Article

Edible plants with medicinal properties used in a community of the Meranao people of Marawi City, the Philippines

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Abstract

The present study investigates the traditional knowledge of the Meranao people residing in Marawi City, the Philippines, regarding the use of edible plant species purported to possess medicinal attributes. This indigenous Filipino community has amassed a wealth of knowledge regarding alternative medicine sources over several decades. This study, therefore, was undertaken on the grounds that the information produced holds immense potential for the advancement of traditional medicine and the conservation of biodiversity. Results of the survey show seventeen food plant species with medicinal properties were identified, demonstrating the rich botanical diversity in the area. Network analysis examining the ethnopharmacological properties of food plants in an effort to determine their potential medicinal value indicates that these plants were utilized not only as sources of nutrition but also to treat a wide range of health conditions, including minor wounds and cancer. This study demonstrates the importance of employing these plant species not only for culinary purposes but also as traditional remedies for the purpose of addressing and controlling local maladies. This research provides valuable insights into the function of specific food plant species within indigenous healthcare systems through an examination of the links between these plants and their traditional medicinal properties, as well as their utilization as food sources. However, additional research should be conducted to ascertain the safety and efficacy of the documented plant species.

Keywords bioactive compounds; ethnomedicine; network analysis; traditional medicine.

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1 Introduction

The nutritional value of numerous species of food plants has been the subject of extensive research; nevertheless, the potential ecological ramifications that may arise from the increased utilization of these

plants in times of food scarcity, for instance, are not well understood. These plants can thrive in unfavorable environmental conditions, such as drought, poor soil quality, and other stresses; a significant proportion of food plant species are categorized as emergency crops (Gitz, 2016). While further investigation is necessary to assess the environmental sustainability of their utilization, including aspects such as pest resistance, propagation methods, and potential impacts on local biodiversity, it is argued that further research is critical for the development of sustainable strategies that facilitate the utilization of numerous food plant species without endangering long-term food insecurity or detrimentally affecting local ecosystems.

Numerous indigenous local communities acknowledge the profound nutritional value and potential therapeutic properties of countless indigenous plant species (Bassam, 2012). Local and popular customs of numerous ethnic societies are often ascribed to the pharmacologic properties of traditional remedies, the majority of which are derived from edible plants harvested in the wild. Abbasi et al. (2015) assert that they are frequently associated with favorable outcomes. For human consumption outside of agricultural areas, a number of these sustenance plants comprise all plant resources harvested or collected from the wild. An assortment of botanical components presents in these numerous plant species utilized as food items find utility as pharmaceuticals, dietary supplements, and sources of bioactive substances. For instance, the incorporation of alternative plant species into the cuisines of diverse ethnic communities may differ regionally. Still, significant improvements in the food and nutrition security, health, and overall welfare of the communities in which they are identified are achieved. As a result of their potential uses as pharmaceuticals, dietary supplements, and sources of bioactive substances, a multitude of plant species used as food have recently attracted considerable interest. Significantly enhancing food and nutrition security, their implementation also improves the health and well-being of many local communities. It is worth noting that medicinal plants and their application in traditional medicine have been documented in virtually every cultural group across the globe (Ahn, 2017). It is, therefore essential to know that the foundation for establishing connections between plants and their therapeutic functions is laid by the pre-existing knowledge pertaining to the therapeutic properties of various medicinal plants utilized by local communities, such as the Meranao people residing in Marawi City. By examining the profound interrelationships among these sustenance food plants and their attributes, we will attain a comprehensive understanding of the interrelationships between nutrition and their therapeutic applications. Implementing such a holistic strategy not only facilitates the discovery of innovative compounds that may have implications in the pharmaceutical or nutritional fields but also ensures the preservation of standard knowledge systems. A multitude of studies has provided evidence that the conservation of various indigenous plants in regional food cultures is inextricably linked to conventional medicinal systems (Fleuret, 1993). Chinese medical theories and food therapy have encompassed the notion of "food as medicine" since ancient times (Weng and Chen, 1996). The medicinal and dietary applications of a diverse range of natural plants were revealed by Etkin and Ross (1991) in their research conducted in West Africa. They hypothesize that humans have selected nutrition-providing, hunger-suppressing, and therapeutically beneficial food plants through trial and error; thus, based on this premise, the present study may reveal that numerous food or sustenance plants must possess ethnomedicinal or therapeutic properties collectively. To discern and grasp the intricate interrelationships among the various medicinal properties of these food plants, network analysis on the associations between these food plant species utilized by the Meranao people and their therapeutic significance was conducted. This study will provide not only information on the utilization of food plants used by the community but may also provide invaluable knowledge on the potential impact of these plants on local food security. By elucidating potential novel therapeutic sources for numerous health problems, the application of network analysis may help improve comprehension of ethnomedical knowledge regarding the use of identified food plants, which is

crucial, and also for possible policies in the conservation and utilization of these botanical resources.

2 Materials and Methods

2.1 Description of the study area

Marawi City is the headquarters of the province of Lanao del Sur, which has the country's second-largest and deepest lake. The city's land area is 87.55 square kilometers, equivalent to 33.80 square miles, and it accounts for 0.58% of the total land area of Lanao del Sur. According to the results of the Census that was conducted in the year 2020, its population was 207,010. This accounted for 17.32% of the total population in the province of Lanao del Sur, equivalent to 4.70% of the entire population in the Bangsamoro Autonomous Region in Muslim Mindanao.

2.2 Investigative method

To get a good look at how people in Marawi City use medicinal plants, the study used a strategic sample method that targeted healthcare providers, native residents, traditional healers, and traditional practitioners. This targeted approach allowed the researcher to ensure that many different perspectives and bodies of information were considered and included. Twenty barangays in Marawi City were included in the research. Considering elements like cultural relevance and geographical diversity, these barangays were selected on purpose to provide a complete portrayal of the urban landscape. The rationale behind this strategy was to learn whatever there was to know about the community's traditional medical practices—utilizing a variety of viewpoints and expertise.

2.3 Data mining

Research articles and publications on medicinal food plants laid the groundwork for the field of data mining. The present analysis also collected data from various published sources, including scientific terminologies pertinent to the species under study. In addition, detailed records were maintained regarding the specific botanical components used and their related ethnomedicinal applications. Furthermore, the processes employed in researching and formulating these plant-derived treatments were also recorded. In addition, an extensive examination of the existing literature was conducted to determine the bioactive chemicals present in these formulations, and their biological activities were evaluated. This essential information was systematically arranged and retained using an extensive, meticulously kept database.

2.4 Quantitative analysis

2.4.1 Informant Consensus Factor (ICF)

ICF was used to assess the degree of agreement between the informants' knowledge of each type of disease (Trotter and Logan, 1986; Heinrich et al., 1998, 2009). The following formula was used to compute the ICF:

$$ICF = (\eta ur - \eta t)/ (\eta ur - 1)$$

where η_{ur} is the number of informant use reports for a specific ailment category, and η_t is the number of species utilized by all informants for that illness.

2.4.2 Fidelity Level (FL)

The FL will identify the most critical plant species utilized by local herbal practitioners and older persons living in the study area to treat specific conditions (Alexiades, 1996; Kim and Song, 2008). The following formula was used to determine the FL:

$$FL\ (percent) = Np \times 100/N$$

where Np is the number of informants who reported specific plant species used to treat specific ailments, and N is the overall number of informants who utilized the plants as medicine to treat any illness.

3 Results and Discussion

3.1 Demographic characteristics of informants

A total of 100 informants were randomly selected in the community. Out of these, 37 were male and 63 were female. The informants were selected from a target age range of 16 to 46 years old and above. The field investigation lasted from June 2022–April 2023.

Table 1 Demographic characteristics of informants.

Factor	Categories	Percentage (%)
Sex	Male (37)	37%
	Female (63)	63%
Educational Attainment	No Formal Education	13%
	Elementary Level	17%
	Secondary Level	26%
	Undergraduate	31%
	Graduate (Higher Education)	13%
Age	16-25 Years old (21)	21%
	26-45 Years old (44)	44%
	46 Years old and above (35)	35%

3.2 Ethnomedicinal uses

Plants have continued to play essential roles in supporting human life in different parts of the world (Karuo, 2011). Studies of ethnomedicine on plants require standardized methods for botanical identification and reliable documentation of indigenous knowledge about the distribution, management, and traditional applications of plants for medicinal purposes (Alebie, 2017). In this study, Meranaos utilized various food plants to treat different ailments. The data collected reveal that 17 species of plants, mostly leaf, fruit, stem, root corms, rhizome, and seeds belonging to 17 families, were identified. According to the findings of this study, the same type of plant can heal various diseases by employing different parts of the plant (Table 2).

Based on the data gathered, many plants are in the study area, many of which have important medical uses. Moreover, the inhabitants in the study area rely heavily on traditional medical practices since they lack access to modern healthcare facilities despite the area's urban location. According to the data gathered, the leaves were the most often used part of the plant for medicinal purposes. Compared to other plant components, leaves are used more often to make herbal remedies since they are simpler to gather and don't represent as much of a risk to the local flora. Leaves are always available for most plant species at all seasons and are readily accessible in case of emergencies. Collecting leaves is more sustainable than gathering other plant parts, such as barks and roots, that can cause damaging effects and even mortality to a plant if harvested in large quantities. Leaves contain the highest secondary metabolites with an antimicrobial effect (Chanda and Kaneria, 2011), antioxidant properties, antibiotic activity, and antidiabetic potential compared with other plant parts (Jain et al., 2019). This is similar to the research findings of (Sabiu et al., 2019), where leaves were the most used

plant part. As mentioned by Lulekal et al. (2008), harvesting roots negatively influences the survival and continuity of medicinal plants, affecting their sustainable utilization. Using more leaves than other plant parts implies that the traditional medical culture in the area does not threaten biological diversity (Bekalo, 2009). Moreover, the collection and mode of preparation of medicine from leaves is much easier than other parts of the plant and makes them the first choice for use (Giday et al., 2009; Telefo et al., 2011).

Regular leaf consumption substantially contributes to the survival and propagation of valuable botanical species with therapeutic capabilities, enabling the long-term growth of those plants within a region. However, different medicinal plants require other methods of preparation and administration when used to treat various illnesses. Decoction, pounding, raw, crushing, aqueous, and extraction were the six types of preparation methods noted in this study. The decoction was the most employed method of preparation compared to other methods. Similar results for the most used form of practice were reported by Tjeck et al. (2017), Gbolade et al. (2012), and Kpodar et al. (2015). According to the latter authors, the fast nature of decoction, when compared to the application of other methods in which the extraction process takes a more extended period, may be responsible for it being the most preferred preparation method. Studies from different parts of Africa have also reported that decoction was the most frequently used method of herbal remedy preparation, commonly using water as a solvent (Nguta, 2010).

Table 2 Ethnomedicinal uses of the food plants by the Meranaos.

Scientific Name	common Name	Ethnomedicinal Uses	Parts Used	Mode of preparation	Mode of Consumption
Alternanthera sessilis (L.) R. Br. ex DC.	Shanti shak		Leaves, stem	Aqueous	cooked as vegetable
Annona Muricata	Soursop	Leaves are used to treat skin diseases and ulcers	Whole plant	Decoction, Raw, and Juice	The ripe fruit can be eaten raw, and the juice can be drink
Colocasia esculenta	Taro	Bacterial and fungal infections, fever, respiratory and skin illnesses, diabetes, internal and external parasites, malaria, stomach ache, parasitic infections, and cancer	Leaves, Corms	Aqueius, Decoctionm Heating, Crushing	Boil the tuber and eat
Phyllostachys edulis	Bamboo Shoot/Labong	Taro leaves and corms were cooked and eaten by women who were having trouble giving birth. Additionally, heated tubers were applied to rheumatoid arthritis sore spots as a defense against wasp stings and other insect bites.	Stem	Raw, Decoction	Cooked as vegetable w/ dried seafood

Chenopodium album I..	Bothua	Use to treat allergies, headaches, and common colds, improving appetite and digestion.	Leaves, Stem	Aqueous, Decoction	Cooked as vegetable
Ipomoeba batatas Poir.	Sweet Potato	Laxative, diuretic, sedative, rheumatism, antidiarrhoeal, antidiarrhoeal, antiphlogistic, antirheumatic, contraceptive, odontalgic, cardiotonic, antiscorbutic, blood purifier, digestive, aphrodisiac, for the treatment of dyspepsia, flatulence, seminal weakness, pharyngopathy, splenopathy, hemorrhoids, ophthalamopathy, cardiac disorder, hepatic disorder, spleen enlargement, biliousness, intestinal ulcers	Leaves	Pounding	Can be boiled, baked, steamed or fried
Momordica charantia	Bitter gourd	Leaves are used to treat debility and diarrhea. The seed is employed in the ulcer treatment, liver and spleen problems, Diabetes, high cholesterol, parasites in the intestines, and Intestinal gas, wound healing, stomachache. On the other hand, the fruit used in asthma, burning sensation, constipation, cough,	Fruits, Seed	Squeeze the gourd fruit to extract the juice	Cooked as vegetable
LiuDioscoreaalata	Purple yam	Fever (malaria), gout, helminthiases, skin diseases	Root	Decoction, Crushing	Boil the tuber and eat

Manihot esculenta	Cassava	Menopausal symptoms, osteoporosis, rheumatoid arthritis, and infertility are all conditions it is used to treat	Leaves, Root	Aqueous	Cooked and pounded, staple food
Vigna radiata	Mung bean	Can be used to treat high blood pressure, wounds, and ulcers. The seeds are used in the treatment of paralysis, rheumatism, coughs, fevers, and liver ailments treat acne, eczema,	Seeds	Pounding, Crushing	Cooked as vegetable
Corchorus olitorius	Molokhia	Dermatitis and relieving itchiness	Leaves	Decoction, Crushing	Cooked as vegetable w/ dried fish
Artocarpus heterophyllus Lam.	Jack fruit/Langka	Fever and inflammation, Joint pain, Weak muscle, Stiffness, Muscle Rigidity	Leaves, Seed	Pounding, Crushing	The unripe fruit is cooked as a vegetable with/ dried fish; the ripe fruits can be mixedwith other fruits.
Moringa oleifera Lam	Moringa	Seeds used against constipation	Leaves, Fruit	Extraction, Decoction, Juice	cooked as vegetable
Musa x paradisiaca L.	Plantain	Malaria and fever to hypertension and Diabetes	Flower, Fruit	Pounding, Decoction	Eaten raw when ripe, It can be fried also
Curcuma longa	Turmeric	Fruits that fight diarrhea, hematemesis, and anemia. Pseudostems and flowers are used to treat chronic dysentery.	Rhizome	Pounding, Decoction, Aqueous	Dried and crystalized, it can be added as spice and food color to fish, meat, and rice.
Zingiber officinale	Ginger	Cancer, Diabetes, Arthritis, diarrhea, inflammation, psoriasis, hepatobiliary diseases, gastric and peptic ulcers.	Roots, Rhizomes, and leaves	Pounding, Crushing, and Aqueous	Pounded and used as seasoning
		Headaches, Colds, Nausea, obesity, Diabetes			

The study has also considered the bioactive compounds unique to each plant species because these compounds play an increasingly important function in each species thus, data from studies on the bioactive compounds in these plants were examined (Table 3). Bioactive compounds from ethnomedicinal plants may offer leads for drug discovery and development. Studying these compounds may lead to new pharmaceuticals

or treatments. Plant bioactive chemicals are essential to human health due to their diverse biological effects. These benefits include antioxidant, anti-inflammatory, and antibacterial activity, which can potentially have a therapeutic effect on various non-contagious conditions.

Table 3 Reported bioactive and biological activities of the food plant species.

Scientific Name	Bioactive Compounds	Biological Activities	References
Alternanthera sessilis (L.) R. Br. ex DC.	Flavonols, triterpenoids, steroids and tannins	Anti-inflammatory, Hematinic, Wound healing, Antidiabetic.	Hygeia and Issin, 2010 Arollado and Osi, 2010 Kumarasamyraja et al., 2012 Boddupalli et al., 2012
Annona Muricata	Acetogenins, alkaloids, flavonoids, essential oils, vitamins, carotenoids, amides, and cyclopeptides	Anticancer, Antiulcer, Antidiarrhea, Antiprotozoal, Antidiabetic, Antibacterial and Antihypertensive	Drishya et al., 2005 Afroz et al., 2020 Adefegha et al., 2015 Nwokocha et al., 2012 Reyad-ul-Ferdous et al., 2023 Brown et al., 2005 Patil and Ageely et al., 2011
Colocasia esculenta	Vitamin C, Starch, Amino Acid, Protein, Anthocyaninsperlargonidin 3-glucoside, Cyaniding 3-glucoside, B-sitosterol, sterorids, Flavonoids, Calcium, Phosporous, Iron, Vitamin C, Thaiamine, Riboflavin, Niacin, Minerals, Saponins, Terpens, Anthraquinones, Cardiac Glycosides, Alkaloids and Ascorbic Acid	Antimicrobial, Antihepatotoxic, Anti-lipid peroxidative, Antidiabetic, Anti-melanogenic and Antihelmentic activity	Singh et al., 2011 Mengane et al., 2015 Kumuwat et al., 2010 Patil and Ageely, 2011 Shah et al., 2007 Kundu et al., 2012
Phyllostachys edulis	Phytosterols and phenols	antioxidant, anti-inflammatory, antimicrobial, antifungal, antiapoptotic, anticancer, antiviral, antibacterial, and anti-fatigue.	Hu et al., 2000 Lu et al., 2005 Fujimura et al., 2005 Hong et al., 2010 Shi et al., 1992 Zhang et al., 2006
Chenopodium album I..	Phenols, lignins, alkaloids, flavonoids, glycosides, saponins, ascorbic acid, β-carotene, catechin, gallocatechin, caffeic acid, p-coumaric acid, ferulic acid, β-sitosterol, campesterol,	Antioxidant, antimicrobial, Anthelmintic, anti-inflammatory, anticancer	Elif Korcan et al., 2013 Kaur and Kapoor et al., 2002 Jabbar et al., 2007 Usman et al., 2010 Khoobchandani et al., 2009

	xanthotoxin, stigmasterol, n-triacontanol, imperatorin, ecdysteroid		
Ipomoeba batatas Poir.	Phenolic acids, Flavonoids, Mono-and di-galactosyldiacylglycerol, Carotenoids, Dietary fiber, Dietary Fiber, Dietary protein, polysaccharides, Alkaloids, Saponins, Coumarins and Chenopodiaceae tannins	Anticancer, hepato-protection, anti-inflammatory, antidiabetic	Ezekiel et al., 2013 Wang et al., 2014 Wang et al., 2014 Knek et al. 2002
Momordica charantia	Polysaccharides, Peptides and proteins, Lipids, Terpenoids, Saponins, Phenolics and sterols	Antioxidant, Antiviral, Antimicrobial, Anti-inflammatory, Anti-tumor, Hypolipidemic, Immunomodulatory, and wound Healing activity.	Liu et al., 2010 Beloin et al., 2005 Braca et al., 2008 Bao et al., 2013 Grover and Yadav, 2004 Chatturvedi et al., 2005 Juvekar et al., 2015 Singer and Clark, 1999
LiuDioscoreaalata	Polysaccharides, Steroidal saponins, Polyphenols, allantoin and Alkaloids	Antioxidant, Immunomodulatory, Antihypertensive, Antimicrobial, Estrogenic effect and Anti-tumor effect.	Araghiniknam et al., 1996 Fang et al., 2011 Hou et al., 2001 Hsu et al., 2002 Liu et al., 2007 Wu et al., 2016
Manihot esculenta	Alkaloids, Glycosides, Flavonoids, Phenols, Carotenoids and Vitamins	antioxidant, antiradical, anticancer, antibacterial, antifungal, antidiarrheal and analgesic	Rajendran et al., 2011 Tsumbu et al., 2011 Arafa et al., 2023 Saad et al., 2014 Ehiobu and Ogu, 2018 Bahekar and Kale, 2015 Miladiyah et al.,2011
Vigna radiata	Tannins, phytic acid, trypsin inhibitors, hemagglutinin and other antinutrients	Antioxidant, Antidiabetic, Antihyperlipidemic, Antihypertensive, Antimicrobial, Anti-inflammatory and	Wongsiri et al., 1956-1964 Yeap et al., 2012 Baudry et al., 2017 Hafidh et al., 2015 Luo et al., 201

		Anticancer	Hafidh et al., 2012 Mouas et al., 2021
Corchorus olitorius	Phenolic acid, Terpenes, fatty acids, ionones, Flavonoids, coumarins, Steroidal, Miscellaneous	Antioxidant, Anti-inflammatory, Hepatoprotective, anti-tumor, antimicrobial, antidiabetic, analgesic, Cardioprotective and antiviral	Yan et al., 2013 Do et al., 2021 Nishiumi et al., 2006 Sumengen et al., 2019 Ahmed et al., 2021 Parvin et al., 2015 Das et al., 2010 Mesli et al., 2022
Artocarpus heterophyllus Lam.	Carotenoids, flavonoids, volatile acid sterols and tannins	Anti-inflammatory, Antioxidant, Antimicrobial, Anticancer, Anti-osteoporotic Activity	Meera et al., 2017 Zhu et al., 2019 Siritapetawee et al., 2023 Arung et al., 2010 Yuan et al., 2017
Moringa oleifera Lam	Vitamins, carotenoids, polyphenols, phenolic acids, flavonoids, alkaloids, glucosinolates, isothiocyanates, tannins, and saponins	gastric ulcers are antidiabetic, hypotensive, and anti-inflammatory	Pal et al., 1995 Woldekidan et al., 2021 Faizi et al., 1998 Amutha and Selvakumari, 2014
Musa x paradisiaca L.	Tannic acid, Catechin, Gallic Acid, Cinnamic Acid, p-Coumaric acid, Gallocatechin gallate, Quercetin, Ferulic acid, Trans-α carotene, Trans-β carotene, Cryptoxanthin, Serotonin, Dopamine, Catecholamines, β-Sitosterol, Campesterol and stigmasterol	Wound healing, Anticancer, Antidiabetic, Antiulcer	Vijayakumar et al., 2017 Vilhena et al., 2020 Boehme et al., 2007 Uzunnhisarcikli and Alanturk, 2019
Curcuma longa	Polyphenols, sesquiterpenes, Diterpenes, Triterpenoids, sterols, and alkaloids.	Antioxidant, Hepatoprotective, Anti-osteoarthritis, anti-inflammatory, anticancer, anti-arthritic, antidiabetic and anti-depressant	Razavi and Marjan, 2020 Nicoliche et al., 2020 Kinney et al., 2015 Jia et al., 2014 Nonose et al., 2014 Xu et al., 2019 Aggarwal et al., 2013 Nile and Park, 2015
Zingiber officinale	Phenolic and terpene	Antioxidant, Anti-inflammatory, antimicrobial and anticancer	Zhang et al., 2016 Kumar et al., 2014 Citronberg et al., 2013

3.3 Quantitative analysis

3.3.1 Informant Consensus Factor (ICF)

The informants' degree of agreement with the knowledge regarding medicinal plants was measured using the informant consensus factor. In the context of a particular disease category, high ICF values suggest that a significant proportion of the informants mentioned one or a small number of medicinal plants. The result shows that 20 different disease categories were recorded in this study (Table 4). Among the illness categories, chronic disorders, dental and oral-related, and eye disorders have the highest degree of consensus, scoring 1.00. In contrast, the lowest level of consensus was observed for cardiovascular conditions. It is widely believed that the abundance of fast food establishments, cafes, and restaurants serving meals high in unhealthy fats, salt, and additives is to blame for the widespread agreement on this topic because cafes are popular hangouts for many individuals these days, particularly teens.

Table 4 Category of ailments mentioned and their Informants Consensus Factor (ICF).

Disease Category	Nur	Nt	ICF
Cardiovascular Disorder	5	4	0.25
Chronic Disorder	2	1	1
Dental and oral-related	6	1	1
Dermatological Disorder	6	2	0.8
Digestive Disorder	4	3	0.333
Eye Disorder	12	1	1
Fever/Febric Condition	63	2	0.984
Gastrointestinal Disorder	34	9	0.758
Genetic Disorder	3	2	0.5
Immune Disorder	3	2	0.5
Infectious Disease	22	7	0.714
Metabolic Disorder	5	3	0.5
Musculoskeletal Disorder	13	3	0.833
Neurological Disorder	6	4	0.4
Parasitic Disease	3	2	0.5
Reproductive Health	4	3	0.333
Respiratory Disorder	8	3	0.714
Rheumatic Disorder	9	4	0.625
Skin Disorder	10	4	0.667
Wound and Injury Related	13	2	0.917

3.3.2 Fidelity Level (FL)

Depending on the use report cited by the informants for a given species for a specific ailment, this study assigned an FL of 100 percent to two plant species, *M. oleifera Lam* and *M. charantia*, excluding plants which are only mentioned once for greater precision. The information reveals that the informants relied on one specific plant species for treating one ailment rather than several different elements.

3.4 Network analysis

The network relationship of health issues and the medicinal food plants utilized by the Meranao people of

Marawi City is depicted in Fig. 1. Nodes in this network symbolize ailments or medicinal food plants, while boundaries delineate the documented utilization of a specific plant for the treatment of a particular condition. In a proportional relationship, the degree of a node determines the number of edges that are connected to it. The magnitude of an edge is directly correlated with the frequency with which a specific plant has been documented as a remedy for a particular malady. The network map was constructed with the purpose of examining the correlation between the medicinal plants utilized by the inhabitants of Marawi City for sustenance purposes, as well as to illuminate the interdependence and importance of different plant species in the treatment of specific ailments. Significant observations regarding regional medical practices have been unveiled through the utilization of this visualization, which has revealed noteworthy patterns and critical nodes.

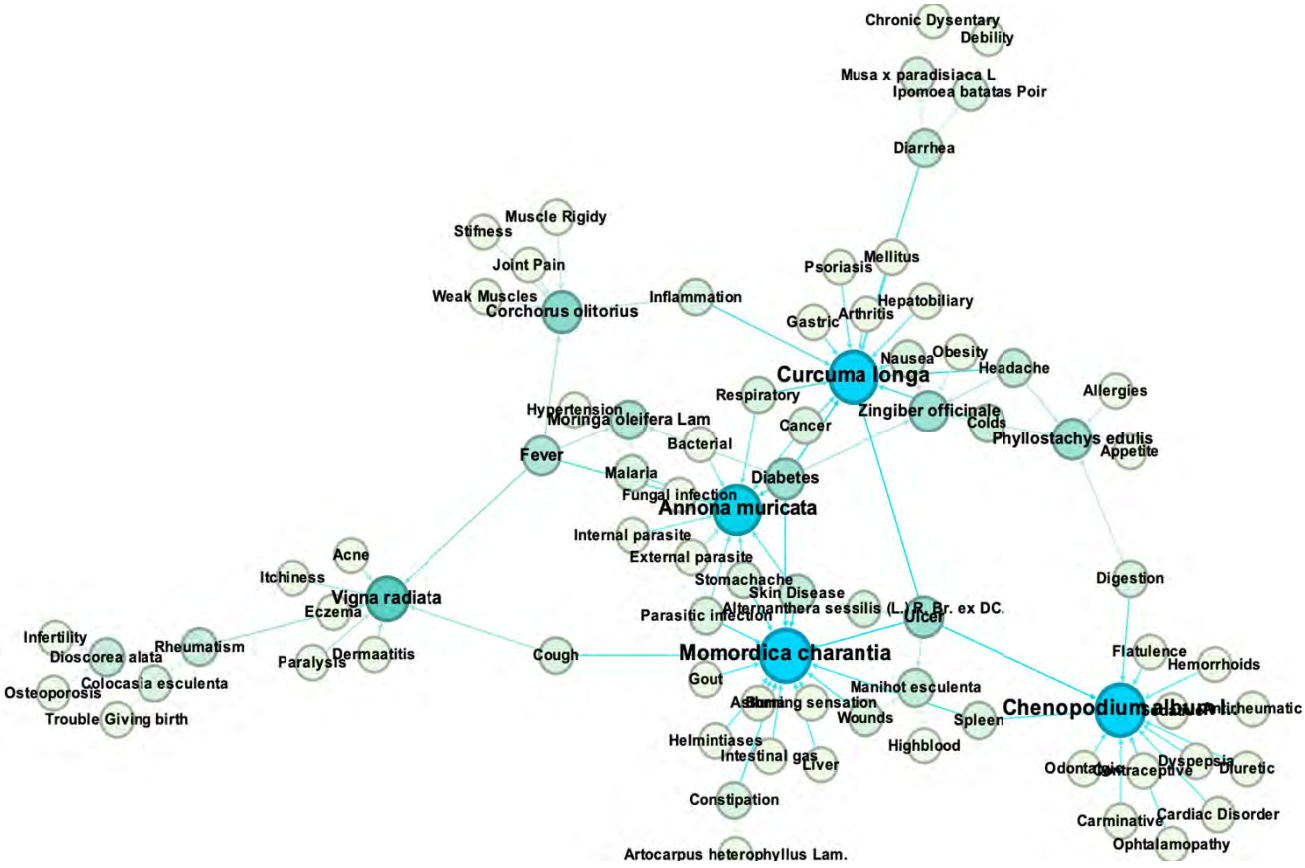

Fig. 1 Network of medicinal food plants and the addressed ailments.

Based from the figure, *M. charantia*, *Curcuma longa*, and *Chenopodium album* signify their larger value in managing multiple health issues. These three different plant species showed that they are connected to one of the ailments, ulcers. The medicinal properties of *M. charantia* have been demonstrated to be effective in treating various conditions. Aside from that, because of the abundance of vitamins, minerals, and other substances that are beneficial to your health, it is an excellent choice for the local traditional medicinal practices. According to (Leung et al., 2009), *M. charantia* has been extensively studied worldwide for its medicinal properties to treat several diseases.It is a versatile plant worthy of treating almost any disease inflicted on humanity. This may be because the plant possesses over 225 medicinal constituents (Taylor, 2002). Similarly, *C. longa* contains a wide variety of therapeutic effects. It remains significant in addressing

prevalent ailments. In certain traditional practices, *C. longa* is used to remedy respiratory issues like coughs, asthma, and bronchitis due to its expectorant and anti-inflammatory properties. Although *Artocarpus heterophyllus* Lam and *Alternanthera sessilis* (L.) present a lower degree compared to *M. charantia, C. longa*, and *C. album*, they somehow stand out as they can also heal some ailments such as skin disease and constipation.

The prominence of ulcers, indicated by enlarged nodes in the context of treated illnesses, indicates their extensive occurrence within the community. The prevalence of ulcers in the network suggests a strong need for efficient treatments to control this condition, highlighting the importance of medicinal plants such as *M. charantia*, *C. longa*, and *C. album* in addressing this health issue.

The Meranao people of Lanao Del Sur province mostly have traditional reliance on plant medicines. The ethnomedicinal knowledge of the Maranao people reflects a deep connection between their culture, environment, and traditional healing practices. Documenting and preserving this knowledge contribute to the understanding of conventional medicine but also highlights the importance of cultural heritage and indigenous healthcare systems. The utilization of these plants in traditional medicine represents the cultural legacy of the local community as well as the indigenous knowledge of its members. In addition to its medical properties, these food plants are intricately connected to the cultural and societal structure of Marawi City. Incorporating these plants in traditional medicine exemplifies local communities' cultural history and indigenous knowledge. The preservation and comprehension of these plants entail their therapeutic advantages and the protection of traditional cultural practices.

4 Conclusion

The efficacy and effectivity of the therapeutic claims of these species must be further pharmacologically investigated and validated. Many people worldwide have relied on many plant species for hundreds of years because they have been shown to treat various illnesses. The study of food plants with medicinal importance contributes significantly to the vast body of traditional knowledge and practices. The Meranao peoples' traditional knowledge of not only the nutritional values of the plants but also their therapeutic uses also helps provide more treatment options, making them potentially useful for the therapy of both pre-existing and newly discovered ailments. The indigenous knowledge of the Meranao of Marawi City regarding the utilization of the food plants for nutrition and as medicine is of the utmost importance to document. This is important before indigenous knowledge is lost forever as a result of not only the lack of interest on the part of younger generations but also the extinction of the species, as these are not primarily considered the most important species by many.

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