

Jimma University



College of Natural Sciences

Department of Biology

**Ethnobotanical Study of Medicinal Plants in Dedo District, Jimma Zone,
Southwest Ethiopia**

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The thesis entitled ‘**Ethnobotanical Study of Medicinal Plants in Dedo District, Jimma Zone ,Southwest Ethiopia**’ has been approved by the department of Biology for the partial fulfillment of the Degree of Master of science in General Biology.

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Declaration

This thesis *entitled* “**Ethnobotanical Study of Medicinal Plants in Dedo District, Jimma Zone, Southwest Ethiopia**” is an Original work and has not been presented for any master’s degree in any other University, and that all the resources and materials used for the thesis have been brightly acknowledged.

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Abstract

This study was conducted to assess medicinal plants and associated indigenous knowledge in Dedo District, Jimma Zone, Southwest Ethiopia. Fifty informants (30 male and 20 female) were selected from six kebeles. Out of these, 10 key informants (nine male and one female) were purposely selected based on the recommendations of elders and local authorities. Other 40 informants were selected randomly. Data were collected using semi-structured interviews and field observations. Informant consensus factor (ICF), preference ranking, paired comparison and fidelity level were calculated. Sixty six plant species belonging to 33 families were collected, identified and recorded for the treatment of ailments. The most frequently used plant parts for human and livestock ailments were leaves. The most widely used method of preparation was pounding/powdering. The common route of administration recorded was oral (63.01%) followed by dermal (26%). The disease categories such as Mich (general body illness) and febrile illness, Eye disease and Devil disease, earache, headache and toothache, tonsillitis and nasal bleeding categories have higher ICF values. People of the study area have preference for *Ruta chalepensis* for the treatment of Mich/General body illness. Paired comparison of seven species of plants that were used for the same disease showed that *Nigella sativa* was the most preferred species by traditional healers for the treatment of stomach ache. The study showed that people of Dedo District have used medicinal plants to treat human and livestock ailments. Local people know which part of plant used to treat what type of diseases. Therefore, the documented plants should be further investigated for their efficacy and safety to be integrated into conventional medicine. Furthermore these plants need to be conserved for their sustainable utilization.

Keywords: Dedo district, ethnobotany, indigenous knowledge, medicinal plants and traditional healers

1. Introduction

Plants are integral part of the life and culture of man from the time immemorial. After fulfilling the primary needs like food and shelter man has sought for a suitable remedy among plants for curing various diseases (WHO, 2002). The number of plant species which have one time or another been used in some culture for medicinal purposes can only be estimated (Schipman *et al.*, 2002). Medicinal plants used for personal health-care and environmental esthetics are ecologically found and they come with the territory (Hamilton *et al.*, 2003).

Ethnobotany is the study of how people of particular culture and religion make use of indigenous plants. Ethnobotanists explore how plants are used for such thing as goods, shelter, medicine and religious ceremonies. Ethnobotany has its root in botany. Botany in turn originates in part from an interest in finding plants to cure illness. In fact, medicine and plants have always closely tide (Tuschmani, 1996). Moreover, traditional medicine is sum total of knowledge, skill and practices based on the theories, beliefs and experience indigenous to different culture that are used to maintain health as well as to prevent, diagnosis, improve or treat physical and mental illness (WHO, 2002).

The term medicinal plants include various types of plants used in the plants herbalism and some have medicinal activities. Medicinal plants are the “backbone” of traditional medicine, which means more than 3.3 billion people in the less developed countries utilize medicinal plants on a regular basis (Davidson-Hunt, 2000).

The medicinal plants consider as a rich resources of ingredients which can be used in drug development and synthesis. Besides that these plants play a critical role in the development of human cultures around the whole world. Nowadays, the use of traditional medicine is an important role in daily health care. Local medicine is even preferred to modern medicine because they are less expensive and more effective in specific disease (Mott, 1980). Furthermore, human life is directly integrated with the plants and traditional medicine to health care practice knowledge, and incorporating plants, animals and mineral based medicines, spiritual therapeutic manual technique and exercises applied singularly or in combination to treat diagnosis and prevent illness and wellbeing (WHO, 2001).

The use of traditional medicine in most developing countries as normative base for the maintenance of good health has been widely observed (UNESCO, 1996). Furthermore, an interesting reliance on the use of medicinal plants in industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as for traditionally used rural herbal remedies (UNESCO, 1998). Natural products and mainly plants are the bases of traditional medicine (Busia, 2003). In Africa, up to 80% of the population uses traditional medicine for primary health care and global market (WHO, 2001). Similarly, in Ethiopia, so many species of plants have been used for treatment of many different diseases for centuries (Ajere, 2005).

Like in any other rural communities, in Ethiopia people in Dedo District use medicinal plants around them using their traditional practices accumulated for generations to treat both human and Livestock ailments. However, due to various reasons such as habitat destruction, Timber production, Coal mining, Agricultural activities and other geo-climatic factors, medicinal plant resources are under serious threats.

The Elders, who know more about medicinal plants, may die without delivering their traditional experiences to the next generation. Therefore, detailed scientific documentation of valuable plant resources and related indigenous knowledge is very necessary in order to transmit the knowledge to the next generation.

1.1 Statement of the problem

Now days, in the time of globalization, many traditional knowledge and cultures are changing and eroding rapidly. Similarly, in the study area there are problems related to traditional use of medicinal plants. Many young individuals today do not have knowledge about medicinal plants and their values. There is lack of awareness in the transfer of knowledge of medicinal plants from old to young generation. This can be affected by religious beliefs, modernization and environmental change. The young generations are not willing to use medicinal plants considering it as backward. The knowledgeable local individuals also keep their knowledge rather than transferring to others. So, this study assessed and explored the medicinal plants and associated indigenous knowledge of local people in Dedo District by asking the following questions.

- 1, what are the most common human and livestock health problems?
- 2, do people use plants to treat human and livestock ailments?
- 3, what plant parts are used to treat human and livestock diseases?

1.2 Objectives of the study

1.2.1 General objective

The general objective of the study was to assess medicinal plants used by the local community to treat human and livestock ailments and associated indigenous knowledge in Dedo District.

1.2.2 Specific objectives

The specific objectives of the study were:

1. To assess medicinal plants used to treat human and livestock ailments in Dedo District.
2. To examine indigenous knowledge of the people in the use of traditional medicine.
3. To examine methods of preparation and route of administration of traditional medicines for treatment of human and livestock ailments.

1.3 Significance of the study

The medicinal plants used by the people of Dedo District and the associated knowledge will be documented and pass to the future generation. The result of this study will also be used by other researchers for further study on the medicinal plants of the study area.

1.4 Limitation of the study

This study was restricted to the identification of medicinal plants and their use in curing various human and livestock ailments and associated knowledge in Dedo District. Medicinal plants in nearby communities were not included in this study due to transportation and time constraints.

2 Literature Review

2.1 Meaning and origin of traditional medicine

Medicinal plants have a promising future because there are about half million plants around the world, and the medical values of most of them have not been investigated yet. Ethnobotany is considered as the cultural group in exchange for their participation in the branch of ethnobiology. Ethnobotany is the study of the relationship between plants and people: From “ethno “study of people and “botany”-study of plants. Ethnobotany is considered as a branch of ethnobiology. Ethnobotany studies the complex relationships between (uses of) plants and cultures. The focus of ethnobotany is on how plants have been or are used, managed and perceived in human societies and includes plants used for food, medicine, and divination, cosmetics, clothing and social life (Schults, 1992).

Ethnobotany is a multidisciplinary science defined as the interaction between plants and people. This relationship between plants and human cultures is not approaches enhance the quality of the science, provide limited to the use of plants for food, clothing and shelter compensation for the cultural groups and take into but also includes their use for religious ceremonies, ornamentation and health care (Schults, 1992). A trained botanist identifies the plants and record colleagues who arrange the details of their uses.

Traditional medicine refers to health care practice, knowledge and beliefs incorporating plant, animals and minerals based medicine, spiritual raised manual techniques and exercises applied singularly or in combination to treat diagnosis and prevent illness and maintain wellbeing (WHO, 2001). Traditional African medicines are the sum total of practices, measuring gradients and procedure of all kinds of weather materials or not which form time of memorial has in able the African towards guard against diseases and tolerate suffering and cure themselves(Busia, 2005).

Medicinal plants are plants that commonly used in treating and preventing specific diseases which are considered to be harmful to humans. Hence, the important role of medicinal plants in health care delivery service should be emphasized since the down of history man has relied so much on medicinal plants for curing and preventing illness including the promotion

of both physical and spiritual well-being, particularly people of Ethiopian have become paramount in almost every house hold(Ajere,2005).

Many researchers have discussed that most of plant parts are important for healthcare from the beginning of human beings. Plants are used in traditional medicine for several thousands of years ago (Aburabia, 2005). The part of plants that is used for medicinal values includes: leaf, root, stem, rhizome, fresh root, seeds, fruit and flower with different methods of application (Toledo,2009).Moreover, medicinal plants are used to the spiritual origin of diseases as well as physical disabilities. The vast knowledge of such plant is known beginning to be acknowledging in the world. So, this is a role played by indigenous people as custodians of the world heritage (Indu,2007).Traditional remedies are part of the cultural and religious life of African people. The seemingly wide use of traditional medicine is attributed to its accessibility and affordability. At this time in the modern world the continuing renaissances, oral traditional has leads to ever greater loss of ethnobotanical information. As a subsequent generation losses interest in the way of their elders, the knowledge can vanish all together. Their cycle altimetry ends in this the preservation of valuable information (Arvigo and Balick, 1993).Medicinal plants are used in world wide. For example, in North Western Argentina Chaco plant remedies are used for the treatment of almost all kinds of alignments ranging from treating conditions to problem likes dandruff. In Bulgaria medicinal plants appear to be considerably used throughout the country. Firstly, medicinal plants are used for the treatment pain, mucus secretion of sound of infused animals, constipation, gastric troubles, sore tongue in children and fungal infection.

2.2 Indigenous People and Indigenous Knowledge on useful Plants

Indigenous people refer to who follow traditional, non-industrial lifestyle in areas that they have occupied for generations. It is the result of many generationslong years experiments (Martin, 1995). Ethnobotany is mainly focused on indigenous societies (Balick and Cox, 1996). Traditional people around the world possess unique knowledge of plant resources on which they depend for food, medicine and general utility (Khanal, 2006).

Medicinal plants are also used for flavors and fragrances in various industries such as bakery, confectionery, alcoholic beverages, foods, soft drinks and pharmaceuticals. They are added

to the appetizers, biscuits, bread, butter, cakes, cheese, seasonings, soups, teas, vegetables, and vinegars. Flavor of food makes the food palatable, added in pastes, powders of dentifrices, mouthwashes and gargles, breath fresheners and denture cleaners. There is also need to develop better institutional research & development support & public policies for the development of essential oil industry (Bhattacharjee, 2000).

2.3 Threats to medicinal plants

Many people of our world exploit our Earth mercilessly as if there were no tomorrow. The greatest danger elsewhere in our country is losing the indigenous knowledge of our culture and biodiversity resource including the medicinal plants of many wild species of plants for food, clothing, shelter, fuel, fiber, income generation and the fulfilling of cultural and spiritual needs throughout the world (Asefaw, 2001). Recent evidence from Ethiopia as well as other countries indicates that the existences of these indigenous resources are threatened. Environmental degradation, agricultural expansion, loss of forests and woodlands, over-harvesting, fire, cultivation of marginal lands, overgrazing and urbanization appear to be the major threats to the medicinal plants of Ethiopia. The main threats of the medicinal plants in Africa are; a high population growth rate, competing land uses of natural vegetation to other forms of land use such as agriculture, lack of local knowledge, increasing commercialization of traditional medicine, increasing demand in the local and World market, lack of appropriate policies and legislation or failure to enforce, poverty and high unemployment rate, invasive species, undue pressure on specific preferred species and slow plant growth are also another threats to medicinal plants (Moundu *et al*, 2004)

3. Materials and Methods of the study

3.1 Description of the study area

Dedo is one of the districts of Jimma Zone in Oromia Regional State, southwest Ethiopia. Dedo is bordered in the South by the Gojeb river which separate it from the south Nation, Nationalities and Peoples Region, on the west by Gera, on the north by Kersaand, on the east by Manchew. The altitude of this district ranges from 880-2400 m above sea level. According to the central statistical agency (CSA) (2005), Dedo District has an estimated total population of 308,544 (male = 155,596, female = 152, 948). The total area is estimated at 1,571 km². The climate of the study area varies with altitude. High altitude areas (highland(2300-3200) from sea level that has an annual rainfall 900-1400mm, the middle altitude (mid-land(1500-2300) and gets less than 1400 and lowland (500-1500) and has 400-900mm annual rainfall. (Dedo district, 2017). There are five major ethnic groups in Dedo District. These are Oromo (78.87%), Dawro (8.54%), Amhara (1.47%) and Kafficho (0.94%). Afaan Oromo is the major spoken language in the district (CSA, 2005).

The vegetation of the study area consists of various types of trees, shrubs and herbaceous species. Some of the common plant species include *Olea europaea*, *Juniperus procera*, *Calpurnea aurea*, *Acacia spp.*, *Ocimum spp.*, *Ficus sp.*, *Carissa edulis*, *Podocarpus falcatus*, *Eucalyptus spp.*, etc. Barley, wheat, teff, pea, maize, bean, Sorghum, potato and cabbage were among the commonly cultivated crops and vegetables. Coffee and chat is the main cash crop in the study area. Dedo district also possess enormous livestock like sheep, cattle, goat and donkey (Dedo District Agricultural Office, 2017).

New dedo map

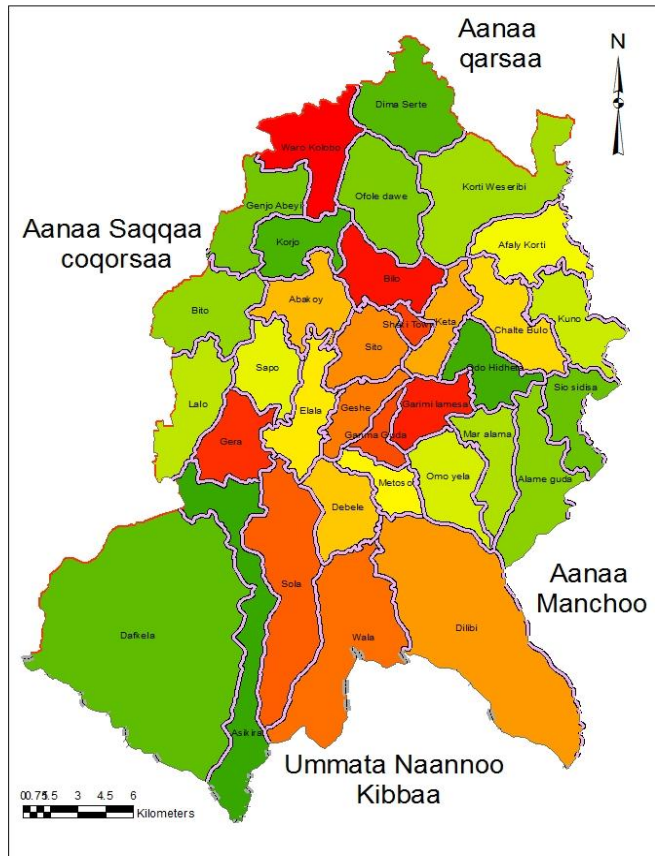


Figure 1: Map of the study area in, 2017

3.2 Methods

3.2.1 Selection of study sites and Informants

From 33 Ganda (kebele) of Dedo district sixkebele (ganda) like Debale, Garimaguda, Metesso, Offoledawe, Omoyalla and Warokolobo) were randomly selected for the study. In general, 50 informants (30 males and 20females), were selected. Out of these, 10 key informants (9 males and 1 female) were selected using purposive sampling technique based on the recommendations of local authorities, knowledgeable elders and development agents. The other 40informants (21 males and 19females) were selected randomly from the local community. The traditional healers identified were asked for their consent to share their knowledge only for the purpose of this study.

3.2.2 Data collection

Ethnobotanical data were collected from March 2017 to May 2017 from the study sites on three field trips following the methods developed by different authors (Cotton, 1996; Hedberg, 1993; Martin, 1995). Semi-structured interviews, observations and guided field walks with informants were used to obtain data on indigenous knowledge about the medicinal plants.

3.2.3 Methods of data collection

The ethnobotanical data of medicinal plants were collected by using semi-structured interviews and field walks with key informants. The interview includes types of medicinal plants, methods of preparation, parts of medicinal plants used for treatment of humans as well as livestock ailments, route of administration. The sample of medicinal plants was collected and transported to Jimma University for identification. The voucher specimens were deposited at Jimma University herbarium.

3.2.4 Data analysis

Descriptive statistics like percentage and frequency were employed to analyze and summarize the data on medicinal plants and associated knowledge. The most useful information gathered on medicinal plants reported by local people were medicinal value, application, methods of preparation, route of application, ailment treated, dosage, part and habit used also analyzed through descriptive statistical analysis. Facilities in Microsoft Excel spreadsheets were utilized to make simple calculations to determine proportions and draw pie charts.

3.2.4.1 Informant consensus factor

In order to evaluate the reliability of information during the interview, informants were contacted at least two times for the same idea and the valid information was provided and recorded and the information that deviates from the original information was rejected. Only the relevant ones were taken into account and statistically analyzed. Similarly, informant consensus factors were analyzed for one of the plant attributes reported by informants and calculated. The informant consensus factor was analyzed using the following formula:

$$ICF = (Nur - Nt) / (Nur - 1) \text{ (Teklehaymanot and Giday, 2007).}$$

Where: ICF = informant Consensus Factor,

Nur = number of use citations and Nt = number of species used.

3.2.4.2 Preference ranking

Preference ranking was computed following Martin (1995) for eight most important medicinal plants used in treating mitch and febrile illness. Eight key informants were selected to assess the degree of effectiveness of these eight medicinal plants against the ailment. The medicinal plant believed to be most effective to treat the illness has got the highest value (8) and the one with the least effective got the lowest value (1). The value of each species was summed up and the rank for each species was determined based on the total score. This helps to indicate the most effective medicinal plants used by the community to treat the disease.

3.2.4.3 Paired comparison

This analytical tool was used for evaluating the degree of preferences or levels of importance of certain selected plants/parts of plants (Nemarundwe and Richards, 2002). Paired comparisons to indicate the efficacy and popularity of seven medicinal plant species used to treat stomach ache were employed as described by previous work of Martin (1995). Seven key informants were randomly selected by flipping coins and allowed to show their responses independently for pairs of seven traditional medicinal plants that were noted for treating the disease. A list of the pairs of selected items with all possible combinations was made and sequence of the pairs and the order within each pair was randomized before every pair is presented to selected informants and their responses recorded, total values summarized and rank made based on the report of the informants.

3.2.4.4 Fidelity level

The fidelity level was calculated for those frequently reported diseases by informants in order to identify the most important medicinal plant species used to treat. The following formula was used to calculate fidelity level:

$FL = (N_i/N) \times 100$. Where, N_i is the number of informants that claim use of a plant species to treat a particular disease and N is the number of informants that use the plant as a medicine to treat any given disease Alexiades (1996).

4. Results and Discussions

4.1 Medicinal Plants of the Study Area

The result revealed that sixty-six plant species distributed in 33 families were recorded (Appendix 1). The plants were used in treating 43 human and livestock ailments. These plants were distributed in 33 families. Asteraceae and Lamiaceae were represented by seven species each, Solanaceae by five species, Rutaceae by four species, Fabaceae, Poaceae and Euphorbiaceae by three species each, Acanthaceae, Zingibraceae, Apiaceae, Malvaceae, Myrtaceae, Rubiaceae, Rosaceae, and Ranunculaceae, constitute two species each, and the rest (16) families were represented by one species each. The local community assigned vernacular names to all of the documented medicinal plants. This indicates the existence of a very close interaction between the people and their plant resources, the importance of plants in local culture is usually shown by the proportion of plants that can be identified by local people and by local names. Of these, 50 (75.75%) and 16 (24.24%) were used to treat human and livestock ailments, respectively (Appendix 1 and 2).

Among the cited medicinal plant species of the study area, the majority were wild, while the remaining were from home garden and cultivated by the community (Table 1).

Table 1: Source of Medical Plants of the study area in 2017

Source of Medical Plants	Percentage
wild	53.03
cultivated	28.78
Home garden	18.18

Similar results were obtained from researches conducted at different parts of the country (Kuma, 2014; Giday, 1999; Yineger and Yehualaw, 2007, Lulekal, 2005). This result indicates that the local communities mostly depend on medicinal plants collected from the wild than those from the home gardens. The number of medicinal plants collected from the

homegarden is also promising. This finding agrees with different ethnobotanical studies conducted in Ethiopia (Amenu, 2007, Yineger and Yehuwalaw, 2008).

Medicinal plants showed their variations in growth habits. Assessment of the growth forms of these plant species indicated that herbs had the highest proportion of the species followed by Shrubs, trees and climbers (Table 2).

Table: 2. Plant habit/growth form of Medicinal plants in the study area in 2017

Plant habit/Growth form	Total Plants	Percentage
Herbs	27	40.9
Shrubs	21	31.8
Tree	14	21.21
climber	4	6.06

Similar results were obtained by different investigators in Ethiopia (Mesfinet *al.*, 2009, Teklehaymanot and Gidey, 2007 and Tolossaet *al.*, 2013). Some of the medicinal plants collected and identified in this study were also reported by other investigator from other parts of Ethiopia (Tolasa, 2007). Such widespread use of these medicinal plants by different groups of people in different parts of Ethiopia could be due to cultural overlap among different ethnic groups.

4.2 Parts of medicinal plants used to treat human ailments

The study revealed that almost all plant parts, including roots, leaves, stem, bark, fruits, young shoots and flowers, were cited for use in preparing the different remedies.

However, the most frequently utilized plant part was leaf followed by root and seed (Figure 2).

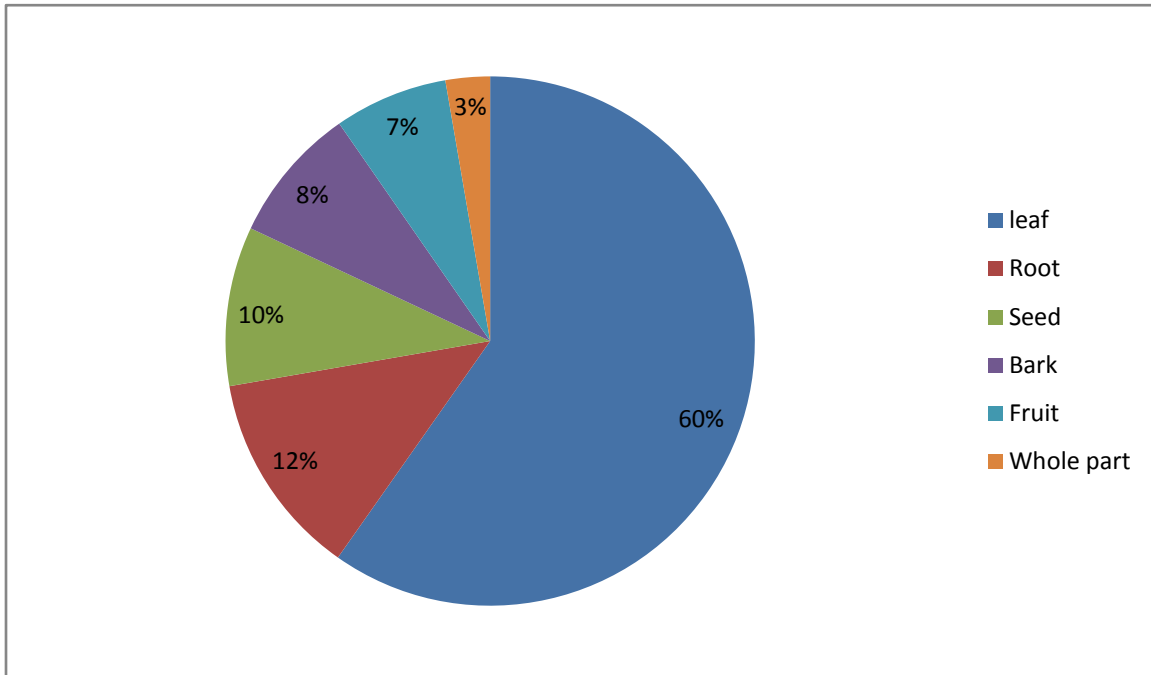


Figure 2: Parts of medicinal plants used to treat human ailments in the study area in 2017.

Leaves were the most cited plant parts used by the healers for the preparation of traditional medicines. This finding is in line with the results of other ethnomedicinal studies in Ethiopia (Yirga, 2010, Yineger and Yewhalwa, 2008, Teklehaymanot and Giday, 2007) who reported that leaves were the most cited plant parts used in remedy preparations, but disagrees with the finding of Abebe and Ayehu (1993); Luleka *et al.* (2008); Mesfin *et al.* (2009), Birhane *et al.* (2011); Assefa and Abebe (2014) who found that roots were the most commonly used plant parts. This deviation is probably due to differences in plant resource sites. The preference for leaves could be due to ease of preparation and the chemical constituents of leaf for the treatment of diseases. Remedy preparation that involves roots, rhizomes, bulbs, barks, stems or whole plant have effects that pose a lasting danger to the continuity of an individual plant compared to leaves. In this study area, the fear of high threat of medicinal plants due to plant parts used for the purpose of medicine is minimal as leaves were the most harvested plant parts used in the area which has little effect on the survival of mother plant. This finding is similar to the results of other ethnomedicinal studies across Ethiopia (Yineger and Yehualaw, 2007, and Yirga, 2010).

4.3 Method of preparation

The local people employed variety of methods in order to prepare remedies. Remedy preparations vary based on the type of disease treated and the actual site of the ailment. According to the respondents, the mode of preparation were pounding and crushing (Figure:3).

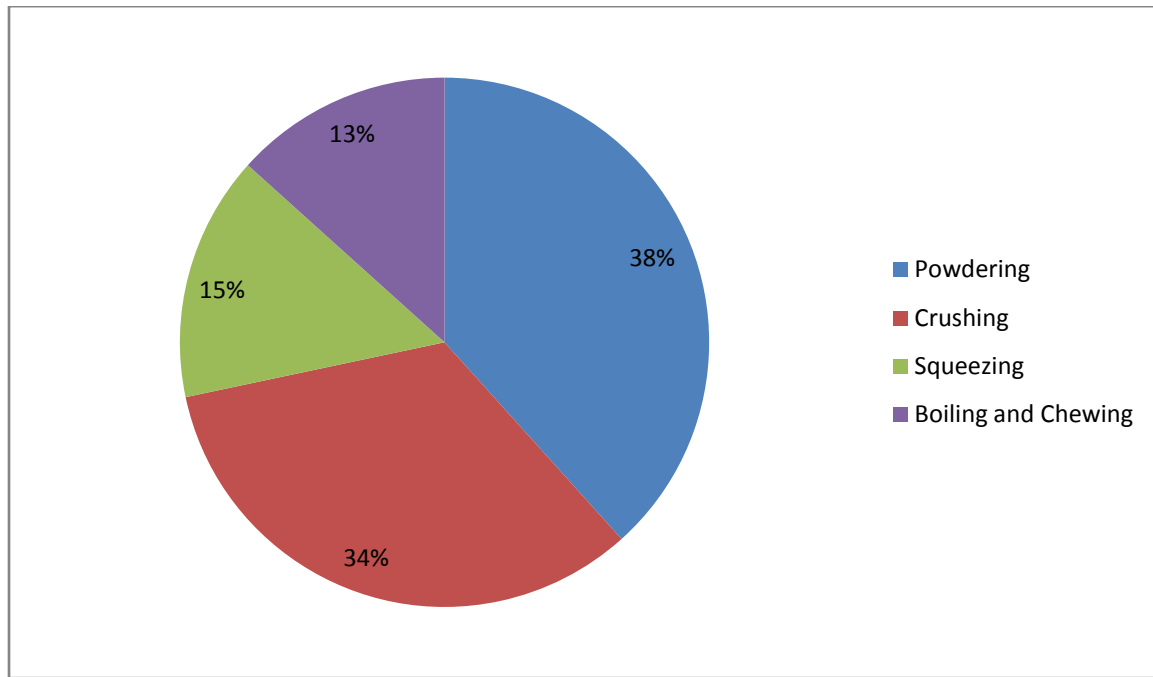


Fig: 3. Reported Methods of remedies preparation in the study area, 2017.

Pounding/powdering was the most frequently reported method of traditional medicine preparation in the study area. This may be due to the possibility of effective extraction of plant ingredients when crushed/powdered so that its curative potential would increase. The preparations are either used fresh or can be stored in different clean and dry containers (e.g., clothes, plastic bags or sealed bottles) for later use. Preparations may involve using a single plant part or mixtures of different organs of the same plant or mixture of organs from different plants (Kuma, 2014).

4.4 Route of administration

The major routes of administration of traditional medicine in the study area were oral, dermal, and nasal. Oral administration was the dominant route followed by dermal and nasal and others were through eye and ear (Figure: 4).

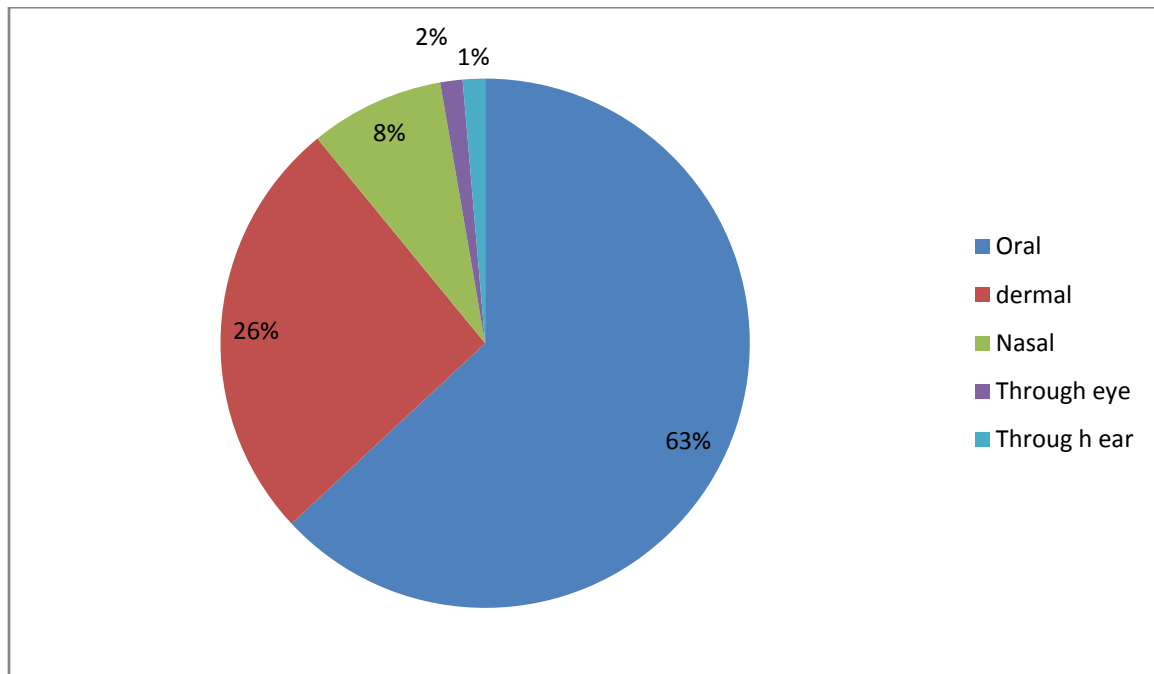


Fig. 4 Reported routes of administration of medicinal plant remedies used for humans in the study area, 2017.

Both oral and nasal routes permit rapid physiological reaction of the prepared medicines with the pathogens and increase its curative power (Aberra,2003).The remedies that are administered orally are taken diluted by water, skimmed milk and honey or are taken with red tef'orinjera made from finger millet (or taken with boiled coffee. Those taken through nasal are either smoked or boiled in water and the patient inhales the smoke or the steam being covered with cloth.Similar results were obtained by other authors (Amenu, 2007, Lulekal, 2005, Yineger andYehuwalaw, 2007, Tirfessa *et al* 2017).

4.5 Dosage

People of the study area used various units of measurementsand the duration of administration to determine the dosage.Local units such as finger length (e.g., for bark, root, stem), pinch (e.g., for pounded plant medicine) and numbers (e.g., for leaves, seeds, fruits,

bulbs and flowers) were used to estimate and fix the amount of medicine. Recovery from the disease, disappearance of the symptoms of the diseases, fading out of the disease sign and judgment of the healer to stop the treatment were some of the criteria used in determining duration in the administration of the dosage. Dosage was determined in several ways including measurement of root length and leaf number. Various authors (Abebe and Ayehu, 1993; Bekele, 2007; Bekalo *et al.* 2009, Birhane *et al.* 2011 and Tirfessa *et al.* 2017) have also reported the absence of standardized dosing in the application of traditional medicines in Ethiopia and elsewhere. However, from the interview made during the study, it was found that there was disagreement among the healers concerning the dosage. For example, some informants suggested that three or five leaves of the plant was used to treat some disease, while others suggest two or three leaves for the same problem. Still some others suggested that they applied the leaves number up to seven randomly without such measuring system. Although the full dose determination is varying from healer to healer, the dose given depends on age, physical strength and health conditions. The healers never administer treatments that are taken internally to pregnant women. This finding indicates us that there is lack of precision in the determination of doses in the area. This is the real drawback of medicinal plants. Similar finding was reported from other parts of Ethiopia (Yirga, 2010), Getahun (1976) and Abebe (1986).

4.6 Applications

The prepared traditional medicines were applied in a number of methods, drinking, followed painting and chewing), sniffing, eating, dropping and putting are the major applications of remedies in the study area. These findings agree with the findings of previous investigators (Abebe and Ayehu, 1993; Teklehaymanot and Gidey, 2007; Yineger and Yewhalwa, 2007; Bekalo *et al.* 2009; Mesfin *et al.* 2009 and Birhane *et al.* 2011) who found that drinking (oral application) was the dominant method of administration.

4.7 Medicinal plants used to treat livestock ailments

From the collected medicinal plants, 16 species were used for treatment of livestock ailments. They were grouped under 11 families. Regarding their habitats; 62.5% species were collected from the wild, 25% species from cultivated and 12.5% species were home garden. More species for livestock treatment were collected from the wild. As most informants agree,

even though the area has high number of livestock population, the local people do not have enough knowledge about ethnoveterinary medicinal plants compared to those used for treatment of human ailments. Most of the ethnoveterinary medicinal plants were shrubs followed by trees, while herbs were the least in medicinal plant composition (appendix: 2). In this study area shrubs like, *Dodonaea angustifolia* L. f., *Acalypha fruticosa* Forssk, *Vernonia amygdalina* Del. and *Solanum marginatum* Del., climber like *Mikania capensis* DC and *Ampelocissus bombycina* (Bank.) planch and herb like *Nicotiana tabacum* L. were used only for the treatment of livestock ailments in the study area. This finding agrees with the result of ethnoveterinary study in other part of Ethiopia (Tirfessa *et al*, 2017).

4.8 Plant parts used for livestock remedy preparation

The mostly harvested plant part for treatment of livestock ailments in the study area were leaf, while the least used plant part was the seed. Like that of human medicine, leaves were the most harvested plant part of remedy preparation for livestock ailments (Teklehaymanot and Gidey, 2007).

4.9 Method of preparations and route of administration

The local people used different forms of remedy preparations and applications to treat livestock diseases. The methods of preparations used were crushing, pounding and boiling. For instance, the leaf of *Nicotiana tabacum* L. was crushed, mixed with little water and then added through the mouth by using bottle and bottle like materials to treat the stomach ache in the study area. Fresh leaves of *Vernonia amygdalina* Del. was used to treat retained placenta. Based on the nature of the ailments the remedies were applied through different routes. Oral application of remedies was found to be the highest (56.25 %), followed by dermal (18.75 %) and through eye and nasal (25 %). This finding agrees with other works in Ethiopia (Tolossa *et al.*, 2013).

4.10 Informant consensus factor (ICF)

The present ethnobotanical analysis of ICF provides a measure of reliability for any given claim providing reliable evidence. In this study, all the cited human and livestock diseases were grouped into 12 categories based on the site of occurrence of the disease, condition of

the disease as well as treatment resemblance of the disease to the local people. The informant consensus of medicinal plant usage resulted in ICF ranging from 0.44 to 0.89 per illness category (Table5).

Table 5: Informant consensus factor (ICF)

Category	Species	Use Citation	ICF
Mich and Febrile illness	10	86	0.89
Eye disease and Devil disease, earache, headache,	9	58	0.85
Toothache, tonsillitis and nasal bleeding	6	28	0.81
Blood pressure, kidney disease and hepatitis	3	10	0.77
Snake bite and rabies	8	26	0.72
Stomachache, diarrhea, vomiting and poisons, constipation, internal parasite	17	54	0.69
Common cold, influenza, cough and asthma	8	24	0.69
Retained placenta, anthrax, black leg	3	6	0.60
Malaria and anemia	4	8	0.57
Broken bone, backache and Rheumatism	7	14	0.53
Gonorrhea and urinating problem	4	7	0.50
Skin infection, wound, hair ulcer and leg ulcer, elephantiasis	11	19	0.44

Disease categories with relatively higher ICF values were: Mich and Febrile illness, Eye disease and Devil disease, earache, headache and tooth ache, tonsillitis and nasal bleeding. This may indicate the common occurrence of these ailments, so that more number of people exchanging information and agree on plant species that can be used to treat these diseases than the rest. Medicinal plants that are presumed to be effective in treating a certain disease

have higher ICF values (Teklehaymanot and Giday, 2010). A high ICF value close to 1 indicates that the informants rely most on the same taxa to manage specific disease conditions, while a low value indicates that the informants disagree on the taxa to be used in the treatment of a given ailments.

4.11 Preference ranking

When there are different species prescribed for the same health problem, people show preference of one over the other. *Ruta chalepensis* is the most effective in treating evil eye and michfollowed by *Ocimumlamiifolium* and the least effective was *Calpurnia aurea*(
Table: 6).

Table:6 Preference ranking of medicinal plants used for treating Mich (General body illness) collected from Dedo district, 2017.

Vernacular name	Scientific name	Respondents (R ₁ -R ₈)								Total	Rank
		R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈		
Cereddaama	<i>Ruta chalepensis</i>	7	5	5	6	8	6	8	7	52	1 st
Damakasee	<i>Ocimumlamiifolium</i>	7	8	6	6	5	6	7	5	50	2 nd
Togoo	<i>Diclipteralaxata</i>	8	5	6	5	6	6	6	7	49	3 rd
Dhummuugaa	<i>Justicia schimperiana</i>	7	6	4	5	6	4	3	4	39	4 th
Makkanniisa	<i>Croton macrostachyus</i>	2	5	4	5	6	4	5	4	35	5 th
Gizaawaa	<i>Withaniasomnifera</i>	2	1	4	6	5	4	6	5	33	6 th
Hancabbi	<i>Ocimumforskolei</i> Benth	6	1	5	4	1	6	5	4	32	7 th
. Ceekaa	<i>Calpurnia aurea</i>	4	6	7	4	1	2	6	1	31	8 th

4.12 Paired comparison

A paired comparison made to determine the most preferred medicinal plants among these seven species that were used to treat stomach ache in the study area, the responses of seven informants, showed that *Nigella sativa* ranked first followed by *Ruta chalepensis* (Table 7).

Table: 7 Paired comparisons of seven medicinal plants used to treat stomach ache in the study area, 2017.

Vernacular name	Scientific name	Respondents (R ₁ - R ₇)							Total	Rank
		R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇		
Qullubbiadi	<i>Allium sativum</i> L	6	5	3	2	6	4	4	30	3
Abasuuda gurraacha	<i>Nigella sativa</i> L	7	5	7	4	5	5	4	37	1
Maxxannee	<i>Pavoniaurens</i>	4	1	5	1	6	3	3	23	5
Qomonyoo	<i>Brucea antidysenteric</i> J.F.Mill.	5	6	5	4	5	1	3	29	4
kookii	<i>Prunusperisca</i> Batsch	4	2	1	1	5	3	4	20	6
Cereddaama	<i>Ruta chalepensis</i>	7	6	6	4	5	3	3	34	2
Waleensuu	<i>Erythrinabrucei</i> Schw <i>empf</i>	4	1	1	3	5	2	3	19	7

Therefore, this result indicated that *Nigella sativa* was the most preferred while *Erythrinabrucei* Schweinf was the least favored over the other plant species cited in treating the disease.

4.13 Fidelity level (FL)

Fidelity level (FL) is useful for identifying the inhabitants' most preferred species in use for treating certain ailments. *Ruta chalepensis*, *Nigella sativa* and *Dicliptera laxata* were reported by many informants to treat evil eye and mich, stomach ache and eye disease hence had the highest FL value (Table:8).

Table: 8 Fidelity level of some medicinal plants in the study area, 2017.

Vernacular name	Scientific name	Ailments treated	N_I	N	FL	FL%
Ceredaama	<i>Ruta chalepensis</i>	Evil eye and Mich	22	23	0.956	95.6
Abasuuda guraacha	<i>Nigella sativa</i>	Stomach ache	17	18	0.9444	94.44
Togoo	<i>Diclipteralaxata</i> C.B.Cl	Eye disease	17	19	0.894	89.47
Qullubbii adii	<i>Allium sativum</i>	Malaria	14	16	0.875	87.5
Damakasee	<i>Ocimumlamiifolium</i>	Head ache	18	21	0.857	85.7
Jibimbila	<i>Zingiberofficinale</i> Ross	Tooth ache	11	14	0.7857	78.57

High FLs could also be indicator of efficacy of the reported plants to cure specific ailments.

5. Conclusion and Recommendation

5.1 Conclusions

Dedo District harbors diverse plant species. In this study, 66 medicinal plant species were recorded. Of these, 50 (75.75%) and 16 (24.24%) were used to treat human and livestock ailments, respectively. The medicinal plant species collected and identified were largely from the wild (35 species were from the wild vegetation), 19 species from cultivated field areas and 12 species from homegardens. Analysis of growth forms of these medicinal plants revealed that herbs constitute the largest category 27 (40.9%) followed by shrubs 21 (31.8%), trees 14 (21.21%) and climbers 6 (6.06%). Leaves were the most frequently used plant parts followed by roots for preparation of human and livestock remedies. Traditional medicine preparation mostly involved single plant. Route of administration was mainly internal in which oral administration is the common route followed by dermal (external application). The main factors that threaten indigenous knowledge were secrecy of information on medicinal plants, oral based knowledge transfer and modernization of young generation to abandon traditional medicine and turning to modern medication. Therefore, awareness rising should be made among the healers so as to avoid erosion of the indigenous knowledge and to ensure its sustainable use. Further biological studies should also be conducted on the reported medicinal plant species of the study area so as to utilize them in drug development.

5.2 Recommendations

Based on the results of the study, the following recommendations are forwarded for the sustainable use of medicinal plants:

1. Identifying effective medicinal plants and encouraging the local people to grow them in homegardens, mixing with crops in farm lands and as live fences.
2. Medicinal plants are central to the indigenous cultures and material needs. Therefore, formal and non-formal education systems should be designed to create positive attitude among the young by integrating in to the curricula about the traditional use of plants in general and medicinal plants in particular.
- 3 Recognition and intellectual property rights should be given to traditional healers, either through certification or through organizing them in a community to popularize their indigenous knowledge on medicinal plants
4. Attention should be given to standardization of measurement and hygiene of the traditional medicines prepared from plants.
5. The overall analysis shows that major uses of medicinal plants for treatment of different diseases ranges from simple to fatal diseases. These traditional remedies in fact, need to be confirmed through scientific investigations to identify those that may give alternatives for modern drugs.
6. Indigenous people of the study area should be involved in conservation and management plans of plant resources.

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Appendices

Appendix 1: List of Medicinal plants used to treat human ailments in the study area

N O.	Vernacular name	Scientific name	Family name	Growth habit	Plant type	Plant Parts used	Disease treated	Mode of preparation	Route of administration
1	Mimmixa	<i>Capsicum annum L.</i>	Solanaceae	H	C	Fruit	Stomachache	The fruit crushed and very small amount will be drunk	Oral
2	Ogiyo	<i>Aframomum corrorima</i> (Braun) Jansen	Zingiberaceae	H	C	Seed	Constipation	The seed powdered with seed <i>Linum usitatissimum</i> . L and drunk	Oral
3	Garbuu			H	C	Seed	Repair back	The powder is prepared as Soup/broth drunk while	Oral

		<i>Hordeum vulgare</i> L.	Poaceae				bone	warm/hot or Mixed powder with water is taken orally	
4	Abbayii	<i>Maesalan ceolata</i> Forssk.	Myrsinaceae	T	W	Bark	Elephantiasis Skin infection	Bark is pounded and mixed with butter and painted on the foot	Dermal
5	Botoroo	<i>Stereospermum kunthianum</i> Cham	Bignoniaceae	T	W	Bark	Tooth ache	The bark used for cleaning tooth and treat tooth ache	Oral
6	Togoo	<i>Dicliptera laxata</i> C.B.Cl	Acanthaceae	H	HG	Leaf	Eye disease Mich(General body illness)	Fresh leaf crushed and attached around the infected eye Leaf parts (apex) boiled and drunk with sugar, also	Dermal Oral

							Anemia(mar sisa)	the boiled water gargling in the mouth if the disease attacks in mouth. The crushed leaves boiled and drunk for 2-3 days (by coffee cup) in the morning before meal.	
7	Dhumugaa	<i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anders	Acanthaceae	SH	HG	Leaf	Michi(gener al body illness	Leaf parts heated on fire and attach to body in the night before sleep Used to wash body of Mothers on five day after the give birth.	Dermal
8	Qullubbii adii	<i>Allium sativum</i> L	Alliaceae	H	C	Bulb	Malaria Common cold Stomach pain Toothache	Odd numbers of the single white part (Firqii) Crushed and taken with bread in the morning before eating breakfast. Crushed and drunk with sugar Chewing when Stomach feel pain	Oral

								Chewing and gangling its liquid in the mouth	
9	Dimbilala	<i>Coriandrum sativum</i> L	Apiaceae	H	HG	leaf	Skin disease	The leaf of <i>Coriandrum sativum</i> pounded with leaf of <i>Croton macrostachyus</i> and <i>Rumexnervosus</i> creamed on pain area for 2-3 days.	Dermal
10	Inshilaala	<i>Foeniculum vulgare</i> L.	Apiaceae	H	HG	Leaf	Urinating problem infant colic	Leaves boiled in water and drunk before eating breakfast	Oral
11	Goddoo gurraacha	<i>Artemisia afra</i> Jacq . ex. Willd	Asteracea	H	HG	Leaf	Constipation Internal parasite	the crushed leaves and drunk in the morning before breakfast for 2-3 days Fresh leaf washed and boiled in water and taken (Specially when infants get very bad fart	Oral
12	Qabarichoo	<i>Echinopsma crochaetus</i>	Asteraceae	H	W	Root	Snake bite	Chewing and also believed that its smoke avoid and kill snake.	Oral

						Stem	Diarrhea	Pieces of stems are pounded and the powder is taken	
13	Qoricha Cheffe	<i>Sphaeranthus steetzii</i> Oliv. & Hiern	Asteraceae	H	W	Bark and leaf	Cutaneous L eishmaniasis	Leaves and bark are pounded while fresh and the concoction applied on the skin surface where wounds occur	Bandaging
14	Ibicha	<i>Vernonia amygdalina</i> Del.	Asteraceae	SH	HG	Leaf	Malaria	The leaf crushed and 1/2 of coffee cup drunk in the morning before meal	Oral
15	Adaa	<i>Guizotia scabra</i> (Vis.) Chiov.	Asteraceae,	H	W	Leaf	Wound	Leaf of <i>G. scabra</i> is squeezed and its drop is prepared.	Dermal
16	Reejiii	<i>Vernonia auriculifera</i> Heirn	Asteraceae,	SH	W	Leaf	Blood clotting	The leaves squeezed and dropped on wound (bleeding part).	Dermal
17	Papaya	<i>Carica papaya</i> L.	Caricaceae	T	C	Leaf	Malaria	Leaves are pounded and then boiled; the decoction is taken while cold	Oral

18	Caatii	<i>Catha edulis (Vahl)</i> Forssk. ex. End	Celastraceae	SH	C	Leaf	Common cold Evil disease	Chewing and boiling the leaf Chewing	Oral
19	Bosoqgee	<i>Kalanchoe petitiiana</i> A. Rich	Crassulaceae	H	W	Root Leaf	Nasal bleeding Cohama (leg ulcer)	Root and leaf of <i>Kalanchoe petitiiana</i> will be powdered and sniffed. Crushing the leaves and washing the leg in the night	Nasal Dermal
20	Hadhooftuu	<i>Cucurbita pepo L.</i>	Curcubitaceae	CL	C	Leaf	Hair disease(xan nachamataa a)	Pounding the leaves and painting to the children hair	Dermal
21	Adaamii	<i>Euphorbia abyssinica</i> J.F. Gmel.	Euphorbaceae	T	W	Bark	Ascaris, Gonorrhoea	The bark is Crushed and the very little Sap is taken and eaten with red tef	Oral
22	Makanniisa	<i>Croton macrostachys</i>	Euphorbionce	T	W	Leaf	Wound	Leaves are Crushed and the liquid is dropped around the injured part or juice will be extracted by	Dermal

		Del.					Febrile illness	squeezing the leaf and dropped. Odd numbers of leaf part(apex) boiled and the vapor taken by wearing thick cloth specially Blanket before sleeping	Oral
23	Waleensuu	<i>Erythrina brucei</i> <i>Schweinf</i>	Fabaceae	T	HG	Bark	Stomachache	Chewing the bark and drunk its water	Oral
24	Sanamakii	<i>Senna didymobotry</i> (Fresen) Irwin & Barneby	Fabaceae	SH	W	Leaf	Snake bite	leaves are pounded while fresh and the juice is taken	Oral
25	Ceekaa	<i>Calpurnia aurea</i>	Fabaceae	SH	W	Leaf Seed	Snake bite Skin itch (cito)	Fresh leaf will be crushed and the drop of the sap taken Juice prepared from the seeds and applied on skin	Oral Nasal

26	Mukafooni	<i>Hypericum quartinianum</i> A. Rich	Hypericaceae	SH	W	Leaf	Evil eye	Fresh pulverized	Oral
27	Naanaa	<i>Mentha sp.</i>	Lamiaceae	H	C	Leaf	Blood pressure Common cold	Fresh leaves are pounded and juice is prepared	Oral
28	Damakasee	<i>Ocimum lamiifolium</i>	Lamiaceae	H	HG	Leaf	Headache Intestinal parasite Michi Eye disease	Fresh leaves are pounded and the volatile substance will be inhaled Fresh leaves are pounded, and then juice is prepared and drunk (especially when infants have continuous fart. Leaf mixed with another plants and boiled then taken orally The leaf part squeezed and washed around the infected Eye part	Oral Dermal

29	Harma guusee	<i>Ajugainte grifolia</i> , Buch.-Hamn.	Lamiaceae	H	W	Leaf	Kidney disease	The leaves squeezed and drunk	oral
30	Maraasisaa	<i>Clerodendrum myricoides</i> (Hochst.)	Lamiaceae	SH	W	Stem Leaf	Devil disease Evil eye	Usually Brushing the tooth by taking stick (for tooth brush)	Oral
31	Kefoo	<i>Ocimum basilicum</i> L	Lamiaceae	H	C	Leaf	Headache Malaria	Putting the leaves in the Nose and inhaling its perfume/Smell The leaves mixed with bulb of <i>Allium sativum</i> and pounded together eaten with honey.	Nasal Oral
32	Hancabbii	<i>Ocimum forskolei</i> Benth	Lamiaceae	H	W	Leaf	Febrile illness	The leaf squeezed will be sniffed	Nasal

33	Urgeessaa	<i>Premna schimperi</i> Engl.	Lamiaceae	H	W	Root	Tooth ache	Root of <i>Premna schimperi</i> will be chewed and the solution is allowed to be in contact with diseased tooth.	Oral
34	Talbaa	<i>Linumusi tatissimum</i> . L	Linaceae	H	C	Seed	Avoid constipation stomachache	The seed added to water and drunk with sugar	Oral
35	Hidda hincinnii	<i>Hibiscus macranthus</i> Hochst. ex. A. Rich	Malvaceae	H	W	Root	Evil eye	Crushing the root and drunk (for infants)	Oral
36	Maxanne	<i>Pavoniaurens scavan</i>	Malvaceae	H	W	Root	Toothache Stomach e	Roots are boiled and decoction taken when cold and chewing root Chewing the cleaned root part during stomach feel pain	Oral (gargling)

37	Bargamo adii	<i>Eucalyptus globulus</i>	Myrtaceae	T	C	Leaf	Cough	Leaves are boiled and decoction taken when cold specially for infants when they have severe Cough	Oral
38	Zayituni	<i>Psidium guagava</i> L.	Myrtaceae	SH	HG	Fruit	Hepatitis	The fruit kept at cold area and eaten	oral
39	Handoodee	<i>Phytolaccado decandra</i> L'Herit.	Phytolaccaceae	SH	W	Root Leaf	Gonorrhoea Fever (gubaa)	The root crushed and drunk Reducing the body temperature by attaching the leaves on the body	Oral Dermal
40	Coqorsa	<i>Cynodon dactylon</i> L. Pers.	Poaceae	H	W	Entire part(leaf)	Snake bite Wound	The whole parts Crushed and squeezed around the injured body part Crushed and the liquid dropped on the wound and absorb to dry the wound.	Dermal
41	Muujjaa	<i>Snowdenia polystachya</i> (Fresen.) Pil	Poaceae	H	W	Leaf	Skin infection	Lateral part will be crushed and rubbed against the affected skin.	Dermal

							(Fungal)		
42	Rumaani	<i>Punica granatum</i> L.	Punicaceae	T	C	leaf	Snake bite	The leaf parts Crushed and drunk	Oral
43	Hidda fiitii	<i>Clematis hirsute</i> Perr.&Guill	Ranunculacea e	CL	W	Leaf	Tonsillitis Headache	Squeezing the leaf and smelling through nose	Nasal
44	Abasuuda gurraacha	<i>Nigella sativa</i> L.	Ranunculacea e	H	C	Seed	Intestinal parasite Stomachach e	Powdering the seed and mix with Ginger , <i>AlliumSativum</i> L.and taken with bread Chewing a number of the seed	Oral
45	Heexoo	<i>Hagenia abyssinica</i> (Bruce) J.F Gmel.	Rosaceae	T	W	Fruit	Tape worm	Powder mixed with water and fermented overnight is taken orally in the morning	Oral
56	Kookii	<i>Prunus perisca</i> (L.)	Rosaceae	SH	C	Leaf	Stomachach	Leaves crushed and decoction is given to children	Oral

		Batsch					e	by coffee cup in the morning before meal	
48	Buna	<i>Coffee arabica</i> L.	Rubiaceae	T	C	Seed	Diarrhea	Powder of roasted coffee mixed honey and eaten in the morning before breakfast for 2-3 days or liquid Coffee with butter drunk	Oral
49	Ulaagaa	<i>Psychotria orophila</i> Petit	Rubiaceae	T	W	leaf	Mich	The leaves crushed and boiled then drunk	Oral
50	Loomii	<i>Citrus aurantifolia</i> (Christm	Rutaceae	Tre e	C	Fruit	Poison Vomiting	Juice from ripe fruit is squeezed and drunk	Oral
51	Turunjii	<i>Citrus medica</i> L.	Rutaceae	Tre e	C	Leaf	Devil disease	Crushing the leaves and drunk	Oral
52	Ulumayii	<i>Clausena anisata</i> (Willd.) Benth.	Rutaceae	SH	W	Leaf	earache Skin disease	Juice of leaves is used as ear drop The leaves crushed and painted on the skin	Through ear Dermal

53	Cereddaama	<i>Ruta chalepensis</i> L	Rutaceae	H	HG	Leaf	Stomachache Miche Evil eye Internal parasite	Fresh leaves are pounded and then juice is prepared and taken orally	Oral
54	Alaltuu	<i>Salix subserrata</i>	Salicaceae	SH	W	Leaf	Rabies	Leaves are crushed and dried, and then mixed with milk and taken for several days in the morning(leaf which people touch and cross the River is preferable	Oral
55	Qomonyoo	<i>Brucea antidysenterica</i> J.F.Mill.	Simaroubaceae	SH	HG	Seed Leaf Root	Malaria Rheumatism Rabies	Raw Seed is taken from time to time to protect Malaria. Rubbing and heat up the leaf and moist the body in the night until feel better	Dermal

							Stomach ache	Pounding the root part drunk in the morning for several days	Oral
56	Asaangira	<i>Datura stramonium</i> L	Solanaceae	H	w	Leaf	Wound	The leaf crushed and the liquid dropped on wound	Dermal
						Seed	External parasite and worm	Cooking the Seed in the Broken pot and steaming it and worms come out from the body	
57	Gizaawa	<i>Withanias omnifera</i>	Solanaceae	SH	HG	Leaf	Mich Elephantiasis coughs Asthma devil disease	Boiling the leaves and drunk for three days in the morning	Oral

58	Suruma	<i>Pilea bambusteti</i> Engl.	Urticaceae	SH	W	Leaf	Broken bone	Crushed the leaves and taken orally for 3-5 days	Oral
59	Kusaayee	<i>Lantana camara</i> L.	Verbenaceae	SH	W	Leaf	Skin disease	Rubbing the leaves on the injured skin until it shows little bleeding	Dermal
60	Jibimbila	<i>Zingiber officinale</i> Ross	Zingiberaceae	H	C	Rhizome	Common cold Toothache	Rhizomes are freshly Crushed and mixed with Sativum L. boiled; the decoction is taken while warm The cleaned rhizome part chewed on the attacked teeth	Oral

Appendix: 2 Medicinal plants used to treat livestock ailments in the study area

NO.	Scientific name	Family name	Local name	Growth habit	Plant type	Parts used	Disease treated	Mode of preparation	Route of administration
61	Hiddii	<i>Solanum marginatum</i> L.f.	Solanaceae	SH	W	Fruit	phelunza	The seed squeezed and dropped in the nose of sheep and goat	Nasal
62	Botoro	<i>Steeospermum kunthianun</i> Cham	Bignoniaceae	T	W	Bark	Snake bites	The bark pounded and mixed with water and given to cattle	Oral
63	dhoqonu	<i>Acalypha fruticosa</i> Forssk	Euphorbiaceae	SH	W	Bark and Leaf	Constipation	Bark and leaves removed pounded together and stirred with juice and given to cattle by bottle.	Oral

64	Dhumuga	<i>Justicia schimperiana</i> (Hochst. ex Nees) T.Anders	Acanthaceae	SH	w		Black leg Intestinal parasites	Leaf and Root: Leaf and root of <i>Justicia schimperiana</i> will be pounded with dried fruit of <i>Ricinus communis</i> mixed with water and given to cattle Leaf: Pounded leaf of <i>Justicia schimperiana</i> will be mixed with barely malt powder and given to the animal (cattle, horse or donkey) to drink.	Oral
65	Ibicha	<i>Vernonia amygdalina</i> Del.	Asteraceae	SH	W	Leaf	Retained placenta	The leaves simply provided (given) to cows after the give birth.	Oral
66	Hidda Reeffa	<i>Mikania capensis</i> DC	Asteraceae	CL	W	Root	Rabies	The root of <i>Mikania capensis</i> and <i>Cucumis ficifolius</i> will be powdered together mixed with water given to cattle.	Oral
67	Makanisa	<i>Croton macrostachys</i> Del.	Euphorbiaceae	T	W	Leaf	Skin disease Blotting (bokoka garaa)	The leaves Crushed and rubbed on the affected part of the skin The leaves squeezed and rubbed around nose part	Dermal Nasal

68	ceekaa	<i>Calpurnia aurea</i>	Fabaceae	SH	W		Wound Skin rash	Leaf of Calpurnia aurea is smashed and rubbed on affected area Leaf of Calpurnia aurea together with that of Croton macrostachyus and Justicia schimperiana will be pounded and used to wash skin of cattle.	Dermal
69	Waleensuu	<i>Erythrina brucei Schweinf</i>	Fabaceae	T	HG	Root Bark	Eye disease Constipation	The Root Crushed and dropped in to the cattle eye The bark crushed and mixed with salt the given to cattle orally	Thoug h Eye Oral
70	Sigilu	<i>Englerina woodfordiodes (Schweinf.) M. Gilbert</i>	Loranthaceae	SH	w	Root	Eye disease	The root pounded and the liquid part added into the eye	Throug h eye
71	Asabudaguracha	<i>Nigella Sativa L.</i>	Ranunculacea e	H	C	Seed	Intestinal parasite	Powdering the seed and mix with Ginger , Sativum L.and taken with bread	Oral

72	Ittacha	<i>Dodonaea angustifolia</i> L.f	Sapindaceae	SH	W	Leaf	Diarrhea	The leaves crushed and mixed with salt and given to cattle in the morning	Oral
73	Tambo	<i>Nicotiana tabacum</i> L.	Solanaceae	H	C	Leaf Stem	Stomachache	Dry leaf and stem of <i>Nicotiana tabacum</i> will be powdered with salt and given to cattle	Oral mixed
74	Buqee Seexanaa	<i>Ampelocissus bombycina</i> (Bank.) Planch.	Vitaceae	CL	W	Leaf	Anthrax	Leaf with leaf of <i>Croton macrostachyus</i> and <i>Justica schimperiana</i> are dried together and pounded, then creamed an affected area.	Dermal

Appendix 3: Check list prepared for data collections (Collecting Medicinal Plants Information) in the study Area).

1. Date _____ kebele _____
2. Name of respondent _____ sex _____ Age _____
 - 2.1. Occupation _____
 - 2.2 marital status: Married Widow Single Divorce
 - 2.3. Religion _____
 - 2.4. Educational status _____
3. What are the most common human health problems in your area?
4. What are the most common livestock health problems around your area?
5. Do you use plants to treat disease in your locality?
 - 5.1, Name of plant _____
 - 5.2, Habitat of plant _____
 - 5.3, Habit of the plant _____
 - 5.4, part of the plant used _____
 - 5.5, Preparation methods _____
 - 5.6, Usage (dosage) _____
 - 5.7. Application methods _____
 - 5.8. What are the major Threats to the medicinal plants? _____
6. How do you prevent or control those diseases?
7. How do you treat human health problems?
8. How do you treat livestock problems?
9. Which plants do you use for treating those particular diseases?
10. Local name of plants?
11. Botanical name?
12. Family name of the plant?
13. How widespread is the medicinal plants from your area?
14. Preparation methods (crushed, pounded, powder, exudation, concoction, milky latex/extract with cold water/boiled/juice etc. _____
16. Does the dosage differ with sex and age groups?

17. Which age groups of the local people use the medicinal plant? _____
18. What are the noticeable side effects? _____
19. How do you preserve traditional medicines? _____
20. From where you get medicinal plants
21. Are medicinal plants marketable? _____
22. Are there threats to those medicinal plants? _____
23. How is the knowledge of traditional medicine transmits from generation to generation (especially younger generation)? _____
24. Is there any relationship between modernization and traditional medicinal plant use in the study area?

Survey area: **Dedo District**

Community/ Village _____ Interviewer/Facilitator _____

Date/month/year _____ Time: From _____

THANK YOU

Appendix 4: List of informants of the study area

Appendix 4.1: purposively selected informants (Traditional healers)

NO.	Informants full name	Sex	Age	Religion	Edu.level	Kebele
1	Neim A/Sambi	M	45	Muslim	8	Debale
2	Jihad A/Tulem	M	40	Muslim	10	Debale
3	Kedir A/Dura	M	36	Muslim	8	Metesso
4	Haji A/Nega	M	65	Muslim	2	Metesso
5	Sh Ahmed A/Fita	M	50	Muslim	10	Omoyella
6	A/JebalMamo	M	45	Muslim	4	Gerimaguda
7	Hadhakuma A/Jihad	F	60	Muslim	---	Offoledawe
8	Sh hafiz A/temam	M	55	Muslim	3	Offoledawe
9	A/Biya A/borana	M	55	Muslim	---	W/kolobo
10	A/gissa A/Simbo	M	50	Muslim	----	W/kolobo

Appendix 4.2: Randomly Selected Informants

NO.	Informants full name	Sex	Age	Religion	Edu.level	Kebele
11	Taju A/Gidi	F	40	Muslim	4	Warokolobo
12	Hadhabiyya Use A/sambi	F	55	Muslim	2	Warokolobo
13	HadhaDilbi A/Temam	F	50	Muslim	6	Warokolobo
14	Hadhakoro A/sambi	F	60	Muslim	2	Warokolobo
15	Fatuma A/Jihad	F	30	Muslim	8	Offoledawe
16	Zayituna A/Jebal	F	44	Muslim	----	Offoledawe
17	HadhaTemam A/Lemma	F	53	Muslim	----	Gerimaguda
18	Maryamee A/Zinab	F	34	Muslim	6	Gerimaguda
19	Fatuma A/Nega	F	40	Muslim	4	Metesso
20	Hunda A/Gumbul	F	35	Muslim	8	Metesso
21	Azalech Haile	F	40	Orthodox	6	Metesso
22	AlimaZakir	F	33	Muslim	7	Metesso
23	Zara Seifu	F	42	Muslim	4	Metesso
24	Sharafu A/Sambi	M	35	Muslim	8	Metesso
25	Reshad A/Fita	M	30	Muslim	8	Metesso
26	A/Reshad A/Gissa	M	45	Muslim	6	Metesso
27	A/Raya A/Fita	M	40	Muslim	7	Metesso
28	RiyadAyele	M	30	Muslim	Diploma	Metesso
29	Mohammed A/Jihad	M	35	Muslim	Diploma	Debale
30	Abayazid A/Dura	M	30	Muslim	9	Debale
31	Awal A/Temam	M	32	Muslim	9	Debale
32	Sh.Kamil A/Jihad	M	40	Muslim	8	Debale
33	Sh.Mohammed A/Bulgu	M	47	Muslim	5	Warokolobo
34	Sh. Abdella A/Garo	M	55	Muslim	2	Warokolobo
35	A/JebalSh.Teha	M	43	Muslim	4	Warokolobo
36	A/Temam A/Diga	M	60	Muslim	5	Warokolobo
37	Naji Jihad	M	30	Muslim	Diploma	Offoledawe
38	Siraj A/fita	M	36	Muslim	4	Offoledawe

39	Abayazid	A/Sambi	M	48	Muslim	6	Omoyella
40	Haji	Kemal	M	50	Muslim		Omoyella
41	SEifu	A/Mecha	M	41	Muslim	2	Gerimaguda
42	Hamid	A/simal	M	38	Muslim	4	Gerimaguda
43	Gali	A/Mecha	M	45	Muslim	3	Gerimaguda
44	Hadhatemam	A/Bulgu	F	54	Muslim	-----	Debale
45	HadhaDefar	A/Nega	F	46	Muslim	-----	Debale
46	Lubaba	A/Jihad	F	30	Muslim	7	Debale
47	HadhaMashar	A/Simal	F	44	Muslim	-----	Debale
48	Hadhakanzi	Sh. Ibrahim	F	50	Muslim	-----	Omoyella
49	Bediriya	Haji zakir	F	35	Muslim	-----	warokolobo
50	MustefaBori		M	30	Muslim	-----	Warokolobo