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Quantitative analysis and systematic review of the traditional plants used by Sama Tribe of Simunul Island, Tawi-Tawi, Philippines

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Abstract

This ethnobotanical study documents the medicinal plants that are utilized by the Sama tribe of the Simunul, Tawi-Tawi. It aimed to establish the quantitative analysis and systematic review of the ethno medicinal practices of the Sama Simunul, Tawi-Tawi. Snowball sampling was utilized as the sampling method and descriptive research design was utilized. Interviews and semi-structured questionnaires were translated into the Sama dialect. This was utilized in gathering the data from the 50 Sama healers residing at Simunul, Tawi-Tawi, and which majority of them were female. The collection and identification of plants, plants were pressed and mounted using the herbarium techniques, and the validation of the identified plant species was verified after. The systematic review was utilized to determine the active bio-isolates and bioactivities of the medicinal plants that are utilized by the Sama healers. Use-category, use-report, use value, informant consensus factor, and fidelity level were used for the quantitative ethno medicinal analysis. Forty-seven (47) medicinal plants were cited by the respondents and thirty (30) families were identified. *Lamiaceae* is the most widely used plant family by the Sama healers due to its medicinal constituents, which include a strong aromatic essential oil, tannins, saponins, and organic acids. The leaves were the most used for treatment. In terms of preparation, decoction was commonly used, and it was taken orally.

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Introduction

The foundation of medical care in developing nations is traditional medicine, which has been accepted and handed down by the local healers that are passed down from generation to generation since it is believed to be effective, safe, cost-effective, and accessible to the underprivileged and those residing in distant places (Baddu and Ouano 2018).

World Health Organization (WHO) stated that 60% of people worldwide utilize traditional medicine and in 80% of the world's poorest countries, basic medical care is almost solely provided by these methods, notably herbal medicines. Between 35,000 and 70,000 plant species are thought to be utilized medicinally worldwide, with about 7000 of them being native to South Asia. Approximately 1500 medicinal herbs utilized by Filipino traditional healers have been recognized, and 120 species possess their safety and efficacy verified by scientific study (Dapar *et al.*, 2020).

Medicinal plants have been employed as therapeutic alternatives that might be used especially for certain health issues and include a wide range of compounds that can be used to treat chronic as well as infectious conditions. They are high in secondary metabolites and essential oils that have medicinal value (Baddu and Ouano 2018). Further, Tantengco *et al.* (2018) mentioned that indigenous tribes in the Philippines have utilized plants as medicines to treat a variety of medical conditions like headaches, stomachaches, coughs, colds, toothaches, urinary tract infections, chickenpox, and dysentery.

The appalling state of poor people's health, particularly among indigenous peoples, has a dramatic influence on their quality of life in many rural areas of Mindanao, Philippines.

The concern is ascribed to a lack of access to both privately and publicly funded healthcare practitioners, as well as the high cost of synthetic medications. As a result, researchers are looking into alternative forms of treatment, like utilizing medicinal plants (Pucot *et al.*, 2019). The Subanen lumads, Muslim tribes of the Tausug, Sama, and Yakan, as well as Chavacano and Cebuano locals, reside in the southernmost region of the Philippines.

Each of these indigenous communities is rich in folkloric medicinal plant knowledge and practices that are passed down from one generation to the next (Madjos and Ramos 2021). Among these tribes, the Sama of Simunul, Tawi-Tawi also utilizes medicinal practices. Simunul is one of the coastal municipalities in the island province of Tawi-Tawi which is subdivided into fifteen (15) barangays (PhilAtlas 2021). The Sama people of Tawi-Tawi are called by their place of residence.

For instance, there are the Sama Balimbing, Sama Simunul, and Sama Sibutu. So, this study focused only on the traditional practices of the Sama Simunul where medicinal plants are commonly used for a variety of health-related concerns due to readily available sources.

Significance of the Study

This study will benefit society, those indigenous people who have limited access to health care services, contribute to the conservation of traditional knowledge of the Sama Tribe in Simunul, Tawi-Tawi, and will lead to additional pharmacological and clinical research to find new drugs to improve the health-care system considering that the herbal plants have been used in traditional medicine.

Scope and Delimitation of the Study

This study was only focused on the medicinal herbs utilized by the Sama Tribe of Simunul, Tawi-Tawi, which comprises of nine (9) barangays, are the Bagid, Bakong, Doh-Tong, Luuk Datan, Manuk Mangkaw, Maruwa, Mongkay, Sokah-Bulan, and Timundon in terms of the plant species used, parts of the plants, preparation, mode of administration and aliments treated using medicinal plants. The subject in this study consisted of only fifty (50) Sama Simunul "healers" residing at Simunul Island, Tawi-Tawi.

Objectives of the study

This study aims to establish a quantitative analysis and systematic review of the ethnobotanical practices of the Sama tribe in Simunul Island, Tawi-Tawi.

Specifically, this study aimed to:

1. Provide a qualitative profile of the medicinal herbs utilized by the Sama community in Simunul Island, Tawi-Tawi in terms of:
a) Plant species used.
b) Parts of the plants used.
c) Preparation of the herbal plants
d) Mode of administration
e) Ailments treated using herbal plants.

2. Determine the active bio-isolates and bioactivities of medicinal herbs utilized by the Sama community in Simunul Island, Tawi-Tawi through a systematic review of medicinal plants.

3. Conduct a quantitative ethnobotanical analysis by calculating the:
a) Use- report
b) Use- value
c) Fidelity level
d) Informant consensus factor

Materials and methods

Clearance for the Study

The researchers obtained ethics approval from the Western Mindanao State University-Research Ethics Oversight Committee (WMSU-REOC), Zamboanga City. Given that the study's respondents include indigenous people, formal approval has been requested from the municipal mayor, barangay captains, and the provincial director of the National Commission on Muslim Filipinos (NCMF). The exemption certification from the National Commission on Indigenous Peoples (NCIP)-IX was obtained because there is no current NCIP office in the Province of Tawi-Tawi. Moreover, the researchers/project proponents have submitted a completed application form to the appropriate provincial offices and agree to follow the rules and/or additional conditions.

Ethnobotanical Survey

The data were collected through semi-structured questionnaires and informal interview was conducted which was performed in the Sinama dialect for a minimum of ten minutes. The questions that have given were based on the traditional treatment utilizing herbal plants, specific parts of the herbal plants used, mode of preparation, mode of administration, and ailments being treated using medicinal plants (Abe and Ohtani, 2013).

Inclusion and Exclusion Criteria

Age

According to Nzimande *et al.* (2021) being over 18 years old and being a diviner, diviner trainee, herbalist, or herbalist trainee were requirements for study participation (Table 1).

Geographic origin

Locals from *Barangays* Bagid, Bakong, Doh-Tong, Luuk Datan, Manuk Mangkaw, Marowa, Mongkay, Sokah Bulan, and Timundun were selected since this study was mainly focused on the medicinal plants and practices from areas that are determined to be non-industrialized (Table 1).

Years of experience

According to the traditional medicine practice act (2000) a minimum of five years of relevant experience after completion in a recognized institution for traditional medicine (see Table 1).

Table 1. Inclusion and Exclusion Criteria in Selecting the healers and their practices in using medicinal plants.

Characteristics	Inclusion	Exclusion
Age	≥ 18 years old	< 18 years old
Geographic origin	Local healers residing at the parameter of Simunul, Tawi-Tawi	Local healers residing outside of Simunul, Tawi-Tawi
Years of experience	≥ 5 years of practice	< 5 years of practice

Collection and Identification of Plants

Samples of medicinal plants were collected with the assistance of the Sama healers. The collected plants were pressed on Herbarium sheets following the herbarium process.

These specimens have been identified by the botanist from the Jose Vera Santos Memorial Herbarium (PUH) of the University of the Philippines Diliman and will be stored in Western Mindanao State University's Department of Biological Sciences where they will serve as documentation of the medicinal plants utilized by the Sama Simunul. The hierarchical classification and description of plant samples have been obtained, and the specimens' local names have been linked also to the Dictionary of Philippines Plant Names. All binomial names have their spelling, synonyms, and family classification verified using Tropicos, World Flora Online, The Plant List, Global Biodiversity Information Facility, and the International Plant Names Index.

Quantitative Ethnobotanical Analysis

Use categories

Data on medicinal plants has been categorized in this study into 16 categories, most of which are based on the WHO's (World Health Organization, 2011) International Classification of Diseases (ICD-10). Categories include certain infectious and parasitic diseases (1), neoplasms, tumors, and tissue proliferation (2), Endocrine, nutritional, and metabolic diseases (3), neurological diseases (4), eye diseases (5), ear diseases (6), cardiovascular diseases (7), respiratory diseases (8), gastrointestinal diseases (9), skin and it is a subcutaneous tissue disease (10). Diseases of the musculoskeletal system and connective tissue (11), diseases of the genitourinary system (12), applications in pregnancy and childbirth, postpartum and infant care (13), symptoms, signs and abnormal clinical findings not elsewhere classified (14), Injury, poisoning and certain other consequences of external causes (15) and factors affecting one's health state and use of medical services (16) (Ong and Kim 2014).

Use- report

In this study, the researchers evaluated the following factors to determine the use-report of the plants. Each time a plant is indicated as being utilized for a certain use, that use-report counts as one. Even when an informant utilizes a plant for many uses that fall into the same category, it is still recognized as a single use-report. A multiple use-report will be assessed if at least two informants mention the same plant for the same reason (Dapar *et al.*, 2020).

Use-value

To calculate the Use-value, researchers applied this formula:

UV=(∑Ui)/n

Where *n* denotes the overall number of informants and *Ui* is the number of use-reports reported by each informant for a particular species. Use-values for a plant are high when there are numerous reports of its use, indicating that the plant is essential, and low (around zero) when there are few reports. It enables the provision of a quantitative measure for the relative importance of locally recognized plant species (Ducusin, 2017).

Informant Consensus Factor

Researchers used the following formula to determine the Informant Consensus Factor (ICF):

$ICF = (N_{ur} - N_t)/(N_{ur} - 1)$

where *Nur* is the total number of informant usage reports for each category, and *Nt* is the total number of taxa utilized for a certain category. For a given category, just one or a small number of plant species are reported to be utilized by a large percentage of informants, yielding high ICF values (which are close to 1.00), while low ICF values signify disagreement among informants over the best plant to employ. ICF can thus be used to pinpoint particularly interesting species for the search for bioactive compounds. It is used to assess how well the informants' knowledge of each category of medicinal plants agrees with one another (Dapar *et al.,* 2020).

Fidelity Level

To calculate the Fidelity level researchers used the formula of:

$$FL\ (\%) = \frac{I_P}{I_u} 100$$

Iu is the overall number of informants indicating the plant for any use or purpose regardless of category, and *Ip* is the number of informants who independently suggested a certain species for a specific ailment.

The highest value (1.00) indicates a high level of informant agreement demonstrating the efficacy of medicinal herbs in each category of condition (Heinrich *et al.,* 1998), however, a minimum value of 0.00 denotes that there was no information sharing between the informants (Abu-Irmaileh and Afifi, 2003).

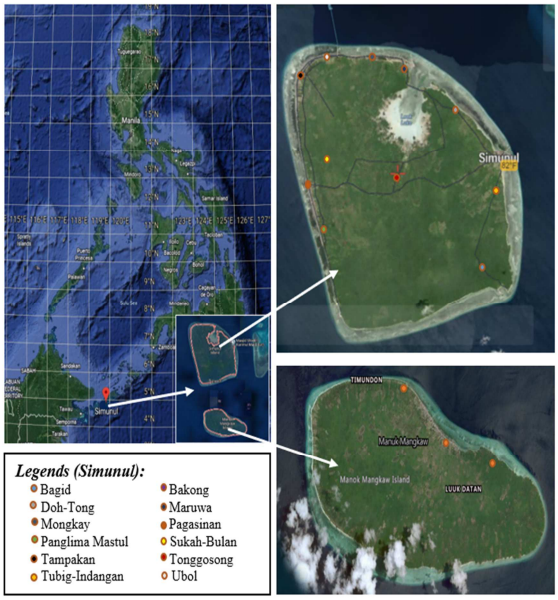

Fig. 1. Location of Simunul Island and the Fifteen Barangays.

Systematic Review

Data mining in systematic reviews was used as a pattern by Alebie *et al.* (2017). A web-based systematic research literature technique was used as part of the search strategy. A variety of search techniques were utilized to gather journal articles on ethnobotanical or ethno medicinal plants that would be used in traditional practices. Look for published MSc/Ph.D. theses using the Google search engine and local university websites and utilize worldwide scientific databases like PubMed, Science Direct, Web of Science, and Google Scholar to identify journal articles that have already been published.

The results of the search were checked twice: the first step was involved reviewing the titles and abstracts of identified journal articles and theses. Next, pertinent prospects have been downloaded and reviewed for inclusion (Madjos and Ramos 2021).

Data Analysis

For descriptive statistics, the researcher used the SPSS software tools. The family was alphabetically organized and a thorough review of the medicinal plants' scientific name (with authority), local vernacular term (as common names), Tagalog name/English names, parts used, preparation, mode of application and administration was included. Institutions conducting published research or unpublished these has been highlighted. The bioactivities of medicinal herbs, bioactive isolated natural compounds, and their claimed uses have all been considered in the complete literature research (Madjos and Ramos, 2021).

Result and discussion

Result

Demography of Informants

A total of fifty (50) respondents were included in this study, where majority came from barangay Doh-Tong (9), and least from the barangays of Bakong and Mongkay (4). These were equivalent to 18% and 8%, respectively. In terms of age, majority of the respondents were 35-49 years old which obtained twenty (40%) and least were four (8%) came from 18-34 years old. Of this total number, thirty-seven (74%) were females and thirteen (26%) were males (Table 2).

Table 2. Sociodemographic profile of Sama healers of Simunul, Tawi-Tawi

Category	Subcategory	No. of informants	% of informants
Barangay	Bagid	5	10
	Bakong	4	8
	Doh-tong	9	18
	Luuk Datan	5	10
	Manuk Mangkaw	7	14
	Marowa	5	10
	Mongkay	4	8
	Sokah-Bulan	6	12
	Timundun	5	10
Age	18-34 years old	4	8
	35-49 years old	20	40
	50-65 years old	18	36
	More than 65 years old	8	16
Gender	Male	13	26
	Female	37	74
Education Level	Primary Education	11	22
	Secondary Education	18	36
	Higher Education	21	42
Civil Status	Single	10	20
	Married	33	66
	Widowed	7	14

In terms of educational attainment of the Sama healers, higher education with twenty-one (42%) earned the highest percentage, while only eleven (22%) achieved primary education. As for their civil status, majority of them were married (33) which obtained the highest percentage (66%), whereas only 7 (14%) were obtained in widowed (Table 2).

Traditional Practices of Medicinal Plants

There were 47 plant species identified and classified into their respective families. The data was collected using a semi-structured questionnaire and an informal interview. *Abokado* (4), *aloe vera* (9), *alugbati* (2), *balabat* (1), *bawang poteh* (22) *bawing* (14), *biyabas* (33), *buyu* (6), *dulow* (3), *gumamela* (27), *ibah* (3), *iyah-iyah* (6), *kabasi* (1), *kalamansi* (3), *kalamunggay* (4), *kamatis* (1), *kambang tulih* (7), *kapal-kapal* (24), *lagundi* (9), *lakdan bulan* (15), *lansang-lansang* (3), *lara* (7), *luuyah* (13), *mangkuru* (13), *maras* (14), *mayana* (9), *nangka* (8), *nangkabalanda* (15), *paliya* (21), *pandan* (3), *paragis* (7), *patawali* (4), *pait-pait* (24), *patik-patik* (46), *pijuhun* (5), *pilarang* (42), *pinggi kayuh* (7), *salimbangun* (1), *santul* (2), *sibukow* (3), *sibuyas* (2) , *sillay* (25), *sokah* (2), *sokah-sokah* (15), *sulasi* (13), *tangan-tangan* (23), and *timun* (3).

These plant species mentioned by the Sama healers of Tawi-Tawi belong to 30 families as shown in Table 3: *Acanthaceae* (2), *Amaryllidaceae* (3), *Annonaceae* (1), *Arecaceae* (1), *Asphodelaceae* (1), *Asteraceae* (1), *Basellaceae* (1), *Caricaceae* (1), *Crassulaceae* (1), *Cucurbitaceae* (3), *Euphorbiaceae* (3), *Fabaceae* (3), *Lamiaceae* (4), *Lauraceae* (1), *Malvaceae* (1), *Meliaceae* (1), *Menispermaceae* (1), *Moraceae* (1), *Moringaceae* (1), *Myrtaceae* (1), *Oxalidaceae* (1), *Pandanaceae* (1), *Phyllanthaceae* (2), *Piperaceae* (2), *Poaceae* (2), *Rubiaceae* (1), *Rutaceae* (1), *Solanaceae* (2), *Verbenaceae* (1), and *Zingiberaceae* (2). The majority of these plant species utilized to treat ailments such as hypertension, cough, postpartum care, fever, and boils.

Table 3. Showing the collected medicinal plant samples, parts used, preparation, mode of administration, and ailments the plants treated.

Scientific name	Vernacular name	Common name	Parts used	Preparation	Mode of administration	Ailments	No. of Use Report	No. of species used per family
			Acanthaceae					
Andrographis paniculata Nees	Pait-Pait	Bitterweed	Leave, Whole plants	Infusion with water/ Decoction	Oral	Diabetes, Blurry eyes, Hypertension, Fever, Detoxification	24	2
Justicia gendarussa	Salimbangun	willow-leaved justicia	Leaves	Heating	Topical application	Dislocation	1	
			Amaryllidaceae					
Allium cepa L.	Sibuyas	Onion	Specialized stem	Washed	Topical application	Insect bites, Mild burns	2	
Allium sativum L.	Bawang poteh	Garlic	Clove/ Specialized stem	Pounding, No preparation	Ingestion	Hypertension, Diabetes, Fever, Toothache	22	3
Crinum asiaticum	Pijuhun	Giant crinum	Leaves	Heating	Topical application	Inflammation		
			Bark	Extraction	Oral	Sore throat	5	
			Annonaceae					
Annona muricata L.	Nangka balanda	Guyabano	Leaves	Decoction	Oral	U.T.I, Hypertension, Postpartum care	15	1
			Fruit	Washed	Ingestion			
			Arecaceae					
Cocos nucifera	Sokah	Coconut	Exocarp	Decoction	Topical application, Oral	Postpartum	3	1
			Asphodelaceae					
Aloe vera	Aloe vera	Aloe vera	Leaves	Extraction	Topical application	Hair problems, Inflammation	9	1

Scientific name	Vernacular name	Common name	Parts used	Preparation	Mode of administration	Ailments	No. of Use Report	No. of species used per family
			Asteraceae					
Blumea balsamifera (L.) DC.	Lakdan Bulan	Sambong	Leaves	Decoction	Oral	Cough, Fever, Hypertension, Diarrhea	15	1
			Basellaceae					
Basella alba	Alugbati	Malabar spinach	Leaves	Pounding	Topical application	Boils, wounds	2	1
			Caricaceae					
Carica papaya	Maras	Papaya	Fruit	No preparation	Ingestion	Constipation, Hypertension		1
			Leaves	Infusion with water, Deccoction	Oral	Fever, Malaria, Dengue	14	
			Crassulaceae					
Kalanchoe pinnata	Kapal-kapal	Cathedral bells	Leaves	Pounding	Topical application	Fever, joint pain, abscess, boils, headache	24	1
			Cucurbitaceae					
Momordica charantia	Paliya	Ampalaya/Bitter melon	Fruit	Extraction	Oral	gastroenteritis (infants), Diabetes, Hypertension, Diarrhea, Detoxification, Phlegm, Emetic	21	3
			Leaves	Decoction				
Cucumis sativus	Timun	Cucumber	Fruit	Washed	Topical application	Cheilitis	3	
Cucurbita maxima	Kabasi	Squash	Fruit	Decoction	Ingestion	Blurry eyes	1	
			Euphorbiaceae					
Euphorbia hirta	Patik-Patik	Hairy Spurge	Whole plant	Decoction	Oral	Fever, Dengue, Malaria, cough	46	3
Jatropha curcas	Tangan-Tangan	Physic nut	Leaves	Pounding, Heating	Topical application	Boils, Cheilitis, abscess, inflammation	23	
Manihot esculenta Crantz	Panggih kayu	Cassava	Leaves, Stem,	Decoction	Oral	Detoxification, Diarrhea, Fever, anemia	7	
			Fabaceae					
Caesalpinia sappan L.	Sibukow	Sappan wood	Bark, Stem	Decoction	Oral	Anemia	3	3
Mimosa pudica L.	Iyah-iyah	Makahiya / Sensitive plant	Leaves, Roots, Whole plant	Decoction	Oral	U.T.I, Hypertension	6	
				Pounding	Topical application	Inflammation		
Sesbania grandiflora (L.) Pers.	Kambang tuli	West indian pea	Bark	Infusion with water	Oral	Sore throat, Ulcer	7	
			Leaves	Decoction	Oral	Fever, Cheilitis		
			Lamiaceae					
Coleus scutellarioides (L.) Benth	Mayana	Coleus	Leaves	Pounding	Topical application	Boils, Abscess	9	4
Ocimum africanum	Sulasi	Lemon basil	Leaves, Flower	Pounding	Inhalation	Vertigo, Fainting, Fever	13	
Origanum vulgare L.	Pilarang	Oregano	Leaves	Infusion with water/ Decoction	Oral	Cough, Fever, Fatigue, Dyspnea	42	
Vitex negundo L.	Lagundi	Five-leaved chaste tree	Leaves	Decoction	Oral	Cough, Fever	8	
			Lauraceae					
Persea americana	Abokado	Avocado	Leaves	Decoction	Oral	Stomachache, Diarrhea, U.T.I.,	4	1
			Malvaceae					
Hibiscus rosa-sinensis	Gumamela	China rose	Flower, leaves	Pounding	Topical application	Boils	27	1
				Infusion with water	Oral	Hypertension		

Scientific name	Vernacular name	Common name	Parts used	Preparation	Mode of administration	Ailments	No. of Use Report	No. of species used per family
			Maliaceae					
Sandoricum koetjape	Santul	Santol	Bark	Decoction	Oral	Diarrhea		1
			Leaves	Decoction	Topical application	Postpartum care	2	
			Menispermaceae					
Tinospora crispa (L.) Hook.f. & Thomson	Patawali	Petawali	Stem, Bark	Infusion with water, decoction	Oral	Hypertension, fever, Diabetes	4	1
			Moraceae					
Artocarpus heterophyllus Lam.	Nangka	Jackfruit	Bark, Leaves	Decoction	Oral	U.T.I, Hypertension, Diabetes	8	1
			Moringaceae					
Moringga oleifera Lam.	Kalamunggay	Malunggay / horse raddish	Leaves	Infusion with water, Extraction	Oral	Diabetes, Hypertension, Anemia	4	1
			Myrtaceae					
Psidium guajava	Biyabas	Guava	Fruit	No preparation	Ingestion	Diarrhea	33	1
			Leaves	Decoction	Oral	Diabetes, Fever, Postpartum care, Acnescars, Diarrhea, Detoxification		
					Topical administration	Skin rashes		
			Oxalidaceae					
Averrhoa bilimbi L.	Ibah	Bilimbi	Fruit	Decoction, Washed	Oral, Ingestion	Arthritis, Headache	3	1
			Leaves	Pounding	Topical application	Inflammation		
			Pandanaceae					
Pandanus amaryllifolius	Pandan	Pandan	Leaves, Roots	Decoction	Oral	Hypertension, Body ache	3	1
			Phyllaanthaceae					
Phyllanthus niruri	Sokah-Sokah	Gale of the wind	Whole plant	Pounding	Topical application	Skin rashes, inflammation	11	2
			Leaves	Decoction	Oral	Hypertension		
Breynia oblongifolia	Balabat	Coffee bush	Leaves	Pounding	Topical application	Wounds	1	
			Piperaceae					
Peperomia pellucida	Lansang-Lansang	pepper elder	Leaves, Roots	Decoction	Oral	Kidney problems, U.T. I	3	
Piper betle (L.)	Buyu	Betel	Leaves	Washed, Extraction	Oral	Hypertension, Diabetes		2
				Pounding	Topical application	Bleeding	6	
			Poaceae					
Cymbopogon citratus	Sillay	Lemon Grass	Roots, Leaves, Whole plant	Decoction, Infusion with water	Oral	Fever, Hypertension, Relapse	25	
Eleusine indica (L.) Gaertn	Paragis	Goose grass	Leaves, Roots	Infusion with water, Decoction	Oral	Fever, Hypertension, Cheilitis, Cough	7	2
			Rubiaceae					
Morinda citrifolia L.	Mangkuru	Noni	Fruit	Washed	Ingestion	Hypertension, Tumor, Fever	13	1
			Leaves	Heating	Topical application	Headache, inflammation		
			Rutaceae					
Citrofortunella microcarpa	Kalamansi	Calamansi	Fruit	Extraction	Oral	Cough	3	1
			Leaves	Decoction		Diarrhea		
			Solanaceae					
Capsicum frutescens L.	Lara	chili pepper	Leaves	Pounding	Topical Application	Boils, Abscess	7	
				Decoction	Oral	Fever		2
Solanum lycopersicum L.	Kamatis	Tomato	Fruit	No preparation	Topical application	Wound	1	

Scientific name	Vernacular name	Common name	Parts used	Preparation	Mode of administration	Ailments	No. of Use Report	No. of species used per family
			Verbenaceae					
Lantana camara	Bawing	Lantana	Leaves, Roots	Decoction	Oral	Hypertension, Diabetes	13	1
			Zingiberaceae					
Curcuma longa L.	Dulow	Turmeric	Whole plant	Pounding	Topical application	Inflammation/	3	2
				Infusion with water	Oral	Diabetes		
Zingiber officinale	Luuya	Ginger	Rhizome	Decoction	Oral	Hypertension, cough, colds, sore throat	12	

Qualitative Profile

Among the parts of the medicinal plant, leaves (54%) were the most used part of the plant for treatment, while exocarp (0.36%) was least used part (See Fig. 2). The mode of preparation of these medicinal plants, decoction (46%) got the highest citation whereas steaming of the medicinal plants (0.18%) achieved the lowest (See Fig. 3). Oral (62%) was the most common mode of preparation whereas inhalation (2%) was the least common mode (Fig. 4).

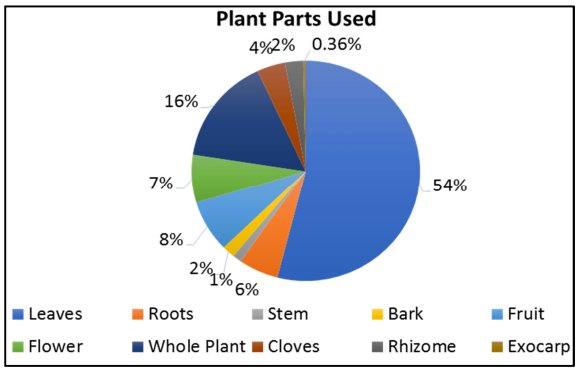

Fig. 2. Plant parts used by the Sama healers for medicinal applications.

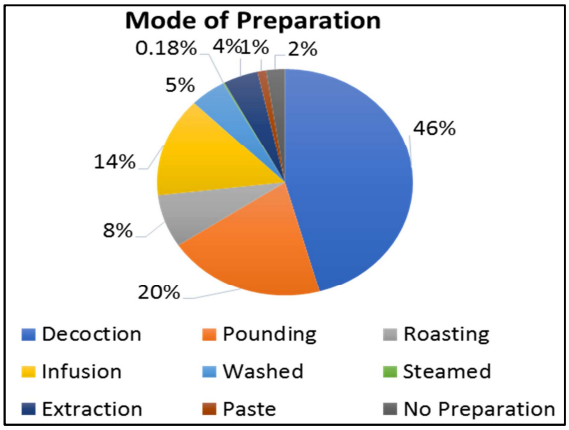

Fig. 3. Mode of preparation of medicinal plants used by the Sama Simunul healers.

Forty-two (42) ailments were identified and among these ailment hypertension obtained the highest scored which garnered 97 (19.25%) and was the most frequently reported case while cold, malaria, dyspnea, phlegm, stomachache, gastroenteritis, acne scar, fatigue, body ache, mild burn, and insect bite with 1(0.2%) was the least (Appendix 7/Fig. 5).

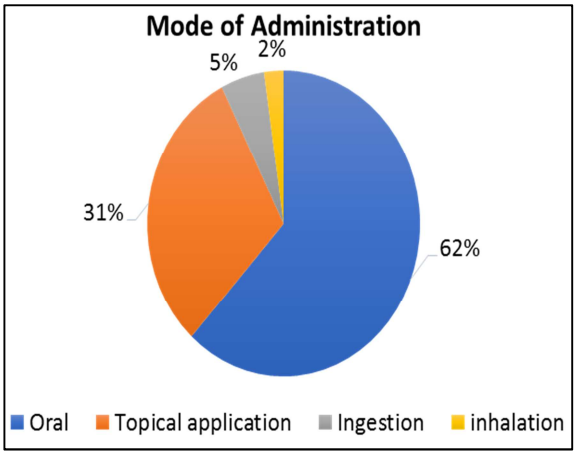

Fig. 4. Mode of administration of medicinal plants used by the Sama Simunul healers.

Quantitative Ethnomedicinal Analysis

The category 14 obtained the highest cited for use-report (111) with use-value of 2.22. On the other hand, category 2 got the lowest for use-report (2) with use-value of 0.04. Category 2 obtained the highest value for the Informant consensus factor (ICF) with an ICF value of 1 and the lowest was category 15 which obtained an ICF value of 0.33. Lastly, for Fidelity level category 11 got the highest value with 79.16% wherein *Jatropha curcas* was the most cited plant. In contrast, category 15 obtained the lowest with 6.06% fidelity level wherein *Psidium guajava* was the cited plant (Table 4).

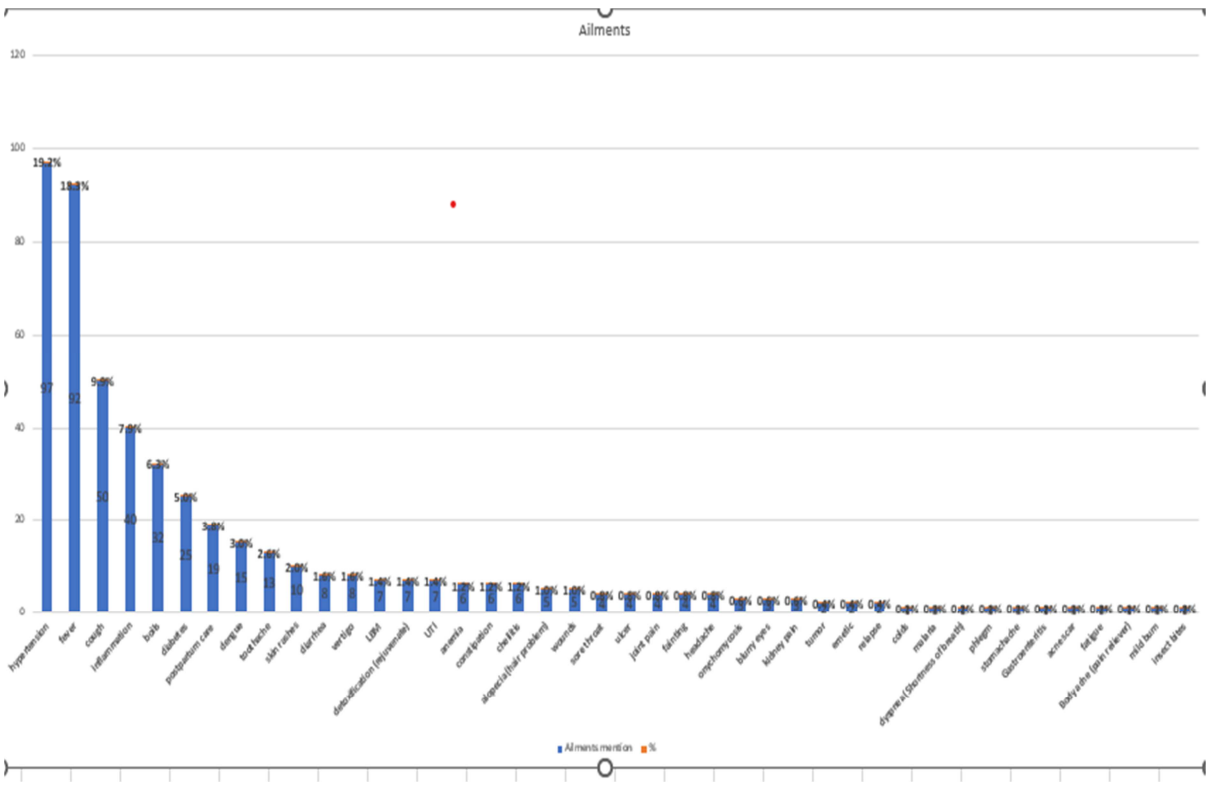

Fig. 5. Ailments treated using herbal plants.

Table 4. Quantitative analysis of plants showing the use category, use report (UR), use-value (UV), fidelity level (FL), and informant consensus factor (ICF).

UC No.	UC names and abbreviations	Reported diseases or uses under each UC	Most cited species for each category	No. of species	No. of use-report	% of all use-reports	UV	ICF	FL%
1	Certain infectious and parasitic diseases	Dengue, Malaria, Onychomycosis, Colds	*Euphorbia hirta*	4	20	3.85%	0.4	0.84	30.43%
2	Neoplasms, tumors, and tissue growth	tumor	*Morinda citrifolia L.*	1	2	0.38%	0.04	1	15.38%
3	Endocrine, nutritional and metabolic diseases	diabetes	*Momordica charantia*	9	25	4.80%	0.5	0.67	33.33%
4	Disease of the nervous system	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	Diseases of the eye	Blurry eyes	*Andrographis paniculata*	2	3	0.57%	0.06	0.5	8.33%
6	Diseases of the ear	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Diseases of the circulatory system	Anemia, Hypertension	*Cymbopogon citratus*	22	103	19.80%	2.06	0.79	68%
8	Diseases of the respiratory system	Cough, Phlegm, Sore throat, dyspnea	*Origanum vulgare L*	11	56	10.76%	1.12	0.81	73.80%
9	Disease of the digestive system	Diarrhea, Constipation, Toothache, Emetic, Gastroenteritis, Ulcer, Detoxification	*Allium sativum*	10	49	9.42%	0.98	0.81	59.09%

UC No.	UC names and abbreviations	Reported diseases or uses under each UC	Most cited species for each category	No. of species	No. of use-report	% of all use-reports	UV	ICF	FL%
10	Disease of the skin and subcutaneous tissue	Boils, skin rashes, alopecia, acne, cheilitis, Abscess	*Hibiscus rosa-sinensis*	12	68	13.07%	1.36	0.83	66.66%
11	Disease of the musculoskeletal system and connective tissue	inflammation, Joint pain (Arthritis), Dislocate	*Jatropha curcas*	12	45	8.65%	0.9	0.75	79.16%
12	Disease of the genitourinary system	Kidney pain, Urinary tract infection	*Peperomia pellucida*	5	10	1.92%	0.2	0.55	66.66%
13	Uses in pregnancy and childbirth, post-partum care, and infant care	Postpartum care	*Psidium guajava*	4	19	3.65%	0.38	0.83	35.48%
14	Symptoms, signs and abnormal clinical findings not elsewhere classified	Vertigo, Fainting, Headache, Relapse, Fatigue, Body ache, Fever	*Euphorbia hirta*	19	111	21.39%	2.22	0.84	67.39%
15	Injury, poisoning and certain other consequences of external causes	Wounds, mild burn, Insect bites	*Psidium guajava*	5	7	1.34%	0.14	0.33	6.06%
16	Factors influencing health and contact with health services	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

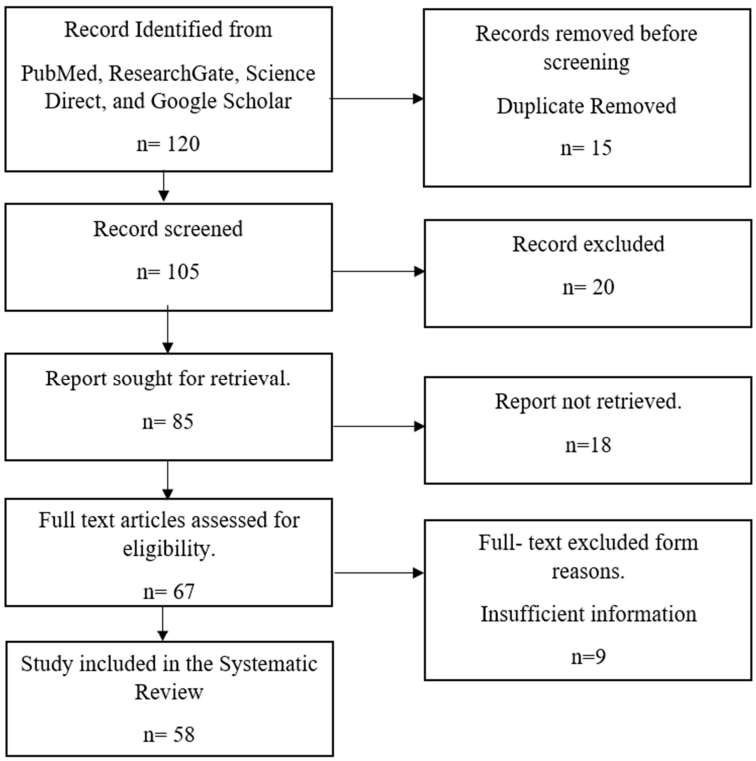

Fig. 6. Identification of studies using databases adapted from Page *et al.*, (2020).

Systematic Review

After removing duplicates and irrelevant articles a total of 58 studies were included to support the result of this study. The available information on these genera was collected from scientific databases and cover from 2003 to 2022. In accordance with Liberati and colleagues (2009), the PRISMA framework ensures a transparent and complete reporting of systematic reviews and meta-analyses. Further, PRISMA is primarily concerned with reporting reviews that assess the effects of interventions, but it may also serve as a foundation for reporting systematic reviews with goals other than assessing treatments (Page *et al.*, 2021) (Fig. 6).

Table 5. Systematic Review of Medicinal plants mentioned by the Sama healers of Simunul, Tawi-Tawi, Philippines

Scientific name	Parts used	Ailment	Systematic review		Reference
			Bioactivities	Bio-isolates	
Andrographis paniculata Nees	Leaves/ Whole plants	Diabetes, Blurry eyes, Hypertension, Fever, Detoxification	anti-inflammatory, antimicrobial, anti-hypertensive, anti-diabetes, anti-infection, anti-oxidation	diterpenoids, flavonoids, and polyphenols	(Chao and Lin, 2010)
Justicia gendarussa	Leaves	Inflammation	Anti-inflammatory, anti-arthritic	Flavonoids, β-sitosterols	(Paval *et al., 2009*)
Allium cepa	Stem	Insect bites, Mild burns	antimicrobial, anti-inflammatory	flavonoids, phenolic acids, tannins, lignans, and coumarins	(Zhao *et al.,* 2021)
Allium sativum	Clove	Hypertension, Diabetes, Fever	Anti-bacterial, Antifungal, Antiviral, and Anticancer activity	alliin, allicin, ajoenes, vinyldithiins, and flavonoids	(Batiha *et al.*, 2020)
Crinum asiaticum	Leaves Bark	Inflammation Sore throat	Anti-inflammatory	Alkaloids, amides, phenolic compounds, flavonoid	(Sun *et al.*, 2009; Mahomoodally *et al.,* 2020)
Annona muricata L.	Leaves Fruit	U.T.I, Hypertension, Postpartum care	Hypotensive effect	alkaloids, isoquinoline, coreximine, and anomurine	(Nwokocha *et al.,* 2012)
Cocos nucifera	Exocarp	Postpartum	Antioxidant, Anti-inflammatory, antimicrobial	terpenoids, alkaloids, resins	(Lima *et al.*, 2015; Obidoa *et al.,* 2009)
Aloe vera	Leaves	Hair problems, Inflammation,	anti-inflammatory, antimicrobial	Alkaloids, flavonoids, tannins	(Nalimu *et al.*, 2021)
Blumea balsamifera (L.) DC.	Leaves	Cough, Fever, Hypertension, Diarrhea	Analgesic, Antibacterial, Anti-pyretic, Antifungal, Antibacterial, Antifebrile activity	Sesquiterpenoid	(Bhuiyan *et al.,* 2009)
Basella alba	Leaves	Boils, wounds	anti-bacterial, anti-inflammatory, anti-proliferative	Phenolic and Flavonoid	(Kumar *et al.,* 2018)
Carica papaya	Fruit Leaves	Constipation, Hypertension Fever, Malaria, Dengue	anti-inflammatory, antiulcer, antioxidant, antibacterial Antimicrobial, antioxidant	phenolics, flavonoids, and alkaloids tannin, saponin, alkaloid, flavonoid, and glycoside	(Sharma *et al.,* 2020)
Kalanchoe pinnata	Leaves	Fever, joint pain, abscess, boils, headache	Antimicrobial, antiviral, anti-inflammatory,	flavonoids, triterpenes, sterols, bufadienolides, and organic acids	(Obregon-Diaz *et al.,* 2018)
Momordica charantia	Fruit Leaves	gastroenteritis (infants), Diabetes, Hypertension, Diarrhea, Detoxification, Phlegm, Emetic	Antidiabetic, anticancer, anti-inflammation, antivirus, and cholesterol-lowering effects	triterpene, proteid, steroid, alkaloid, inorganic, lipid, and phenolic compounds	(Joseph and Jini, 2013)
Cucumis sativus	Fruit	Cheilitis	anti-inflammatory, antifungal, antibacterial	saponins, glycosides, terpenes, phenolics, alkaloids, flavonoids, and tannins	(Sari *et al.*, 2021)
Euphorbia hirta	Whole plant	Fever, Dengue, Malaria, cough	Antibacterial, Antimalarial, Anti-inflammatory,	alkanes, triterpenes, phytosterols, tannins, polyphenols, and flavonoids.	(Kumar *et al.,* 2010)
Jatropha curcas	Leaves	Boils, Cheilitis, abscess, inflammation,	anti-inflammatory, antioxidant, antimicrobial, antiviral	diterpenoids, sesquiterpenoids, alkaloids, flavonoids, phenols, lignans, coumarins and cyclic peptides	Abdelgadir and Van Staden 2013)
Manihot esculenta Crantz	Leaves, Stem,	Detoxification, Diarrhea, Fever, anemia	antimicrobial, antiulcer, and anti-hyperlipidemic, anti-inflammatory, anthelmintic, antiseptic, antibacterial	alkaloids, steroids, flavonoids, and saponins	(Olaniyan and Ajayi 2021)
Caesalpinia sappan L.	Bark, Stem	Anemia	antiviral antimicrobial, antioxidant	brazilin, protosappanin, and chalcone.	(Niu *et al.,* 2020)
Mimosa pudica L.	Leaves, Roots, Whole plant	U.T.I, Hypertension Inflammation	Antiulcer, Antimicrobial, Antioxidant	alkaloid, glycoside, flavonoid and tannins	(Azmi *et al.*, 2011)
Cucurbita maxima	Fruit	Blurry eyes	Antioxidant	polyphenols, phytosterols, and tocopherols	(Dubey 2012)
Sesbania grandiflora (L.) Pers.	Bark Leaves	Sore throat, Ulcer Fever, Cheilitis	Antioxidant, antimicrobial Antibacterial, antioxidant, anti-inflammatory	phenolic acids, flavonoids, and tannin alkaloids, flavonoids, glycosides, tannin, anthraquinone, steroid, pholobatannins, and terpenoids	Mohiuddin, 2019; Anantaworasakul *et al.,* 2017)

Scientific name	Parts used	Ailment	Systematic review		Reference
			Bioactivities	Bio-isolates	
Coleus scutellarioides (L.) Benth	Leaves	Boils, Abscess	Antimicrobial, Antioxidant, anti-inflammatory, antiviral	alkaloids, tannins, flavonoids, saponins terpenoids.	(Yanto *et al.,* 2020)
Ocimum africanum	Leaves, Flower	Vertigo, Fainting, Fever	Antioxidant, antimicrobial, anti-inflammatory	Phenolic acids and flavonol-glycosides	(Aminah and Wantini, 2022)
Origanum vulgare L.	Leaves	Cough, Fever, Fatigue, Dyspnea	Antimicrobial, antiviral, antioxidant, anti-inflammatory	Polyphenols, triperpenoids, sterols	(Oniga *et al.,* 2018)
Vitex negundo L.	Leaves	Cough, Fever	Antibacterial activity	Alkaloid, Carbohydrate, Tannin, and Phenol, Flavonoid and Gum and Mucilage	(Panda *et al.,* 2009)
Persea americana	Leaves	Stomachache, Diarrhea, U.T.I. Fever Boils	antiviral, analgesic and anti-inflammatory activities	Flavonoids, megastigmane glycosides, lignans	(Park *et al.,* 2019)
Hibiscus rosa-sinensis	Flower, leaves	Hypertension	Antioxidant, Antipyretic, Analgesic, Spasmolytic, and Wound- healing activity.	Flavonoid and Tannin	(Krishnaiah *et al.,* 2009)
Sandoricum koetjape	Bark	Diarrhea	Antifungal, anti-angiogenic	Alkaloid, triterpenoids	(Wirata *et al.,* 2021)
	Leaves	Postpartum care	Anti-inflammatory, anti-angiogenesis		
Tinospora crispa (L.) Hook.f. & Thomson	Stem, Bark	Hypertension, fever, Diabetes	antioxidant, immunomodulatory, cytotoxic, antimalarial, cardioprotective, and anti-diabetic activities	alkaloids, flavonoids, and flavone glycosides, triterpenes, diterpenes and diterpene glycosides, cis clerodane-type furanoditerpenoids, lactones, sterols, lignans, and nucleosides.	(Jantan *et al.,* 2016)
Artocarpus heterophyllus Lam.	Bark, Leaves	U.T.I, Hypertension, Diabetes	Antibacterial activity	Glycosides, Terpenoids, Alkaloids, and Saponin	(Binumol and Sajitha, 2013)
Moringga oleifera Lam.	Leaves	Diabetes, Hypertension, Anemia	Hypotensive, anti-inflammatory, Anti- anemic activity	Flavonoid, Alkaloid, Saponin, Tannin, and Glycoside	(Vergara-Jimenez *et al.* 2017)
Psidium guajava	Fruit	Diarrhea	Antimicrobial, Antioxidant, Cytotoxic activity	Terpenoid, Tannins, Steroids, Flavonoids, Saponins, and Alkaloids	(Raj *et al.,* 2020)
	Leaves	Diabetes, Fever, Postpartum care, Acne scars, Diarrhea, Detoxification, Skin rashes			
Averrhoa bilimbi L.	Fruit	Arthritis, Headache	Antioxidant, anti-inflammatory	alkaloid, tannins, saponins, flavonoids, cardiac glycosides, glycosides, triterpenes, phenols, and carbohydrates.	(Alhassan and Ahmed, 2016)
	Leaves	inflammation			
Pandanus amaryllifolius	Leaves, Roots	Hypertension, Body ache	antiviral, antioxidant, antihyperglycemic, anticancer, antimicrobial activities	alkaloids, terpenoids, flavonoids, saponins, anthraquinone glycoside and cardiac glycoside	(Bhuya and Sonowal, 2021)
Peperomia pellucida	Leaves, Roots	Kidney problems, U.T. I	Antidiarrhoeal, Antimicrobial, Anti-inflammatory, Antioxidant	Patuloside A, Dillapiolle, and Pachypophyllin	(Kartika *et al.,* 2016)
Breynia oblongifolia	Leaves	Wounds	Antibacterial, anti-inflammatory	caffeine, chlorogenic acids (CGAs), trigonelline, tryptophan alkaloids, diterpenes	(Saadullah *et al.,* 2022)
Phyllanthus niruri	Whole plant	Skin rashes, inflammation	anti-hypertensive, antiviral, anti-plasmodial, antioxidant, anti-inflammatory	lignans, tannins, coumarins, terpenes, flavonoids, alkaloids, saponins and phenylpropanoids	(Bagalkotkar *et al.,* 2006)
	Leaves	Hypertension,			
Piper betle (L.)	Leaves	Hypertension, Diabetes Bleeding	Antibacterial, Antioxidant, Anti-inflammatory, Antidiabetic	hydroxychavicol, eugenol, and gallic acid	(Nguyen *et al.,* 2020)
Cymbopogon citratus	Roots, Leaves, Whole plant	Fever, Hypertension, Relapse	Anti-hypertensive, Anti-inflammatory, Antioxidant, Antimicrobial	Terpenes, alcohol, ketones, aldehyde, and esters.	(Velazquez *et al.,* 2016; Shah *et al.,* 2011)
Eleusine indica (L.) Gaertn	Leaves, Roots	Fever, Hypertension, Cheilitis, Cough	antioxidant, anti-inflammatory, antimicrobial, antidiabetic, antipyretic, antiplasmodial, antiviral, hepatoprotective, and urolithiasis	sterol glucosides, flavonoids, phenolic, amino acids	(Sukor *et al.,* 2021)
Morinda citrifolia L.	Fruit	Hypertension, Tumor, Fever	antioxidant, anticarcinogenic, neuroprotective, and anticonvulsant activity, analgesic, and anti-inflammatory effects, Antihypertensive	Rutin, flavonoid, scopoletin	(Hui *et al.,* 2020; Pandy *et al.,* 2014)
	Leaves	Headache, inflammation	Antioxidant, Anti-inflammatory activity	Flavonoids, Alkaloids, Tannins, triterpenes, saponins, and coumarinsa	(Ly *et al.,* 2020)

Scientific name	Parts used	Ailment	Systematic review		Reference
			Bioactivities	Bio-isolates	
Citrofortunella microcarpa	Fruit	Cough	antioxidative effects, antibacterial, anti-inflammatory	Phenolic compounds (tocopherols, flavonoids, and phenolic acids), nitrogen compounds (alkaloids, chlorophyll derivatives, amino acids, and amines), carotenoids, and ascorbic acid	(Husni *et al.*, 2021; Dulay and De Castro, 2016)
	Leaves	Diarrhea	Antibacterial, Antioxidant, anti-inflammatory		
Capsicum frutescens L.	Leaves	Boils, Abscess Fever	anti-inflammatory and antioxidant activities	flavonoids and phenolic acid	(Cho *et al.*, 2020; Olatunji and Afolayan, 2019)
Solanum lycopersicum L.	Fruit	Wound	Antioxidant, anti-inflammatory,	Phenolic compounds	(Kondratev *et al.*, 2022; Rivero *et al.*, 2022)
Lantana camara	Leaves, Roots	Hypertension, Diabetes,	Antibacterial, Antihyperglycemic activity, Antioxidant, Anti-inflammatory activity	alkaloids, flavonoids, tannins, saponins, glycosides and terpenoids	(Reddy 2013; Bashir *et al.*, 2019)
Curcuma longa L.	Whole plant	Inflammation Diabetes	antioxidant, anti-inflammatory, antidiabetic	terpenoids, flavonoids, phenypropanoids and sesquiterpenes	(Dosoky and Setzer, 2018)
Zingiber officinale	Rhizome	Hypertension, cough, colds, sore throat	antioxidant, anticancer, anti-inflammatory, anti-apoptotic, anti-hyperglycemic, anti-hyperlipidemic and anti-emetic.	phenolic and terpene	(Rehman *et al.*, 2011; Mao *et al.*, 2019)

Table 6. Comparison between Sama Simunul and Sama Tumalutab on the demographic characteristics.

		Sama Simunul	Sama Tumalutab (Aharaja *et al.*, 2022)
Gender	Male	13	9
	Female	37	41
Age	24 years old	4	1
	24-65 years old	38	39
	More than 65 years old	8	10
Educational Attainment	None	0	30
	Primary Education	11	10
	Secondary Education	18	7
	Higher Education	21	3
Civil Status	Single	10	2
	Married	33	11
	Widowed	7	37

Table 7. Comparison of plant species used by the Sama of Tumalutab and Sama of Simunul.

No. of plants	Sama Simunul	Sama Tumalutab (Aharaja *et al.*, 2022)
	Plant Species	Plant Species
1	*Euphorbia hirta*	*Euphorbia hirta*
2	*Origanum vulgare* L.	*Psidium guajava*
3	*Psidium guajava*	*Hibiscus rosa-sinensis*
4	*Hibiscus rosa-sinensis*	*Cymbopogon citratus*
5	*Cymbopogon citratus*	*Andrographis paniculata* Nees
6	*Andrographis paniculata* Nees	*Kalanchoe pinnata*
7	*Kalanchoe pinnata*	*Jatropha curcas*
8	*Jatropha curcas*	*Annona muricata* L.
9	*Allium sativum*	*Blumea balsamifera* (L.) DC.
10	*Momordica charantia*	*Morinda citrifolia* L.
11	*Annona muricata* L.	*Coleus scutellarioides* (L.) Benth
12	*Blumea balsamifera* (L.) DC.	*Vitex negundo* L.
13	*Carica papaya*	*Artocarpus heterophyllus* Lam.
14	*Ocimum africanum*	*Mimosa pudica* L.
15	*Morinda citrifolia* L.	*Stachytarpheta jamaicensis* (L.) Vahl.
16	*Lantana camara*	*Mesophaerum suaveolens* (L.) Kuntze
17	*Zingiber officinale*	*Costus woodsonii* Maas.
18	*Phyllanthus niruri*	*Coleus amboinicus* Lour.
19	*Aloe vera*	*Sida acuta* Burm.f.
20	*Coleus scutellarioides* (L.) Benth	*Urena lobata* L.
21	*Vitex negundo* L.	*Tinospora crispa* (L.) Hook.f. & Thomson
22	*Artocarpus heterophyllus* Lam.	*Moringga oleifera* Lam.
23	*Manihot esculenta* Crantz.	*Flemingia strobilifera* (L.) R.Br.
24	*Sesbania grandiflora* (L.) Pers.	*Peperomia pellucida*

No. of plants	Sama Simunul	Sama Tumalutab (Aharaja *et al.,* 2022)
	Plant Species	Plant Species
25	*Eleusine indica* (L.) Gaertn	*Chrysophyllum cainito* L.
26	*Capsicum frutescens* L.	*Calophyllum inophyllum* L
27	*Mimosa pudica* L.	*Centella asiatica* (L.) Urban
28	*Piper betle* (L.)	*Artemisia indica* Willd.
29	*Crinum asiaticum*	*Dracaena trifasciata* (Prain) Mabb.
30	*Persea americana*	*Orthosiphon aristatus* (Blume) Miq.
31	*Tinospora crispa* (L.) Hook.f. & Thomson	
32	*Moringga oleifera* Lam.	
33	*Cucumis sativus*	
34	*Caesalpinia sappan* L.	
35	*Averrhoa bilimbi* L.	
36	*Pandanus amaryllifolius*	
37	*Peperomia pellucida*	
38	*Citrofortunella microcarpa*	
39	*Curcuma longa* L.	
40	*Cocos nucifera*	
41	*Allium cepa*	
42	*Basella alba*	
43	*Sandoricum koetjape*	
44	*Justicia gendarussa*	
45	*Cucurbita maxima*	
46	*Breynia oblongifolia*	
47	*Solanum lycopersicum* L.	

Table 8. Plant species that were utilized both by the healers of Sama Simunul, Tawi-Tawi and Sama Tumalutab, Zamboanga City.

Plant species	Sama Simunul (vernacular name)	Sama Tumalutab (Aharaja *et al.,* 2022) (vernacular name)
1. *Andrographis paniculata* Nees.	Pait-pait	Pait-pait
2. *Annona muricata* L.	Nangkabalanda	labanos
3. *Cymbopogon citratus*	Sillay	Say
4. *Euphorbia hirta*	Patik-patik	Patik-patik
5. *Hibiscus rosa-sinensis*	Gumamela	Gumamela
6. *Jatropha curcas*	Tangan-Tangan	Tangan-Tangan
7. *Kalanchoe pinnata*	Kapal-kapal	Lapa-Lapak
8. *Mimosa pudica* L.	Iyah-iyah	Sipug-Sipug
9. *Morinda citrifolia* L.	Mangkuru	Bangkuru
10. *Moringga oleifera* Lam.	Kalamunggay	Malunggay
11. *Peperomia pellucida*	Lansang-lansang	Lansang-lansang
12. *Psidium guajava*	Biyabas	Bayabas
13. *Tinospora crispa* (L.) Hook.f. & Thomson	Patawali	Pitawali
14. *Vitex negundo* L.	Lagundi	Lagundi
15. *Coleus scutellarioides* (L.) Benth	Mayana	Mayana
16. *Artocarpus heterophyllus* Lam.	Nangka	Nangka

Table 9. Comparison between Sama of Tumalutab, Zamboanga City and Sama of Simunul, Tawi-Tawi in terms of Use report and Used value of the plant species.

Plants	Sama Simunul		Sama Tumalutab (Aharaja *et al.,* 2022)	
	UR	UV	UR	UV
Euphorbia hirta	46	0.92	14	0.28
Origanum vulgare L.	42	0.84	0	0
Psidium guajava	33	0.66	25	0.50
Hibiscus rosa-sinensis	27	0.54	2	0.04
Cymbopogon citratus	25	0.50	1	0.02
Andrographis paniculata Nees	24	0.48	5	0.10
Kalanchoe pinnata	24	0.48	3	0.06
Jatropha curcas	23	0.46	5	0.10
Allium sativum	22	0.44	0	0
Momordica charantia	21	0.42	0	0
Annona muricata L.	15	0.30	7	0.14
Blumea balsamifera (L.) DC.	15	0.30	6	0.12

Plants	Sama Simunul		Sama Tumalutab (Aharaja *et al.*, 2022)	
	UR	UV	UR	UV
Carica papaya	14	0.28	0	0
Ocimum africanum	13	0.26	0	0
Morinda citrifolia L.	13	0.26	3	0.06
Lantana camara	13	0.26	0	0
Zingiber officinale	12	0.24	0	0
Phyllanthus niruri	11	0.22	0	0
Aloe vera	9	0.18	0	0
Coleus scutellarioides (L.) Benth	9	0.18	1	0.02
Vitex negundo L.	8	0.16	6	0.12
Artocarpus heterophyllus Lam.	8	0.16	1	0.02
Manihot esculenta Crantz.	7	0.14	0	0
Sesbania grandiflora (L.) Pers.	7	0.14	0	0
Eleusine indica (L.) Gaertn	7	0.14	0	0
Capsicum frutescens L.	7	0.14	0	0
Mimosa pudica L.	6	0.12	1	0.2
Piper betle (L.)	6	0.12	0	0
Stachytarpheta jamaicensis (L.) Vahl	0	0	6	0.12
Crinum asiaticum	5	0.10	0	0
Mesosphaerum suaveolens (L.) Kuntze	0	0	5	0.10
Costus woodsonii Maas	0	0	4	0.8
Coleus amboinicus Lour	0	0	4	0.08
Sida acuta Burm.f.	0	0	4	0.08
Urena lobata L.	0	0	4	0.08
Persea americana	4	0.08	0	0
Tinospora crispa (L.) Hook.f. & Thomson	4	0.08	6	0.12
Moringga oleifera Lam.	4	0.08	2	0.04
Flemingia strobilifera (L.) R.Br.	0	0	3	0.06
Cucumis sativus	3	0.06	0	0
Caesalpinia sappan L.	3	0.06	0	0
Averrhoa bilimbi L.	3	0.06	0	0
Pandanus amaryllifolius	3	0.06	0	0
Peperomia pellucida	3	0.06	5	0.10
Citrofortunella microcarpa	3	0.06	0	0
Curcuma longa L.	3	0.06	0	0
Cocos nucifera	3	0.06	0	0
Chrysophyllum cainito L.	0	0	3	0.06
Calophyllum inophyllum L	0	0	2	0.04
Allium cepa	2	0.04	0	0
Centella asiatica (L.) Urban	0	0	2	0.04
Artemisia indica Willd.	0	0	2	0.04
Basella alba	2	0.04	0	0
Sandoricum koetjape	2	0.04	0	0
Dracaena trifasciata (Prain) Mabb.	0	0	1	0.2
Justicia gendarussa	1	0.02	0	0
Cucurbita maxima	1	0.02	0	0
Breynia oblongifolia	1	0.02	0	0
Orthosiphon aristatus (Blume) Miq.	0	0	1	0.02
Solanum lycopersicum L.	1	0.02	0	0

Table 10. Comparison between Sama of Tumalutab, Zamboanga City and Sama of Simunul, Tawi-Tawi in terms of highest Fidelity level.

Plants	Ailments	Sama Simunul	Sama Tumalutab (Aharaja *et al.*, 2022)
		Fidelity Level	Fidelity Level
Justicia gendarussa (Salimbangun)	Dislocate	1	0
Cocos nucifera (Sokah)	Postpartum care	1	0
Cucumis sativus (Timun)	Cheilitis	1	0
Caesalpinia sappan L. (Sibukow)	Anemia	1	0
Cucurbita maxima (Kabasi)	Blurry eye	1	0
Breynia oblongifolia (Balabat)	Wound	1	0
Solanum lycopersicum L. (Kamatis)	Wound	1	0
Coleus amboinicus Lour.	Cough	0	1
Calophyllum inophyllum L.	Sore eyes	0	1

Plants	Ailments	Sama Simunul	Sama Tumalutab (Aharaja *et al.*, 2022)
		Fidelity Level	Fidelity Level
Hibiscus rosa-sinensis L.	Boils	0.666666667	1
Annona muricata L.	Hypertension	0.375	1
Vitex negundo L.	Cough	0.75	1
Moringa oleifera Lam	Anemia	0.25	1
Centella asiatica (L.) Urban	Fever	0	1
Artemisia indica Willd.	Menstrual Cramp	0	1

Table 11. Comparison between Sama of Tumalutab, Zamboanga City and Sama of Simunul, Tawi-Tawi in terms of the Informant Consensus Factor.

Category	Sama Simunul			Sama Tumalutab (Aharaja *et al.*, 2022)		
	No. of use-report	No. of species/taxa	Informant Consensus Factors	No. of use-report	No. of species/taxa	Informant Consensus Factor
1	20	4	0.84	13	5	0.67
2	2	1	1	3	2	0.50
3	25	9	0.67	4	2	0.67
4	N/A	N/A	N/A	1	1	0
5	3	2	0.5	2	1	1
6	N/A	N/A	N/A	4	1	1
7	103	22	0.79	15	8	0.50
8	56	11	0.81	23	6	0.77
9	49	10	0.81	22	8	0.67
10	68	12	0.83	5	3	0.50
11	45	12	0.75	3	2	0.50
12	10	5	0.55	6	5	0.20
13	19	4	0.83	3	2	0.50
14	111	19	0.83	16	8	0.53
15	7	5	0.33	11	6	0.50
16	N/A	N/A	N/A	3	1	1

The systematic review of the medicinal plants mentioned by the Sama healers were summarize in Table 5. All the plant species listed in this study possessed bioactivities and bio-isolates that elaborated the plants' efficacy in treating various diseases.

Discussion

The sociodemographic profiles of the key informants were documented through a semi-structured questionnaires and informal interviews. As shown in the table 1, majority of the respondent were female. In terms of medicinal knowledge women know more and are responsible for the health of the family and providing treatment to a certain illness while men were responsible in providing support and financial needs of the family. This is supported by the numerous studies from around the world that have documented the crucial role that women play as keepers of knowledge about medicinal plants. Moreover, in the study of Costa *et al.* (2021), their findings showed that the knowledge of valuable plants was structured by gender and discovered that women have a higher repertoire of known plant species and tend to share what they know more than males. By contrast, in the study of Reyes-Garcia *et al.* (2010), stated that men were responsible for managing the home economics and supplying resources, therefore they have a greater understanding of natural resources for other uses.

Learning on how to utilize medicinal plants and that are passed down orally from generation to generation also suggest that the knowledge about the uses of these herbal medicine may be compromised by the development of modern medicine nowadays.

Ducusin (2017) has mentioned that knowledge or information about these ancient herbal medications is no longer considered to be valuable by today's younger and more educated population. The traditional knowledge of herbal medicine and practices that has been passed down from the ancestors has also been threatened with extinction by the development of modern medicine and technology.

All the parts of the various plant species were used in treating various diseases. The most frequently used part was the leaves (54%). One reason for this is that leaves are the easiest part of a plant to collect, and they are also more readily accessible. Several ethnobotanical studies in the Philippines reported similar results with the leaves as the most frequently used plant parts (Abe and Ohtani, 2013; Gruyal *et al.,* 2014; Olowa and Demayo, 2015; Tantengco *et al.,* 2018; Nuneza *et al.,* 2021). Leaves have high storage of chemical compounds through photosynthesis which are active components of most herbal preparation in high concentrations (Nuneza *et al.,* 2021). As opposed to taking the stem, root, or entire plant, which may endanger plant life, removing the leaves' biomass within normal bounds does not impact the survival of the plant (Jadid *et al.,* 2022). Whole plant (16%), fruit (8%), flower (7%), roots (6%), cloves (4%), bark (2%), rhizome (2%), stems (1%), and exocarp (0%) are also used in the preparations (Fig. 1) in which photosynthates can be found in other sections of the plant, including the roots, bark, fruits, and seeds (Ducusin, 2017).

The main mode of preparation used by the Sama healers was *decoction* (46%). Decoction can be prepared easily and usually taken orally for faster absorption. This was similar to the results of other ethnobotanical studies (Baddu and Ouano, 2018; Nuneza *et al.,* 2021; Cordero *et al.,* 2022) where decoction was the most common method and can be prepared by boiling the herbal plants for a certain period of time in order to extract the active components and allow it to cool before administration (Tantengco *et al.,* 2018). The next frequently used mode of preparation was pounding (20%) which was the major method of remedy preparation and according to the study of Yimam *et al.* (2022), pounding was better way of preparation that no need for extra equipment to extract the active substances. Followed by infusion, which involved pouring hot water onto the plant material and letting it cool before administration (Tugume *et al.,* 2019). Similar studies also showed that decoction and infusion were the method that was usually prepared for the preparation (Brahmi *et al.,* 2022; Cordero *et al.,* 2022) other preparations includes also roasting, washed, extraction, paste, no preparation, and steaming (Fig. 2).

Most of the medicinal plants were taken *Oral* and some were applied in a form of topical application, ingestion, and inhalation (Fig.3). Oral is considered the best method since it is quick and easy, and it provides for higher absorption of the medicinal plant's bioactive components, which may help to explain why oral is most common mode of administration (Brahmi *et al.,* 2022). Followed by topical application (31%), which is done by applying plant parts directly on the affected area of the body such as skin allergies, wounds, and pimples. Additionally, in the study of Rigat *et al.* (2015) topical application of plants may also relate to the necessity to clean, moisturize, and care for the skin, which serves as a barrier to shield the body from outside aggressors.

Among the 42 of ailments identified, the majority were *hypertension*, followed by fever, cough, and inflammation. Based on the respondents, unhealthy diet, physically inactive and obesity were the factors that contribute to hypertension. According to Singh *et al.,* (2017) stated that hypertension is a major public health issue because of its high prevalence and one of a risk factor for cardiovascular disease. Factors that associated with hypertension are gender, age group, socioeconomic status, tobacco, alcohol consumption, overweight, and obesity.

Use-report and Use-value depict the relative significance of medicinal plants for certain ailments or applications. There were three medicinal plants with the highest Use-report: *Euphorbia hirta* (UR = 46; UV = 0.92) in 3 categories which were category one (1), category eight (8), and category fourteen (14). This implies that medicinal plants with high UV are the most important and valued medicinal plants in the community. Followed by *Origanum vulgare* L. (UR = 42; UV = 0.84) which obtained the second highest use-value and was utilized in 4 categories-category one (1), category seven (7), category eight (8)

and category fourteen (14), and *Psidium guajava* (UR = 33; UV = 0.66) in 7 categories which were category one (1), category three (3), category nine (9), category ten (10), category eleven (11), category thirteen (13), category fifteen (15) (See Appendix 15). Medicinal plants with high UV are the most culturally important, preferred, and agreed to be utilized for certain ailments by the Sama Simunul. Albuquerque *et al.,* (2006) mentioned that high-use-value plants may be used medicinally and conservation efforts for these significant species must be given a top priority.

A total of 7 plant species were found to have 100% FL values, ranging from 0% to 100% (See Appendix 16). Plants with the highest FL were *Justicia gendarussa* for dislocation, *Cocos nucifera* for postpartum, *Cucumis sativus* for cheilitis, *Caesalpinia sappan* L. for anemia, *Cucurbita maxima* for blurry eye, *Breynia oblongifolia* for wound and *Solanum lycopersicum* L. for wound. These FL values demonstrate that some of the informants who claimed to utilize these certain plant species were effective in treating ailments within the locality. Belgica *et al.* (2021), mentioned that the highest fidelity level may indicate the plant species most effective at treating a particular ailment, while the lowest level may suggest plant species were less effective at treating a particular disease. Further, in the study of Bibi *et al.* (2022), FL% essentially represents the importance of a plant for a certain usage. Many ethnomedicinal research studies have also shown that plants that have the highest FL% are the most beneficial.

The highest ICF value (1.0) was the category 2-the neoplasm, tumor, and tissue growth while category 15, on the other hand, has the lowest ICF value (0.33). As shown in the table 4, the highest value indicates that the informants used a particular plant species consistently in the category and it also implies that the informants have agreed on certain plant that used in each category. Belgica *et al.* (2021) stated that medicinal plants with higher informant consensus should be given special consideration for future ethno pharmacological study, and these species are often used and have been used by people for a long time. ICF values indicated credible suggestions for individual species treating various health conditions and therapeutic plants treating various health issues. Further, a low ICF indicates that less traditional treatments are being used due to the accessibility of commercial medications that offer contemporary substitutes for herbal remedies (Caunca and Balinado, 2021).

A systematic review of the different published articles showed significant bioactivities and important bioisolates for the medicinal plants used by the Sama healers of Simunul, Tawi-Tawi (Table 5). The family that has the highest number of medicinal plants used by the Sama Simunul healers is *Lamiaceae*. The *Lamiaceae* family has a wide variety of species that might be herbs, herbaceous plants, shrubs, or tree species. This family contains numerous species that are abundant in terpenes and flavonoids, with diterpenoids being the most prevalent. These different bioactive substances provide the *Lamiaceae* family of plant features including antioxidant, insecticidal, fungicidal, and bactericidal effects, which might lead to a collection of potential pharmacological and commercial value (Ramos da Silva *et al.,* 2021). Furthermore, in various genera of the *Lamiaceae* family, rosmarinic acid (RA) is a phenolic molecule that has significant biological properties including antibacterial, anti-inflammatory, allergic, anti-depressant, and anti-inflammatory properties (Shekarchi *et al.,* 2012). Raja (2012) also mentioned that the medicinal components of the *Lamiaceae* family consist of strong aromatic essential oil, tannins, saponins, and organic acids as backed by the study of Ramos da Silva *et al.,* (2021) stated that the *Lamiaceae* family contains various aromatic plant species that are used in traditional medicine as well as the pharmaceutical and food sectors due to their biological attributes. Its uses mainly pertain to its essential oils, which have a variety of functions including antioxidant, antibacterial, and anticancer actions. Essential oils (EOs) are aromatic and volatile compounds that present in many plant components including leaves, flowers, seeds, roots, and fruits.

Because of a lack of medical services or facilities in the locale, the Sama tribe of Simunul relies on medicinal plants that are available in the area for treating certain diseases.

Conclusion

The study reported that there forty-seven (47) medicinal plants utilized by the Sama healers of Simunul, Tawi-Tawi to prevent and to treat certain diseases. Leaves got the highest cited part of the plant used for treating the diseases. For the preparation of the medicinal plants, a decoction was utilized most and most of the medicinal plants were taken through orally. On the other hand, quantitative ethno medicinal analysis showed that *Euphorbia hirta* got the highest Use-report and Use-value. The plant with the highest fidelity level for boils was *Hibiscus rosa-Sinensis*. For the informant consensus factor, *Morinda citrifolia* L. achieved the highest which falls within the category of neoplasms, tumors, and tissue growth.

These medicinal plants were commonly used to treat fever, hypertension, cough, and postpartum care which may suggest that these diseases were widespread in the area. The family that has the highest number of medicinal plants used by the Sama Simunul healers to treat diseases is *Lamiaceae* which has four cited medicinal plants. Bioactivities and bio-isolates of plants discovered through systematic review indicate that medicinal plants have a major impact on treating the many illnesses found in Simunul, Tawi-Tawi. Lastly, in comparison between two studies showed for the Sama Simunul healers, the medicinal plant that achieved the highest report was *Euphorbia hirta* (46) and for the Use-Value got 0.92, and *Euphorbia hirta* was highly used to treat fever and dengue. For the Sama Tumalatub, the medicinal plant that obtained the highest Use-report (25) and Use-Value (0.50) was the *Psidium guajava* where it was employed in many indigenous systems of medicine.

For the Fidelity level of the Sama Simunul, *Jatropha curcas* got the most cited plant (79.16%). And a total of 7 plant species were found to have 100% FL values which were *Justicia gendarussa* for dislocation, *Cocos nucifera* for postpartum, *Cucumis sativus* for cheilitis, *Caesalpinia sappan* L. for anemia, *Cucurbita maxima* for blurry eye, *Breynia oblongifolia* for wound and *Solanum lycopersicum* L. for wound. In contrast to the Sama Tumalutab, a total of 8 plant species were found to have 100% Fl values, ranging from 4% to 100%. Plants with highest FL value were *C. amboinicus* Lour. for cough, *C inophyllum* L. for sore eyes, *H. rosa-sinensis* L. for boils, *A. muricata* L. for hypertension, *Vitex negundo* L. for cough, *M. oleifera* Lam for anemia, *C. asiatica* (L.) Urban for fever, and *A. indica* Willd for menstrual cramp.

Recommendation

As these plants received the highest Fidelity level and Informant Consensus factor values, this study would like to suggest a pharmacological screening of the following therapeutic plants.

- *Justicia gendarussa* for dislocation,
- *Cocos nucifera* for postpartum,
- *Cucumis sativus* for cheilitis,
- *Caesalpinia sappan L.* for anemia,
- *Cucurbita maxima* for blurry eye,
- *Breynia oblongifolia* for wound
- *Lycopersicon esculentum* Mill. for wound

References

Abe R, Ohtani K. 2013. An ethnobotanical study of medicinal plants and traditional therapies on Batan Island, the Philippines. Journal of ethnopharmacology [Internet]. **145(2),** 554-565. Available from https:// doi.org /10.1016/j.jep.2012.11.029

Albuquerque UP, Lucena RFP, Monteiro JM, Florentino ATN, Almeida C, de FCBR. 2006. Evaluating Two Quantitative Ethnobotanical Techniques. Ethnobotany Research and Applications [Internet] **4,** 051-060. Available from: https:// ethnobotanyjournal.org/index.php/era/article/view/

Abdelgadir HA, Van Staden J. 2013. Ethnobotany, ethnopharmacology and toxicity of *Jatropha curcas* L. (Euphorbiaceae): A review. South African Journal of Botany. [Internet] **88,** 204-218.

Abu-Irmaileh BE, Afifi FU. 2003. Herbal medicine in Jordan with special emphasis on commonly used herbs. J Ethnopharmacol [Internet] **89,** 193-7. Available from https://doi.org/ 10.1016/s0378-8741(03)00283-6.

Aharaja MA, Estepa IIN, Saavedra M. 2022. Quantitative Ethnobotanical Study and Systematic Review of Plants Used by the Sama Bangingi in Tumalutab Island, Zamboanga City. May.

Ahmad M, Sultana S, Fazl-I-Hadi S, Ben Hadda T, Rashid S, Zafar M, Khan MA, Khan MP, Yaseen G. 2014. An ethnobotanical study of medicinal plants in high mountainous region of Chail valley (District Swat- Pakistan). Journal of ethnobiology and ethnomedicine [Internet] **10,** 36. Available from: https://doi.org/10.1186/1746-4269-10-36

Alebie G, Urga B, Worku A. 2017. Systematic review on traditional medicinal plants used for the treatment of malaria in Ethiopia: trends and perspectives. Malaria journal [Internet] **16(1),** 307. Available from: https://doi.org/10.1186/s12936-017-1953-2

Alhassan AM, Ahmed QU. 2016; *Averrhoa bilimbi Linn*.: A review of its ethnomedicinal uses, phytochemistry, and pharmacology. J Pharm Bioallied Sci. [Internet] **8(4),** 265-271. Available from: DOI: 10.4103/0975-7406.199342.

Aminah S, Wantini S. 2020. The Effect of Basil (*Ocimum X Africanum* L.*)* Extract on The Growth of Microbes in the Hand. International Journal of Innovation, Creativity and Change [Internet]. Available from: https://www.ijicc.net/images/vol_13 /Iss_2/Part_2/SC16_Aminah_2020_E_R.pdf

Anantaworasakul, P., Hamamoto, H., Sekimizu, K., & Okonogi, S. 2017. In vitro antibacterial activity and in vivo therapeutic effect of *Sesbania grandiflora* in bacterial infected silkworms. Pharm Biol [Internet] **55(1),** 1256-1262. Available from: DOI: 10.1080/13880209.2017.1297467

Bagalkotkar G, Sagineedu SR, Saad MS, Stanslas J. 2016. Phytochemicals from *Phyllanthus niruri* Linn. and their pharmacological properties: a review. Pharmacy and Pharmacology [Internet] **58,** 1559-1570. DOI 10.1211/jpp.58.12.0001

Bashir, S., Jabeen, K., Iqbal, S., Javed, S., & Naeemn, A. 2019. *Lantana camara*: Phytochemical Analysis and Antifungal Prospective. Planta daninha [Internet] 37. Available from: https://doi.org/10.1590 /S0100-83582019370100137

Batiha GES, Magdy Beshbishy A, Wasef L, Elewa YHA, Al-Sagan A, Abd El-Hack M, Taha A, Abd-Elhakim Y, Devkota HP. 2020. Chemical Constituents and Pharmacological Activities of Garlic (*Allium sativum* L.): A Review. Nutrients [Internet]. **12(3),** 872. doi: 10.3390/nu12030872.

Belgica THR, Suba MD, Alejandro CJD. 2021. Quantitative ethnobotanical study of medicinal flora used by local inhabitants in selected Barangay of Malinao, Albay, Philippines. Biodiversitas [Internet] **22,** 2711-2721. Available from: https://doi.org /10.13057/biodiv/d220720

Bhuyan, B., & Sonowal, R. 2021. An Overview of *Pandanus Amaryllifolius* Roxb.Exlindl. And Its Potential Impact on Health. Current Trends in Pharmaceutical Research [Internet]. **8(1),** 2582-4783. Https://dibru.ac.in/wp-content/uploads /2021 /09/08-CTPR-Review-BB-06.pdf

Bhuiyan MNI, Chowdhury JU, Begum J. 2009. Chemical components in volatile oil from *Blumea balsamifera* (L.) *DC*. Bangladesh Journal of Botany [Internet] **38(1),** 107-109.

Bibi F, Abbas Z., Harun N, Perveen B, Bussmann RW. 2022. Indigenous knowledge and quantitative ethnobotany of the Tanawal area, Lesser Western Himalayas, Pakistan. PloS one [Internet] **17(2),** e0263604. Available from: https://doi.org /10.1371/journal.pone.0263604

Binumol M, Sajitha T. 2013. Phytochemical and antibacterial activity of *Artocarpus heterophyllus* Lam. and Artocarpus communis Forst. on Bacillus subtilis and Pseudomonas fluorescens. International Journal of Scientific & Engineering Research [Internet]. **4(9),** 1766-1784. Available from: https://www.ijser.org/researchpaper/Phytochemical-and-antibacterial-activity-of-Artocarpus-heterop hyllus-Lam-and-Artocarpus-communis-Forst.pdf

Brahmi F, Iblhoulen Y, Issaadi H. 2022. Ethnobotanical survey of medicinal plants of bejaia localities from algeria to prevent and treat coronavirus (COVID-19) infection shortened title: phytomedicine to manage COVID-19 pandemic. ADV TRADIT MED (ADTM) [internet]. Available from: https://doi.org/10.1007/s13596-022-00649-z

Caunca, Evane & Balinado, Lloyd. 2021. Determination of Use-Value, Informant Consensus Factor, and Fidelity Level of Medicinal Plants Used in Cavite, Philippines. Asian Journal of Biological and Life sciences. [Internet] **10,** 443-453.

Chao W, Lin B. 2010. Isolation and identification of bioactive compounds in *Andrographis paniculata* (Chuanxinlian). Chin Med [Internet] **5,** 17. Available from: DOI: 10.1186/1749-8546-5-17.

Cho SY, Kim HW, Lee MK, Kim HJ, Kim JB, Choe JS, Lee YM, Jang HH. 2020. Antioxidant and Anti-Inflammatory Activities in Relation to the Flavonoids Composition of Pepper (*Capsicum annuum* L.). Antioxidants [Internet] **9(10),** 986. Available from: https://doi.org/10.3390/antiox9

Cordero CS, Meve U, Alejandro GJD. 2022. Ethnobotanical Documentation of Medicinal Plants Used by the Indigenous Panay Bukidnon in Lambunao, Iloilo, Philippines. Frontiers in pharmacology [Internet] **12,** 790567.

Costa FV, Guimarães MFM, Messias MCT. 2021. Gender differences in traditional knowledge of useful plants in a Brazilian community. PLOS ONE [Internet] **16(7),** Available.

Dapar MLG, Alejandro GJD. 2020, Ethnobotanical Studies on Indigenous Communities in the Philippines: Current Status, Challenges, Recommendations, and Future Perspectives. Journal of Complementary Medicine Research [Internet] **11(1),** 432. Available from: DOI: 10.5455/jcmr.

Dapar MLG, Alejandro GJD, Meve U, Liede-Schumann S. 2020. Quantitative ethno pharmacological documentation and molecular confirmation of medicinal plants used by the Manobo tribe of Agusan del Sur, Philippines. J Ethnobiology Ethnomedicine [Internet] **16,** 14. Available from: https://doi.org/10.1186/s13002-020

Dosoky N, Setzer W. 2018. Chemical Composition and Biological Activities of Essential Oils of *Curcuma* Species." Nutrients [Internet] **10(9),** 1196. DOI: 10.3390/nu10091196

Dubey SD. 2021. Overview on *Cucurbita maxima*. International Journal of Phytopharmacy [Internet] **2(3),** 68-71. Available from: DOI: 10.7439 /ijpp.

Ducusin MB. 2017. Ethnomedicinal Knowledge of Plants among the Indigenous of Santol, La Union, Philippines. Electronic Journal of Biology [Internet] **13(4),** 360-82. Available from https://dokumen.tips /documents/ethnomedicinal-knowledge-of-plants-among-the-indigenous-ethnomedicinal-knowled ge.html?page=1

Dulay RM, De Castro ME. 2016. Antibacterial and Antioxidant Activities of Three Citrus Leaves Extracts. Der Pharmacia Lettre [Internet] **8(13),** 167-170. https://www.scholarsresearchlibrary.com/articles/an tibacterial-and-antioxidant-activities-of-three-citrus-leaves-extracts.pdf?fbclid=IwAR2uCVBAnug 8Q Wlq ZYxFVkierDxLdVWdhzq9UPTzb4sk14r3dcWHoUxl-

Fajardo WT, Cancino LT, Dudang EB, De Vera IA, Pambdi RM, Junio AD. 2018. Ethnobotanical Study of Traditional Medicinal Plants Used By Indigenous Sambal-Bolinao of Pangasinan, Philippines. Journal of Natural and Allied Sciences [Internet]. **1(1).** 52-63. Available from: https://www. psurj.org/wp-content/uploads/2018/01/JONAS 00

Gebreyes T, Melesse M. 2016. Determination of informant consensus factor and fidelity level of ethnomedicinal plants used in Misha Woreda, Hadiya Zone, Southern Ethiopia. International Journal of Biodiversity and Conservation [Internet] **8(12),** 351-364. Available from: https://doi.org/ 10.5897

Gruyal GA, Roasario RD, Palmes ND. 2014. Ethnomedicinal plants used by residents in Northern Surigao del sur, Philippines. Natural products chemistry & research [Internet] ***2*,** 1-5. Available from: DOI: 10.4172/2329-6836.1000140

Hui CK, Majid NI, Yusof HM, Zainol KM, Mohamad H, Zin ZM. 2020. Catechin profile and hypolipidemic activity of Morinda citrifolia leaf water extract. Heliyon [Internet] **6(6),** e04337. Available from: https://doi.org/10.1016/j.heliyon.2020.e04337

Jadid N, Kurniawan E, Himayani CES, Andriyani, Prasetyowati I, Purwani KI, Muslihatin W, Hidayati D, Tjahjaningrum ITD. 2020. An ethnobotanical study of medicinal plants used by the Tengger tribe in Ngadisari village, Indonesia. PLoS One [Internet]. [cited 2020 Jul 13] **15(7).** e0235886. Available from:
DOI: 10.1371 /journal.pone.0235886.

Jantan I, Ahmad W, Bukhari SN. 2016; *Tinospora crispa* (L.) Hook. f. & Thomson: a review of its ethnobotanical, phytochemical, and pharmacological aspects." Frontiers in pharmacology [Internet] **7,** 59. Available from:
DOI: 10.3389 /fphar.2016.00059

Joseph B, Jini D. 2013. Antidiabetic effects of *Momordica charantia* (bitter melon) and its medicinal potency. Asian Pac J Trop Dis [Internet] **3(2),** 93-102.

Kafle A, Mohapatra SS, Reddy I, Chapagain M. 2018. A review on medicinal properties of *Psidium Guajava*. Journal of Medicinal Plants Studies [Internet] **6(4),** 44-47. Available from: https://www.plantsjournal.com/archives/2018/vol6issue4/PartA/6-4-11-994.pdf

Kartika IGAA, Insanu M, Safitri D, Putri CA, Adnyana IK. 2016. New update: Traditional uses, phytochemical, pharmacological and toxicity review of Peperomia pellucida (L.) Kunth. Pharmacology OnLine [Internet] **31,** 30-43. Available from: https://pharmacologyonline.silae.it/files/newsletter/2016/vol2/PhOL_2016_2_N005_Kartika_30_43.pd

Khan I, Abd Elsalam NM, Fouad H, Tariq A, Ullah R, Adnan M. 2014. Application of Ethnobotanical Indices on the Use of Traditional Medicines against Common Diseases. Evidence-based complementary and alternative medicine [Internet]. [cited 2014 Apr 24]; 2014, 21. Available from: https://doi.org/10.1155/2014/635371

Kondratev VM, Osipova GS, Kiselev MV. 2022. Growth and development of tomato (*Lycopersicon esculentum* Mill.) under light culture conditions. Earth and Environmental Science [Internet] **1010,** 012071.

Krishnaiah D, Devi T, Bono A, Sarbatly R. 2009. Studies on phytochemical constituents of six Malaysian medicinal plants. Journal of Medicinal Plants Research [Internet] **3(2),** 067-072.

Kumar BR, Anupam A, Manchikanti P, Rameshbabu AP, Dasgupta S, Dhara S. 2018. "Identification and characterization of bioactive phenolic constituents, anti-proliferative, and anti-angiogenic activity of stem extracts of Basella alba and rubra." J Food Sci Technol [Internet] **55(5),** 1675-1684.

Kumar S, Malhorata R, Kumar D. 2010, *Euphorbia hirta*: Its chemistry, traditional and medicinal uses, and pharmacological activities. Pharmacogn Rev [Internet] **4(7),** 58-61. Available from: DOI: 10.4103/0973-7847.65327

Lasco G, Mendoza J, Renedo A, Seguin ML, Palafox B, Palileo-Villanueva LM, Amit AML, Dans AL, Balabanova D, mc Kee M. 2020. *Nasa dugo* ('It's in the blood'): lay conceptions of hypertension in the Philippines. BMJ global health [Internet] ***5*(7),** e002295. Available from: https://doi.org/10.1136/bmjgh-2020-002295

Lima EB, Sousa CN, Meneses LN, Ximenes NC, Santos Júnior MA, Vasconcelos GS, Lima NB, Patrocínio MC, Macedo D, Vasconcelos SM. 2015. *Cocos nucifera* (L.) (Arecaceae): A phytochemical and pharmacological review. Braz J Med Biol Res [Internet] **48(11),** 953-64. Available from: DOI: 10.1590/1414-431X20154773.

Ly HT, Pham Nguyen MT, Nguyen TKO, Bui TPQ, Ke X, Le VM. 2020. Phytochemical analysis and wound-healing activity of noni (*Morinda citrifolia*) leaf extract. Journal of Herbs, Spices & Medicinal Plants [Internet] **26(4),** 379-393. Available from: https://doi.org/10.1080/10496475.

Madjos G, Ramos K. 2021. Ethnobotany, Systematic Review and Field Mapping on Folkloric Medicinal Plants in the Zamboanga Peninsula, Mindanao, Philippines. Journal of Complementary Medicine Research [Internet]. Available from DOI: 10.5455/jcmr.2021.12.01.05.

Mahomoodally MF, Sadeer NB, Suroowan S, Jugreet S, Lobine D, Rengasamy KRR. 2020. Ethnomedicinal, phytochemistry, toxicity and pharmacological benefits of poison bulb – *Crinum asiaticum L.* South African Journal of Botany [Internet] **136,** 16-29. Available from: https://doi.org /10.1016/j.sajb.2020.06.004

Mao QQ, Xu XY, Cao SY, Gan RY, Corke H, Beta T, Li HB. 2019. Bioactive Compounds and Bioactivities of Ginger (*Zingiber officinale* Roscoe). Foods [Internet]. **8(6),** 185. Available from: DOI: 10.3390/foods8060185.

Masendo A. 2015. The Manobo Tribe Then and Now: An Ethnography. International Journal of Scientific & Engineering Research [Internet] **6(4),** 227. Available from: https://www.ijser.org/paper /The-Manobo-Tribe-Then-and-Now-An-Ethnography

Mohiuddin AK. 2019. Medicinal and Therapeutic values of *Sesbania grandiflora*. Journal of Pharmacology and Clinical trials [Internet] **19(1),** Available from: https://norcaloa.com/journals/JPCT-

Mun'im A, Puteri MU, Sari SP. 2016. Azizahwati. Anti-anemia effect of standardized extract of *moringa oleifera* lamk. Leaves on aniline induced rats. Pharmacognosy Journal [Internet] **8(3),** 255-258. Available from: https://doi.org/10.5530/pj.2016.3.14

Nalimu F, Oloro J, Kahwa I, Ogwang PE. 2021. Review on the phytochemistry and toxicological profiles of Aloe vera and Aloe ferox. Futur J Pharm Sci [Internet] **7(1),** 145. Available from: DOI: 10.1186/s43094-021-00296-2.

Nguyen LTT, Nguyen TT, Nguyen HN, Bui QTP. 2020. Simultaneous determination of active compounds in *Piper betle Linn.* leaf extract and effect of extracting solvents on bioactivity. Engineering Reports [Internet] **2(10).** Available from: https:// doi.org/10.1002/eng2.12246

Niu Y, Wang S, Li C, Wang J, Liu Z, Kang W. 2020. Effective Compounds From *Caesalpinia sappan* L. on the Tyrosinase In Vitro and In Vivo. Natural Product Communications [Internet] **15(4),** Available from: DOI: 10.1177/1934578X20920055

Nuneza OM, rodriguez BC, Nasiad JM. 2021, *View of ethnobotanical survey of medicinal plants used by the mamanwa tribe of surigao del norte and agusan del norte, mindanao, philippines*. Smujo. https: //smujo.id/biodiv/article/view/7703/4884

Nwokocha CR, Owu DU, Gordon A, Thaxter K, mcCalla G, Ozulua RI, Young L. 2012. Possible mechanisms of action of the hypotensive effect of *Annona muricata* (soursop) in normotensive Sprague–Dawley rats, Pharmaceutical Biology [Internet]. **50(11),** 1436-1441, DOI: 10.3109/13 880209.2012.684690

Nzimande S, Moshabela M, Zuma T, Street R, Ranheim A, Falkenberg T. 2021. Barriers and facilitators of traditional health practitioners' regulation requirements: a qualitative study. Journal of Global Health Reports. Available from: https://www.joghr.org/article/21402-barriers-and-

Obidoa O, Joshua PE, Eze N. 2009. Phytochemical Analyses of *Cocos Nucifera L.* Journal of Pharmacy Research [Internet] **1(1),** 87-96. Available from: https://www.researchgate.net /publication /41187192_Phytochemical_ Analysis _of_ Cocos _nucifera_L?fbclid=IwAR1F37ffxiP4g81 UNlyaJz67LDnoIZ6EXA1UyQASaG9FYe60gx7xmrcG

Obregón-Díaz Y, Pérez-Colmenares A, Obregón-Alarcón K, Aparicio-Zambrano R, Rojas-Fermin L, Usubillaga A, Carmona J. 2019. Volatile Constituents of the Leaves of *Kalanchoe pinnata* From the Venezuelan Andes. Natural Product Communications [Internet] **14(5),** Available from: DOI: 10.1177/1934578X19842703

Odebunmi CA, Adetunji TL, Adetunji AE, Olatunde A, Oluwole OE, Adewale IA, Ejiwumi AO, Iheme CE, Aremu TO. 2022. Ethnobotanical Survey of Medicinal Plants Used in the Treatment of COVID-19 and Related Respiratory Infections in Ogbomosho South and North Local Government Areas, Oyo State, Nigeria. Plants [Internet] **11,** 2667. Available from: https://doi.org/10.3390

Olaniyan O, Ajayi EI. 2021. Phytochemicals and in vitro anti-apoptotic properties of ethanol and hot water extracts of Cassava (*Manihot esculenta* Crantz) peel biogas slurry following anaerobic degradation. Clin Phytosci [Internet] **7,** 77. Available from: https://doi.org/10.1186/s40816-021-00311-2

Olatunji TL, Afolayan AJ. 2019. Comparative Quantitative Study on Phytochemical Contents and Antioxidant Activities of *Capsicum annuum* L. and *Capsicum frutescens* L. The Scientific World Journal [Internet] **4705140,** 13. Available from: https:// doi.org/10.1155/2019/4705140

Olowa L, Demayo CG. 2015. Ethnobotanical uses of medicinal plants among the Muslim Maranaos in Iligan City, Mindanao, Philippines. Advances in Environmental Biology [Internet] **9(27),** 204+. Available from https://link.gale.com/apps/doc/ A444400790/AONE?u=anon~c496140a&sid= googleScholar& xid=5127a5f4

Ong HG, Kim YD. 2014. Quantitative ethnobotanical study of the medicinal plants used by the Ati Negrito indigenous group in Guimaras island, Philippines. Journal of ethnopharmacology [Internet] **157,** 228-242. Available from: https://doi.org /10.1016/j.jep.2 014.09.015

Oniga I, Pușcaș C, Silaghi-Dumitrescu R, Olah NK, Sevastre B, Marica R, Marcus I, Sevastre-Berghian AC, Benedec D, Pop CE, Hanganu D. 2018. *Origanum vulgare* ssp. vulgare: Chemical Composition and Biological Studies. Molecules [Internet]. **23(8),** 2077. Available from: DOI: 10.3390/molecules23082077.

Panda SK, Thatoi HN, Dutta SK. 2009. Antibacterial activity and phytochemical screening of leaf and bark extracts of Vitex negundo l. from similipal biosphere reserve, Orissa. Journal of Medicinal Plants Research [Internet] **3(4),** 294-300. Available from: https://www.researchgate.net /publication/228482464_Antibacterial_activity_and _phytochemical_screening_of_leaf_and_bark_extra cts_of_Vitex_negundo_L_from_Similipal_biosphere _reserve_Orissa

Pandy V, Narasingam M, Kunasegaran T, Murugan DD, Mohamed Z. 2014. Effect of noni (*Morinda citrifolia* Linn.) fruit and its bioactive principles scopoletin and rutin on rat vas deferens contractility: an ex vivo study. Scientific World Journal [Internet] 909586. Available from: DOI: 10.1155/2014/909586.

Park S, Nam YH, Rodriguez I, Park JH, Kwak HJ, Oh Y, Oh M, Park MS, Lee KW, Lee JS, Kim DH, Park YH, Moon IS, Choung SY, Jeong KW, Hong BN, Kang TH, Kim SH. 2019. Chemical constituents of leaves of *Persea americana* (avocado) and their protective effects against neomycin-induced hair cell damage. Revista Brasileira de Farmacognosia [Internet] **29(6),** 739-743. Available from: https://doi.org/10.1016 /j.bjp .2019.08.004

Paval J, Kaitheri SK, Potu BK, Govindan S, Kumar RS, Narayanan SN, Moorkoth S. 2009. Anti-arthritic potential of the plant Justicia gendarussa Burm F. Clinics (Sao Paulo, Brazil) **64(4),** 357-362. https://doi.org/10.1590/s1807-59322 009000400015

Pucot J, Manting MM, Demayo C. 2019. Ethnobotanical Plants Used by Selected Indigenous Peoples Of Mindanao, The Philippines As Cancer Therapeutics. Pharmacophore [Internet] **10,** 61-69. Available from: https://www.researchgate.net/publication/344537304_ethnobotanical_plants_used by_selected_indigenous_peoples_of_mindanao_the _philippines_as_cancer_therapeutics

Raja R. 2012. Medicinally Potential Plants of Labiatae (Lamiaceae) Family: An Overview. Research Journal of Medicinal Plant. [Internet] **6,** 203-213. Availabe from: DOI: 10.3923/rjmp.2012.203.213.

Raj A, Menon V, Sharma N. 2020. Phytochemical screening, antimicrobial, antioxidant and cytotoxic potential of different extracts of Psidium guajava leaves. Vegetos [Internet] **33(4),** 750-758. Available from: https://doi.org/10.1007/s42535-020-00151-4

Reddy NM. 2013. *Lantana Camara Linn*. Chemical Constituents and Medicinal Properties: A Review. Sch. Acad. J. Pharm [Internet] **2(6),** 445-448. Available from: https://saspublishers.com/media /articles/SAJP26445-448.pdf

Rigat M, Vallès J, D'Ambrosio U, Gras A, Iglésias J, Garnatje T. 2015. Plants with topical uses in the Ripollès district (Pyrenees, Catalonia, Iberian Peninsula): ethnobotanical survey and pharmacological validation in the literature. Journal of ethnopharmacology. [Internet] **164,** 162-179. Available from: https://doi.org/10.1016/j.jep. 2015.

Rivero AG, Keutgen A, Pawelzik E. 2022. Antioxidant Properties of Tomato Fruit (*Lycopersicon esculentum* Mill.) as Affected by Cultivar and Processing Method. Horticulturae [Internet]. **8,** 547.

Saadullah M, Asif M, Arif S, Kanwal BA. 2022. Comprehensive Review on Traditional Uses, Chemical Constituents, and Diverse Pharmacological Importance of the Genus *Breynia*. Record of Natural Products [Internet] **6,** 538-549. Available from: http://doi.org/10.25135/rnp.314.2112.2280

Sari TA, Chandra B, Rivai H. 2021. Overview of Traditional Use, Phytochemical and Pharmacological Activities of Cucumber (*Cucumis sativus L.*). Int. Journal of Pharmaceutical Sciences and Medicine [Internet] **6(3),** 39-49. Available from: DOI: 10.47760/ijpsm. 2021.v06i03.004

Shah G, Shri R, Panchal V, Sharma N, Singh B, Mann AS. 2011. Scientific basis for the therapeutic use of *Cymbopogon citratus*, stapf (Lemon grass). J Adv Pharm Technol Res [Internet] **2(1),** 3-8. Available from: DOI: 10.4103/2231-4040.79796

Sharma A, Bachheti A, Sharma P, Bachheti RK, Husen A. 2020; Phytochemistry, pharmacological activities, nanoparticle fabrication, commercial products and waste utilization of *Carica papaya L.*: A comprehensive review. Current Research in Biotechnology [Internet] **2,** 145-160. https://doi.org/10.1016/j.crbiot.2020.11.001

Shekarchi M, Hajimehdipoor H, Saeidnia S, Gohari AR, Hamedani MP. 2012.**.** Comparative study of rosmarinic acid content in some plants of Labiatae family. *Pharmacognosy magazine*. [Internet]. **8(29),** 37-41. Avialbe from: https:// doi.org /10.4103/0973-1296.93316

Shirur SD, Roshan A, Timilsima SS, Sunita S. 2013. A review on the medicinal plant *psidium guajava* linn. (myrtaceae). Journal of Drug Delivery & Therapeutics [Internet]. **3(2),** 162-168. Available from: https://doi.org/10.22270/jddt.v3i2.404

Singh S, Shankar R, Singh GP. 2017. Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Urban Varanasi, International Journal of Hypertension [Internet]. vol. 2017, Article ID 5491838, 10 pages. Available from: https://doi.org/10.1155/2017/5491838

Sun Q, Shen YH, Tian JM, Tang J, Su J, Liu RH, Li HL, Xu XK, Zhang WD. 2009. Chemical constituents of Crinum asiaticum L. var. sinicum Baker and their cytotoxic activities. Chem Biodivers [Internet] **6(10),** 1751-7. Available from: DOI: 10.1002/cbdv.200800273.

Sukor S, Zahari Z, Rahim N, Yusoff J, Salim F. 2022Chemical Constituents and Antiproliferative Activity of *Eleusine indica* (L.) Gaertn. Sains Malaysiana [Internet].; **51(3),** 873-882. Available from: http://doi.org/10.17576/jsm-2022-5103-21

Tantengco OA, Condes ML, Estadilla HH, Ragragio E. 2018. Ethnobotanical Survey of Medicinal Plants used by Ayta Communities in Dinalupihan, Bataan, Philippines. Pharmacognosy Journal [Internet]. **10(5),** 859-870. Available from: DOI: 10.5530/pj.2018.5.145

Tugume P, Nyakoojo C. 2019. Ethno-pharmacological survey of herbal remedies used in the treatment of paediatric diseases in Buhunga parish, Rukungiri District, Uganda. BMC Complement Altern Med [Internet] **19,** 353. Available from https://doi.org/10.1186/s12906-019-2763-6

Velazquez MDRH, Palmero OR, Cortiñas LT, Pacuar MCV, Faramiñan EB, Macias, L.C. 2016; Traditional use of plants as antihypertensive in Jipijapa, Manabí. Comparison with reported in the literature. Mol2Net [Internet] **2.** 1-17. Available from: http://sciforum.net/conference/mol2net-02

Vergara-Jimenez M, Almatrafi MM, Fernandez ML. 2017;Bioactive Components in *Moringa Oleifera* Leaves Protect against Chronic Disease. Antioxidants (Basel) [Internet] **6(4).** 91. Available from: DOI: 10.3390/antiox6040091.

Wirata N, Gede Agung AA, Arini NW, Nuratni NK. 2021Sentul Fruit (*Sandoricum koetjape*) Peel as Anti-Inflammation for Gingivitis after Scaling. Journal of Health and Medical Sciences [Internet] **4(4).** 27-36. Available from: DOI: 10.31014/aior. 1994.04.04.190

Yanto TA, Hatta M, Bukhari A, Natzir R. 2020; Molecular and Immunological Mechanisms of Miana Leaf (*Coleus Scutellariodes* [L] Benth) in Infectious Diseases. Biomed Pharmacol J [Internet]. **13(4).** Available from: https://bit.ly/3nojGwU

Yimam M, Yimer SM, Beressa TB. 2022;Ethnobotanical study of medicinal plants used in Artuma Fursi district, Amhara Regional State, Ethiopia. Tropical medicine and health [Internet] **50(1),** 85. Available from: https://doi.org /10.1186 /s41182-022-00438-z

Zhao X, Lin FJ, Li H, Li HB, Wu DT, Geng F, Ma W, Wang Y, Miao BH, Gan RY. 2021. Recent Advances in Bioactive Compounds, Health Functions, and Safety Concerns of Onion (*Allium cepa L.*). Frontiers in Nutrition [Internet]. Available from: https://doi.org/10.3389/fnut.2021.669805