

# Chapter 6

## Traditional Medicinal Knowledge of Vendors and Their Contribution Toward Community Healthcare in Baguio City, Philippines



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**Abstract** Herbal plants are among the products sold in many urban markets in Asia. They play a vital role in alleviating various and common ailments among city-dwellers. People buy them because of their availability, ease of preparation, low cost, and effectiveness as compared to synthetic and commercial drugs. This study was conducted to identify and document the uses of the medicinal plants sold in the streets and market places of Baguio City, Philippines. Information on the part/s used, method of preparation, and mode of use/application were collected through semi-structured questionnaires and interviews. The data gathered from 42 local street and stall vendors were analysed using use value (UV) as a quantitative tool. A total of 59 species belonging to 52 genera and 29 families were recorded to treat various health-related problems or ailments and diseases. More than 50 health problems were identified. Cough is the most common ailment treated. The leaves are the most frequently used plant part for the treatment of various diseases. Decoction and drinking are the most common modes of preparation and administration respectively. Over-all, Lamiaceae is the most dominant (11 species) and important family (UV 2.26), while *Angelica keiskei* (Miq) Koidz is the most important species (UV 1.05). Thus, this study shows that medicinal plants continue to be widely sold by local vendors for primary health care in an urban context.

**Keywords** Medicinal plants · Use value · Lamiaceae · *Angelica keiskei*

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The original version of this chapter was revised. The author provided a revised map that has been updated in Figure 6.1. The correction to this chapter can be found at [https://doi.org/10.1007/978-981-16-6719-0\\_9](https://doi.org/10.1007/978-981-16-6719-0_9)

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## 6.1 Introduction

The World Health Organization (2018) defines traditional medicine as the ‘sum total of knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses’. All over the world, traditional medicinal systems continue to aid in the primary healthcare of different communities. About 65–80% of the world’s healthcare practice involves the use of traditional medicine (Pan et al. 2014). Traditional medicine varies from one country to another, and among different cultural groups within a country, depending on historical influences, ecological conditions, and other factors. Ayurveda, Siddha, Unani, yoga, naturopathy, and homeopathy are among the oldest traditional systems of medicine in India (Sen et al. 2016). Meanwhile, traditional, complementary, and alternative medicine are common in developed countries and Asia (Yuan et al. 2016). Traditional medicine can be classified into two systems: codified and folk. Codified medical systems include Ayurveda, Siddha, and Unani, traditional Chinese medicine, and acupuncture. These are, among others, based on physiology and pharmacology. Folk medicine, on the other hand, refers to traditional medicinal knowledge on locally available and accessible plants and their uses that have been orally passed on across generations (Telles et al. 2014).

Plants are commonly used in traditional medicine to promote healing. According to Ekor (2014), 80% of the population worldwide relies on herbal medicines as part of their primary health care. Benzie and Galor (2011) report that 90% of the population in Africa, 70% in India and 40% in China and Hong Kong use herbal medicine. In the United States, about 38% of adults and 12% of children use herbal medicines. In the Philippines, a total of 1,500 medicinal herbs have been recorded (Dela Cruz 2010). There is a large number of Filipino herbolarios or herbalists who still practise traditional healing. The Philippine Department of Health (DOH) has recorded 250,000 traditional healers in the country (a ratio of 1 healer for every 300 persons). In Cebu, traditional healers called ‘*mananambal*’ (both male and female) are highly regarded in folk healing because of their experience (Berdon et al. 2016). Despite the popularity of modern medicines, more than 50% of the population uses traditional medicine. The Filipino government recognises the importance of traditional and alternative medicines in the country’s health care delivery system. This support is reflected in the ‘Traditional and Alternative Medicine Act of 1997’ which promotes the development of traditional and alternative health care to improve the quality and delivery of health care services (WHO 2002). The DOH has also taken on the role of regulating the production and sale of traditional medicines in the country (WHO 1998).

Traditional knowledge on medicinal plants in the Philippines is commonly transmitted through oral traditions. Herbolarios have learned to perform folk healing through observation, imitation, and experience (Berdon et al. 2016). However, with the spread of modern education and the growing influence of western medicine, traditional knowledge and healing practices have been pushed into the margins and

labelled unscientific or as mere superstition. Hence, to avoid further loss of traditional medicinal knowledge, there is a need to document the rich knowledge about medicinal plants in the country (Gruyal et al. 2014; Tantengco et al. 2018). Such a revitalization is also needed to ensure that large segments of the Filipino population have access to affordable healthcare. Besides, traditional medicine and its custodians are important components of cultural heritage and are pertinent in bioprospecting (Tantiado 2012), as these medicines contain properties or compounds that can be used for therapeutic purposes or those that synthesize metabolites to produce drugs (Doughari 2012).

Traditionally, Filipinos use medicinal plants to treat minor sicknesses (e.g., colds, coughs, flu, and others). Contrary to popular belief, dependence on traditional medicine is not limited to the rural areas alone. Medicinal plant vendors are a common sight in cities as well, indicating the continuous patronage they receive.

Various researchers have documented the utilisation of medicinal plants from different parts of the Philippines, namely Albay (Mirandilla and Abalon 2013), Benguet (Balangcod and Balangcod 2015), Cavite (Balinado and Chan 2017), Dumagat (Sia et al. 1998), and Iloilo (Tantiado 2012). Other studies have looked into the knowledge of vendors (Flores et al. 2016), resident consumers (Ammakiw and Odiem 2013; Baleta et al. 2016; Gruyal et al. 2014; Mata et al. 2012), and indigenous tribes such as Ati (Madulid et al. 1989), Ati Negrito (Ong and Kim 2014), Ayta (DOST-PCHRD et al. 2009; Ragrario et al. 2013), Bagobo (Paluga et al. 2013a), Bugkalot (Sia et al. 2002), Ivatan (Abe and Ohtani 2013), Kalanguya (Balangcod and Balangcod 2011), Mandaya (Paluga et al. 2013d), Mangyan (Lacdan et al. 2001; Rubite et al. 2002; Sebastian et al. 2013a, b), Manobo (Paluga et al. 2013b), Siquijor tribe in Mt. Bandilaan (Mansueto et al. 2015), Subanon (Elago et al. 2013a), Subanen (Elago et al. 2013b), and Tagakaolo (Paluga et al. 2013c). Several studies reported on the loss of traditional knowledge in the country (Mata et al. 2012; Ong and Kim 2014; Rubite et al. 2002) and the decline of medicinal plants (Ragrario et al. 2013). These are due to factors such as dislocation of communities, loss of forest and acculturation (Ragrario et al. 2013).

In this study, the researchers identified the different medicinal plants sold at the markets and streets in Baguio city, documented the traditional knowledge associated with the plants, and computed the use value of plant species and families respectively. Thus, this chapter provides a practical reference for their identification and proper utilisation for future generations. It also intends to disseminate information and create awareness of the importance of medicinal plants for the alleviation of health problems. Findings of this study contribute to future researches on plant drug discovery.

## 6.2 Materials and Methods

### 6.2.1 Study Area

The study was conducted in Baguio City, Philippines (Fig. 6.1). Specifically, there were seven (7) places selected. (A) First is located at  $16^{\circ} 24' 44.2584$  North,  $120^{\circ} 35' 46.1112$  East of 37 Harrison Road, (B) the second is located at  $16^{\circ} 24' 48.366$  North,  $120^{\circ} 35' 47.7852$  East of Rudel Building V, Mabini Street, (C) third is at  $16^{\circ} 24' 51.588$  North,  $120^{\circ} 35' 43.4364$  East of Magsaysay Avenue (Public Market), (D) fourth is at  $16^{\circ} 24' 38.6712$  North,  $120^{\circ} 35' 33.6516$  East of Orchidarium, (E) fifth is at  $16^{\circ} 24' 54.8532$  North,  $120^{\circ} 37' 1.3656$  East of Baguio-Bua-Itogon Road (Wright Park), (F) sixth is located at  $16^{\circ} 25' 10.56$  North,  $120^{\circ} 37' 38.6004$  East of 19 Outlook Drive South (Mines View), and (G) seventh at  $16^{\circ} 24' 43.9992$  North,  $120^{\circ} 35' 54.6036$  East of 3rd Floor Porta Vaga Mall, Session Road. These are the main sites where herbal plants are commonly sold by vendors in open areas, stalls, and along the side of the road where people pass and see their products.

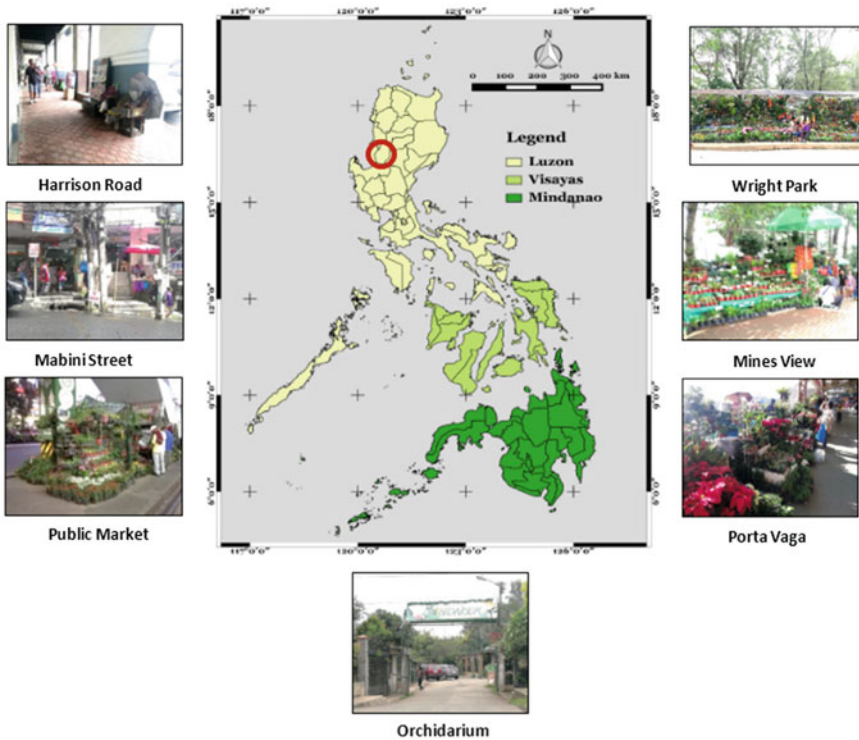


Fig. 6.1 Location map of the study area

## 6.2.2 *Data Collection*

The data was collected from June to September 2018 after ethical clearance (No. 2018–048) from SLU—Research Ethics Committee (Table 6.1). The researchers conducted a descriptive survey with prior informed consent and employed purposive sampling by interviewing all the local vendors in seven (7) study sites using field data sheet and semi-structured questionnaire based on the study by Thring and Weitz (2006).

Interviews were conducted in the local language. At least 20–30 min was allotted for the interview of each informant. The interview was carried out in a place where they were most comfortable. Various details regarding the medicinal plants were asked, such as local name, use, method of preparation, method of application, dosage, source, side effects, and storage conditions among others (Table 6.1).

## 6.2.3 *Collection and Identification of Plant Samples*

The researchers collected and bought each plant mentioned at the end of each interview to be used as a voucher specimen. Initially, plants were labelled with their local and scientific name, contained in polyethylene plastic zipper bags and transported to the laboratory using a clean dry basket before being deposited as voucher specimens at the Fr. Braeckman Museum of Natural History at Saint Louis University.

Plants were identified through using keys, online plant databases, pictorial floras, plant dictionaries, and taxonomic references (ASEAN Tropical Plant Database 2005; Brown 1960; Castro 2006; Cullen 1997; Kew Royal Botanic Gardens 2013; La Frankie 2010; Madulid 2001, 2002; Merrill 1912; Plants of Southeast Asia 2018; Pelsler et al. 2011 onwards; Taiwan Plant Names-Flora of Taiwan and China 2013; Tropicos 2013; United States Department of Agriculture (USDA) Natural Resource Conservation Service 2013; Verheij and Coronel 1991). Verification of plant ID was done by comparing the plant specimens to online and actual herbaria and through consultation with local plant experts and botanists.

## 6.2.4 *Data Analysis and Validation*

Data was grouped into various use categories based on health problems identified and was summarised in a table form. The most common ailments were recorded along with the plants used to treat them. A corresponding numerical code was assigned to the responses given for each question.

The ‘use-value’ was calculated using a method by Cotton (1996) and Phillips and Gentry (1993) as cited in Thring and Weitz (2006) in order to identify which among the plants mentioned was commonly used and sold for each ailment or health

**Table 6.1** Demographic profile of the interviewed respondents in the seven study sites in Baguio city

Study site	No. of respondents	Average age				Gender		Average years of selling medicinal plants				Source of knowledge				
		16–25	26–45	46–up		M	F	1–10	11–20	21–30	31–up	Suppliers	Physicians	Family/relatives/friends	Own Experience	Internet/books
Harrison Road	5			5			5	2		1	2			✓	✓	✓
Mabini Street	6		2	4		1	5	3	1	1	1			✓	✓	✓
Mines View	16	6	8	2	2	2	14	15			1	✓	✓	✓	✓	✓
Orchidarium	6	2		4	1	5	3	3	1		2			✓	✓	✓
Porta Vaga	2		1	1		2	2	2						✓	✓	✓
Public Market	3			3		3	3	2	1					✓	✓	✓
Wright Park	4	1	2	1		4	4	3		1				✓	✓	✓

M—Male, F—Female

problem. The use values were calculated using the equation:

$$UV_s = \sum \frac{UV_{I_s}}{I_s}$$

where  $UV_s$  is the overall use of species (S),  $UV_{I_s}$  is the mean number of all uses of a given plant species (S) as determined by informant (I), and  $I_s$  is the total number of informants interviewed for species (S). Every plant species mentioned by an informant within one-use category was counted as one-use-report.

This index value has taken into account the spread of use for each species and versatility. The theoretical maximum value of the index is the total number of the different use categories.

Meanwhile, to measure the use value or importance of families ( $UV_f$ ), the UV of the species from each family was added (Pardo-de Santayana et al. 2007). The highest  $UV_s/UV_f$  confirmed the most widely used and hence, most important medicinal plant species/family for a given category of usage, while the plant with the lowest  $UV_s/UV_f$  indicated that it is least used or of minimum importance.

The ranking of plant species and families were based on the overall use value or significance of each plant and family arranged from highest to lowest using the total UV of each plant (sum total of  $UV_s$  in all use category) and computation of  $UV_f$  for each family.

Finally, verification of uses was done by supporting them with published studies.

## 6.3 Results and Discussion

### 6.3.1 Medicinal Plants Sold by Vendors

A total of 59 species belonging to 52 genera and 29 families were recorded to treat various ailments and diseases (see Table 6.2 and Fig. 6.2).

**Table 6.2** Medicinal plants sold in Baguio City, their scientific classification, part/s used, selling place, uses, mode of preparation and application, dosage, use value, and literature cited

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Acorus calamus</i> (L.)	Araceae	Lubigam/Bengaw	01	S	Mab	Arthritis, Dizziness, Flu, Gastritis, Muscle Spasms	Boil	Drink, Inhale (Dizziness)	3 × a day	0.17	Arthritis (Singh et al. 2011)
<i>Allium odorum</i> (L.)	Alliaceae	Kutsay	02	L	Orc	Lumps	Fresh (Crush)	Poultice	As needed	0.02	
<i>Aloe vera</i> (L.) Burm.f	Asphodelaceae	Aloe vera	03	L	Min, Orc, Por, Pub, Wri,	Burns, Cancer, Dandruff, Hair fall, Indigestion, Inflammation, Skin Problems, Wounds	Fresh	Poultice	4–5 × a day	0.29	Burns, Cancer, Dandruff, Inflammation, Skin Problems (Imran Qadir 2009) Hair fall (Jadhav et al. 2009) Wounds (Joshi et al. 2011)
<i>Astonia scholaris</i> (L.)	Apocynaceae	Dalipawen	04	B	Har, Mab	Constipation, Diarrhoea, Gastritis, Stomachache, Ulcer, Vomiting	Fresh (Powdered)	Drink with water	2 × a day	0.17	Constipation (Ashok Kumar et al. 2014) Diarrhoea (Shah et al. 2010) Ulcer (Meena et al. 2011)
<i>Andrographis paniculata</i> (Burm. f.) Nees	Acanthaceae	Serpentina	05	L	Min, Por	Cancer, Diabetes, Leukaemia, UTI	Boil	Drink/Chew/Eat	3 × a day	0.21	Cancer (Desai et al. 2008) Diabetes (Hossain et al. 2014) Leukaemia (Cheung et al. 2005) UTI (Sahare et al. 2014)

(continued)



Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Angelica keiskei</i> (Miq.) Koidz	Apiaceae	Ashitaba	06	L	Min, Por, Orc	Anaemia, Cancer, Cough, Diabetes, Dysmenorrhea, Food Poisoning, Gall Stones, Heartburn, High Blood Pressure, High Cholesterol, Indigestion, Insomnia, Kidney Problems, Lumps, Ulcer, UTI	Boil/Fresh	Drink/Chew	2-3 × a day	1.05	Anaemia, Cancer, High Cholesterol (Lee et al. 2018) Cough, Gall Stones (De la Pena 2018) Diabetes (Enoki et al. 2007) High Blood Pressure (Shimizu et al. 1999) Indigestion (Lee 2013)
<i>Anisomelis indica</i> (L.) Kuntze	Lamiaceae	Catnip	07	L	Min	Hyperacidity	Boil	Drink	3 × a day	0.02	
<i>Annona muricata</i> (L.)	Annonaceae	Guyabano	08	L	Har	Cancer, Cyst, UTI	Boil	Drink	3 × a day	0.12	Cancer (Najmuddin et al. 2016) UTI (Oyedéji et al. 2015)
<i>Annona reticulata</i> (L.)	Annonaceae	Anunas	09	L	Har	Fever	Boil	Bathe	3 × a day	0.02	(Jamkhande and Wattamwar 2015)
<i>Annona squamosa</i> (L.)	Annonaceae	Atis	10	S	Har	Muscle Spasms	Boil	Bathe	1 × a day	0.02	

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Apium graveolens</i> (L.)	Apiaceae	Celery	11	L	Min	Inflammation, Memory Loss	Fresh (Inflammation), Boil (Memory Loss)	Chew (Inflammation), Drink (Memory Loss)	As needed	0.05	Inflammation (Mencerini et al. 2007) Memory Loss (Gutierrez et al. 2014)
<i>Arcangelisia flava</i> (L.) Merr	Menispermaceae	Albotra	12	B	Har, Mab	Dysmenorrhea, Stomachache, Ulcer	Boil	Drink	3 × a day	0.10	Stomachache (Rubite et al. 2002) Ulcer (Carag and Buot 2017)
<i>Artemisia dracunculidis</i> (L.)	Asteraceae	Tarragon	13	L	Min, Orc, Por, Wri	Arthritis, Cough, Gastritis, Indigestion, Menstruation, Toothache, UTI	Boil	Drink	1 × a day	0.40	Arthritis (Eisenman and Struwe 2011) Gastritis (Maham et al. 2013) Menstruation (Lamian et al. 2017) Indigestion (Mir et al. 2012) Toothache (Haghi et al. 2010)
<i>Artemisia vulgaris</i> (L.)	Asteraceae	Erbaka	14	W/L	Har, Min, Orc	Dysmenorrhea, Hairfall, Menstruation	Boil	Drink	3 × a day	0.12	Dysmenorrhea (Sujatha et al. 2013) Menstruation (Lee et al. 2000)

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Blumea balsamifera</i> (L.) DC	Asteraceae	Subsub/Sambong	15	L	Har, Mab	Cough, Fever, Flu, Kidney Problems	Boil	Drink	2 × a day	0.10	Cough, Fever, Flu (Bhuyan et al. 2010) Kidney Problems (Montelegre and De Leon 2016)
<i>Bryophyllum pinnatum</i> (Lam.) Kurz	Crassulaceae	Katakataka	16	L	Wri	Lumps	Boil	Poultice	As needed	0.02	Lumps (Balimado and Chan 2017)
<i>Cassia alata</i> (L.)	Caesalpinaceae	Akapulko	17	L	Orc	Eczema	Boil	Poultice	As needed	0.02	Eczema (Gaddam et al. 2014)
<i>Centella asiatica</i> (L.) Domin	Apiaceae	Gotu kola	18	L	Min, Por, Orc	Diabetes, Epilepsy, High Blood Pressure, Memory Loss	Boil	Drink	3 × a day	0.21	Diabetes (Chauhan et al. 2010) Epilepsy (Viveswari et al. 2010) High Blood Pressure (Kishmaiah et al. 2009) Memory Loss (Hemamalini 2016)
<i>Cinnamomum verum</i> (J. Presl)	Lauraceae	Cinnamon	19	B	Har	Insomnia, Leukaemia	Boil	Drink	3 × a day	0.05	Insomnia (Ghadri et al. 2018) Leukaemia (Assadollahi et al. 2015)
<i>Cleistanthus javanicum</i> Blume	Euphorbiaceae	Sarigaw	20	S	Mab	Constipation	Fresh (Peel)	Drink	1 × a day	0.02	Constipation (Sanscera et al. 2016)

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Coriandrum sativum</i> (L.)	Apiaceae	Kulantro	21	S	Mab	Chickenpox, Measles	Boil	Bathe	1 × a day	0.05	Chicken pox (Ragragio et al. 2013) Measles (Kumar et al. 2011b)
<i>Costus</i> sp. (L.)	Costaceae	Insulin Plant	22	L	Por, Wri	Diabetes	Boil	Drink	3 × a day	0.05	Diabetes (Talasila et al. 2014)
<i>Cymbopogon citratus</i> (D.C) Stapf	Poaceae	Lemon Grass	24	R	Har	Insomnia, UTI	Boil	Drink	3 × a day	0.05	Insomnia (Guzman-Gutierrez et al. 2009) UTI (Pereira et al. 2004)
<i>Cymbopogon winterianus</i> Jowitt ex Bor	Poaceae	Citronella	25	L	Orc	Heart Disease, High Blood Pressure	Boil	Drink	3 × a day	0.05	High Blood Pressure (Córtes De Menezes et al. 2010)
<i>Drimys piperita</i> Hook.f	Winteraceae	Sapal	26	S	Mab	Stomachache	Boil	Drink	3–5 × a day	0.02	Stomachache (Plandio and Villaseñor 2004)
<i>Eluexine indica</i> (L.) Gaertn	Poaceae	Paragis	27	L	Har	UTI	Boil	Drink	3 × a day	0.02	UTI (Desai et al. 2017)
<i>Entada phaseoloides</i> (L.) Merr	Fabaceae	Gugu	28	B	Mab	Hair fall	Fresh (Mix with water)	Bathe	3 × a day	0.02	

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Equisetum ramosissimum</i> Desf	Equisetaceae	Horse tail	29	W/S/L	Har, Mab, Min, Wri	Arthritis, High Cholesterol, Kidney Problems, UTI	Boil	Drink	3 × a day	0.12	Arthritis, Kidney Problems (Dedy et al. 2016) UTI (Radiojevic et al. 2012)
<i>Eucalyptus globulus</i> Labill	Myrtaceae	Eucalyptus	30	L	Har	Fever, Flu	Boil	Drink	3 × a day	0.05	Fever (Bachir and Benali 2012) Flu (Vimalanathan and Hudson 2014)
<i>Euphorbia hirta</i> (L.)	Euphorbiaceae	Tawa tawa	31	S/L	Har, Orc	Dengue	Boil	Drink	3 × a day	0.12	Dengue (Perera et al. 2018)
<i>Goniothalamus amuyon</i> (Blco.) Merr	Annonaceae	Sagyat	32	Sd	Har	Arthritis	Fresh (Soak)	Poultice	3 × a day	0.02	Arthritis (Aslam et al. 2016)
<i>Gynura procumbens</i> (Lour.) Merr	Asteraceae	Gynura	23	L	Orc	High Blood Pressure, High Cholesterol	Fresh	Eat	3 × a day	0.05	High Blood Pressure (Tan et al. 2016) High Cholesterol (Hew et al. 2013)
<i>Hibiscus rosa-sinensis</i> (L.)	Malvaceae	Gumamela	33	F	Pub	Boils	Fresh (Crush)	Poultice	3 × a day	0.02	
<i>Lagerstroemia speciosa</i> (L.)	Lythraceae	Banaba	34	L	Har, Mab	Heart Disease, High Cholesterol, Kidney Problems, UTI	Boil	Drink	3 × a day	0.24	Heart Disease, Kidney Problems (Chowdhury et al. 2017) UTI (Laruan et al. 2013)

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Lavandula anustifolia</i> Mill	Lamiaceae/Labiatae	Lavander	35	L	Min, Orc, Por, Wri	Fever, Goitre, Inflammation, Insect bites, Insomnia	Boil	Drink	3 × a day	0.31	Fever (Zhao et al. 2015) Insomnia (Bakhsha et al. 2014)
<i>Melissa officinalis</i> (L.)	Lamiaceae	Lemon balm	36	L	Wri	Cough	Boil	Drink	As needed	0.02	Cough (Sultana et al. 2016)
<i>Mentha arguta</i> Opiz	Lamiaceae	Peppermint	37	L	Min, Orc, Por, Pub, Wri	Bad breath, Cancer, Colds, Cough, Diarrhoea, Dysmenorrhea, Gastritis, Headache, Heartburn, High Blood Pressure, High Cholesterol, Indigestion, Lumps, Stomachache, Vomiting	Boil	Drink	3 × a day	0.67	Bad Breath, Diarrhoea, Dysmenorrhea (Thawkar et al. 2016) Cough, Colds, Indigestion (Mekonnen et al. 2015) Headache, Vomiting (Biswas et al. 2014)
<i>Mentha spicata</i> (L.)	Lamiaceae	Spearmint	38	L	Min	Colds, Cough	Fresh (Mix with water)	Drink	1 × a day	0.05	Cough, Colds (Kakati et al. 2016)
<i>Mentha x piperita</i> f. 'Citrata' 'Chocolate'	Lamiaceae	Chocolate mint	39	L	Orc	Cough	Boil	Drink	As needed	0.02	

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Ocimum basilicum</i> (L.)	Lamiaceae	Basil	40	L/S	Har, Por, Pub	Colds, Cough, Fever, Inflammation, Memory Loss, Skin Problems, Stomachache	Boil	Drink/Eat/Bathe	3 × a day	0.21	Cold, Cough, Fever, Skin Problems (Dev et al. 2011) Kidney Problems (Rattanachai-kunso-pon and Phumkhachorn 2010) Inflammation (Okoye et al. 2014) Memory Loss (Sarahroodi et al. 2013) Stomachache (Ojo et al. 2012)
<i>Parameeria laevigata</i> (Juss.) Moldenke	Apocynaceae	Lupitit	41	S/B	Har, Mab	Arthritis, Blocked Blood Vessels, High Cholesterol, Sprain, Wounds	Boil	Drink	3 × a day	0.29	High Cholesterol, Wounds (Pratiwi et al. 2015)
<i>Passiflora ligularis</i> A. Juss	Passifloraceae	Passion flower	42	L	Orc	Diarrhoea, Insomnia	Boil	Drink	As needed	0.05	Diarrhoea, Insomnia (Patil et al. 2013)
<i>Pelargonium graveolens</i> Ait	Geraniaceae	Malvarosa	43	L	Orc	Cancer, Cough, Heart Disease	Boil	Drink	As needed	0.07	Cancer, Heart Disease (Hamidpour et al. 2017) Cough (Kumar et al. 2012)
<i>Petroselinum crispum</i> (Mill.) Fuss	Apiaceae	Parsley	44	S	Min, Orc, Por, Pub	Kidney Problems, UTI	Boil/Fresh	Drink/Eat	3 × a day	0.12	Kidney Problems (Karimi et al. 2017)

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Piptosporum mouluccanum</i> (Lam.) Miq	Pittosporaceae	Dail	45	S/L	Har, Mab	Diarrhoea, Stomachache	Fresh (Mix with water)	Drink	2 × a day	0.07	
<i>Plectranthus amboinicus</i> (Lour.) Spreng	Lamiaceae	Oregano	46	L	Orc, Wri,	Asthma, Cough, Fever	Boil	Drink	3 × a day	0.17	Asthma, Cough, Fever (Arumugam et al. 2016)
<i>Portulaca oleracea</i> (L.)	Portulacaceae	Purslain	47	L	Orc	Appendicitis	Boil	Drink/Eat	As needed	0.02	Appendicitis (Lei et al. 2015)
<i>Rosmarinus officinalis</i> (L.)	Lamiaceae	Rosemary	48	L/S	Har, Min, Por, Pub, Wri	Blocked Blood Vessels, Cancer, Colds, Cough, Dengue, Hair fall, Headache, Heartburn, High Blood Pressure, Indigestion, Memory Loss, Toothache	Boil	Eat/Drink	3 × a day	0.62	Cough, Colds, Memory Loss, High Blood Pressure (Satyal et al. 2017)
<i>Salvia officinalis</i> (L.)	Lamiaceae	Sage	49	L	Orc, Pub	Bad Breath, Inflammation, Skin Problems	Boil	Bathe	1 × a day	0.07	Inflammation (Abu-Darwish et al. 2013) Skin Problems (Dawid-Pac 2013)
<i>Selaginella tamariscina</i> (Beauv.) Spring	Selaginellaceae	Kayumkom	50	W	Har, Mab	Haemorrhoids, Infertility (Women)	Boil	Drink/Bathe	3 × a day	0.05	Haemorrhoids (Setyawan 2009)

(continued)



Table 6.2 (continued)

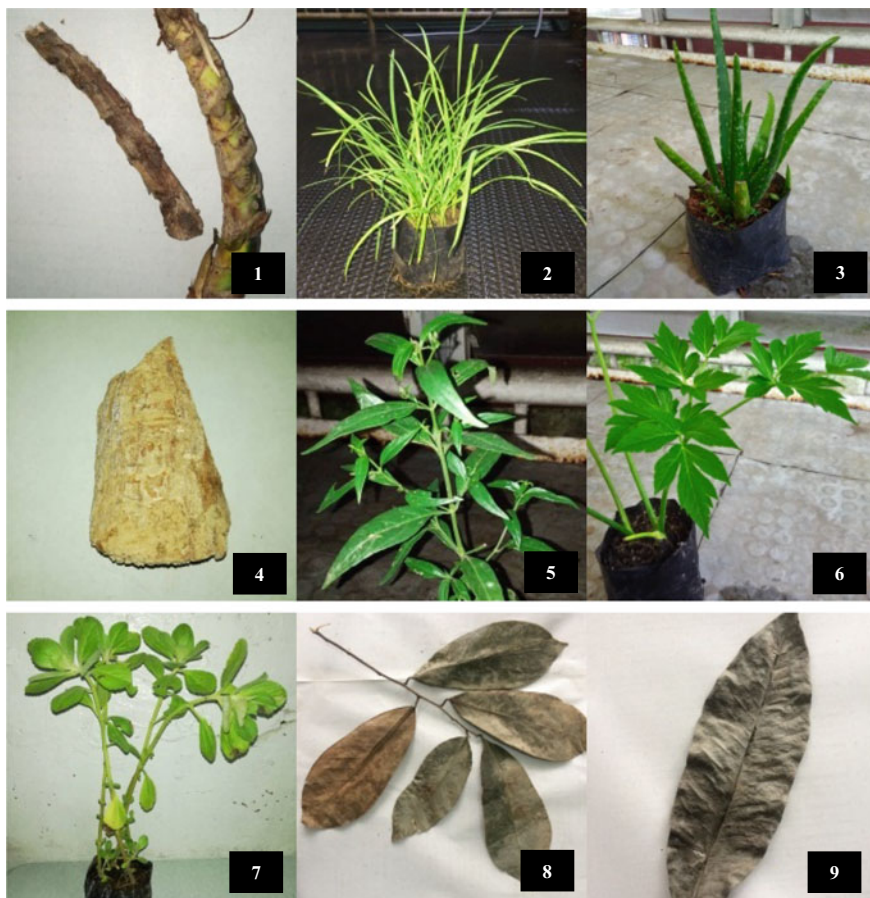
Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Stevia rebaudiana</i> (Bertoni) Bertoni	Asteraceae	Stevia	51	L	Min, Orc, Pub, Wri	Diabetes, Diarrhoea, Inflammation, Kidney Problems, Wounds	Boil/Fresh (Grind)	Drink	5 or more leaves a day	0.48	Diabetes (Lenus-Mondaca et al. 2012) Inflammation (Jeong and Holden 2010) Kidney Problems (Rizwan et al. 2018) Wounds (Babakhanyan et al. 2017)
<i>Swietenia mahogany</i> Jacq	Meliaceae	Mahogany	52	Sd	Har, Min	Arthritis, Constipation, Cough, Diabetes, Goitre, High Blood Pressure, Toothache	Boil	Drink/Chew	3 × a day	0.43	Cough (Bhurat et al. 2011) Diabetes (De et al. 2011) High Blood Pressure (Jawi et al. 2017) Toothache (Panda et al. 2010)
<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Duhat	53	B	Har	Diabetes	Boil/Fresh (Chop)	Drink	3 × a day	0.02	Diabetes (Schosler et al. 2004)
<i>Tagetes erectas</i> (L.)	Asteraceae	Marrigold	54	L	Wri	Allergies	Fresh	Poultice	As needed	0.02	Allergies (Vlahovic 2008)
<i>Taraxacum officinale</i> Web	Asteraceae	Dandelion	55	L	Orc	Gall Stones	Fresh (Grind)	Drink	As needed	0.02	Gall Stones (Wirngo et al. 2016)
<i>Thymus sp.</i> (L.)	Lamiaceae	Thyme	56	L	Min, Orc, Pub	Asthma, Cough, Dengue	Boil/Fresh	Drink/Eat	As needed	0.10	Asthma, Cough (Dauquan and Abdullah 2017) Dengue (Bouguerra et al. 2017)

(continued)

Table 6.2 (continued)

Scientific name	Family	Common name	Voucher No	Part/s Used	Selling Place	Medicinal use/conditions treated	Mode of preparation	Mode of administration	Dosage	Use value	References
<i>Tinospora crispa</i> (L.) Hook.f. & Thoms	Menispermaceae	Makabuhay	57	S	Har, Mab	Arthritis, Constipation, Cough, Diabetes, Goitre, High Blood Pressure, Malaria, Skin Problems, Toothache, Varicose Veins	Boil	Drink	2 × a day	0.33	Arthritis, Diabetes, High Blood Pressure, Malaria, Skin Problems (Ahmad et al. 2016) Cough, Toothache (Hamid 2013)
<i>Vitex trifolia</i> (L.)	Verbanaceae	Dangla	58	L	Har, Mab	Cough, Flu	Boil	Drink	3 × a day	0.10	Cough (Punjani and Kumar 2002) Flu (Mustarichie et al. 2016)
<i>Vitex negundo</i> (L.)	Verbanaceae	Lagundi	59	L	Har, Mab, Orc	Cough, Flu	Boil	Drink	3 × a day	0.07	Cough (Punjani and Kumar 2002) Flu (Vishwanathan and Basavaraju 2010)

Legend L-Leaves; S-Stem; Sd-Seeds; B-Bark; F-Flower; R-Roots; W-Whole Plant; Orc-Orchidarium; Har-Harrison; Mab-Mabini; Min-Mines View; Por-Porta Vaga; Pub-Public Market; Wri-Wright Park



◀**Fig. 6.2** Medicinal plants sold by vendors in Baguio City. 1. *Acorus calamus* (L.) (lubigan), 2. *Allium odorum* (L.) (kutsay), 3. *Aloe vera* (L.) Burm.f. (aloe vera), 4. *Alstonia scholaris* (L.) (dalipawen), 5. *Andrographis paniculata* (Burm. f.) Nees (serpentina), 6. *Angelica keiskei* (Miq.) Koidz. (ashitaba), 7. *Anisomeles indica* (L.) Kuntze (catnip), 8. *Annona muricata* (L.) (guyabano), 9. *Annona reticulata* (L.) (anunas), 10. *Annona squamosa* (L.) (atis), 11. *Apium graveolens* (L.) (celery), 12. *Arcangelisia flava* (L.) Merr. (albotra), 13. *Artemisia dracuncululus* (L.) (tarragon), 14. *Artemisia vulgaris* (L.) (erbaka/damong maria), 15. *Blumea balsamifera* (L.) DC. (subsub), 16. *Bryophyllum pinnatum* (Lam.) Kurz(katakataka), 17. *Cassia alata* (L.) (akapulko), 18. *Centenella tussilagifolia* (Baker) Domin (gotu kola), 19. *Cinnamomum verum* (J Presl) (cinnamon), 20. *Cleidion javanicum* Blume (sarigaw), 21. *Coriandrum sativum* (L.) (kulantro), 22. *Costus sp.* (L.) (insulin plant), 23. *Gynuraprocarbena* (Lour.) Merr. (gynura), 24. *Cymbopogon citratus* (DC.) Stapf. (lemon grass), 25. *Cymbopogon winterianus* Jowitt ex Bor (citronella), 26. *Drimys piperita* Hook.f. (sapal), 27. *Eleusine indica* (L.) Gaertn. (paragis), 28. *Entada phaseoloides* (L.) Merr. (gugu), 29. *Equisetum ramosissimum* Desf. (horsetail), 30. *Eucalyptus globulus* Labill (eucalyptus), 31. *Euphorbia hirta* (L.) (tawa-tawa), 32. *Goniothalamus amuyon* (Blco.) Merr. (sagay), 33. *Hibiscus rosa-sinensis* (L.) (gumamela), 34. *Lagerstroemia speciosa* (L.) (banaba), 35. *Lavandula angustifolia* Mill. (lavender), 36. *Melissa officinalis* (L.) (lemon balm), 37. *Mentha arguta* Opiz (peppermint), 38. *Mentha spicata* (L.) (spearmint), 39. *Mentha x piperita* f. *citrata* 'Chocolate' (chocomint), 40. *Ocimum basilicum* (L.) (basil), 41. *Parameria laevigata* (Juss.) Moldenke(lupiit), 42. *Passiflora ligularis* A. Juss(passion), 43. *Pelargonium graveolens* Ait. (malvarosa), 44. *Petroselinum crispum* (Mill.) Fuss. (parsley), 45. *Pitosporum moluccanum* (Lam.) Miq. (dail), 46. *Plectranthus amboinicus* (Lour.) Spreng. (oregano), 47. *Portulaca oleracea* (L.) (purselane), 48. *Rosmarinus officinalis* (L.) (rosemary), 49. *Salvia officinalis* (L.) (sage), 50. *Selaginella tamariscina* (Beauv.) Spring, 51. *Stevia rebaudiana* (Bertoni) Bertoni (stevia), 52. *Swietenia mahogani* Jacq (mahogany), 53. *Syzygium cumini* (L.) Skeels (duhat), 54. *Tagetes erecta* (L.) (marigold), 55. *Taraxacum officinale* Web. (dandelion), 56. *Thymus sp.* (L.) (thyme), 57. *Tinospora crispa* (L.) Hook.f. & Thoms (makabuhay), 58. *Vitex trifolia* (L.) (dangla), 59. *Vitex negundo* (L.) (lagundi)



Fig. 6.2 (continued)

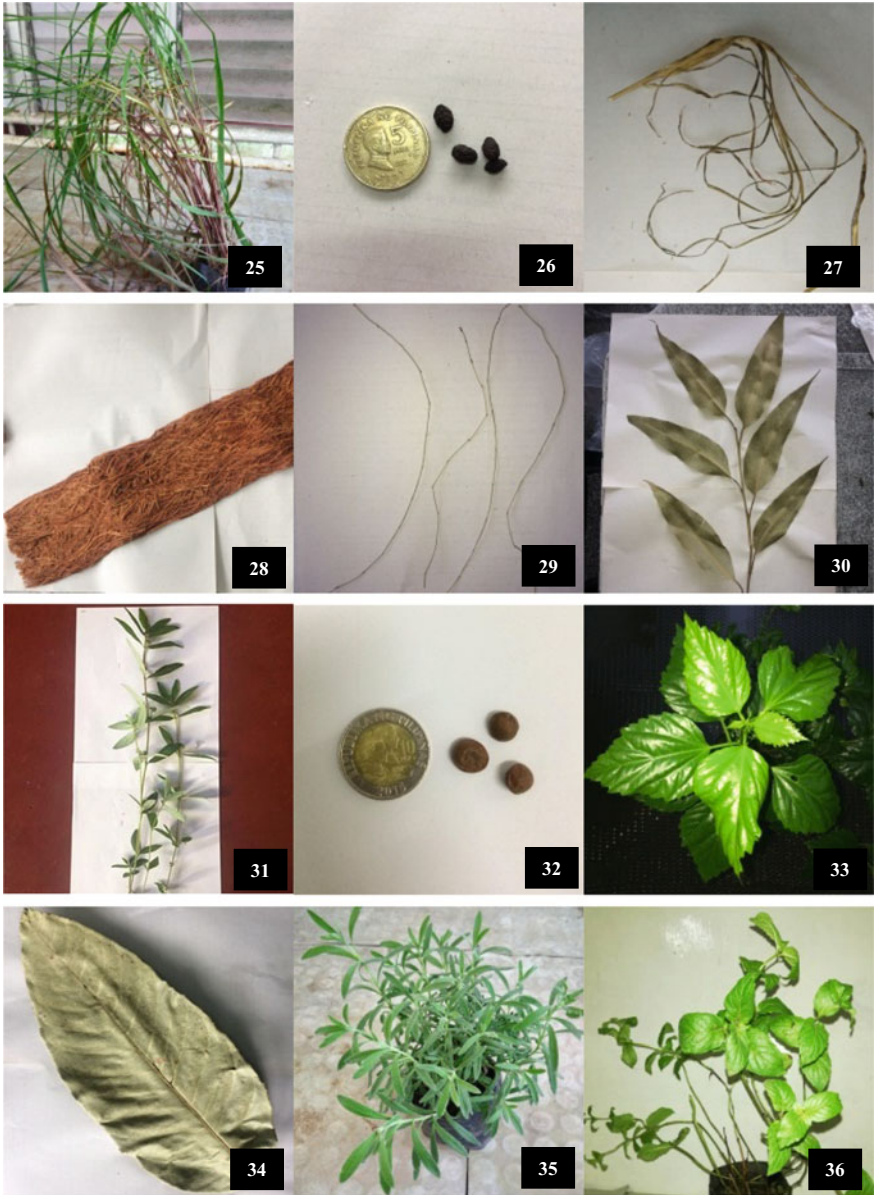


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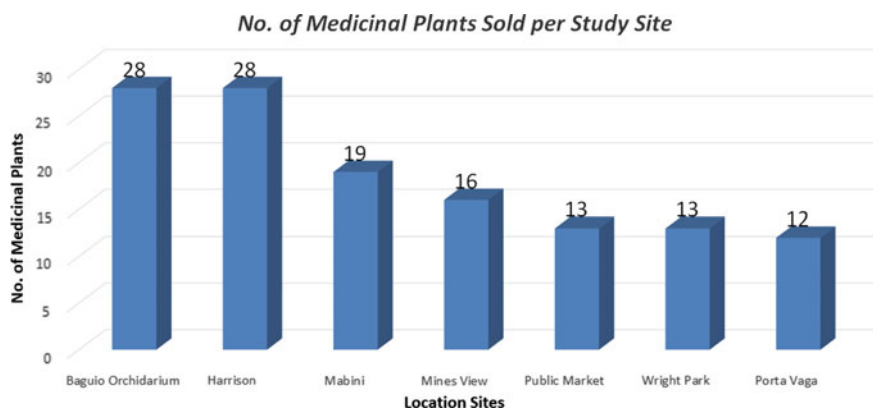


### 6.3.2 *Distribution of Medicinal Plants According to Selling Place*

The study sites with the highest number of medicinal species sold are Baguio Orchidarium and Harrison Road, with a total of 28 different medicinal species. They are followed by Mabini (19), Mines View (16), Public Market (13), Wright Park (13), and Porta Vaga (12) (Fig. 6.3). Based on the interviews conducted, the vendors from Baguio Orchidarium and Harrison Road acquire their medicinal plant products from various locations (e.g., Pangasinan, La Union, La Trinidad in Benguet, Ifugao, and Mountain Province), where most medicinal plants are cultivated and sold. In contrast, the other sites scour limited or very few sources (1–2 locations) resulting in less variety of medicinal plants sold.

According to Noorhosseini et al. (2017), the number of plants sold in an area is usually influenced by the number of diseases present. Usually, plants that are used to treat common diseases are the ones that are in demand in the market. Other factors that affect the number of medicinal plants sold at a certain place include the following: their availability (seasonal or readily available), price range, and effectiveness. Medicinal plants throughout the ages have not only proven their effectiveness in treating diseases but are also cheaper than medicines found in drugstores. In addition, the limited supply of medicinal plants, poor access to processed medicinal plants, lack of alternatives and spatial limitations, and uncertainty and lack of confidence of the consumers affect the number of medicinal plants sold in a place.

Currently, only ten (10) medicinal plants are approved and recommended by the Department of Health (DOH), namely *Cassia alata* (akapulko), *Momordica charantia* (ampalaya), *Allium sativum* (bawang), *Psidium guajava* (bayabas), *Vitex negundo* (lagundi), *Quisqualis indica* (niyog-niyogan), *Blumea balsamifera* (sambong), *Ehretia microphylla* (tsaang gubat), *Peperomia pellucida* (ulasimang bato or pansit-pansitan), and *Clinopodium douglasii* (yerba buena) (Veterans Regional



**Fig. 6.3** Number of medicinal plants sold per study site

Hospital 2015). Unfortunately, this number contributes to the decline in confidence among consumers and discourages them from using other medicinal plants.

Medicinal plants are highly distributed as products in markets and farming industries in the Philippines (De Vera-Ruiz 2018). One reason behind their high distribution is that the farmers feel motivated to cultivate medicinal plants since they provide cure for illnesses, act as substitute for health remedies, and at the same time generate substantial profit without being labour-intensive (Bolido 2017; PhilStar 2002). People also sell medicinal plants when their medical condition improves after using such plants as remedies for their illnesses (Polonio 2016).

### ***6.3.3 Common Ailments Treated by Medicinal Plants and Their Number***

In this study, among the various ailments that the plants are used for, cough is the most common ailment treated (Table 6.3). The Baguio Health Department (2017) lists Upper Respiratory Tract Infection as one of the leading causes of morbidity in Baguio city.

### ***6.3.4 Commonly Used Plant Parts, Mode of Preparation, and Administration***

Different parts of a plant, such as the roots, stem, bark, and flowers can be used in treating different ailments, but the leaves appear to be the most commonly used part, with a citation frequency of 76.95% (Fig. 6.4). Findings of this study are similar to several researches done in the Cordillera region (Ammakiw and Odiem 2013; Balangcod and Balangcod 2011, 2015; Doctor and Manuel 2014), wherein the leaves of the plant were also the most widely used part. According to Balangcod and Balangcod (2015), the leaves are always available and easy to gather and prepare. Moreover, active medicinal ingredients are found in leaves that are used for medicinal purposes (United States Department of Agriculture 2011).

The mode of preparation varies with the type of medicinal plant that is used (Fig. 6.5). In this study, decoction (boiling) is the most common method (69.57%). Decoction is considered to be the easiest approach to draw out active constituents. On top of that, it aids in ascertaining the dosage required to design the formula (Dharmananda 2015).

The modes of administration include drinking (80.37%), chewing (6.30%), poultice (5.56%), added to water for bathing (3.70%), eating (2.96%), and inhaling (1.11%) (Fig. 6.6). The dosage differs according to the type of plant that is used but mostly it is taken 3 times a day, as cited by the vendors and based on their experience.

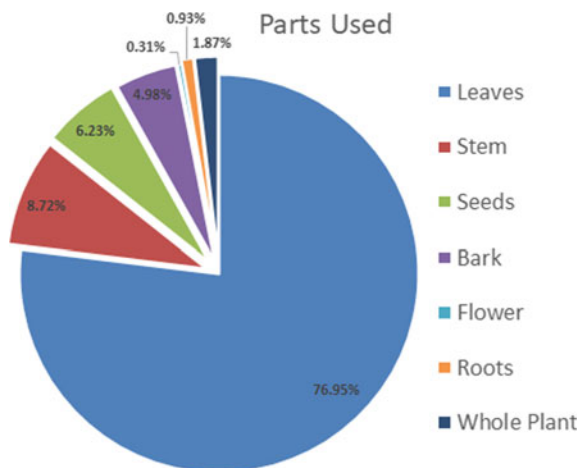
**Table 6.3** Total number of medicinal plants used for various health ailments

Health problem	No. of plants	Health problem	No. of plants	Health problem	No. of plants
Allergies	1	Dizziness	1	Insect Bites	1
Anaemia	1	Dysmenorrhea	4	Insomnia	5
Anti-acidic	1	Eczema	1	Kidney Problems	6
Appendicitis	1	Epilepsy	1	Leukaemia	2
Arthritis	7	Fever	6	Lumps	4
Asthma	2	Flu	5	Malaria	1
Bad Breath	2	Food Poisoning	1	Measles	1
Blocked Blood Vessels	2	Gall Stones	2	Memory Loss	4
Boils	1	Gastritis	4	Menstruation	2
Burns	1	Goitre	3	Muscle Spasms	2
Cancer	7	Hairfall	4	Skin Diseases	4
Chickenpox	1	Headache	2	Sprain	1
Colds	4	Heartburn	3	Stomachache	6
Constipation	4	Heart Disease	3	Toothache	4
Cough	16	Haemorrhoids	1	Ulcer	3
Cyst	1	High Blood Pressure	8	UTI	9
Dandruff	1	High Cholesterol	6	Vomiting	2
Dengue	3	Indigestion	5	Varicose Veins	1
Diabetes	8	Infertility (Women)	1	Wounds	3
Diarrhoea	5	Inflammation	6		

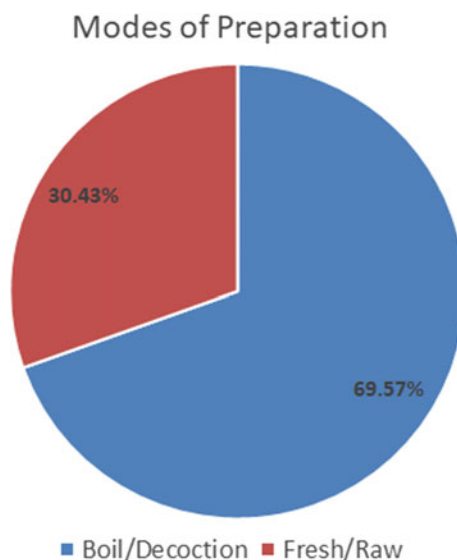
### 6.3.5 Medicinal Plant Families and Species with Their Corresponding Use Value

There are 29 families identified in this study (Fig. 6.7). The three major groups are Lamiaceae with 11 plant species, namely: *A. indica*, *L. angustifolia*, *M. officinalis*, *M. arguta*, *M. spicata*, *M. x piperita f. citrata*, *O. basilicum*, *P. amboinicus*, *R. officinalis*, *S. officinalis*, and *T. vulgaris*. They are followed by Asteraceae with 7 species: *A. dracunculus*, *A. vulgaris*, *B. balsifera*, *G. procumbens*, *S. rebaudiano*, *T. erecta*, and *T. officinale*. The last group is Apiaceae with 5 plant species: *A. graveolens*, *A. keiskei*, *C. sativum*, *C. tussilagifolia*, and *P. crispum*. This result is similar to studies such

**Fig. 6.4** Parts most commonly used

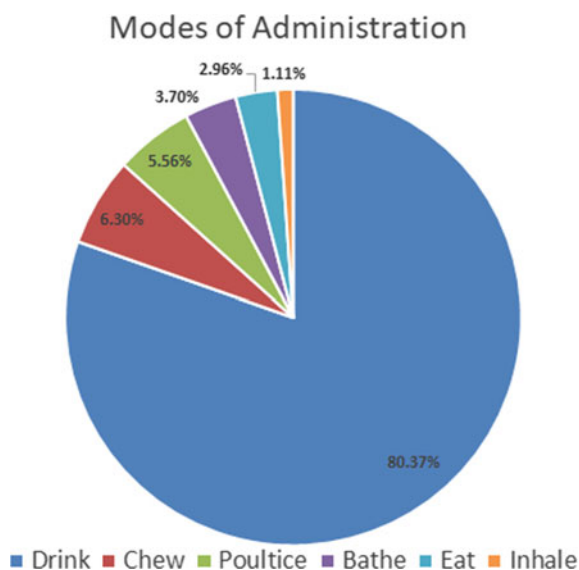


**Fig. 6.5** Modes of preparation



as Amjad et al. (2017) in Pakistan, Enyew et al. (2014) in Central Ethiopia, Uniyal et al. (2011), and Kumar et al. (2011a) in India, which have all cited Lamiaceae as the highest family and Asteraceae a close second in terms of their medicinal properties.

Based on the use value of each family (UVf), Lamiaceae is the most dominant family with a citation index of 2.26 followed by Apiaceae/Umbelliferae (1.48) and Asteraceae (1.19) (Fig. 6.8). In an ethnobotanical study conducted by Abalon and Del Prado (2013) in Albay, the Philippines, *Coleus aromaticus* (oregano) was cited to be one of the most commonly used medicinal plant belonging to the Lamiaceae family.



**Fig. 6.6** Modes of administration

In descending order, based on use value, the top ten commonly used medicinal plants used to treat different ailments include *Angelica keiskei* (1.05), *Mentha arguta* (0.67), *Rosmarinus officinalis* (0.62), *Stevia rebaudiana* (0.48), *Swietenia mahogani* (0.43), *Artemisia dracuncululus* (0.40), *Tinospora crispa* (0.33), *Lavandula angustifolia* (0.31), *Parameria laevigata* (0.29), and *Aloe vera* (0.29) (see Table 6.2).

*A. keiskei*, commonly known as Ashitaba, has the highest UVs among the 59 species of medicinal plants. Based on the data, it can be used to treat anaemia, cancer, cough, diabetes, dysmenorrhea, food poisoning, gall stones, heartburn, high blood pressure, high cholesterol, indigestion, and insomnia, among others.

In far-eastern countries, more than 60 species of the genus *Angelica* are commonly used as medicinal plants. It has been used by people for a long time and has become part of their ancient traditional medicine system. It is also used by western countries like Germany, the United States of America, and the United Kingdom. Common examples of the genus *Angelica* that have been used by people for centuries are *A. acutiloba*, *A. japonica*, and *A. glauca* which are used as anti-inflammatory, diuretic, expectorant, remedy for colds, flu, influenza, etc. (Sarker and Nahar 2004).

According to a census conducted by BHD in 2017, the top 10 causes of morbidity in Baguio City are hypertension (Top 1), followed by upper respiratory tract infections, pneumonia, dog bite, acute gastroenteritis or diarrhoea, systematic viral infections, influenza-like illnesses, asthma and dermatitis, diabetes mellitus, and urinary tract infection, in descending order. Plants such as *A. keiskei* (Shimizu et al. 1999), *S. mahogani* (Jawi et al. 2017), *T. crispa* (Praman et al. 2011), and *R. officinalis* (Cunha 2017) may be used to treat hypertension and decrease the rate of morbidity in the

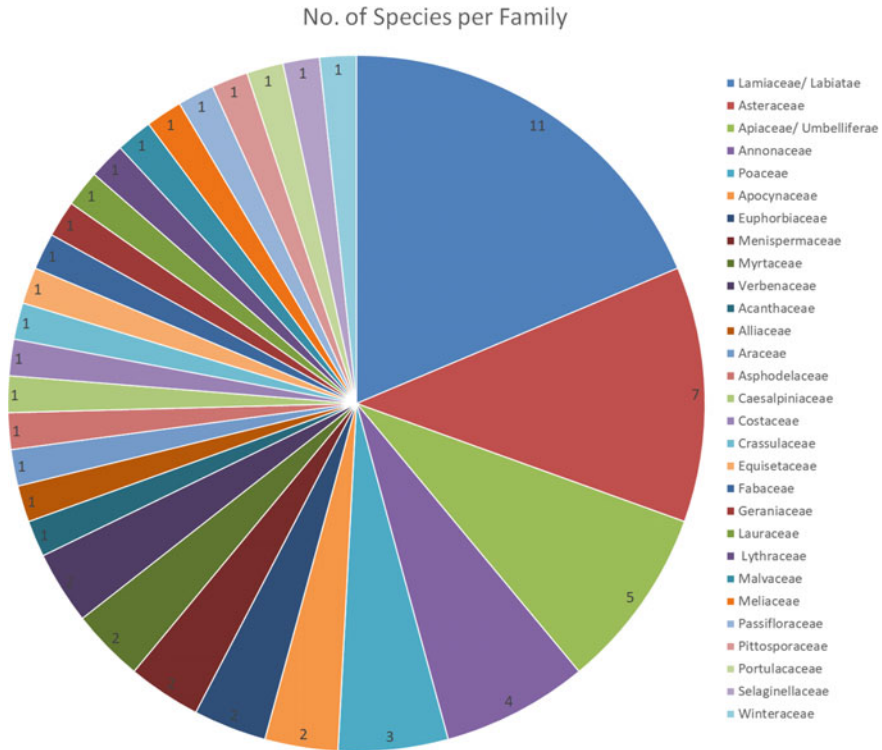


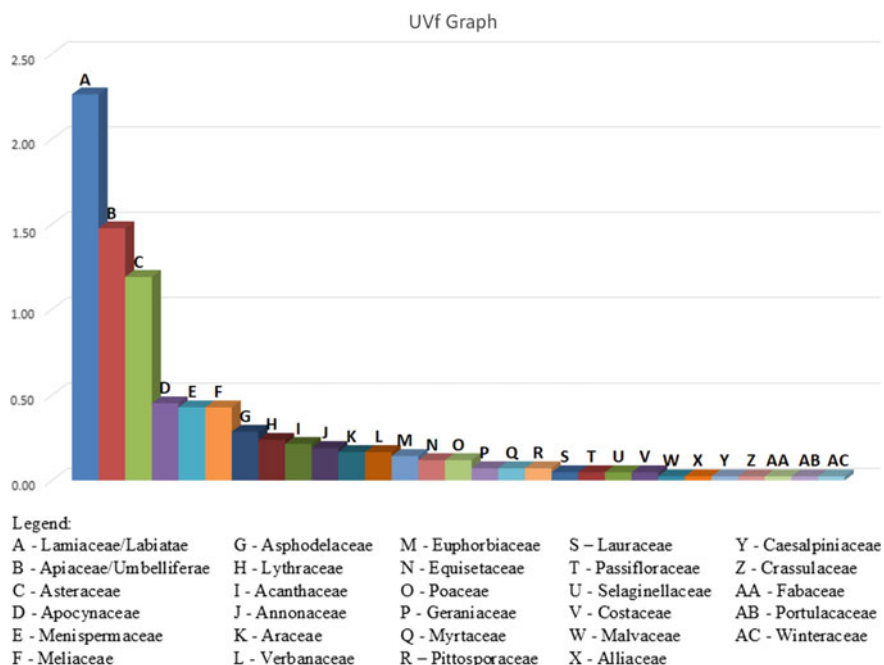
Fig. 6.7 Number of species per family

city. Other plants cited in this study may alleviate other health problems. Thus, these medicinal plants are beneficial in addressing the health problems in the city.

### 6.4 Conclusion and Recommendations

Despite access to modern medicine, herbal plants are still widely sold by vendors at the streets and markets of Baguio City. The medicinal plants are important in treating 59 health problems. Cough is the most common ailment treated. *Angelica keiskei* (Miq) Koidz is the most important medicinal plant that can treat anaemia, cancer, diabetes, high blood pressure, high cholesterol, among others. A majority of the medicinal plants belong to Lamiaceae, which makes it the most important plant family. Due to their abundance and availability, leaves are the most frequently used plant part, whereas decoction and drinking are the most common modes of preparation and administration respectively.

Findings of this study reveal that the vendors who sell plants are knowledgeable on the part/s used, method of preparation, and mode of use/application of the plants used



**Fig. 6.8** Total ranking value (UVf) for medicinal plant families

in traditional/herbal medicine. Thus, the selling of herbal plants not only promotes the utilisation of such plants in primary health care of the local residents of Baguio City but also provides economic value to the vendors.

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**Compliance with Ethical Standards** The authors declare that all the procedures performed in this study involving human participants were in accordance with the ethical standards of Saint Louis University—Research Ethics Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants involved in the study.

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**Conflict of Interest** The authors declare that they have no conflicts of interest.

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