

*Full Length Research Paper*

# **Ethnobotanical study of indigenous knowledge on medicinal plants used to treat diseases in selected districts of Amhara Regional State, Ethiopia**

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This study was conducted in four districts of Amhara Region, Ethiopia. The aim of the study was to assess medicinal plants found in Menz gera, Siyadebirna Wayu, Antsokiya gemza and Bugna districts, Amhara region, Ethiopia. The ethnobotanical surveys were carried out from September 2017 to June 2018 using a semi-structured checklist consisting of questions or issues prepared in advance. Two separate questionnaires were prepared, one for the local healers and the other for the local community. A total of 376 (94 per district) informants were selected using purposive sampling technique and asked both open and close-ended questions. The interviews and observations were based on and around this checklist and some issues were raised promptly depending on responses of an informant. All plant species found in each district were recorded, collected, pressed and identified following Flora of Ethiopia and Eritrea. From the total 376 informants 238 were males and the rest 138 were females. A total of 77 medicinal plants were reported and distributed in 28 families. Family Lamiaceae was distributed in all four districts followed by 5 families which were distributed in three districts. Leaf 47 (56.63%) was the plant part widely used followed by stem 12 (14.46%), root 8 (9.64%) and seed 7 (8.43%), while the rest include fruit 3 (3.61%), bulb 3 (3.61%), flower 1 (1.20%). *Ocimum lamiifolium Hochst.* and *Citrus durantifolia* were the plants with the highest fidelity level values, each scoring 100%, followed by *Moringa stenopetala (Bak.f.) Cuf.* (96%). From the present study, the highest number of medicinal plants was observed in Antsokiya Gemza District followed by Siyaderina wayu, Bugna and Menz Gera, with 29, 24, 15 and 9 number, respectively. In these four districts the highest number of plants was used to treat wound followed by abdominal disease/pain. Pounding and grinding of the plant parts to make a powder were the most frequently used methods of traditional medicine preparation. Traditional medicine is the base for the modern medicine, but nowadays, the work is not respected by most people so it needs further attention especially in changing the attitude of the community towards traditional medicine.

**Key words:** Amhara Regional State, disease treated, medicinal plants, plant part.

## **INTRODUCTION**

Ethnobotanical studies are often significant in revealing locally important plant species especially for the discovery

of crude drugs. Right from its beginning, the documentation of traditional knowledge, especially on the

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medicinal uses of plants, has provided many important drugs of modern day (Cox and Balick, 1996; Flaster, 1996).

The medicinal plant of Ethiopia and the developing countries play major supplementary roles to the limited modern health care available. The development of useful and widely used drugs like Digoxin and Digitoxin, from *Digitalis* leaves; quinine from the cinchona bark; reserpine from *Rauwolfia serpentina*; morphine from *Papaver somniferum*; cocaine from *Erythroxylon coca* and the anti-cancer Vincristine and Vinblastine from *Carthartus troseus* of Madagascar and again anti-cancer compound, bruceatin, from the Ethiopian plant, *Brucea antidysenterica*, just to name a few are examples of the contributions of traditional pharmacopoeia (Desta, 1988).

The various literatures available show the significant role of medicinal plant in primary health care delivery in Ethiopia where 70% human and 90% livestock population depend on traditional medicine again similar to many developing countries particularly that of Sub-Saharan African countries. Those plants are part of the economic commodity for some members of the society which make their livelihood on their collection, trade and medicinal practices by practitioners or healers. It thus has a substantial potential to make contributions to the economic growth and alleviation of poverty in the country. Its proper management protects the environment and conserves biodiversity. The traditional health care is deep rooted in oral and written pharmacopoeias. Ethiopian plants have shown very effective contributions for some ailments of human and domestic animals. Such plants include *Phytolacca dodencadra* Aklilu (1965), many species of *Maytenus* studied by National Cancer Institute, USA (Kupchan et al., 1972) and many species that show anti-malarial (Nkunya, 1992).

Traditional medicine still remains the main resource for a large majority (80%) of the people in Ethiopia for treating health problems, and a traditional medical consultancy including the consumption of the medicinal plants has a much lower cost than the modern medical one (Abebe and Hagos, 1991; Asfaw et al., 1999; Addis et al., 2001). Out of the total flowering plants reported from the world, more than 50,000 are used for medicinal purposes (Govaerts, 2001; Schippmann et al., 2002).

In Ethiopia, about 800 species of plants are used in the traditional health care system to treat nearly 300 mental and physical disorders. The wide spread use of traditional medicine among both urban and rural population in Ethiopia could be attributed to cultural acceptability, efficacy in the country, socio-cultural background of the different ethnic groups as well as historical developments, which are related to migration, introduction of foreign culture and religion. Previous studies showed the existence of traditional medical pluralism in the country. In Ethiopia, either the knowledge from herbalists is passed secretly from one generation to the next

through words of mouths or their descendants inherit the medico-spiritual manuscripts (Pankhurst, 1965; Pankhurst, 1990; Slikkerveer, 1990; Abebe and Ayehu, 1993; Vecchiato, 1993). The study of Ethiopian medicinal plants has not been realized as fully as that of India or other traditional communities elsewhere (Iwu, 1993). In Ethiopia, though there has been some organized ethnomedicinal studies, there is limited development of therapeutic products and the indigenous knowledge on usage of medicinal plants as folk remedies are getting lost owing to migration from rural to urban areas, industrialization, rapid loss of natural habitats and changes in life style. In addition, there is a lack of ethnobotanical survey carried out in most parts of the country.

In view of these, documentation of the traditional uses of medicinal plants is an urgent matter and important to preserve the knowledge. Furthermore, most of the ethnomedicinal studies in northern part of Ethiopia are focused on 'Medihanit Awakie' (professional traditional practitioners) and the ancient medico-magical and/or medico-spiritual manuscripts and old Gee'z manuscripts (Abebe and Ayehu, 1993; Abbink, 1995; Pankhurst, 2001), and ignore the knowledge of ordinary people in the locality (Fassil, 2005). Thus, the purpose of this study is to assess the traditional uses of medicinal plants by the ordinary people in four different districts of Amhara region, Ethiopia and to provide baseline data for future pharmacological and phytochemical studies.

## MATERIALS AND METHODS

### Description of the study area

The study was conducted in four districts (Menz gera, Siyadebirna wayu, Antsokiya gemza and Bugna) of Amhara region, Ethiopia. From these the first three are located in North Shewa Zone and the last district is located in North wollo Zone. Menz gera is located at the eastern edge of the Ethiopian highlands in the Semien Shewa Zone. It is bordered on the south by Menz Lalo, on the southwest by Menz Keya, on the west by the Qechene River which separates it from the Debub Wollo Zone, on the north by Geshe Rabel, on the northeast by Antsokiyana Gemza, and on the east by Efratana Gidim.

The majority of the inhabitants practiced Ethiopian Orthodox Christianity, with 99.56% reporting that as their religion. Siyadebirna wayu is located in the Semien Shewa Zone; is bordered on the south by the Oromia Region, on the west by Ensaro, on the north by Moretna Jiru, and on the east by Basona Werana. The majority of the inhabitants practiced Ethiopian Orthodox Christianity, with 99.58% reporting that as their religion. Antsokiya gemza is the other part of the North Shewa Zone; is bordered on the south by Efratana Gidim, on the southwest by Menz Gera Midir, on the west by Geshe, and on the north and east by the Oromia Zone. The majority of the inhabitants were Orthodox Tewahedo, with 75.98% reporting that as their religion; while 23.15% were Muslim, and 0.82% Protestant. The last district is Bugna which is located in the northwest corner of the Semien Wollo Zone; is bordered on the south by Meket, on the west by the Debub Gondar Zone, on the north by the Wag Hemra Zone, and on the east by the Lasta woreda. The highest point in Bugna is Mount Abuna Yosef, on the

border with Gidan; other notable peaks include Mount Qachen. Rivers include the Tekezé, which has its source in this woreda. The majority of the population practiced Ethiopian Orthodox Christianity, with 98.28% professing this belief; while 1.59% of the population said they were Muslim (Figure 1).

North Shewa zone is one of 10 Zones in the Ethiopian Amhara Region. The highest point in the Zone is Mount Abuye Meda (4012 meters); other prominent peaks include Mount Megezez. North Shewa has a population density of 115.30. While 214,227 or 11.66% are urban inhabitants, a further 112 or 0.01% are pastoralists. The three largest ethnic groups reported in Semien Shewa were the Amhara (95.73%), the Oromo (2.14%), and the Argobba (1.71%); all other ethnic groups made up 0.42% of the population. Amharic is spoken as a first language by 96.97%, and 2.32% spoke Oromiffa; the remaining 0.71% spoke all other primary languages reported. North Wollo is the other zone in the Amhara Region of northern Ethiopia. Part of its southern border is defined by the Mille River. Its highest point is Mount Abuna Yosef. Most of this Zone is mountainous and characterized by steep slopes, which are unsuitable for agriculture and severely limits the cultivated area. A survey of the land in this zone shows that 24% is arable or cultivable, 4.6% pasture, 0.37% forest, 17.4% shrub land, 47.3% degraded or unusable, and the remaining 6.3% for all other uses. North Wollo has a population density of 123.25. While 155,273 or 10.35% are urban inhabitants, a further 2 persons are pastoralists. The largest ethnic group reported in North Wollo was the Amhara (99.38%); all other ethnic groups made up 0.62% of the population. Amharic is spoken as a first language by 99.28%; the remaining 0.72% spoke all other primary languages reported.

### Survey of medicinal plants

The ethnobotanical surveys were carried out from September 2017 to June 2018 using a semi-structured checklist consisting of questions or issues prepared in advance. There were two separate questionnaires, one for the traditional healers and the other for the local community.

The questionnaires were open-ended and close-ended. The interviews were based on and around this checklist and some issues were raised promptly depending on responses of an informant. First the questions for questionnaire and interview were written in Amharic then translated into English during paper writing. Prior to the administration of the questionnaire, conversations with the informants were held with the assistance of local farmers and help us in getting relevant information.

A total of 376 informants were questioned and interviewed; per each district 94 informants were involved. Out of about 336,092 inhabitants (168,739 females and 167,353 males) of the four districts (Wikipedia), these included a total of 238 males and 138 females; of which, fourteen were male local healers (three from Menzgera, three from Siyadebirna wayu, five from Antsokiya and three from Bugna district). The female and male informants' age ranges from 35 to 85 years and the mean age is 48 and 60 years respectively.

The informants were selected purposively and appointment was made prior to the visits. The informants such as teachers, agricultural professionals, health workers, local farmers and healers were asked to give their knowledge about the plants they use against a disease, plant parts harvested, method of preparation of the remedy and details of administration. Besides, observations were made on how they harvest the plant part, prepare the remedy and take the medicine. Specimens of the reported medicinal plants were collected during regular systematic walk in the fields and identified by botanists at the National Herbarium of Addis Ababa University following Flora of Ethiopia and Eritrea. Voucher specimens were deposited at the National Herbarium of Addis Ababa University, Ethiopia.

### Data analysis

All the data collected in the field were analyzed using qualitative and quantitative data analysis approach. For qualitative data, first the main themes were identified. Secondly, the main themes were assigned, then the responses were classified under the main themes. Finally, the themes and response were integrated into the text. On the other hand, the quantitative data were analyzed using Statistical Package for the Social Sciences software and presented in the form of table and graph.

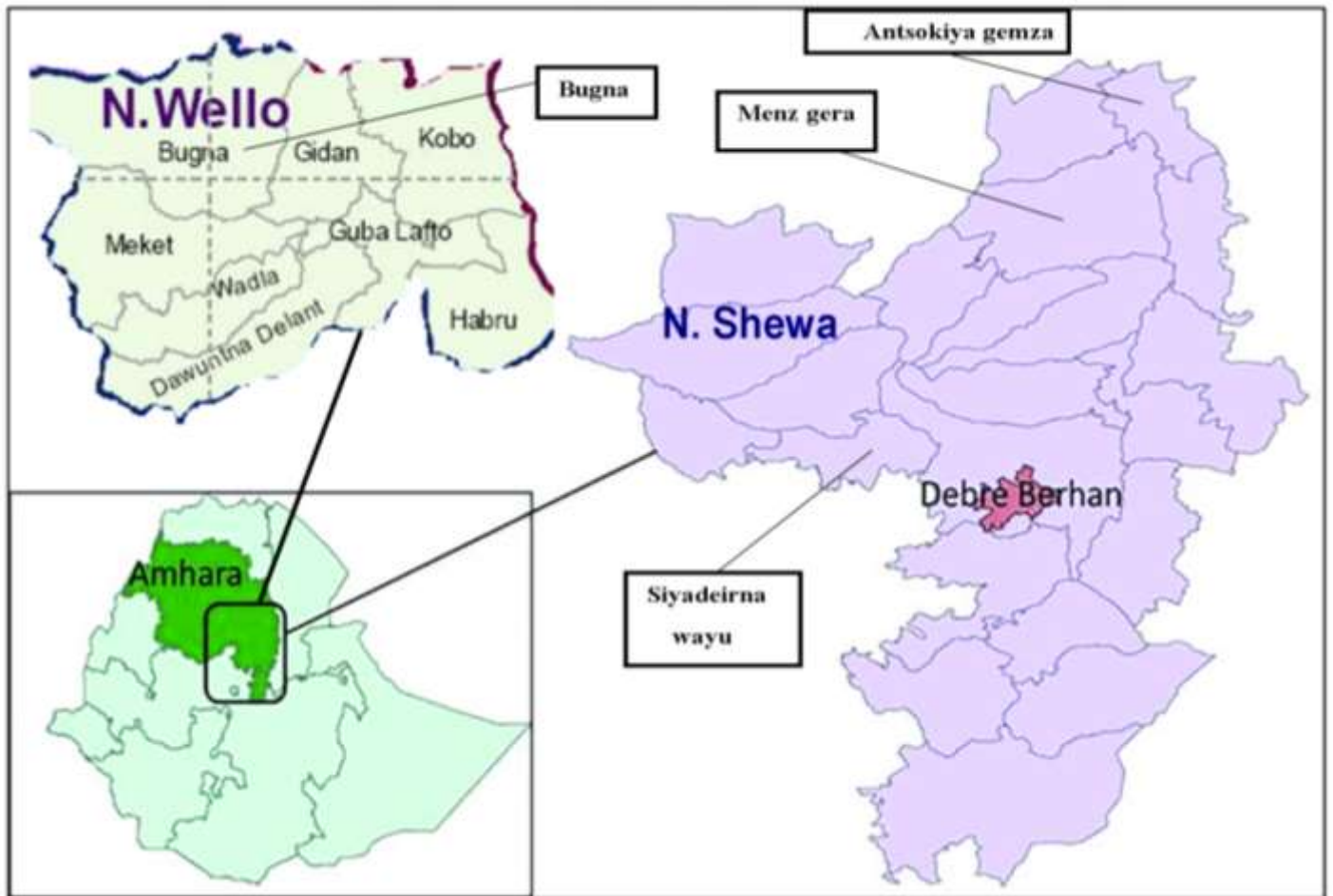
## RESULTS AND DISCUSSION

### Medicinal plant species diversity and distribution

A total of 77 medicinal plants were reported by the local community including the healers from the study area as being used for treatment of different disease in the area. These plants are distributed in 28 families. Family Lamiaceae was distributed in all four districts followed by 5 families which were distributed in three districts. Lamiaceae is among the most represented families in the flora of Ethiopia and Eritrea (Flora of Ethiopia and Eritrea, 1995; Flora of Ethiopia and Eritrea, 2004; Flora of Ethiopia and Eritrea, 2006). Other 12 and 10 families were distributed in two and one districts respectively (Figure 2). Other studies conducted in different parts of the country (Giday and Ameni, 2003; Tanto et al., 2003; Tadesse et al., 2005) also revealed the highest contribution of these families (Lamiaceae, Asteraceae and Fabaceae) to the Ethiopian medicinal flora.

### Knowledge of local healers on plant preparation

The local healers or practitioners used several methods of preparation of traditional medicines from plants. Pounding and grinding of the plant parts into powder were the most frequently used methods of traditional medicine preparation. According to Tilahun (2009), pounding and crushing are the most frequently employed methods to prepare remedies in single and multiple preparations. According to Rindos (1984), knowledge on plant use is the result of many years of human interaction and selection on the most desirable and successful plants present in the immediate environment at a given time. According to the practitioners, the powder as a result of grinding or pounding is a good strategy for preserving the plant materials that are not available both in dry and rainy seasons. It was also cited that, these are effective methods for the complete extraction of the active ingredients or potential content of the plant; they increase the curative power of the medicine or its efficacy, as both increases the healing power of the remedy through faster physiological reaction. The prepared medicinal plant is taken immediately or preserved for later use. The multiple prescriptions reported by the healers usually contain a range of



**Figure 1.** Map of the study area. Geographical location of Menz gera, Siyadebirna wayu, Antsokiya gemza and Bugna districts Amhara region, Ethiopia.

pharmacologically active compounds; in some cases, it is not known which ingredients are important for the therapeutic effect and some are used as adjuvants (Schulz et al., 2001). According to the local healers, the local communities including families of the practitioners do not want to learn and know about traditional medicine even they do not respect the healers; they see them as devil's followers. Even though, they still pass the traditional knowledge to their son. The traditional knowledge in the family or community is passed from male parent to his first-born son (Bishaw, 1990; Tesfu et al., 1995).

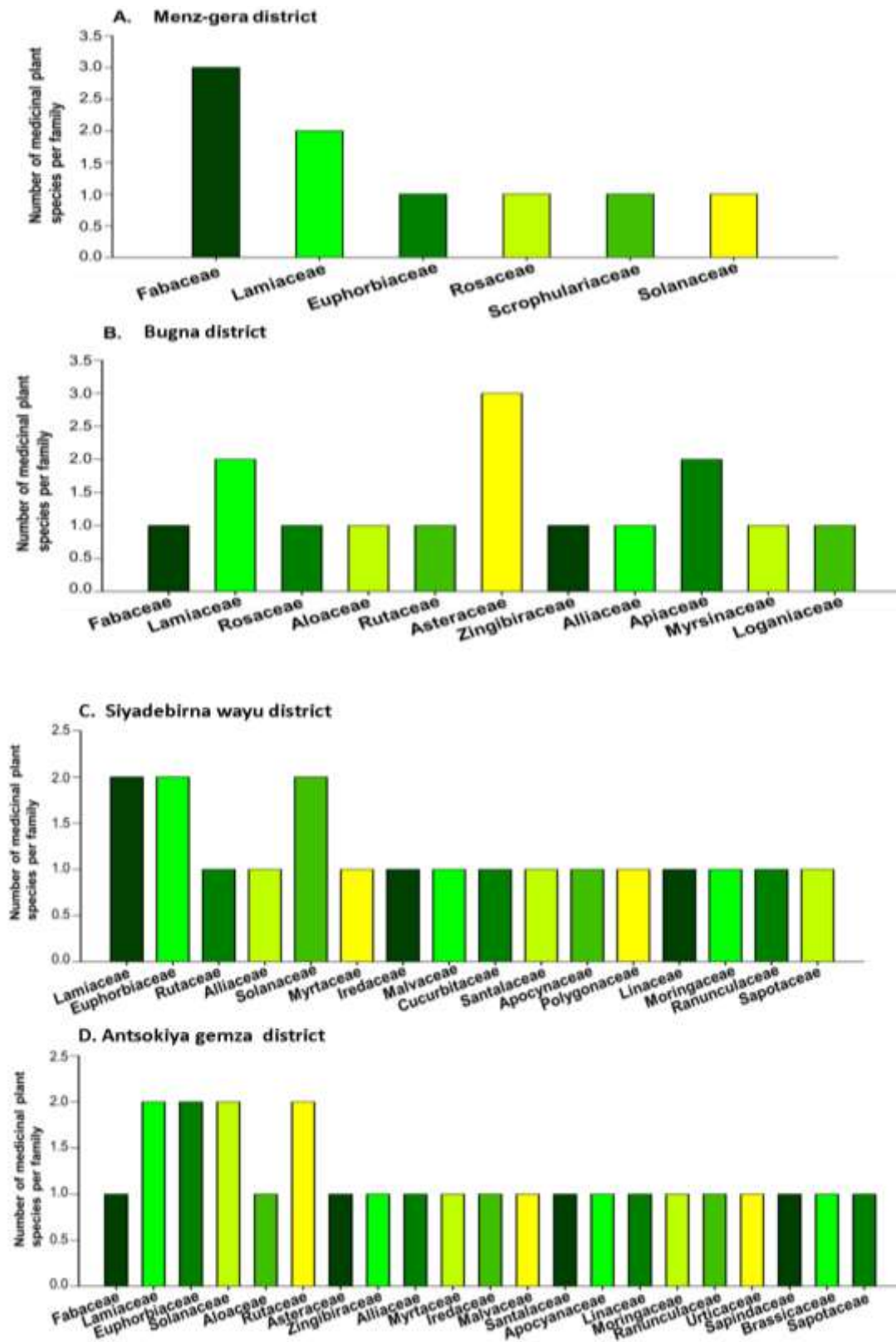
#### Plant part(s) used

Plant part(s) used for medicinal purposes indicated that leaf 47 (56.63%) was the plant part widely used followed by stem 12 (14.46%), root 8 (9.64%) and seed 7 (8.43%); while the rest include fruit 3 (3.61%), bulb 3 (3.61%), flower 1 (1.20%); the plant part for 2 (2.41%) species was

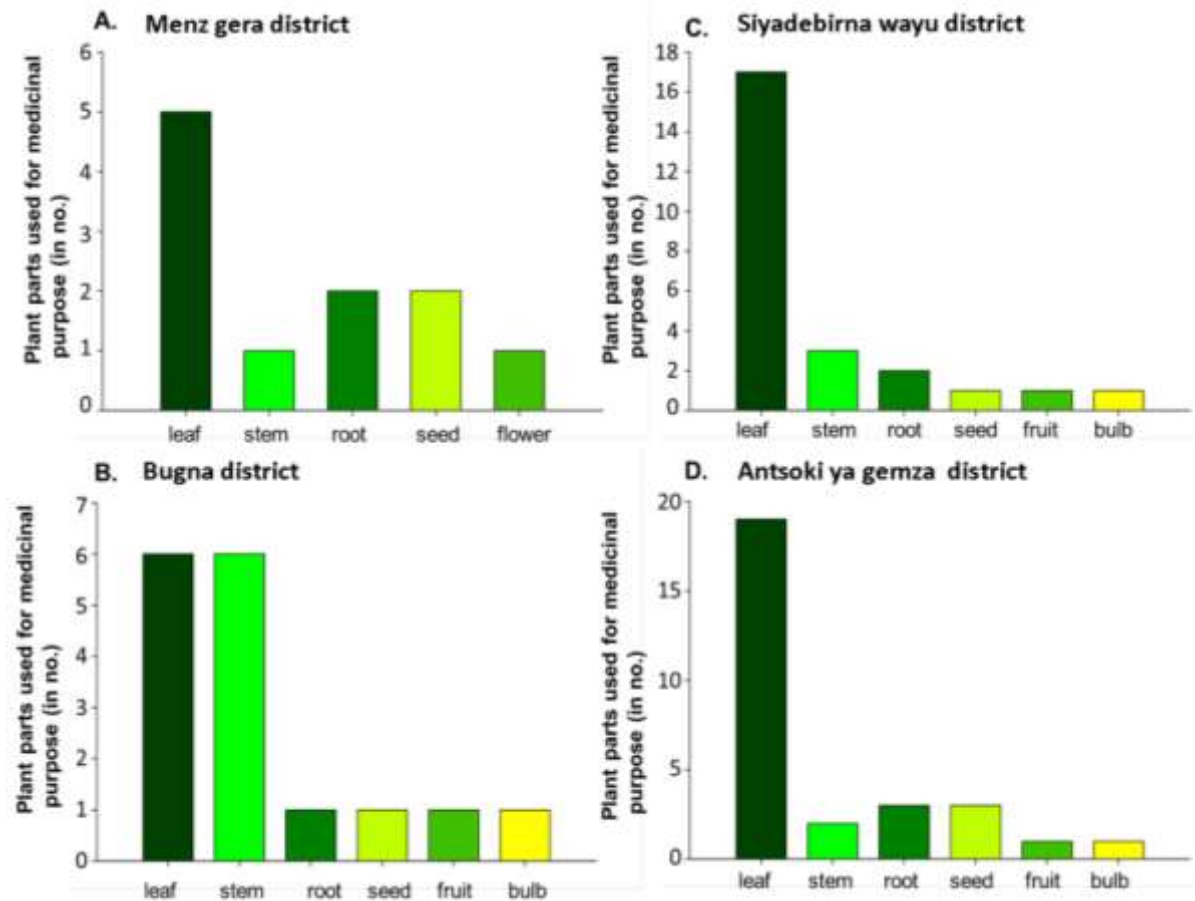
not specified. In all districts leaf is the widely used plant part (Figure 3). Previous reports in Ethiopia Flora of Ethiopia and Eritrea (1995), Flora of Ethiopia and Eritrea (2004), Flora of Ethiopia and Eritrea (2006) have also shown that leaves were the most commonly used to treat various health problems. Based on the family, 4 different parts of the plant under fabaceae family were used for medicinal purpose followed by 6 families from which 2 plant parts were used and from the remaining 18 families one plant part was used to treat different diseases (Table 1).

#### Fidelity level index

Fidelity level (FL), as an estimation healing potential, is an important means to see for which ailment particular specie is more effective; accordingly, *O.lamiifolium Hochst.* and *C. durantifolia* were the plants having the highest level values, each scoring 100%, followed by *M. stenopetala (Bak.f.) Cuf.* (96%) (Table 2 and Figure 3).



**Figure 2.** The number of medicinal plants distribution in different districts per family. (A) Number of medicinal plants per family in Menz-gera district. (B) Number of medicinal plants per family in Bugna district. (C) Number of medicinal plants per family in Siyadebirna Wayu district. (D) Number of medicinal plants per family in Antsokiya-gemza district.



**Figure 3.** Plant parts used for medicinal purpose in four different districts. **(A)** Plant parts used for medicinal purpose in Menz-gera district. **(B)** Plant parts used for medicinal purpose in Bugna district. **(C)** Plant parts used for medicinal purpose in Siyadebirna Wayu district. **(D)** Plant parts used for medicinal purpose in Antsokiya-gemza district.

**Table 1.** The different families of the species with their plant parts used for medicinal purpose.

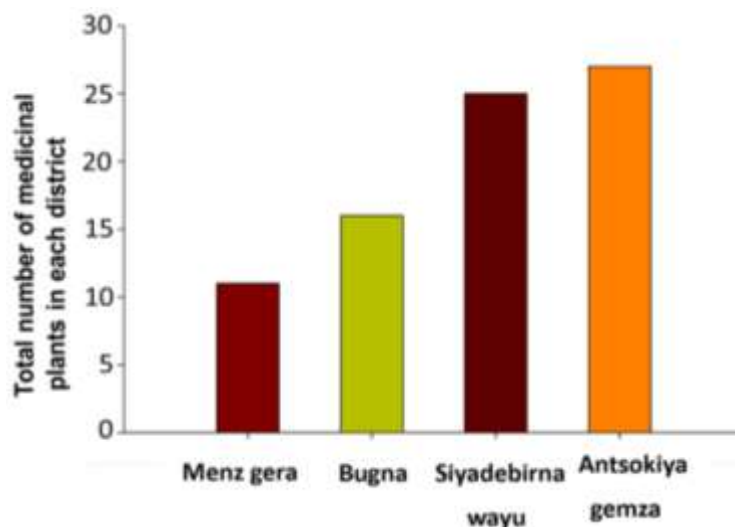
Family name	Plant part used for medicinal purpose						
	Leaf	Stem	Seed	Root	Flower	Fruit	Bulb
Fabaceae	✓	✓	✓		x	x	x
Lamiaceae	✓	✓	x	x	x	x	x
Euphorbiaceae	✓	✓	x	x	x	x	x
Rosaceae	x	x	✓	x	✓	x	x
Scrophulariaceae	✓	x	x	x	x	x	x
Solanaceae	x	x	x	✓	x	x	x
Aloaceae	✓	✓	x	x	x	x	x
Rutaceae	x	x	x	x	x	✓	x
Asteraceae	✓	✓	x	x	x	x	x
Zingiberaceae	x	x	x	✓	x	x	x
Alliaceae	x	x	x	x	x	x	✓
Apiaceae	✓	x	x	x	x	x	x
Myrsinaceae	x	x	x	x	x	✓	x
Myrtaceae	✓	x	x	x	x	x	x
Iredaceae	✓	x	x	x	x	x	x
Malvaceae	✓	✓	x	x	x	x	x

**Table 1.** Contd.

Cucurbitaceae	✓	x	x	x	x	x	x
Santalaceae	✓	x	x	x	x	x	x
Apocynaceae	✓	x	x	x	x	x	x
Polygonaceae	✓	x	x	x	x	x	x
Linaceae	x	x	✓	x	x	x	x
Moringaceae	✓	x	x	x	x	x	x
Ranunculaceae	✓	x	x	x	x	x	x
Urticaceae	✓	x	x	x	x	x	x
Sapindaceae	✓	x	x	x	x	x	x
Brassicaceae	x	x	x	x	x	x	x
Sapotaceae	✓	x	x	x	x	x	x

**Table 2.** Fidelity level (FL) value of medicinal plants.

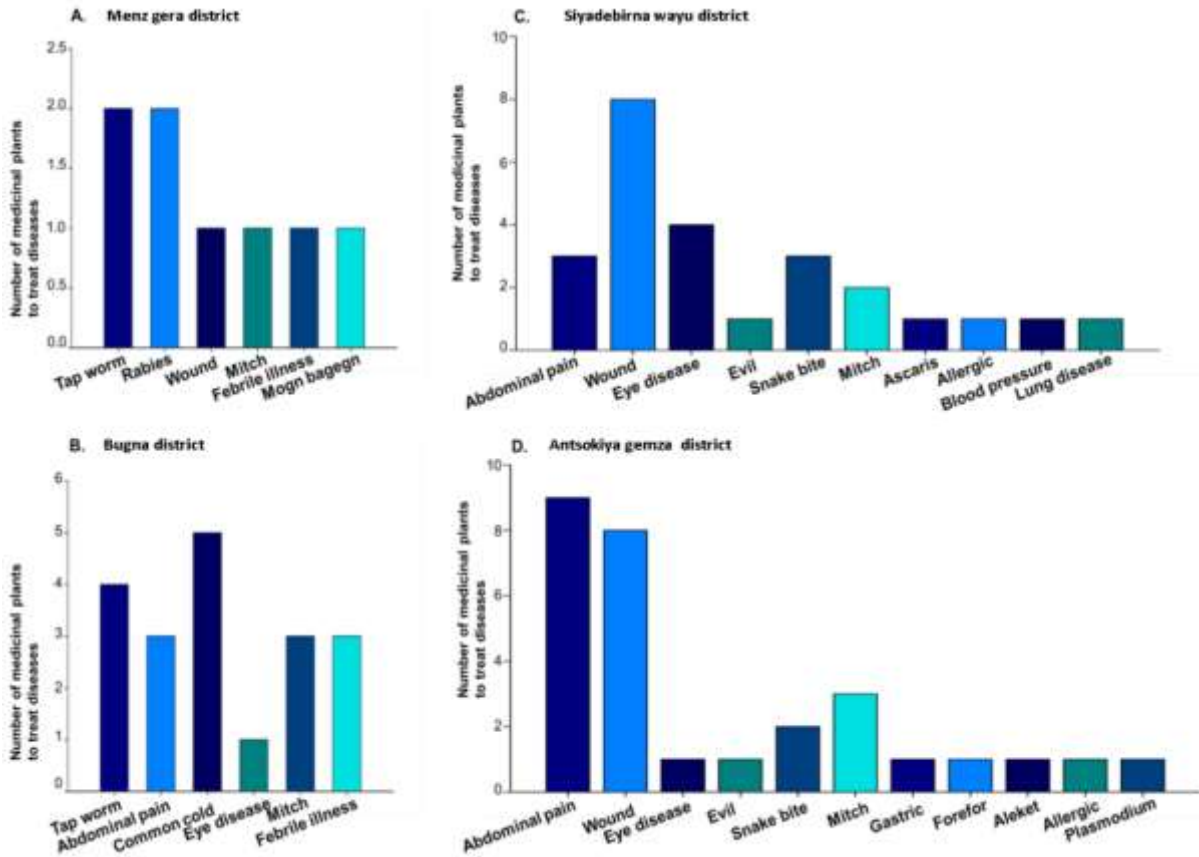
Species name	Local name	Use/s	Fidelity level (FL) (%)
<i>Ocimum lamiiifolium</i> Hochst.	Dama Kesse	Febrile illness	100
<i>Citrus durantifolia</i>	lomi	To clean mouth and kill microorganisms in the mouth	100
<i>Moringa stenopetala</i> (Bak.f.) Cuf.	Shiferaw	Blood pressure	96
<i>Hagenia abbyssinica</i>	Kosso	Abdominal disease / pain	93.75
<i>Embelia schimperi</i> Vatke	Inkoko	Tapeworm	92.85
<i>Linum usitatissimum</i> L.	Telba	Drying of abdomen	92.85
<i>Carissa spinarum</i> L.	Agam	Bite of snake	75

**Figure 4.** The total number of medicinal plants in each district.

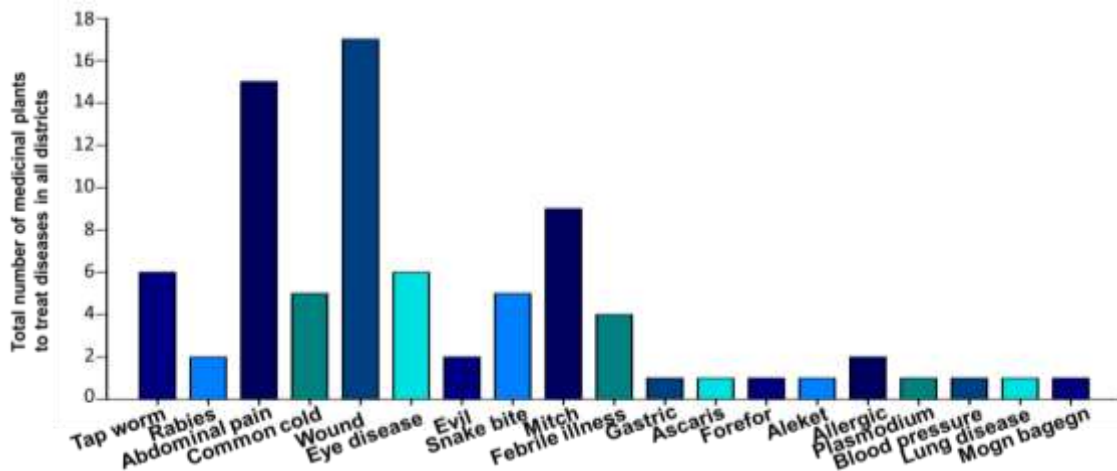
### Number and uses of medicinal plants

The number of medicinal plants was different from one district to the other. From the present study, the highest number of medicinal plants was observed in Antsokiya gemza district followed by Siyaderina wayu, Bugna and Menz gera, with 29, 24, 15 and 9 number, respectively (Figure 4). On the other hand, different medicinal plants

were used to treat different disease. In these four districts the highest number of plants was used to treat wound followed by abdominal disease/pain. According to MSWHO (2008), wounds are among the leading human disease. In Menz gera District, the highest number of plants was used to treat tapeworm and rabies followed by four different diseases with the same number of species. In Bugna, the highest numbers of plant were used to treat



**Figure 5.** The number of medicinal plants used to treat different disease. (A) Number of medicinal plants and its use in Menz-gera district. (B) Number of medicinal plants and its use in Bugna district. (C) Number of medicinal plants and its use in Siyadebirna Wayu district. (D) Number of medicinal plants and its use in Antsokiya-gemza district.



**Figure 6.** The total number of medicinal plants used to treat different disease in four districts.

common cold followed by tapeworm. In Siyadebirna wayu, the highest number of plants was used to treat wound followed by eye disease. In Ansokiya Gemza

District, the highest number of plants was used to treat abdominal disease/pain followed by wound (Figures 5 and 6).



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## CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests.

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