Ethnobotanical study of medicinal plants used by local communities in Sekerak Subdistrict, Aceh Tamiang, Indonesia

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Abstract. Navia ZI, Suwardi AB, Baihaqi. 2021. Ethnobotanical study of medicinal plants used by local communities in Sekerak Subdistrict, Aceh Tamiang, Indonesia. Biodiversitas 22: 4273-4281. Local communities in Aceh Tamiang have gained a wealth of medicinal knowledge through practice and experience in their long-term battles with the disease. However, because of a lack of written records and rapid economic development, their traditional medicinal knowledge is under threat. This study investigated medicinal plants and related traditional knowledge of local communities in the Sekerak subdistrict, Aceh Taming District, Indonesia. Field surveys, plant collections, and interviews with communities were used in this study. The Snowball Sampling technique was used to select 60 informants for the interviews. A total of 46 medicinal plant species belonging to 40 genera and 26 families were used for medicinal purposes by local communities to treat 28 different diseases. The itch, swelling, cough, and nosebleed were the most commonly treated. With a use-value index of 0.98, Tagetes erecta was the most commonly used medicinal plant by local communities. In addition, local communities identified the leaf (90%) as the most widely used plant part and oral administration (65%) as the most common method of administering traditional medicine. Elders have more knowledge of medicinal plants than younger generations, indicating that traditional knowledge is eroding across generations. However, initiatives to promote and conserve medicinal plants must be improved, particularly among the younger generation. This is required to ensure the availability of medicinal plants and the preservation of traditional knowledge in the future.

Keywords: Aceh, biodiversity, medicine, Sekerak, traditional knowledge

INTRODUCTION

Most of the peoples around the world have used such medicinal plants to treat different types of diseases since ancient times (Qureshi et al. 2016). Currently, medicinal plants continue to capture the interest of modern medicine, particularly the pharmaceutical sector in the discovery of better drugs (Rivera et al. 2005). It is estimated that approximately 80% of the global population uses phytotherapy (Miraldi and Baini 2018). For centuries, medicinal plants have been used in rural areas and widely in urban areas in both developing and developed countries (Kidane et al. 2018; Hu et al. 2020; Elfrida et al. 2021; Pathy et al. 2021). According to the World Health Organization (WHO), herbal medicine is used by approximately 80% of the worldwide population for the health care system, particularly in rural areas (Hu et al. 2020). Leading to a lack of modern health facilities in developing countries, traditional medicines, therefore, provide an inexpensive source of primary health care (Aziz et al. 2018).

Medicinal plant use and the accumulated knowledge of traditional pharmacological practices are a rich cultural heritage that is an integral part of local traditions and culture, and they should be protected to ensure their long-term use. Several studies have addressed traditional knowledge and skills in medicinal plant use being lost or at risk of extinction (Pathy et al. 2021). They have identified the most important causes of medicinal plant species extinction as degradation, destruction of natural habitat, and young people’s lack of enthusiasm in traditional culture as a result of westernization, acculturation, and education (Yineger et al. 2008).

Over a long history, local communities in the Aceh Tamiang District, along with almost 80% of whom live in rural areas, have accumulated a wealth of folk medicinal knowledge and represented many experiences in treating common local diseases. Although the use of medicinal plants in Indonesia has been studied in different locations, particularly in Aceh province (Elfrida et al. 2020; Navia et al. 2020; Sutrisno et al. 2020; Suwardi et al. 2020; Navia et al. 2021), it was discovered that many of them were poorly described and neglected. In addition, traditional medicinal knowledge is threatened by a lack of written records and conservative inheritance behavior. Several studies have found that many young people worldwide are uninterested in traditional medicinal knowledge (Yineger et al. 2008; Merétika et al. 2010; Ianni et al. 2015; Bruschi et al. 2019; Weckmüller et al. 2019; Suwardi et al. 2021). As a result, study and documentation of medicinal plants and the associated indigenous knowledge are required. This study investigated medicinal plants and related traditional
knowledge of local communities in the Sekerak subdistrict, Aceh Taming, Indonesia.

MATERIALS AND METHODS

Study area
The study was conducted from May to August 2021 at Sekerak Subdistrict, Aceh Tamiang District, Aceh Province, Indonesia. The study area is in the Sekerak Kanan, Bandar Mahligai, and Lubuk Sidup villages (Figure 1). The Sekerak subdistrict is administratively part of the Aceh Tamiang district. This area is located at 04°15'31.00" - 04°23'39.00" N; 97°46'32.00" - 98°06'19.00" E; 200-500 m asl. The district has an area of 257.95 km² with 7,001 people consisting of 3517 men and 3484 women. Climatic conditions in the Sekerak subdistrict are tropical humid, and monthly temperature ranges from 26 to 30°C. Most people depend on agriculture, with rice, rubber, and oil palm as the primary product (Central Bureau of Statistics of Aceh Tamiang District 2021).

Data collection
A total of 60 respondents were selected using the snowball method (Pathy et al. 2021) and surveyed using semi-structured interviews (Table 1). The respondents were local inhabitants aged between 15 and 68 years old. Interviews and discussions were performed based on a checklist of questions prepared in Indonesian. Before each interview, prior informed consent was requested, and during the interview process, we followed international codes of ethics (International Society of Ethnobiology 2006). The local names of the plants, the disease treated by the plants, the plant parts used, the modes of preparation, and the routes of administration were carefully recorded during the interviews with the respondents.

Field observations were performed to identify the morphological features and habitats of each medicinal plant species. Voucher specimens of the local medicinal plants were collected from the home gardens. They were identified in the Laboratory of Biology, Samudra University, and confirmed according to botanical websites (http://www.plantsoftheworldonline.org/). For this study, voucher specimens were not deposited in the herbarium.

Data analysis
Use Value (UV)
Relative importance attached to a given medicinal plant species was calculated using UVs (medicinal use-value) parameter used by Evert et al. (2009):

\[ UV_s = \frac{\sum_{i=1}^{n} U_is}{ns} \]

Where: UVs is the use-value of a given species s; U is the number of uses of species s mentioned by respondent i; ns is the total number of respondents.

Table 1. The demographic structure of respondents

| Parameter       | Specification          | Freq. | Percentage |
|-----------------|------------------------|-------|------------|
| Gender          | Male                   | 21    | 35.0       |
|                 | Female                 | 39    | 65.0       |
| Age             | 15-25                  | 14    | 23.3       |
|                 | 26-35                  | 11    | 18.3       |
|                 | 36-45                  | 7     | 11.7       |
|                 | 46-55                  | 15    | 25.0       |
|                 | 56-65                  | 5     | 8.3        |
|                 | >65                    | 7     | 11.7       |
| Education       | None                   | 17    | 28.3       |
|                 | Elementary School      | 12    | 20.0       |
|                 | Junior High School     | 11    | 18.3       |
|                 | Senior High School     | 12    | 20.0       |
|                 | University             | 8     | 13.3       |
| Marital status  | Single                 | 14    | 23.3       |
|                 | Marriage               | 38    | 63.3       |
|                 | Widow                  | 8     | 13.3       |

Figure 1. Shows the site of the studied area. A. The map is showing the location of Aceh province, Indonesia, its neighboring provinces, B. The map is showing the location of Aceh Tamiang District. C. The map is highlighting the Sekerak subdistrict, and (●) showing the site of the study
Informant Agreement Ratio (IAR)

The Informant Agreement Ratio (IAR) was calculated following Nzuki et al. (2013):

\[
IAR = \frac{Nr - Na}{Nr - 1}
\]

Where: \(Nr\) is the total number of citations of the species and \(Na\) is the number of diseases treated by the species.

Informant Consensus Factor (ICF)

The informant consensus factor (ICF) was calculated to determine the effectiveness of the medicinal plants in each disease category according to Heinrich et al. (1998):

\[
ICF = \frac{Nur - Nt}{Nur - 1}
\]

Where: \(Nur\) is the number of individual reports of the plant used for a particular illness category and \(Nt\) is the total number of species used by all respondents for this illness category.

Fidelity Level (FL)

The fidelity level (FL) was calculated for each preferred species for their popularity according to the respondents who cited them in the treatment of a particular disease. The formula is provided below (Ugulu 2010):

\[
FL = \frac{I_p}{I_u} \times 100
\]

Where: \(I_p\) is the number of informants who suggested the use of a species for the same major purpose (therapeutic use) and \(I_u\) is the total number of respondents who mentioned the plant species for any use.

RESULTS AND DISCUSSION

Diversity of medicinal plants

From the study sites, 46 medicinal plant species belonging to 40 genera and 26 families were documented. Ethnomedicinal information for each species, including its family name, scientific name, vernacular name, growth form, plant parts used, preparation, application methods, and disease, are listed in Table 2.

Among the families that contributed more medicinal species were Zingiberaceae, represented by 6 species, followed by Rutaceae with 4 species, Euphorbiaceae, Piperaceae, and Rubiaceae with 3 species in each family, and the remaining families each with one or two species. Zingiberaceae is the dominant family found in the study area, which is consistent with reported of Jadid et al. (2020) in Ngadisari village, East Java. The use of the same plant species in different locations may be due to their cosmopolitan distribution, serve a specific purpose, or be attributed to traditional knowledge being a closely guarded secret (Tugume and Nyakoojo 2019).

Growth form and plant parts used

The results of growth form analysis revealed that shrub plants represent the highest proportion (16 species), followed by the tree (14 species), herbaceous (12 species), a climber (4 species), and shrub (1 species) (Figure 2).

The abundance of shrubs in the study area could explain the high usage of shrubs. These findings contradict Ani et al. (2021), who discovered that trees were the dominant species for herbal medicine in Ndano village, West Nusa Tenggara. According to respondents, shrubs are grown in home gardens due to their small size, and in addition to being medicinal plants, several species are used as food and ornamental plants. Plants are grown in home gardens in rural areas for various purposes, including food, medicine, ornamental plants, traditional ceremonies, and family income (Elfrida et al. 2020; Suwardi et al. 2020b; Sutrisno et al. 2021). The fact that cultivated plants are rich in bioactive compounds explains the high frequency of occurrence of medicinal plant species in home gardens. Harvesting from home gardens was stimulated by the need to have medicinal plant species close to residents to avoid long distances in their exploration of medicinal plant species in the wild (Tugume and Nyakoojo 2019).

Local communities in the study area use different plant parts to prepare traditional medicine (e.g., latex, leaf, stem, root, seed, bark, flower, and fruit) (Figure 3).

Leaf (50%) were the most commonly used plant part as an ethnomedicinal practice of the communities in the study area. This study is consistent with the studies reported by Tantengco et al. (2018) and Suwardi et al. (2021) that local communities have the most used leaves in ethnomedicinal practices compared to other parts of the plant. The leaves have been widely used in traditional medicine due to the presence of bioactive compounds other than parts of the plant (Ismail and Wan Ahmad 2019). During the fieldwork, respondents mentioned that leaves are also easy to gather and are the most abundant part of the plant. Furthermore, the use of plant parts as traditional medicine can offer protection and ensure the plant's long-term viability. Leaves are considered to synthesize a wide variety of secondary metabolites, including alkaloids, saponins, and phenolic compounds (Tantengco et al. 2018) that could be concerned for the pharmacological effects encountered by the local communities. Several plants are used as traditional medicine, such as Annona muricata, which is known to have diterpenoids, flavonoids, polyphenols, saponins, alkaloids, kaempferol, and acetogenin, which is antimalarial activity (Endale et al. 2013; Pimenta et al. 2014; Somsak et al. 2016). The application of A. muricata aqueous leaf extract in the treatment of malaria is known to have no toxic effect (Somsak et al. 2016).

Preparation and application methods

There are numerous different ways to prepare medicinal plants to treat human diseases. In the study area, the most common methods of preparation of traditional medicines from plant material were decoction (61%), followed by crushed (9%), and infusion (7%) (Figure 4).
| Family name    | Scientific name                                      | Vernacular name | Growth form | Parts used | Preparation    | Application methods | Disease                                                                 |
|----------------|------------------------------------------------------|-----------------|-------------|------------|----------------|---------------------|-------------------------------------------------------------------------|
| Acantthaceae   | Ruellia simplex C.Wright                           | Kencana biru    | S           | Le         | Decoction      | Oral                | Diabetes                                                             |
| Annonaceae     | Annona muricata L.                                 | Daun sirsak     | T           | Le         | Decoction      | Oral                | Breast cancer, fever, malaria, hypertension, wound, breast cancer     |
|                | Annona squamosa L.                                 | Srikaya         | T           | Le/Le      | Raw state, decoction | Oral                | Hypertension, stomachache, breast cancer                             |
| Asteraceae     | Tagetes erecta L.                                  | Tahi ayam       | S           | Le/Le      | Crushed, decoction | Oral                | Cough, indigestion, cold, diarrhea                                     |
| Brassicaceae   | Ageratum conyzoides L.                             | Bandotan        | H           | Le         | Crushed        | Friction            | Itch                                                                  |
| Bromeliaceae   | Ananas comosus (L.) Merr.                          | Nenas           | H           | Fr         | Infusion       | Oral                | Gout arthritis                                                       |
| Campanulaceae  | Hippobroma longiflora (L.) G.Don                   | Bunga katarak   | H           | Fw         | Infusion       | Oral                | Gout arthritis                                                       |
| Euphorbiaceae  | Aleurites moluccanus (L.) Willd.                   | Kemiri          | T           | Fr         | Decoction      | Gargle              | Toothache                                                            |
|                | Jatropha circas L.                                 | Daun jarak      | S           | Fr         | Decoction      | Oral, gargle        | Indigestion, sprue, toothache                                        |
|                | Jatropha multifida L.                              | Daun betadine   | S           | Lt         | Extracted      | Smearing            | Skin burn, sprue                                                     |
| Fabaceae       | Archidendron pacificorum (Benth.) I.C. Nielsen     | Jengkol         | T           | Ro         | Decoction      | Oral                | Diabetes                                                             |
| Lamiaceae      | Senna acantha (Griseb.) H.S.Irwin & Barneby         | Gelinggang      | S           | Le         | Crushed        | Friction            | Ringworm                                                             |
|                | Orthosiphon aristatus (Blume) Miq                  | Kumis kucing    | S           | Le         | Decoction      | Oral                | Constipation                                                         |
|                | Peronema canescens Jack                            | Sungkai         | T           | Le         | Decoction      | Oral                | Hypertension                                                        |
| Liliaceae      | Aloe vera (L.) Burnf.                              | Lidah buaya     | H           | Lt/Le      | Extracted, crushed | Oral, smearing | Laxative, aging, alopecia                                             |
| Malvaceae      | Hibiscus rosa-sinensis L.                          | Kembang sepatu  | S           | Le         | Decoction      | Oral                | Fever                                                                |
| Marantaceae    | Donax canniformis (G.Forst.) K. Schum              | Bamban          | S           | Se         | Decoction      | Dropping            | Eye inflammation                                                     |
| Melastomataceae| Melastoma malabathricum L.                         | Senggani        | S           | Le         | Crushed, decoction | Friction, oral | Itch, diabetes, wound, smearing oral                                  |
| Meliaceae      | Aглаia odorata Lore                                | Pacar cina      | S           | Le         | Decoction      | Oral                | Menstrual pain, fever, insomnia                                      |
| Moraceae       | Lansium domesticum Corrēa                         | Langsat         | T           | Ba         | Decoction      | Oral                | Malaria                                                             |
|                | Artocarpus heterophyllus Lam.                      | Putik nangka    | T           | Le/S       | Raw state, decoction | Oral, dripping, smearing | Fever, swelling, wounds, skin diseases, diarrhea, Sprue, diarrhea, wound |
| Myrtaceae      | Psidium guajava L.                                 | Jambu biji/batu | T           | Le         | Decoction      | Gargle, oral        | Indigestion, gout arthritis, hypertension, cholesterol                    |
|                | Syzygium polyanthum (Wight.) Walp.                | Daun salam      | T           | Le         | Crushed, decoction | Friction, oral | Indigestion, gout arthritis, hypertension, cholesterol                    |
| Pandanaceae    | Pandanus amaryllifolius Roxb.                      | Pandan          | S           | Le         | Decoction      | Friction            | Indigestion, stomachache                                             |
| Piperaceae     | Peperomia pellucida (L.) Kunth                     | Sirih cina      | C           | Le         | Crushed        | Friction            | Gout arthritis                                                       |
|                | Piper betel L.                                     | Sirih           | C           | Le         | Decoction      | Dropping, oral      | Nose bleeding, fever                                                  |
|                | Piper ornatum N.E.Br.                              | Sirih merah     | C           | Le         | Decoction      | Oral                | Diabetes                                                             |
| Poaceae        | Cymbopogon citratus (D.C) Stapf                   | Serai           | H           | St         | Crushed, decoction | Friction, oral | Indigestion, stomachache                                             |
| Podocarpaceae  | Podocarpus acuminatus de Laub.                    | Melur           | T           | Le         | Decoction      | Oral                | Fever                                                                |
| Polygonaceae   | Antigonon leptopus Hook. & Arn.                    | Air mata pengantri | C           | Le/Fw      | Decoction      | Oral                | Diabetes                                                             |
| Family       | Species                                      | Part Used | Habit | Preparation | Route | Uses                                      |
|--------------|---------------------------------------------|-----------|-------|-------------|-------|-------------------------------------------|
| Rhamnaceae   | *Ziziphus mauritiana* Lam.                  | Daun bidara | T     | Le          | Oral  | Diabetes, cholesterol                      |
|              | *Coffee abbayesii* J.-F.Leroy               | Kopi      | T     | Le          | Oral  | Cholesterol                               |
|              | *Mitragyna speciosa* (Korth.) Havil        | Daun biak | S     | Le          | Oral  | Cholesterol, hypertension                 |
|              | *Morinda citrifolia* L.                    | Daun kudu  | T     | Le/Fl       | Medicinal bath, Oral | Fever, hypertension, gout arthritis |
|             |                                             |           |       |             |       |                                           |
| Rubiaceae    | *Coffea abbayesii* J.-F.Leroy               | Kopi      | T     | Le          | Oral  | Cholesterol                               |
|              |                                              |           |       |             |       |                                           |
| Rutaceae     | *Acronychia laevis* J.R.Forst. & G.Forst.   | Daun pacar | S     | Le          | Oral  | Gastric ulcer, skin burn                  |
|              | *Citrus x aurantifolia* (Christm.) Swingle  | Jeruk nipis | S     | Fr          | Oral  | Sprue, cough                              |
|              | *Citrus limon* (L.) Osbeck                  | Lemon     | S     | Fr          | Oral  | Cough, obesity                            |
|              | *Murraya koenigii* (L.) Spreng             | Temurui   | T     | Le          | Oral  | Cholesterol, hypertension                 |
| Solanaceae   | *Capsicum frutescens* L.                    | Cabai     | H     | Le          | Oral  | Alopeicia                                 |
| Zingiberaceae| *Alpinia chinensis* (Retz.) Roscoe          | Sitawa    | S     | Le          | Oral  | Fever                                     |
|              | *Alpinia purpurata* (Vieill). K.Schum.      | Lengkuas  | H     | Rz/Le       | Oral  | Menstrual pain, gout arthritis            |
|              | *Curcuma longa* L.                         | Kunyit    | H     | Rz/Le       | Oral  | Gout arthritis, gout unclear              |
|              | *Curcuma zedoaria* (Christm.) Roscoe        | Kunyit putih | H     | Rz/Le       | Oral  | Hypertension                              |
|              | *Kaempferia galanga* L.                     | Kencur    | H     | Rz/Le       | Oral  | Indigestion, stomachache, diarrhea, fever|
|              | *Zingiber officinalis* Roscoe               | Jahe      | H     | Rz/Le       | Oral  | Indigestion, stomachache, fever          |

Note: Habit: H: Herbaceous, S: Shrub, T: Tree, P: Palm, C: Climber; Parts used: Ro: Root, Ba: Bark, Lt: Latex, St: Stem, Le: Leaf, Fw: Flower, Fr: Fruit, Se: Seed, Rz: Rhizome.
Decoction (61%) was the most common application method for communities in the study area. During the fieldwork, the respondents stated that decoction encourages the absorption of herbal remedies and improves the taste of medicinal plants. The decoction method is considered the major method of preparing herbal remedies and is widely used by other ethnic groups worldwide (Hu et al. 2020; Elfrida et al. 2021; Pathy et al. 2021).

The traditional medicines were used in six main ways, including oral, gargle, friction, dropping, smearing, and bathing (Figure 5). The most common method was oral administration (64%), followed by friction (9%).

Oral administration (65%) was the most popular method of traditional medicine administration. This method was popular since it is a simple administration. It has also been discovered to be widely used in other studies (Bano et al. 2014; Polat et al. 2015; Aziz et al. 2018; Phumthum et al. 2018). Local communities frequently use additives such as honey, salt, and sugar to improve the flavor, taste, and overall acceptability of several oral route remedies. Local communities also use medicinal baths as part of their traditional medicinal practices. In addition to oral administration, respondents indicated that medicinal baths are safe, easy to use, and have no negative side effects when used as an external treatment method. A medicinal bath is typically used to induce sweating, reduce fever, activate blood circulation to dispel blood stasis, expel wind to alleviate excess gas and relieve itching (Yang et al. 2009). Medicinal baths can also be used to treat and prevent diseases (Hu et al. 2020), such as skin problems. The skin is immersed in the medicinal bath water, allowing the bath constituents with medicinal value to be absorbed (Wang et al. 2002). Hot water can also increase blood capillary dilation and metabolism. Medicinal baths have been reported to be widely used by communities in southern and southwestern China (Luo et al. 2018).
The local importance of medicinal plants

Medicinal plant use-values ranged from 0.03 to 0.98. *Tagetes erecta* (0.98), *Kaempferia galanga* (0.90), *Melastoma malabathricum* (0.85), *Zingiber officinale* (0.83), *Psidium guajava* (0.82), *Piper betle* (0.80), *Morinda citrifolia* (0.77), *Aloe vera* (0.57), *Annona muricata* (0.55), and *Murraya koenigii* (0.52) were the most important species in the traditional medicine of local communities, with UVs > 0.50 (Figure 6). The informant agreement on plant use ranged from 0.8 to 1.0. Twenty-five (54.3%) species had the maximum IAR-value of 1 (Figure 7). These species have the highest level of agreement as a treatment for allergy, toothache, fever, hypertension, stomachache, diabetes, diarrhea, and ulcer.

Diseases reported by respondents have been classified according to the International Classification of Diseases – 10 ver. 2019 (https://icd.who.int). A total of 32 diseases in 16 categories were documented in the study area (Table 3).

The most common use-report categories were symptoms, signs, and abnormal clinical and laboratory (183 use-report, 11 species), followed by diseases of the digestive system (170 use-reports, 15 species), certain infectious and parasitic diseases (86 use-reports, 6 species), and diseases of the circulatory system (76 use-reports, 7 species). The ICF values ranged from 0.667 to 0.953. Most of the disease categories had a high ICF value, they were diseases of the skin and subcutaneous tissue and symptoms (0.953), and signs involving the circulatory and respiratory systems (0.953), while the lowest was for Neoplasms (NP) (0.667). Itch, swelling, cough, and nosebleed were specific diseases that have high ICF value. According to respondents, nose bleeding was common in children under the age of two. However, they also stated that nose bleeding was also found in adolescents. Nosebleed (epistaxis) is uncommon before the age of two years, and its prevalence increases with age (Fuller and Prosser 2018), with the majority of cases emerging from low-income families (Said and Mohasseb 2020). The local communities in the study area used *Piper betle* leave for the treatment of nose bleeding. The leaf is rolled and inserted into the nostrils. The majority of Indonesians, particularly those living in rural areas, use *P. betle* to treat various diseases, such as nose bleeding (Sucipto et al. 2016). *P. betle* is well-known for its biologically active compounds, which include alkaloids, saponins, flavonoids, polyphenols, and essential oil, and it has been shown to have a significant wound healing effect (Shah et al. 2016).
Traditional knowledge of medicinal plants has been passed down through communities from generation to generation. The average number of species identified by each age group of the respondent ranged from 8.11 ± 1.21 (15-25 years) to 62.31 ± 1.12 (> 65 years). The statistical analysis revealed a significant difference in traditional knowledge of medicinal plants between the elders and the younger generation (P < 0.05; n = 60). This suggests that traditional knowledge is eroding across generations. This study supports the findings of Sujarwo et al. (2014) and Weckmüller et al. (2019), who discovered that elders have greater medicinal plant knowledge than younger generations. During the survey, we discovered that the younger generation is less interested in traditional medical systems. They prefer to consume modern medicine, which is widely available in the pharmacy/drugstore. The young generation, particularly those between the ages of 15 and 25, are known as millennials, and they have strong relationships with information exchange, media, and digital technology, in particular the internet and smartphones. They prefer to get immediate health information from online health platforms. As a result, the young generation prefers modern medicine systems over traditional medicine systems, assuming that modern medicine is perceived to be easier and more practical. According to Sujarwo et al. (2014), the use of the internet/smartphones has contributed to cultural erosion among younger generations, particularly those related to indigenous knowledge of nutraceutical plants. The village government and elders have provided various initiatives to protect traditional knowledge related to traditional medicine systems. The village government has begun to establish traditional medicine gardens in their village in order to promote and conserve the traditional medicine system. Moreover, elders, particularly mothers, have passed on knowledge of plants as a traditional medicine to their children, though this practice remains limited. Since traditional medicinal knowledge is passed down orally from generation to generation, basic knowledge could be lost.

Overall, the large number of medicinal plants mentioned by local communities demonstrated important local knowledge in the study area. The findings revealed that 46 medicinal plant species from 40 genera and 26 families were used for medicinal purposes by local communities to treat 28 different diseases with the itch, swelling, cough, and nose bleeding being the most commonly treated. With a use-value index of 0.98, Tagetes erecta was the most commonly used medicinal plant by local communities. Local communities identified the leaf (50%) as the most widely used plant part and oral administration (65%) as the most common method of administering traditional medicine. Initiatives to promote and conserve medicinal plants, however, must be improved, particularly among the younger generation. This is required to ensure the availability of medicinal plants and the preservation of traditional knowledge in the future.

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Table 3. Informant consensus factor by categories of diseases

| Classification of diseases | Specific disease name | Number use-report | Number species | ICF value |
|---------------------------|-----------------------|-------------------|----------------|----------|
| Certain infectious and parasitic diseases (CID) | Diarrhea, ringworm, malaria | 86 | 6 | 0.941 |
| Diseases of the circulatory system (CSD) | Hypertension | 76 | 7 | 0.920 |
| Diseases of the digestive system (DSD) | Constipation, gastric ulcer, stomachache, toothache, indigestion, cholesterol | 170 | 15 | 0.917 |
| Diseases of the eye and adnexa (EAD) | Eye inflammation, cataract | 8 | 2 | 0.857 |
| Diseases of the genitourinary system (GD) | Menstrual pain | 15 | 2 | 0.929 |
| Diseases of the respiratory system (RSD) | Sprue | 16 | 4 | 0.800 |
| Diseases of the skin and subcutaneous tissue (DST) | Itch, swelling | 44 | 3 | 0.953 |
| Endocrine, nutritional and metabolic diseases (ENM) | Diabetes | 35 | 6 | 0.853 |
| Mental and behavioral disorders (MBD) | Insomnia, laxative | 15 | 2 | 0.929 |
| Symptoms and signs involving the circulatory and respiratory systems (DCR) | Cough, nose bleeding | 65 | 4 | 0.953 |
| Symptoms, signs, and abnormal clinical and laboratory (SSA) | Fever, cold | 183 | 11 | 0.945 |
| Diseases of the musculoskeletal system and connective tissue (DMC) | Gout arthritis | 31 | 7 | 0.800 |
| Symptoms and signs involving the skin and subcutaneous tissue (SCT) | Skin burn | 9 | 2 | 0.875 |
| Diseases of the skin and subcutaneous tissue (DST) | Alopecia | 19 | 2 | 0.944 |
| Neoplasms (NP) | Breast cancer | 4 | 2 | 0.667 |
| Injury, poisoning, and certain other consequences of external causes (PD) | Wound | 65 | 5 | 0.938 |

Note: International Classification of Diseases - 10 ver. 2019 (https://icd.who.int)
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