergu	F	30	Zegite Bakole	Farmer	-
Biruk Torcha	M	48	Chano Mile	Farmer	Healer
Bogal Mana	M	62	Ganta	Merchant	Healer
Bolla Botolla	M	65	Chano Chalba	Carpenter	Healer
Bonka Bogale	M	36	Ganta Bonke	Weaver	
Bora Santa	M	68	Ganta Bonke	Farmer	Healer
Borku Botolla	M	48	Ganta Meyche	Farmer	Healer
Bultte Duka	F	47	Ganta Kanchama	House Wife	-
Bune Domba	M	32	Dega Ocholo	Nurse	
Buzunesh Chifamo	F	54	Dega Ocho,Lo	Teacher	Healer
Chufa Chunka	M	41	Gatse	Farmer	
Dacha Afaka	M	29	Chano Mile	Teacher	
Dagone Fino	F	28	Ganta	House Wife	
Dale Dengato	M	50	Ganta	Farmer	Healer
Damake Mahala	M	60	Wusamo	Carpenter	Healer
Damench Degu	M	58	Ganta	Farmer	Healer
Daniel Dabalo	M	75	Chano Mile	Farmer	-

Darza Dalo	M	57	Wusamo	Farmer	Healer
Dembe Habtamu	F	79	Gatse	Farmer	-
Desto T/Mariam	M	66	Ganta Mayche	Farmer	-
Dilae Dicha	F	57	Dega Ocho,Lo	House Wife	-
Era Senko	M	59	Ganta Bonke	Farmer	Healer
Fikere Mekuria	F	55	Chano Chalba	House Wife	Healer
Filmon Gobe	M	43	Chano Chalba	Teacher	Healer
Gebeyo Gasa	M	60	Wusamo	Carpenter	
Geda Sanka	M	73	Zegite Bakole	Farmer	Healer
Genet Geda	F	45	Ganta	Farmer	Healer
Getachew Gorda	M	32	Zegite Bakole	Carpenter	-
Gete Tsegaye	F	39	Ganta	Carpenter	-
Gettelo kuntta	M	62	Chano Mile	House Wife	-
Gida Girche	M	32	Gatse	Nurse	Healer
Godatse Goda	F	34	Ganta Bonke	Weaver	-
Golole Goshe	M	49	Wusamo	Guard	-
Goshu Gogilo	M	45	Ganta Bonke	House Wife	Healer
Haile tukuso	M	56	Wusamo	Farmer	-
Halaka Tukuso	M	32	Ganta Bonke	Farmer	-
Kantaye Doboche	M	70	Wusamo	Farmer	Healer
Kebea Kalthay	F	39	Chano Mile	Teacher	Healer
Ketelo worgocho	M	40	Ganta	Farmer	Healer
Kuntashe Worka	F	29	Ganta Bonke	Merchant	
Kutaye Kunta	F	45	Zegite Bakole	House Wife	Healer
Lakare Denba	F	30	Chano Chalba	House Wife	Healer
Magera Maycha	M	39	Chano Chalba	Teacher	Healer
Mamite Hanche	F	78	Gatse	House Wife	Healer
Marta Mago	F	26	Ganta	House Wife	-
Maskale Marako	F	38	Wusamo	House Wife	Healer
Mato Dirgo	M	76	Chano Chalba	Trader	-
Melka Maycha	M	85	Chano Mile	Trader	-
Mengistu Dabaricho	M	57	Zegite Bakole	Farmer	Healer
Misrake Asnake	F	49	Ganmta Kancham	Farmer	-
Misre Hontso	F	73	Gatse	House Wife	-
Mulune Nigatu	F	77	Zegite Bakole	House Wife	-
Ocho Kebede	M	48	Ganta Bonke	Farmer	-
Olatte Odiro	M	41	Dega Ocho,Lo	Farmer	
Otolche Damoshe	F	50	Gatse	House Wife	Healer
Pawulos Ashenafi	M	45	Chano Mile	Farmer	
Sage Burzala	M	67	Dega Ocholo	Farmer	Healer
Samuel Eroba	M	69	Chano Chalba	Merchant	
Sariye Gultume	F	60	Wusamo	House Wife	Healer
Selam abite	F	50	Chano Shara	Farmer	Healer
Senait Gujibo	F	35	Wusamo	Teacher	Healer
Sinbiro Tutulo	M	62	Ganta Kanchama	Teacher	-
Sisay Shamena	M	49	Ganta Bonke	Nurse	-
Tadesse Akumo	M	78	Chano Chalba	Farmer	
Tasama Azizo	M	68	Gatse	Guard	

Tonjolo murshe	M	33	Ganta	Carpenter	
Tosea Tana	M	40	Chano Chalba	Farmer	
Ultte Ushacha	F	53	Wusamo	House Wife	-
Umbbe Anjullo	F	53	Wusamo	House Wife	-
Ume Iticho	F	70	Zegite Bakole	House Wife	
Unddale Ubba	F	62	Gatse	Farmer	Healer
Wajore Wanna	F	69	Wusamo	House Wife	Healer
Wandara Wana	M	55	Chano Mile	Farmer	-
Wanke Waliye	F	74	Wusamo	House Wife	Healer
Wedda Waske	F	38	Gatse	House Wife	-
Wolige Wolde	M	50	Zegite Bakole	Farmer	
Xambuke Sage	F	27	Ganta Meche	House Wife	Healer
Yalola Yate	F	38	Ganta Bonke	Teacher	Healer
Yaya Chotoro	M	72	Gatse	Guard	
Yazo Yaba	M	60	Zegite Bakole	Farmer	Healer
Yohannis Garbo	M	57	Dega Ocholo	Farmer	
Zarume Salo	F	50	Wusamo	Carpenter	Healer
Zelege Abba	M	50	Gatse	Merchant	
Zerfu Santa	M	65	Chano Chalba	Header	
Zewedu Zata	M	65	Zegite mercha	farmer	Healer
Zuma zamba	M	57		farmer	Healer

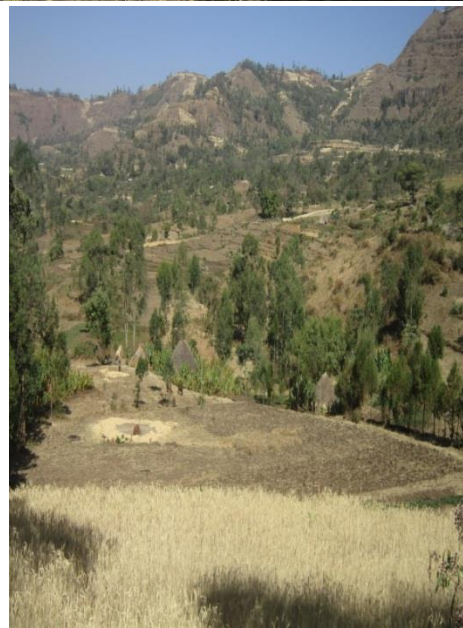
Appendix 6: part of the field activities



Individual interview with key healers [photo courtesy by: Tarekegn Shado, Feb /2019]



Focus group discussion [photo courtesy by Tarekegn Shado , Feb/2019]



Examples of plant community type [photo courtesy by Tarekegn Shado, Feb/2019]



Pressing and packing for further analysis [photo courtesy by Tarekegn Shado, Feb/2019]



Getting traditional treatment after hard field work to remove rash on the skin /sefeta by key healers

[Photo courtesy by Tarekegn Shado, Feb/2019]