Ethnomedicinal Resources of the Indigenous People's (IP) Groups in the SOCSARGEN Region

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Abstract

An ethnomedicinal study was conducted to document the medicinal plants used, the manner of preparation and application in the treatment of ailments and the consensus in the use of medicinal plants to treat various ailments among four (4) indigenous people's groups, the Obo in Lake Sebu, South Cotabato, T'boli in Maitum, Sarangani Province, and Blaan and Tagakaolo in General Santos City. The ethnobotanical interview was conducted using open-ended semi-structured questionnaires among identified traditional healers and elders as well as the household in the community. A total of 136 plants species, mostly herbs (47%), have been recorded with the corresponding conditions or illnesses in which they are believed to exert a therapeutic effect. Plant parts utilized for traditional medicine of the 4 IP groups include leaves (38%), roots (25%) and bark/stem (16%). Decoction (54%) and direct consumption (27%) applied via oral route are the common traditional medicine preparation. The IP communities in the SOCSARGEN Region have a rich pharmacopeia of traditional medicinal plants that persist through time despite the availability and convenience offered by modern medicine.

Keywords: *ethnobotany, traditional medicine, T'boli, Obo, Blaan, Tagakaolo, informant consensus factor (ICF)*

The universal desire to live a disease-free life provided means for the utilization of natural resources as therapeutic solutions. Throughout history, the use of traditional medicinal plants for combating various ailments can be confirmed by available references presenting rituals and spiritual healing practices of different indigenous groups in the country. Since time immemorial, traditional medicine played a vital role in the healthcare and maintenance of indigenous communities.

Mendoza (2009) reported that alternative medicine is popular in the country and at present indigenous sources such as plant and animal parts are still the most important supply and sometimes the only source of therapeutics for indigenous people. In her study on "Mainstreaming Traditional Health Knowledge," Palaganas et al. (2001) discussed that traditional healing practices, to include the use of medicinal plants, are favored over consultations and check-ups from medical professionals. Preference to traditional healing may be due to inaccessibility of healthcare/medical services to IP communities and their low economic status, conditions common in most IP communities.

Traditional use of biological sourced medicinal resources plays an important role in modern drug discovery. Various researches conducted in India, Europe, Asia and South American countries utilized the ethnomedical information of plants as reference to indicate the presence of biologically active constituents (Union Internationale, 1993; Pfeiffer and Butz, 2005; Garcia et al., 2010, Sher et al., 2010, Sivaperumal et al., 2010). Studies showed that therapeutic claims of medicinal folklores were in many cases proven to be scientifically valid. These folk or traditional medicines served as 'leads' or clues to the discovery of modern medicines. Currently, a large number of medicinal plants has found their way as raw materials of the modern biopharmaceutical industry. These and

more have led to the evolution and establishment of new and recently well-recognized scientific endeavor, the ethnopharmacology which brings together traditional and scientific medicinal/ pharmaceutical principles (Heinrich and Gibbons, 2001, Gilani, & Atta-ur-Rahman, 2005; Pieters and Vlietinck, 2005, Nishijima et al., 2009).

At present, the use of traditional medicine has tremendously expanded and gained nationwide acceptance and popularity considering the expensive western medical treatment which most Filipinos could not afford. The approval of Republic Act 8423 (R.A. 8423) otherwise known as the Traditional and Alternative Medicine Act (TAMA) of 1997 that promotes and advocates the use of traditional medicine nationwide bolstered the popularity and quantum recognition in the mainstream of traditional medicine (Mendoza, 2009).

SOCSARGEN region is home to diverse biological resources that includes some endemic species in its Key Biodiversity Areas (KBA) namely; Daguma Range, Mt. Matutum Protected Landscape and Mt. Busa. These natural landscapes are also the original domain of different ethnic groups such as T'boli, Blaan, Tagakaolo, Obo and Manobo before the settlement of migrants in the majority of the lowland areas of the region (PGO-South Cotabato, 2013; PSA, 2012). The researchers selected the landscape as the site of the study being the home of various Indigenous People (IP) Groups (Conservation International Philippines et al., 2007)

According to de la Cruz and Gorospe (2006), IPs are very close to nature that the very essence of their cultural heritage depends on their interaction with it. Highly integral in IP's culture is traditional healing practices utilizing flora or fauna combined and in most cases with associated rituals. Each IP has its own distinct cultural and traditional practices although they may sometimes slightly resemble each other. For sure these are shaped by their natural environment and their interaction with varied neighbouring ethnic groups, migrants, the Moros and other tribal people. This study sought to conduct ethnopharmacological resource assessment in major IP communities of SOCSARGEN region. Such undertaking hopes to widen knowledge based on current IP traditional pharmaceutical/medicinal resources and its utilization in the region.

Materials and Methods

Study Area

SOCSARGEN region situated in the southernmost part of Mindanao is composed of South Cotabato, Sarangani Province, and General Santos City (Figure 1). It is a home to the diverse group of indigenous communities who have been wandering the area for hundreds of years (Peralta, 2003). Indigenous groups from this region, T'boli, Obo, Blaan, and Tagakaolo were selected for eth-

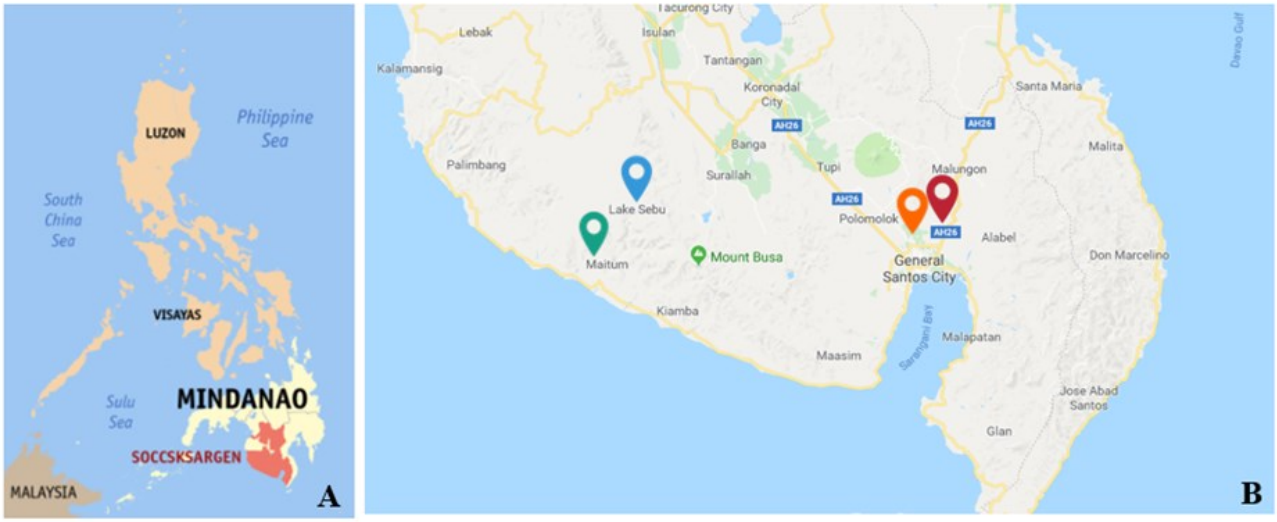

Figure 1. Satellite map showing the location of A) SOCCSKSARGEN Region in Mindanao, and B) the IP communities marked as study sites: Sitio Sansapan Brgy. Upper Labay, General Santos City, Blaan community (N 06° 17.654 E 125° 11.448, 165-616 masl); Sitio Bunga, Brgy Conel, General Santos City (N 06° 14.09.72 E 125° 09.55.82, 145-194 masl); Sitio Upo, Brgy. Lanao, Maitum, Sarangani Province,T'boli community (N 06° 07.015 E 124° 27.450, 108-678 masl); Sitio Lambila, Brgy Lamfugon, Lake Sebu, South Cotabato, Obo community (N 06° 16.814 E 124° 38.898,503 -619 masl). Sources: https://en.wikipedia.org/wiki/SOCCSKSARGEN, www.Googleearth.com

nopharmacological data collection.

Rugged hills and dense vegetation surround the study sites. Sitio Sansapan Brgy. Upper Labay, General Santos City of the Blaan community, is particularly located at N 06° 17.654 E 125° 11.448 with an elevation of 165-616 masl; Sitio Bunga, Brgy. Conel situated N 06° 14.09.72 E 125° 09.55.82 at 145-194 masl is the location of a small community of Tagakaolo; Sitio Upo, Brgy. Lanao, Maitum, Sarangani Province for the T'boli community located N 06° 07.015 E 124° 27.450 with an elevation of 108-678 masl; and Sitio Lambila, Brgy Lamfugon, Lake Sebu, South Cotabato for the Obo community located at N 06° 16.814 E 124° 38.898 with an elevation of 503-619 masl. All these cultural communities were observed to rely on crop agriculture as their main source of livelihood and are dependent on rainfall to water their ground.

Permits, Courtesy Calls, and Ocular Inspection

Before the conduct of the study, the research team acquired the necessary permits from the Department of Environment and Natural Resources, and the Indigenous People's Council in the respective municipalities/city selected for the study. Courtesy calls and ocular inspection to the identified study sites-municipal and barangay level were made. Meetings with officials of Barangay and Municipalities to present the project and address some critical issues were also conducted.

Ethno-Pharmacological Survey

A reconnaissance survey was conducted to every potential study site before the actual field study. The survey was done with the purpose of identifying contact person from every chosen community to facilitate entry to study sites. It also included the identification of local guides and interpreter who assisted the research team in the conduct of the study on identified study sites. Local guides possessing sufficient to excellent indigenous knowledge of the biological resources of the study site were selected for the field study.

Research permit from the Tribal Council of each community was secured before data gathering. Gratuitous Permit for the collection of sample specimen was also secured from DENR-12 office.

Documentation of the medicinal plants used by the indigenous people was carried out among purposively selected respondents. A total of 98 respondents from the four communities were interviewed using semi-structured interview based on the prepared questionnaire. Local IPs who have knowledge or are known users of traditional floral medicine were chosen as respondents with the help of local official, tribal leader and or local elderly people. A particular preference was given to traditional healers of the community. Eight tribal healers were interviewed, three (3) from each Blaan and T'boli communities and two (2) from each Tagakaolo and Obo communities. Age, sex, occupation and educational background of the respondents were noted. These factors as identified by Pfeiffer (2005) as including geographical origin, residence, ethnicity, and religion influences ethnobotanical knowledge. Selection of the actual sites for specimen collection was decided upon by the local guides and recommendations of the locals who are familiar with the area.

Prior to the interview, free and prior consent was secured from each respondent. The interview was done in Bisaya and Ilonggo dialects while an interpreter was sought for respondents who only speak their native language. Consent to record the process, such as photo documentation and video or audio recordings was also asked. None of the key informants objected to the documentation.

Obo, T'boli, Tagakaolo and Blaan field guides who also happened to be healers walked along the sampling sites with the researchers while being interviewed. Plants with medicinal value encountered along the way were identified with their medicinal use. Preparation and application of plants as medicine were described and demonstrated by the healers to the researchers. A Blaan healer even performed a simulated healing procedure that includes performance of a ritual. The actual preparation of medicine was documented in video and photographs. Respondents not identified as healers were interviewed through a house to house visit which was then followed by a survey of ethnomedicinal plants available in their backyards.

The plants used by the people in the community were photographed in their natural habitat and collected whenever possible. Several plants were collected from respondents' backyard but most were obtained from the forest. Mature plant specimens collected were pressed as voucher specimens and kept in the Nutraceautical Laboratory College of Natural Sciences and Mathematics, MSU, General Santos City. Observations on the morphological features and habitats of each medicinal species were noted during the field study to facilitate the complete taxonomic identification and classification of plant specimens. Online and in print sources were used for the identification of plants (Castro, 2006; CO's Digital Flora, 2011;

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region.

Family	Botanical name	Local name	Habit	Availability	Plant parts used	Usage	Source of Information
Anacardiaceae	*Mangifera indica* L.	Mangga	tree	commonly encountered	bark, leaves	A bark decoction is taken orally for LBM. Leaves are boiled, and the juice is taken orally for vomiting; Leaves are boiled, and its juice is taken orally for kidney problems.	Blaan T'boli
Anacardiaceae	*Dracontomelon dao* (Blanco) Merr. & Rolfe	Lete tao	tree	Rare	bark	A bark decoction is taken orally to treat the different type of diseases.	T'boli
Annonaceae	Annona muricata L.	Babana (Guyabano)	tree	commonly encountered	leaves, shoot	Shoot or leaf decoction is taken orally for diarrhea.	Blaan
Araceae	*Schismatoglottis plurivenia* Alderw.	Fuhaw	herb	commonly encountered	shoot	Extract released from the gentle rubbing of shoots is applied topically from head to toe in a migraine.	Obo
aliaceae	*Schefflera elliptica* (Blume) Harms	Tamlang	shrub	commonly encountered	leaves, roots	Leaves are wiped directly on the face (for women); for men, used as "anting-anting"; Juice of pounded roots is given orally in a toothache.	Obo
Arecaceae	*Colocasia sp*	Kataes	herb	occasionally encountered	leaves	Leaves are used as incense for devil sickness. Leaves are passed over a flame then topically applied on the painful area for osteomuscular pains. Leaves are also pounded and mixed with oil then topically applied to the swelling part.	T'boli
Arecaceae	*Cocos nucifera* L.	Lubi	Tree	commonly encountered	juice, meat, coco sap (tuba), coco shell, roots	Whole coconut fruit is grilled before the coco juice is drank to ease fatigue, ulcer, spasms or UTI; Coco sap or tuba is mixed with egg then topically applied on chicken pox	T'boli Obo

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

						Charred coconut husk is applied on the umbilical cord to prevent inflammation. Roots decoction is orally taken for relapse.boils;	
Arecaceae	*Areca catechu* L.	Mama	Tree	commonly encountered	fruit	Fruit is eaten for deworming.	T'boli
Athyriaceae	*Diplazium esculentum* (Retz.) Sw.	b'lata	Fern	commonly encountered	roots	Fresh root extract is applied topically on the area with snake bites.	Obo
Bromeliaceae	*Ananas comosus* (L.) Merr.	Pinya	grass	commonly encountered	tuber	A small amount of juice is mixed with milk and directly applied to the soring eye.	T'boli
Burseraceae	*Canarium denticulatum* Blume	simbolo	Tree	Rare	bark	A bark decoction is taken orally to treat the different type of diseases.	T'boli
Caricaceae	Carica papaya L.	Papaya	Tree	commonly encountered	the sap of fruit, leaves	fruit sap or crushed leaves is topically applied on the dog bite.	T'boli
Compositae	*Acmella oleracea* (L.) R.K.Jansen	BulekLemele	herb	commonly encountered	flower	The flower is directly chewed on the aching tooth.	T'boli
Compositae	*Chromolaena odorata* (L.) R.M.King & H.Rob. *(Compositae)*	Hagonoy	herb	commonly encountered	leaves, bark	Leaves are pounded and topically applied on wounds.	T'boli
Compositae	Spilanthes acmella (L.) L.	Tandukngehe (toothache plant)	herb	commonly encountered	flowers/roots	Juice of roots and flowers are taken orally in a toothache.	Obo
Compositae	*Elephantopus scaber* L.	Dila-dila	grass	commonly encountered		Root decoction is taken orally for stomachache;	T'boli
						The leaf decoction is washed onto face and body when vomiting blood. Leaves with a pinch of salt are boiled, its decoction is orally taken for stomachache.	Blaan

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Composi-tae	*Blumea balsamifera* (L.) DC.	Gabon		commonly encoun-tered	leaves, shoot	Leaves and shoots are boiled, and its juice is orally taken for fever and cough. Leaves are boiled, and the juice is orally taken for a headache; Leaves are used as incense for spasms and regulation of body heat.	Blaan T'boli
Composi-tae	*Artemisia vulgaris* L.	Hilbas		commonly encoun-tered	leaves	The leaf decoction is orally taken for diarrhea.	Blaan
Convolvu-laceae	*Ipomoea batatas* (L.) Lam.	Kamote	Vine	commonly encoun-tered	leaflets	Leaflets are eaten for anemia.	T'boli
Costaceae	*Costus spiralis* (Jacq.) Roscoe	sewak	shrub	commonly encoun-tered	fruits	Ash from the ashing of the fruit is applied topically on mouth surface with sore.	Obo
Crassu-laceae	*Bryophyl-lum pinnatum* (Lam.) Oken	Katakataka	herb	commonly encoun-tered	leaves	Crushed leaf is directly applied on the aching or impacted tooth.	T'boli
Cucurbita-ceae	*Momordi-ca charantia* L.	Ampalaya	vine	commonly encoun-tered		Fruit is eaten for anemia.	T'boli
Cyatheace-ae	*Cy-athea contaminans* (W all. ex Hook.) Copel.	cabo negro (giant fern)	fern	commonly encoun-tered	skin of the stem	Shaved skin of the stem is ex-posed to smoke/heat and ap-plied topically in epilepsy	Obo
Cyperaceae	Cyperus rotundus L.	blitang	grass	commonly encoun-tered	roots	Pounded roots are taken orally in preventing urinary problems	Obo
Dioscore-aceae	*Dioscorea spp.*	Gabi (any varie-ty)	vine	commonly encoun-tered	tuber	The tuber is pounded, its extract is mixed with oil then topically applied on the eye of the boils.	T'boli
Dioscore-aceae	*Dioscorea bulbifera* L.	banal	vine	commonly encoun-tered	skin of root crop	Shaved skin of root crop or the pounded fleshy root is exposed to smoke/heat applied topically in hepatitis	Obo
Dipterocar-paceae	*Shorea sp.*	Lawaan	tree	occasionally en-countered	latex	Latex is burned and used as incense to cure devil sickness, relapse, and hypertension. In-cense is also given to the ex-pectant mother during labor to ensure a safe child delivery.	T'boli

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Euphorbiaceae	*Phyllanthusniruri* Linn.	banga-banga	herb	commonly encountered	leaves	Pounded leaves are applied topically on the forehead and arms against evil in the spring	Obo
Euphorbiaceae	*Manihot esculenta* Crantz	Balanghoy	shrub	commonly encountered	leaves	Leaf extract is used as an ointment for fever.	Blaan
Euphorbiaceae	*Euphorbia hirta* L.	Tawa-tawa	herb	commonly encountered	entire plant	A decoction of part or entire plant is given orally like water taken for a cough and dengue fever. Stem is cut, and its sap is directly applied on sore eyes; A root decoction is given orally for tuberculosis. The leaf decoction is taken orally for the ulcer. Roots are boiled for relapse.	Blaan Obo T'boli
Hypoxidaceae	*Curculigo orchioides* Gaertn.	kesongi	herb	Occasionally encountered	root crop	Root crop's skin shavings are applied externally in boils.	Obo
Lamiaceae	*Plectranthus amboinicus* (Lour.) Spreng.	Kalabo/Oregano	herb	commonly encountered	leaves, shoot	Leaf or shoot decoction is taken orally for a cough.	Blaan
Lamiaceae	*Plectranthus scutellarioides* (L.) R.Br.	Matabulan / mayana	herb	commonly encountered	leaves	A decoction of leaves is given orally to treat a cough.	Obo
Lamiaceae	*Mentha suaveolens* Ehrh.	bulokbukay	herb	commonly encountered	leaves	Leaf extract is applied externally on minor wounds	Obo
Lamiaceae	*Plectranthus scutellarioides* (L.) R.Br.	Mayana	herb	commonly encountered	leaves	The leaf decoction is taken orally for a cough; Decoction of leaves and its juice is taken orally for a cough, colds, diarrhea, and stomachache.	Blaan T'boli
Lamiaceae	*Vitex negundo* L.	Lagundi	tree	commonly encountered		The leaf decoction is taken orally to cure a cough.	T'boli
Lamiaceae	*Hyptis capitata* Jacq.	d'ludo/aritis-aritis	herb	commonly encountered	flowers	Ash of flowers from ashing is mixed with oil and applied topically to treat boils.	Obo
Lamiaceae	*Vitex parviflora* A.Juss.	Tugas	tree	occasionally encountered	stem	The stem is scraped and boiled with salt, and the juice is taken orally for relapse and toothache, the juice is gargled.	Blaan
Lauraceae	*Persea americana* Mill.	Avocado	tree	commonly encountered	leaves	The leaf decoction is taken orally for stomachache and diarrhea.	Blaan

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Lauraceae	*Cinnamomum burmanni* (Nees & T.Nees) Blume	kaningel	tree	Rare	bark	A bark decoction is taken orally to treat the different type of diseases such as bughat, fever, body pains.	T'boli
Leguminosae	*Senna alata* (L.) Roxb.	Asunting	tree	commonly encountered	leaves	Leaves are topically applied on the itchy part of the skin.	T'boli
Leguminosae	*Gliricidia sepium* (Jacq.) Walp.	Madre Cacao	shrub	commonly encountered	leaves, roots	Leaves are pounded, and its extract is applied on body area with *panuho*t. For itchiness leaf extract is combined with oil used as a liniment and applied on the affected area.	Blaan T'boli
						The leaf decoction is washed on the wounds to prevent infection. The leaf decoction is taken orally for the ulcer.	
Leguminosae	*Vigna unguiculata* (L.) Walp.	Sitaw	vine	commonly encountered	bud	Bud that is rubbed gently to release extract is topically applied on the eye of the boil.	T'boli
Leguminosae	*Pterocarpus indicus* Willd.	Narra	tree	commonly encountered	bark	A bark decoction is taken orally taken for stomachache or constipation.	Blaan
Leguminosae	Senna alata (L.) Roxb.	KyObog/ acapulko	tree	commonly encountered	leaves	Leaves are chewed, and the juice is sipped to treat a cough	T'boli
Liliaceae	*Allium sativum* L.	Bawang	grass	commonly encountered	bulb	The bulb is pounded and mixed with chili and topically applied on the dog bite.	T'boli
Liliaceae	*Streptopus sp*	kaningul	tree	Rare	bark	For the Obo bark decoction is taken orally in women after giving birth against relapse or "bughat."	Obo
Lycopodiaceae	*Lycopodium clavatum* L.	lumot	herb	common	whole plant	Pounding of the whole plant and applied topically on face for facial purposes	Obo
Lygodiaceae	*Lygodium circinatum* (Burm. f.) Sw.	Sloan(Nito)	vine	Occasionally encountered	roots	A root decoction is orally taken for relapse.	Blaan
Malvaceae	*Malvastrum aboriginum* B. L. Rob.	bakosomblino	herb	commonly encountered	roots	A root decoction is given orally to treat muscle pains.	Obo
Malvaceae	*Urena lobata* L.	Dalupang		Occasionally encountered	roots	The root decoction is orally taken for hemorrhage.	Blaan

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Malvaceae	*Abutilon ramiflorum A.St.-Hil.*	lumato	shrub	commonly encountered	flowers	The pounded flower is applied on the enlarged or swelling area due to elephantiasis to reduce pain and swelling.	Obo
Malvaceae	*Diplodiscus paniculatus* Turcz.	B'lobo	herb	Occasionally encountered	leaves	The leaf decoction is taken orally to treat fever and body pains.	T'boli
Meliaceae	*Sandoricum koetjape* (Burm.f.) Merr.	Santol	tree	commonly encountered	bark	A bark decoction is taken orally for a cough and stomachache. The leaf decoction is taken orally for stomachache.	Blaan
Moringaceae	*Moringa oleifera* Lam.	Malunggay	tree	commonly encountered	leaves	Leaves are pounded and topically applied on wounds to stop bleeding.	T'boli
Musaceae	*Musa spp.*	Saging (any variety)	shrub	commonly encountered	leaves, roots, stem, trunk	Stem core "*ubod*" is topically applied on the forehead for a headache; Stem and leaves are pounded and directly applied on wounds. The rotting trunk is used as dressing for wound healing.	T'boli Blaan
Myrtaceae	*Psidium guajava* L.	Bayabas	shrub	commonly encountered	leaves, shoot, fruit	The leaf decoction is taken orally for stomachache and fever. Pounded leaves are topically applied on minor wounds and used as dressing for major wounds and as a disinfectant.	Blaan T'boli
Phyllanthaceae	*Phyllanthus niruri* L.	Sampaluk-sampalukan	herb	commonly encountered	Roots	A root decoction is taken orally for relapse.	T'boli
Piperaceae	*Piper betle* L.	Buyo	vine	occasionally encountered	leaves	Leaves are pounded, and the extract is topically applied to body area with muscle pain.	T'boli
Piperaceae	*Piper aduncum* L.	buyo-buyo	tree, shrub	commonly encountered	roots	A root decoction is given orally in stomachache (1 root:1 glass of water).	Obo
Poaceae	*Eleusine indica* (L.) Gaertn.	Fet	grass	commonly encountered	Roots/entire leaves	Roots are rubbed on the scalp to promote hair growth. A decoction of leaves/whole plant is taken orally for UTI.	Obo Tboli

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Poaceae	*Cymbopogon citratus* (DC.) Stapf	Tanglad	grass	commonly encountered	leaves	Lemongrass is boiled, and its juice is taken orally for hypertensions.	T'boli
Poaceae	*Imperata cylindrica* (L.) Raeusch.	cogon	grass	commonly encountered	stalk	Rubbing of the stalk in the gums to facilitate eruption of baby's teeth	Obo
Poaceae	*Cymbopogon nardus* (L.) Rendle	lembet bong	grass	commonly encountered	roots	Root decoction is given orally in dysmenorrhea (1 root: 1 glass of water)	Obo
Poaceae	*Zea mays* L.	Mais	grass	commonly encountered	fruit	Young corn decoction is taken orally for the kidney problem.	T'boli
Poaceae	*Paspalum conjugatum* P.J.Bergius	Hilamon (Carabao Grass)	grass	commonly encountered	entire plant	Mixed with kofilbot, the leaves are boiled and taken orally for relapse.	T'boli
Poaceae	*Eleusine indica* (L.) Gaertn.	Fet	grass	commonly encountered	entire plant		T'boli
Rhamnaceae	*Ziziphus jujuba* Mill.	Mansanitas	tree	commonly encountered	leaves, stem	A decoction of leaves and stem are taken orally for gastric pains.	T'boli
Rubiaceae	*Coffea spp*	Kafe, Kape (different types)	shrub	occasionally encountered	leaves	The leaf decoction is taken orally for kidney problems.	T'boli
						The leaf decoction is taken orally to stop vomiting.	Blaan
Sapotaceae	*Chrysophyllum acreanum* A.C.Sm.	Caimito (Starapple)	tree	commonly encountered	bark, udlot, leaves	The bark is boiled, and the decoction is taken orally for a cough and vomiting. Shoots are boiled, and the decoction is taken orally for stomachache.	Blaan
Sapotaceae	*Madhuca sp.*	mataan	tree	commonly encountered	the sap of the stem	The sap of the stem topically applied to treat ringworm.	Obo
Solanaceae	*Capsicum annuum* L.	Sili	shrub	commonly encountered	fruit	Fruit is pounded mixed with garlic and topically applied on the dog bite.	T'boli
Solanaceae	*Solanum melongena* L.	Talong	shrub	commonly encountered	flower	A tincture of eggplant flower extract mixed with oil is dropped on the ear for ear discharges.	T'boli
Solanaceae	*Nicotiana tabacum* L.	Tobacco	shrub	commonly encountered	leaves	Leaves are directly rubbed on the skin as an insect repellent.	T'boli

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Solanaceae	*Solanum torvum* Sw.	t'long	woody herb	commonly encountered	whole plant	Planting of the whole plant around the house to ward off snakes	Obo
Solanaceae	*Solanum americanum* Mill.	Koti	herb	Rare	leaves	Steamed leaves are eaten in anemia	Obo
Urticaceae	*Pipturus asper*Wedd.	damay	shrub	commonly encountered	stem/sap	Shaved skin of stem or its sap is applied on affected area with cancer particularly breast cancer	Obo
Urticaceae	*Dendrocnide meyeniana* (Walp.) Chew	K'nowol	tree	rare	bark	A bark decoction is taken orally to treat the different type of diseases.	T'boli
Zingiberaceae	*Zingiber officinale* Roscoe	Luy-a	herb	commonly encountered	rhizome	Roots are passed over the flame and topically applied on the itchy part of the skin such as insect bites and skin allergies.	T'boli
		Alam	herb	rare	stem	The stem is scraped and directly put on the forehead for a headache.	Blaan
		bakouho	herb	commonly encountered	roots	Root decoction is given orally in "bughat" (1 root:1 glass of water)	Obo
		Banganga			roots	A root decoction is orally taken to cure a toothache.	Blaan
		blakan ibid	tree	commonly encountered	stem	The stem of the plant is applied externally on affected area in rheumatism.	Obo
		bletang	tree	rare	roots	A root decoction is taken orally in a stomachache.	Obo
		Bloh	tree	rare	roots	Roots mixed with oil are applied topically as anti-hiwit (buyag)	Obo
		b'lol	tree	commonly encountered	fruits/seeds	Fruits and seeds are taken orally to prevent the occurrence of boils.	Obo
		Boli	herb	commonly encountered	roots	A root decoction is orally taken for relapse.	Blaan

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Bugo	tree		leaves, stem	The stem is scraped and directly applied on wounds and extract of the pounded leaf is applied topically on the affected area to cure swelling.	Blaan
Buk	herb	occasionally	roots	The tuber is eaten in elephantiasis	Obo
Bulak-bulak			leaves	Leaves are used as a poultice and topically applied on wounds.	Blaan
Bulongbletan	shrub	rare	roots	A root decoction is taken orally by mother right after giving birth to prevent bughat.	Obo
Dahon-dahon (kamunggay-kamunggay)	Shrub	Rare	leaves	Leaves are eaten directly for snake bites.	Blaan
Damay	vine	occasionally encountered	leaves, stem	The leaf decoction is taken orally for a cough. The stem is scraped and directly applied on boils.	Blaan
FalsoMangayan	shrub	commonly encountered	stem, flower	Flowers are placed on the lower abdomen of pregnant women to ensure an easy delivery.	T'boli
Flangwa	tree	occasionally encountered	bark	The bark is scraped and then topically applied to the wound and swelling part of the body.	T'boli
Gan			leaves, roots	Leaf and root concoction is taken orally for fever.	Blaan
Gapas-gapas	tree	occasionally encountered	leaves	Leaves are used as a poultice and topically applied on wounds.	Blaan
Kadias		occasionally encountered	leaves, roots	A root decoction is taken orally to stop bleeding after child delivery.	T'boli
Kamatesemala	shrub	commonly encountered	shoot/flowers	Shoot and flower decoction is bathed during german measles or reddening of the skin	Obo
Katae	herb	rare	root crop	The root crop is roasted and is eaten to treat tuberculosis.	Obo

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Kayu Mlato	shrub	occasionally encountered	roots	Root decoction is taken orally for relapse.	Blaan
kesowa	herb	commonly encountered	roots	Root decoction is given orally in "kabuhi" (1 root:1 glass of water)	Obo
klong'lan	herb	commonly encountered	roots	Pounded roots is applied on forehead to treat fever	Obo
KluonKoda	herb	commonly encountered	leaves	Leaves are pounded and topically applied on wounds.	T'boli
KluonLamnek	herb	commonly encountered	leaves	A decoction of leaves is given to a crying baby for relaxation and to facilitate sound sleep.	T'boli
KluonWaya	herb	commonly encountered	leaves	Leaves are pounded and topically applied on snake bites and wounds.	T'boli
ko'baul	tree	rare	leaves	Water with soaked shoot is applied topically against chill	Obo
Kofilbot	grass	commonly encountered	entire plant	The leaves are mixed with carabao grass, boiled and taken orally for relapse.	T'boli
komungu	herb	Occasionally encountered	rhizome	Inhalation of the rhizome during nosebleed	Obo
Konowon	vine	occasionally encountered	leaves	A leaf bud is extracted, and its juice is externally applied on wounds.	T'boli
k'taas	tree	rare	stem	Shaved stems are applied topically in treating severe wounds	Obo
KuyoIwas		rare	roots	Fresh root extract is taken orally for relapse or "bughat".	T'boli
Lagnob	tree	rare	roots	Root decoction is taken orally for a headache, relapse, and fever.	Blaan
lamibu (white flower)	grass	commonly encountered	roots	Aroma of freshly collected roots is inhaled in nausea.	Obo
lomenge	tree	commonly encountered	roots	Root decoction is given orally in diarrhea.	Obo
lomenge	tree	commonly encountered	roots	Root decoction is given orally in pneumonia.	Obo

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

Lomongoy	shrub	commonly encountered.		The antidote for fatigue.	T'boli
maglong	tree	Occasionally encountered	bark	A bark decoction is taken orally to treat the different type of diseases.	T'boli
Maltaan (Tanabog)	tree	commonly encountered	roots, leaves	Root decoction is taken orally to treat body pain. Leaves are used by the direct application on body areas with pain.	Blaan
Mandalosa	herb	commonly encountered	leaves	Leaves are wrapped on the fractured part.	
matungo	shrub	commonly encountered	leaves	Poultice of leaves applied externally on the forehead of babies with difficulty in sleeping	Obo
medyu	shrub	commonly encountered	whole plant	Whole plant decoction is given orally in treating anemia	Obo
miango	tree	moderate-rare	the sap of the tree	Sap collected from the bark is applied topically to the affected area in boils.	Obo
Milagrosa	herb	commonly encountered	entire plant	Entire plant decoction is taken orally for stomachache.	Blaan
Munot	grass	commonly encountered	roots	A decoction of roots is taken orally for "bughat".	T'boli
Sagbot	grass	commonly encountered	roots	Roots are pounded and applied topically for dog and snake bites.	Blaan
sakotmison (misen)	shrub	commonly encountered	leaves	Poultice of leaves expose to smoke/heat is applied on forehead for fever	Obo
Sikalid	herb	commonly encountered	roots	Root decoction is taken orally during reproductive problems like dysmenorrhea	Blaan
Slotura	herb	commonly encountered	roots	Root decoction is taken orally for vomiting and diarrhea.	Blaan
Tabako-tabako	herb	commonly encountered	leaves	Leaves are pounded and topically applied on wounds to stop bleeding.	T'boli

Table 1. Ethnomedicinal information of plants used by selected IP communities in SOCSARGEN Region. Cont'd.

	tebalao	shrub	commonly encountered	stem/stalk	Stem/stalk (around 7pcs) decoction is taken orally to treat illness caused by disturbing the spirit of the mountain.	Obo
	Tekulo	shrub	commonly encountered	shoots	Decoction of shoots is taken orally in dysmenorrhea	Obo
	Tino	shrub	rare	roots	Root decoction is given orally in chicken pox (1 root: 1 glass of water)	Obo
	t'let'langas	herb	commonly encountered	roots	Root decoction is given orally to treat a cough.	Obo
	totuugong	herb	commonly encountered	roots	Root decoction is given orally to treat gas pain.	Obo

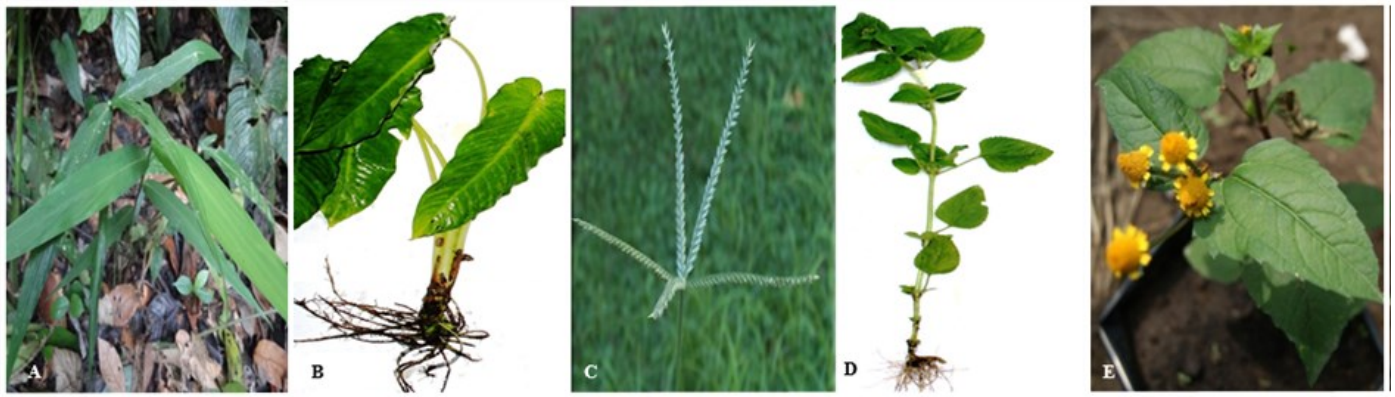

Figure 2. Example of plants highly valued by the communities as traditional medicine being abundant in the backyard. A) *Zingiber officinale* Roscoe for relief from itchiness; B) *Schismatoglottis plurivenia* Alderw. for relieving symptoms of migraine; C) *Eleusine indica* (L.) Gaertn as treatment for UTI; D) *Mentha suaveolens* Ehrh. for wound healing activity; and E) *Spilanthes acmella* (L.) for its numbing effect relieves the person suffering from a toothache.

Plant List, 2013) with several plant specimens confirmed by a plant taxonomist from the National Museum. Prevailing diseases in the area were classified into sixteen categories based but with some modifications from the classification made by Ferreira, et al., (2009). The categories were assigned in numbers, each presenting a disease relating to a particular organ of the body.

Results and Discussions

Ethnobotanical Resources of IP groups

Medicinal plants play an important role in providing knowledge to the researchers in the field of ethnobotany and ethnopharmacology. The observations of present study showed that traditional medicine plays a significant role among the members of the Obo, T'boli, Blaan and Tagakaolo. The tribes' cultural practice of treating diseases always involves utilization of medicinal plants.

One hundred thirty-six (136) plants were recorded based on interviews of IP traditional healers and users, seventy-eight (78) of which were identified at species level. These plants were used to treat 44 types of various ailments and diseases sorted out into 16 categories. Species are distributed to 39 families dominated by Lamiaceae (18%), Poaceae (18%), Compositae (15%), Leguminosae (13%), Solanaceae (13%), and Malvaceae (10%). Table 1 records these floral species including the ethnomedicinal information. Sample of the plants that are abundant and commonly utilized for treating common health problems are *Zingiber officinale* Roscoe, *Schismatoglottis plurivenia* Alderw, *Eleusine indica* (L.) Gaertn, *Mentha suaveolens* Ehrh, and *Spilanthes acmella* (L.) L. Photos with the information of medicinal uses are shown in Figure 2.

Based on respondents' assessment of medicinal resources, 66% were commonly encountered, 0.8% was moderate, 9% occasionally encountered, 10.5% rare and 13.5% of species with no available information. These values express the availability of the medicinal plants. Commonly encountered plant species or those abundant are normally utilized by the respondents for convenience. Moreover, healers sometimes explore the deep forest areas just to get medicinal plants to heal his suffering patient as discussed during the interview. Most of the diseases reported can be attributed to some external factors such as the weather conditions, from the immediate environment, their way of life, as well as the homeostatic and physiological disparities.

The range of gastrointestinal problems and internal parasite infestation, genito-urinary problems, cuts and wounds, and illnesses associated with child delivery such as relapse, bleeding, and muscle weakness are problems which have rich floral based pharmacopeia. Most medicinal plant species were used to treat only one disease with a few that can cure more than one disease. Particular plants of interest for their multiple uses are *kaningel*, (*Cinnamomum burmanni* (Nees & T.Nees) Blume) and *tawa-tawa* (*Euphorbia hirta* L.).

Tawa-tawa (*Euphorbia hirta* L.) is reported to cure tuberculosis, sore eyes and malaria. *Kaningel* (*Cinnamomum burmanni* (Nees & T.Nees) Blume) also showed a wide range of medicinal uses particularly on women's health problems. The multi-therapeutic ability implies that these plant species have the capability of curing wide range of conditions demonstrating their usefulness as direct source of traditional medicine.

Majority of the medicinal plants listed in Table 1 are used singly with only 3% used in combination with other plants or animal by-products such as milk. Example of medicine preparation using a combination of plants are the shredded *kaningag* bark and *dalupang* (*Urena lobata* L) bark wrapped in *gabi (Dioscorea spp)*, *fuhaw* (*Schismatoglottis plurivenia* Alderw) or any available broad leaf inserted inside a bamboo and cooked on fire. The juice extracted in this process is then taken orally to cure genito-urinary problems among women.

Method of Preparation, Plant Part/s Used, Application, Growth Forms

The type of organ/part used (stem including modified stems rhizome and tuber, leaves, bark, roots, shoot, latex/sap, seed, fruit, flower, or whole plant) in the preparation were identified; and methods of preparation of treatments (poultice or passing over flame, infusion, decoction, tincture, ash application, burned, eaten raw/juice is extracted, cooked without seasoning) and route of application (oral, nasal, external/topical skin), hitting the body, bath/wash, exposure to smoke/heat) were also documented (Figure 3). Source of collection was also determined to evaluate the location of the species, whether it was domesticated or can be sourced only in the forest. Information generated may be useful in assessing the ecological status of the medicinal plants.

Among the different plant parts, the leaves were most frequently used for the treatment of diseases having the highest percentage (38%) followed by roots (25%) and stem (16%). Figure 4A

Figure 3. The various ways of preparation and application of traditional medicine, with roots, stems (A), and leaves (B) as the common plant parts used. A typical preparation is through decoction (C & D) which may be taken orally (E) or used in bathing. For topical application (F), plant parts are commonly pounded to release the sap.

shows the preferred parts of plants used in treating the ailments in the community. In the study of Leffers (2003), who presented and described 238 plant species occurring in the eastern Namibia, as well as in the studies of Kumar et. al. (2007) and Panghal et. al. (2010) a wide range of different plants and plant parts were used with plant roots playing a significantly important role. Findings of this study, however, showed roots to be only the second popular choice in plant part utilization.

The analysis of growth forms shows that, of the total medicinal plants recorded from the study sites, herbs were highly represented having a percentage of 43% followed by shrubs, trees, grasses, ferns, and vines (Figure 4B). Higher use of herbs for medicinal purposes is attributed to perceived effectiveness in the treatment of ailments and diseases. As compared to the other growth forms, natural abundance and availability made it all the more the most preferred growth form of plant.

In Figure 4C, it was evident that the most common method of medicine preparation was decoction (34%), followed by direct consumption, crushing/pounding, poultice, ash application, shaving, steaming, rubbing, and direct inhalation. Boiling leaves and roots in water often result in extraction of oils, volatile organic compounds and other chemical substances that brought about the effectiveness of the treatment in curing ailments (Capasso, et al., 2003; Azmir, et al , 2013).

Figure 4D shows that 50.98% of the medicines were administered orally, 43.14% topically while exposure to heat/smoke and hitting the body accounts for the remaining 5.88%. This means that treatments were usually swallowed or taken in to guarantee the efficacy of the medicine.

Informant Consensus in the Use of Medicinal Plants

Informant consensus factor (ICF) was determined per category. ICF is used to measure the consensus among respondents from the four communities regarding the information they have given in the use of floral species in the treatment of a certain group of ailments (Table 2). The value describes the degree of agreement of people in the community in the treatment of diseases. Value of 1 means high consensus of plants utilized for treatment. Tabuti, et al. (2012) interpreted that a high ICF value means that the community is confident in the choice of plants for medicine, while a low ICF value means that the community is still experimenting and that the treatment may not be sufficient.

A low consensus was observed among informants in Brgy. Upper Labay, General Santos City with regards to the plants they utilized to treat diseases. Dermatological problems, and infection categories, however, yielded an ICF value of 1. In addressing dermatological problems, *madre de cacao* (*Gliricidia sepium* (Jacq.) Walp) is used as an ointment to treat itchiness and infection, while

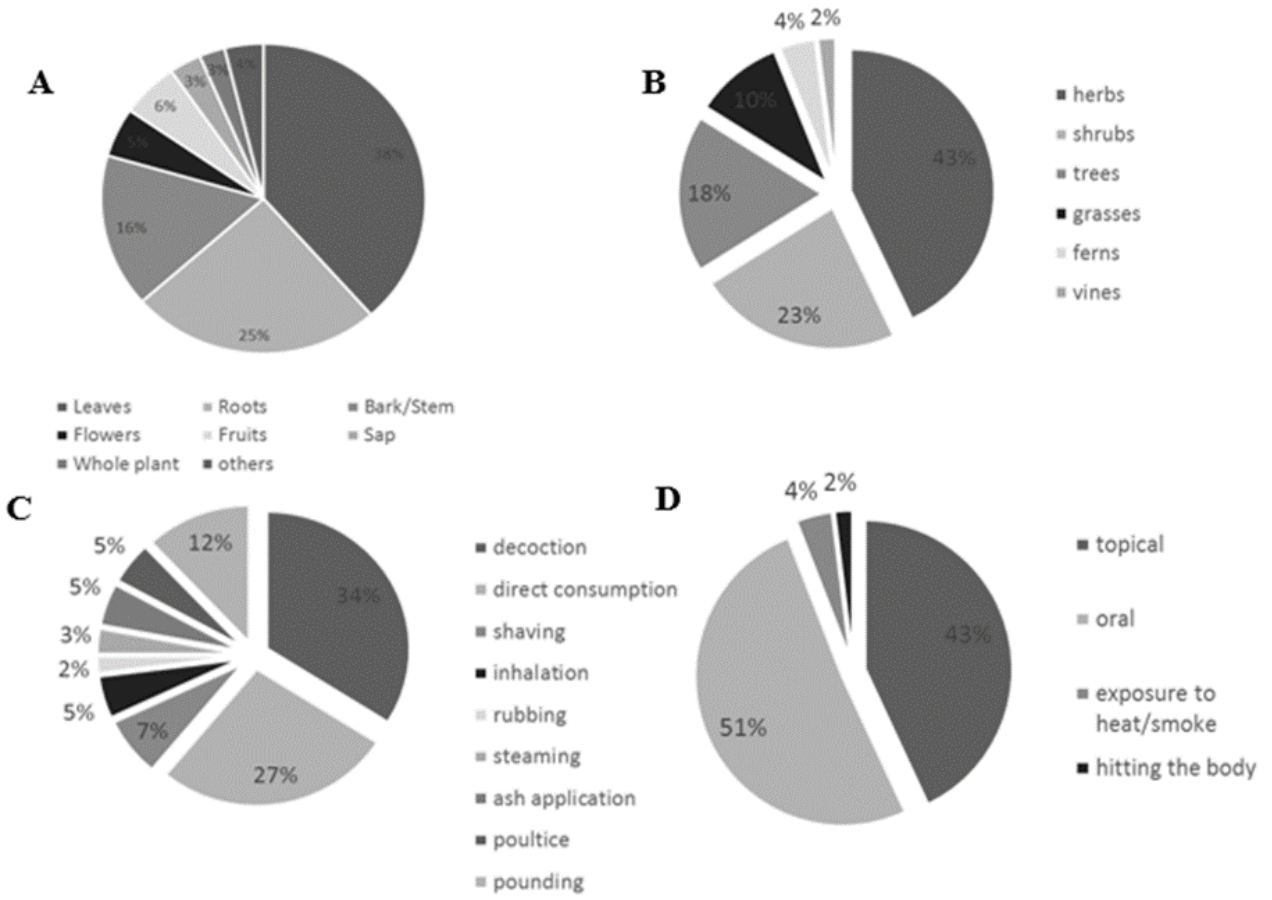

Figure 4. Preparation and use of traditional medicinal plants. (A) Preference of tribal healers in terms of plant parts used; (B) composition of medicinal plants based on habit; (C) preferences of traditional healers for route of administration; and (D) mode of medicine preparation for traditional healing.

decoction of *tawa-tawa* (*Euphorbia hirta* L.) is popularly used to treat dengue.

With the current effective health program of Barangay Upper Labay and easy access to their constituents to medical needs (Brgy. Upper Labay Profile Report, 2012) most residents prefer western medicine to treat illnesses. However, if the sickness is worst, has no progress while on treatment or requires immediate treatment as in the case of snake bites, and the treatment using conventional western medication is expensive patients and their family resort to traditional medicinal way of treatment. Eye and ear related category, antidote-related category, and cancer obtained the highest ICF Value of 1 in the Blaan community of Upper Labay. This means that all informants in the community use similar selection of plants to treat a disease. *Tawa-tawa* (*Euphorbia hirta* L.) is used to treat sore eyes, *b'lata* as antidote for snake bites, and *damay (Pipturus asper* Wedd.) for treatment of cancer.

For Obo tribe, antidote has the highest ICF value. A range of plants are used as antidote for snake bites. Plants used as antidote may be available in the backyard while others are only found in the forest. However, not all plants were documented by the researchers as they are guarded secrets of some healers. The tribe believes that the effectiveness of the antidote will be lost if made known to others. The plant is typically chewed to extract the juice and is applied on bitten body part with the bark as the common plant part harvested.

Wound healing for severe and minor wounds obtained the next highest ICF with a value of 0.875 (Table 2). *K'taas* for severe wound and *bulokbukay* (*Mentha suaveolens* Ehrh.) for minor wounds, which are common plants in the community, are applied to the wound with a gentle pressure until bleeding stops or pain becomes manageable. The nervous system related problem followed by infectious and transmitted diseases category also obtained high consensus among respondents

Table 2. Informant consensus in the use of medicinal plants among IP communities in SOCSARGEN region.

Disease Category	List of Disease	ICF			
		Tboli	Blaan	Obo	Tagakaolo
Antidotes	Rabies	-0.5	0	1	0.76
Cancer Related		-	-	1	
Cardiovascular System Related problem	High Blood Pressure, anemia	-0.5	0	0.666	0.566
Dermatological Problems	Itchiness, allergies, boils, insect repellant, ap-ap	0.00	1	0.809	0.809
Devil Sickness	*Barang*	0	-	0.857	0.867
Eye and Ear Related	Sore eyes, buog (ear infection)	0	0	1	-
Fever and Headache	Fever, headache	-	0	0.846	-
Gastro-intestinal and internal parasites	Gastric Illness, stomachache, diarrhea, deworming	0.36	-0.0833	0.818	-
Genito-urinary system related problems	Smooth delivery, bleeding after childbirth, relapse, breast pain,	0.3333	0	0.777	-
Infection	Dengue, chicken pox, malaria, leprosy	0.2	1	0.8333	-
Musculoskeletal and Other Pains	body pain/muscle pain, spasm, toothache	0.2	0	0.769	0.59
Neurologic disorders	Paralysis	0	-	0.842	0.842
Respiratory Disease	Cough	0.4	0.00	0.818	0.818
Weakness	Fainting, weakness	0.16667	-0.2	-0.2	1
Wound Healing	Wound bleeding, wound healing, swelling	-0.09	0.22	0.875	0.880
Miscellaneous	crying of baby, facilitate eruption of baby's teeth, facial wipes, to ward off snakes, facial, hair grower	0.25	-	0.795	-

(-) *– no reported incidence of the use of plant for treatment of the disease/ailment under the specific category*

with a value of 0.84 and 0.833 respectively. Plants noted in these particular categories are *lamibu*, *cabo negro* (*Cyathea contaminans* (Wall. ex Hook.) Copel.), *kamatesemala, tawa-tawa* (*Euphorbia hirta* L.), and *tino*. Freshly collected roots of *lamibu* with its aromatic smell are inhaled by a person experiencing nausea, while the stem of *cabo negro* (*Cyathea contaminans* (Wall. ex Hook.) Copel.) is shaved, exposed to smoke and then topically applied to an epileptic person. For *kamatesemala*, shoot of flower is extracted, its juice applied externally on areas with German measles or areas showing redness.

People in the Obo community have a high consensus with regards to the plants they utilize for treating and preventing diseases. The healer plays a vital role in the community, serving as source of information in the treatment of various illnesses in

the area. In fact, most young mothers sought advice from their community healer for their family's medical problems and thus become learned in medicinal plants. Sitio Lambila, where the study was conducted is a very remote area with no electricity and no constant supply of potable water. With these conditions, illnesses prevalent in the area are diarrhea and boils, which are associated with the lack of clean water supply (PGO-South Cotabato, 2010). According to the respondent, the community would be fortunate if once a month a barangay medical team could visit the area to provide very basic medical need. Thus, knowledge in plant use for its medicinal value proves to be essential in this remote community.

Respiratory diseases (0.4) showed the highest ICF, followed by gastrointestinal and internal parasite problems (0.36) and in close third is the genito-urinary related problem (0.33) in the T'boli community (Table 2). *Mayana* (*Plectranthus scutellarioides* (L.) R.Br.), *Kyobog, Lagundi (Vitex negundo* L). , and *Aritis-aritis* (*Hyptis capitata* Jacq).were used to treat cough. *Mansanitas* (*Ziziphus jujuba* Mill.), bayabas Psidium guajava L., *tawa-tawa* (*Euphorbia hirta* L.), *mayana* (*Plectranthus scutellarioides* (L.) R.Br.), *Aritis-aritis* (*Hyptis capitata* Jacq), *dila-dila*, *saging* (*Musa spp.*), *mama* (*Areca catechu* L) were taken orally for gastric problem such as stomachache, diarrhea, and worm infestation. *Lawaan* (*Shorea sp.*), *falsomangayan*, *carabao grass* (*Paspalum conjugatum* P.J.Bergius), *kokounbaya*, *kluonwaya*, *tawatawa* (*Euphorbia hirta* L.), *kuyoiwas*, *munot*, *fet* (Eleusine indica (L.) Gaertn.) *sampa-samplalukan* (*Phyllanthus niruri* L.), *kayu mlato* were used to treat reproductive related problem such as bleeding after delivery and to facilitate easy child delivery.

The Tagakaolo community in Brgy. Conel, has a high consensus on the plants they utilized to treat various diseases. Treatment for *bughat* showed the highest ICF followed by medicine to prevent or reduce bleeding (0.880) (Table 2). However, their pharmacopeia is not species-rich as very few usable plants were recorded. Moreover, the types of ailments could be treated by the assemblage of medicinal plants are less diverse. It is worth noting though that this IP community constitute only a small number of households who migrated from Davao del Sur.

The use of traditional medicine is common in many parts of the world particularly among IPs whose connection to their natural environment is undeniably an essential part of their culture (Trotter and Logan, 1986). This idea holds true in the area as shown by the present assessment of Bla'an, T'boli, Tagakaolo and Obo tribes. The ethnobotanical knowledge and practices of the four IP communities stems from its long history of use, familiarity to the effects, availability and nearness of resources and spiritual connection. This traditional practice together with limited access and services to primary health care leads to its popularity. A high consensus among informants from the Obo community of Lake Sebu, South Cotabato was observed in contrast to the very low consensus of informants on the use of medicinal plants in Blaan community of Upper Labay, General Santos City, and T'boli community of Maitum, Sarangani. However, the consensus among the informants from the Tagakaolo community of Brgy Conel, General Santos City was high.

Conclusion

The four indigenous people's communities widely practice the use of medicinal plants in treating diseases and are therefore rich in ethnomedicinal knowledge. In this era of modern health care, the use of floral resources integrated into their culture and the inadequate basic health care in these communities are the reasons for the fortitude and even popularity of this practice. The persistence of the use of medicinal plants throughout the generation and the high consensus of users in the community may be used as an indication of their efficacy. Indeed, indigenous communities are repository of rich pharmacopeia and, when explored, serves as guide in the discovery of novel drugs.

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