REVIEW

Ethnomedicinal plants used for treating urinary tract infections in the Philippines: a systematic review

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ABSTRACT

Background: In developing nations, including the Philippines, medicinal plants are still utilized to cure prevalent communal ailments. One of these diseases is UTI, characterized by infections of the lower urinary tract, composed of the bladder and urethra, and the upper urinary tract, including the kidneys and ureters. This systematic review identified the medicinal plants used for UTI treatment in the Philippines.

Methods: The study was conducted based on the PRISMA flow diagram, starting with a data search on the Scopus, EBSCO-CINAHL, and OVID Medline databases and a manual search from Google Scholar. The following search technique was utilized in Scopus, EBSCO-CINAHL, and Google Scholar was: (ethnobot* OR ethnomed* OR ethnopharmacolo* OR "medicinal plan*") AND (Philippin* OR Filipin*). Meanwhile, the search terms used for Ovid Medline were (ethnobotany OR ethnomedicine OR ethnopharmacology OR medicinal plants) AND (Philippin* OR Filipin*). The collected studies were subjected to inclusion and exclusion criteria. The necessary information was extracted from the eligible research papers, and the studies' quality was assessed through a developed quality assessment tool.

Results: Initially, 498 studies are gathered in this systematic review, with 434 obtained from Scopus, EBSCO-CINAHL, and OVID Medline databases and 64 from manual searching on Google Scholar. After thorough screening, the number of eligible studies is narrowed down to 42, with publication dates starting from 2012 to 2021. The articles included are

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Email Address: ogtantengco@up.edu.ph
Date received: January 4, 2024
Date revised: February 15, 2024
Date accepted: February 17, 2024
DOI: https://doi.org/10.54645/202417SupQGY-19

KEYWORDS

ethnobotany, UTI treatment, *Cocos*, toxicologic, decoction, Region III and Region XIII

observational studies written in English or Filipino. Most studies included are observational because they provided primary information about ethnobotanical knowledge. Systematic reviews, literature reviews, letters to the editor, comments, and case reports were excluded. The ethnobotanical studies on medicinal plants used for UTI treatment were obtained from the 16 regions of the Philippines, with most ethnobotanical studies conducted in Region III (Central Luzon) and Region XIII (CARAGA). A total of 47 different families, 81 genera, and 97 species are documented in this study. The most common plant family, genus, and species were Poaceae, *Cocos*, and *Cocos nucifera* L., respectively. Leaves, roots, and fruits were predominantly used, commonly prepared by decoction and administered orally. Although 26 spp. (26.8%) had no data on toxicity or teratogenicity; most documented medicinal plants (71 spp., 29.58%) used to treat UTIs in the Philippines had records of toxicologic and teratogenic properties. Of these, 45 spp. (63.38%) are nontoxic, 21 spp. (29.58%) are toxic, two spp. (2.82%) are both nontoxic and toxic, two spp. (2.82%) are both toxic and teratogenic, and one sp. (1.41%) is both nontoxic and teratogenic.

Conclusion: There remains a scarcity of ethnobotanical studies documenting the use of plants in treating UTIs. This study showed the abundance of medicinal plants used in treating UTI in the Philippines. However, pharmacological and toxicological studies are still needed to determine the safety and efficacy of these medicinal plants in treating UTIs in the community.

Abbreviations
BSLA – brine shrimp lethality assay
CALABARZON – Cavite, Laguna, Batangas, Rizal, and Quezon
CAR – Cordillera Administrative Region
DOH-PITAHC – Department of Health-Philippine Institute of Traditional and Alternative Health Care
ESBL – extended-spectrum β-lactamase
EBSCO - CINAHL – Elton B. Stephens Company-Cumulative Index to Nursing and Allied Health Literature
GIDAs – geographically isolated and disadvantaged areas
IPs – Indigenous Peoples
MIMAROPA – Mindoro, Marinduque, Romblon, and Palawan
NCR - National Capital Region
PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SOCCSKSARGEN – South Cotabato, Cotabato, Sultan Kudarat, Sarangani, and General Santos City
UTIs – Urinary tract infections

INTRODUCTION

The Philippines is one of the world's 18 mega-biodiverse countries, accounting for two-thirds of global biodiversity and 70–80% of plant and animal species. That is why it is unsurprising that the country ranks sixth in terms of plant species variety, accounting for 5% of the global flora (*Biodiversity Facts: Status and Trends of Biodiversity, Including Benefits from Biodiversity and Ecosystem Services* n.d.). Furthermore, the country is culturally diverse, with an estimated 14 to 17 million Indigenous Peoples (IPs) divided into 110 indigenous communities and around 185 ethnolinguistic groups (United Nations Development Programme 2013). With such a diverse flora, the IP learned to use medicinal plants to treat prevalent diseases. This practice became part of IP culture and has been passed down to succeeding generations (Belgica et al. 2021). As a result, medicinal plants became part of the Philippine primary health care system because they are readily available and inexpensive, especially in rural, geographically isolated, and disadvantaged areas (Maramba-Lazarte 2020; Park and Canaway 2019).

The potential of traditional medicine in the Philippines is highlighted by the prevalence of diseases in the community, such as urinary tract infections (UTIs). UTIs develop when bacteria pass through the urethra and infect both the lower urinary tract (bladder and urethra) and the upper urinary tract (kidneys and ureters) (Belete and Saravanan 2020). Common UTIs include urethral infections (urethritis), bladder infections (cystitis), and kidney infections (pyelonephritis) (Dayco n.d.). Typical UTI symptoms include pain or burning while urinating, frequent urination, the need to urinate despite having an empty bladder, bloody urine, and pressure or cramping in the groin or lower abdomen (*Urinary Tract Infection* 2021). It affects over 150 million individuals globally each year (Belete and Saravanan 2020) and has a morbidity rate of 142.4 per 100,000 persons in the Philippines in 2019 (Republic of the Philippines Department of Health 2020). Sadly, the global death toll from UTIs was 236,790 in 2019, a 140.18% increase from 98,590 in 1990 (Yang et al. 2022).

Several risk factors may contribute to why some people are more likely to acquire UTIs than others, including pregnancy, poor hygiene, sexual activity, and even previous bouts of UTI. However, most reports are accounted to females than in males because their urethra is naturally shorter, making it more accessible to bacteria (Dayco n.d.) such as *Escherichia coli*, *Enterococcus fecalis*, and *Streptococcus* spp. (Czajkowski et al. 2021). Statistically, adult women are 30 times more likely than males to have a UTI, with nearly half having at least one episode in their lifetime (Foxman 2002; Tan and Chlebicki 2016). That is why Dy-Zulueta reported UTI in Philstar in 2023 (Dy-Zulueta 2023) as one of the top three most common health issues among Filipinas. Other susceptible adults include the geriatrics and patients requiring urethral catheterization (Dayco n.d.).

Treatment for UTI is mostly determined by the underlying cause, severity, patient characteristics, individual preferences, and geographical and cultural acceptance. Understanding and establishing UTI’s complex and diverse etiology is crucial for providing appropriate interventions. Such treatments should not be restricted to synthetic or commercially available drugs but also include medicinal plants utilized locally to treat UTI. Research on the use of medicinal plants in treating UTI in the Philippines remains limited, with the available data limited to small-scale studies among community dwellers in various parts of the country. Traditional healers in Laguna frequently use *Annona muricata* L. to treat UTIs by making leaf decoction by means of boiling (Fiscal 2017). Likewise, the Y'Apayaos in Cagayan use *Lagerstroemia speciosa* (L.) Pers. leaf and stem decoction to treat UTI (Baddu and Ouano 2018). The Subanens of Misamis Occidental are also documented treating UTI by washing the affected area with decoction from *Gynura procumbens* (Lour.) Merr. leaves (Alduhisa and Demayo 2019). Lastly, to combat UTI, the Alangan Mangyans from Occidental Mindoro drinks *Cocos nucifera* L. juice (Villanueva and Buot Jr. 2020).

Despite these trends in UTI treatment using medicinal plants, none were approved and validated by the Department of Health-Philippine Institute of Traditional and Alternative Health Care (DOH-PITAHC) for combating UTI. Furthermore, although several ethnobotanical studies have emerged in the Philippines, the majority of them solely listed medicinal plants and their uses. There were also few ethnopharmacological studies to support the findings of ethnobotanical surveys. Hence, this systematic review aims to investigate, synthesize, and compile ethnomedicinal research evidence on anti-UTI medicinal plants in the Philippines that have yet to be clinically validated or recognized. Additionally, this review also included toxicologic and teratogenic data on plant species that can be used as a reference for their safety and the need for further testing.

METHODS

Study Selection

The PRISMA flow diagram (Page et al. 2021) (Figure 1) was used to guide this systematic review. From inception to December 5, 2021, a systematic literature review was conducted in three electronic databases: Ovid Medline, Scopus, and Elton B. Stephens Company-Cumulative Index to Nursing and Allied Health Literature (EBSCO-CINAHL). Google Scholar was also searched manually. The following search technique was utilized in Scopus, EBSCO-CINAHL, and Google Scholar was: (ethnobot* OR ethnomed* OR ethnopharmacolo* OR "medicinal plan*") AND (Philippin* OR Filipin*). Meanwhile, the search terms used for Ovid Medline were (ethnobotany OR ethnomedicine OR ethnopharmacology OR medicinal plants) AND (Philippin* OR Filipin*). However, this technique was not included in PROSPERO or other databases used for systematic reviews and meta-analyses. Furthermore, the articles included in the study were only those written in English or Filipino. Most studies included are observational because they provided primary information about ethnobotanical knowledge. Systematic reviews, literature reviews, letters to the editor, comments, and case reports were excluded.

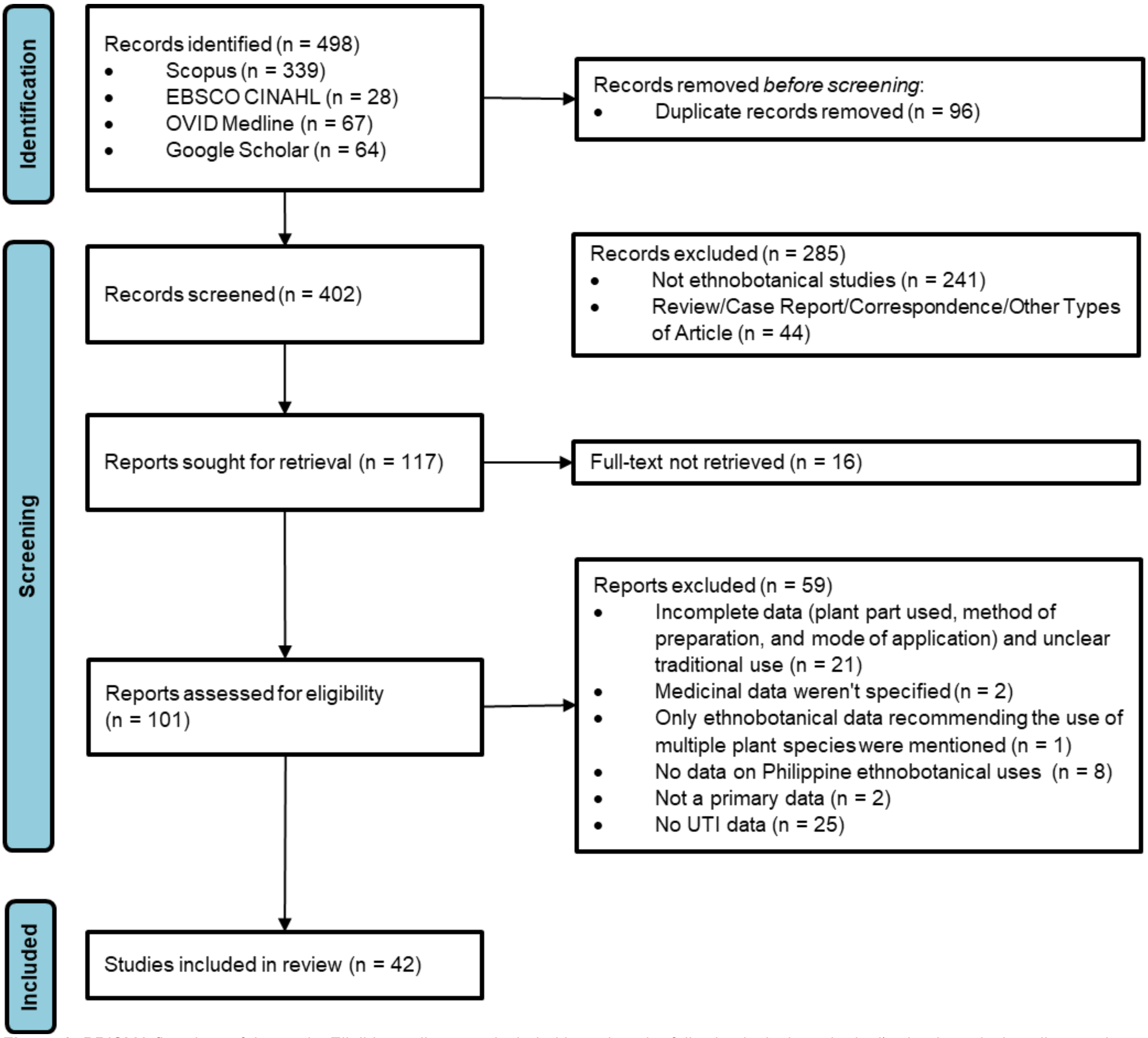

Figure 1: PRISMA flowchart of the study. Eligible studies were included based on the following inclusion criteria: i) ethnobotanical studies conducted in the Philippines; ii) The study included medicinal plants used in the management of urinary tract infections; iii) the study has sufficient data regarding the species of the medicinal plants, parts used, mode of preparation, and route of administration.

Data Extraction

This study followed the data extraction conducted by Magtalas et al. (2023) (Magtalas et al. 2023; Magtalas et al. 2023; Magtalas et al. 2023). Four reviewers—MCM, PTB, ECC, and RCG—independently reviewed the titles and abstracts. For each eligible study, full-text articles were obtained. Afterward, full-text articles were independently evaluated. All irrelevant articles were removed, and the reasons for their removal were documented. The following information was gathered from each included study: first author, year of publication, plant species, plant part used, method of preparation, route of administration, traditional use, ethnic group or users, and place of study. The results of this study were presented as tables and graphs generated using Microsoft Excel.

Assessment of Study Quality
A quality assessment tool for ethnobotanical studies developed by Magtalas et al. (2023) (Magtalas et al. 2023; Magtalas et al. 2023; Magtalas et al. 2023) was used. It was adapted and tailored from a study by Timmer et al. (2003) (Timmer et al. 2003) and was tailored for ethnobotanical research, which assessed the quality of ethnobotanical research as low, acceptable, or high (Table 1). The tool was composed of ten questions assessing the following: the quality of the study's objectives, the design of the study, the completeness of the study's area and population description, the replicability of the study through its methods, the sample size calculation, the taxonomic classification of plants used, the explanation of the results, and the compatibility of the results with the conclusions of the study. However, it should be noted that the risk of bias in the studies included was not assessed.

RESULTS

The initial data search provided 498 studies, with 434 studies obtained from Scopus (339 studies, 68.07%), EBSCO-CINAHL (28 studies, 5.62%), and OVID Medline databases (67 studies, 13.45%). In addition, 64 studies (12.85%) were obtained from the manual search on Google Scholar. After removing duplicates and irrelevant articles, 101 articles were chosen for this review. After full-text analysis, only 42 studies were included in the qualitative synthesis (Figure 1). Of the 42 ethnobotanical studies included, 22 papers (52.4%) reviewed were of high quality and 19 (45.2%). Only one (2.4%) paper has low quality, indicating that most papers gathered have good quality and reproducibility. None of the studies were excluded after the quality assessment. However, two (4.8%) papers did not have their plant specimen verified by a taxonomist. The qualitative synthesis and summary of the full-text analysis of the studies included in this review are exhibited in Table 1 and Supplemental Table 1, respectively.

Annual trends in the number of ethnobotanical studies
Ethnobotanical studies on the medical management of UTI in the Philippines have slowly gained popularity. The oldest data recorded that pioneered studies in this field was a study by Olowa et al. (2012) (Olowa et al. 2012), titled "Medicinal plants used by the Higaonon tribe of Rogongon, Iligan City, Mindanao, Philippines." Subsequently, a study by Abe and Ohtani (2013) (Abe and Ohtani 2013) was published. From 2012 to 2013, there was one publication per year, but the number remarkably spiked to four publications in 2014. In 2015–2018, the number of studies surged, with a slight decline in 2019. The studies steadily increased from then on, peaking at eight in 2021. Comparing the number of studies published in 2012 and 2021, there has been an eightfold increase in the number of studies published annually. Despite this increasing trend over the years, there is still a significant gap between research and the number of ethnic groups in the Philippines that need to be studied (Figure 2).

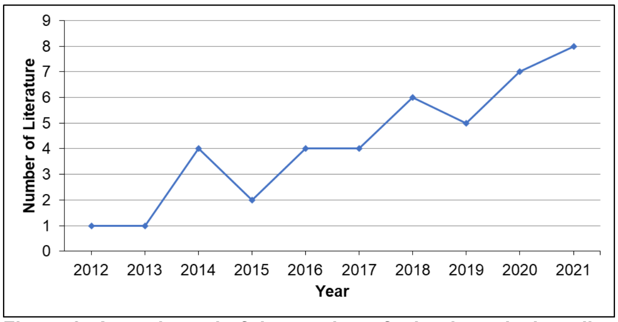

Figure 2: Annual trend of the number of ethnobotanical studies with data on plants used to treat urinary tract infections in the Philippines.

Geographical distribution of studies
In this study, ethnobotanical studies with records of medicinal plants used for treating UTIs were conducted at 34 sites in the Philippines, comprising 16 out of the 17 regions of the Philippines (Figure 3). Most studies were conducted in Mindanao (19 papers, 37.3%), followed by Luzon (26 papers, 51.0%) and Visayas (six papers, 11.8%). The Central Luzon and Caraga region (Region XIII) had the highest number of published ethnobotanical studies, with seven papers each. Central Luzon is home to Aeta people, Aytas, Dumagats, Ilongot-Eǵongot community, and indigenous herbolarios. On the other hand, the Caraga region is home to Manobos, Mamanwa tribe, and traditional practitioners. Because these regions are home to indigenous peoples and contain a variety of plants used in traditional medicine, these mountainous regions became ideal for ethnobotanical studies.

Table 1: Qualitative synthesis of the studies with data on plants used for urinary tract infections in the Philippines.

First Author and Year	Study Design	Province	Informants	Sample Size	Number of Plant Species Used in Urinary Tract Infections
Abe, R. (2013) (Abe and Ohtani 2013)	Observational Study	Batanes	Ivatan	116	7
Alduhisa, G.U. (2019) (Alduhisa and Demayo 2019)	Observational Study	Misamis Occidental	Subanen	83	1
Aya-Ay, A.M. (2016) (Aya-Ay 2016)	Observational Study	Davao City	Indigenous people	138	1
Baddu, V.D. (2018) (Baddu and Ouano 2018)	Observational Study	Cagayan	Y'Apayaos	39	1
Balangcod, T.D. (2015) (Balangcod and Balangcod 2015)	Observational Study	Benguet	Ibalois	80	4
Balberona, A.N. (2018) (Balberona et al. 2018)	Observational Study	Aurora	Ilongot-Eǵongot community	22	5
Balinado, L.O. (2017) (Balinado and Chan 2017)	Observational Study	Cavite	Traditional practitioners	18	8

Belgica, T.H.R. (2021) (Belgica et al. 2021)	Observational Study	Albay	Traditional practitioners	350	2
Cabanting, R.M.F. (2016) (Cabanting and Perez 2016)	Observational Study	Palawan, Zamboanga del Norte, Zamboanga del Sur, North Cotabato	Locals	39	2
Cajuday, L.A. (2019) (Cajuday and Banares 2019)	Observational Study	Albay	Locals	24	1
Canceran, M.L. (2021) (Canceran et al. 2021)	Observational Study	Aurora	Dumagat	9 families	2
Caunca, E.S. (2021) (Caunca and Balinado 2021)	Observational Study	Cavite	Local herbalists	94	7
Cordero, C.S. (2020) (Cordero et al. 2020)	Observational Study	Aklan	Malaynon Ati tribe	31	6
Cordero, C.S. (2021) (Cordero and Alejandro 2021)	Observational Study	Antique	Ati tribe	22	5
Dalisay, J.A.G.P. (2018) (Dalisay et al. 2018)	Observational Study	Antique	Barangay officials, local folks, and herbal healers	Not stated	2
Dapar, M.L.G. (2020) (Dapar et al. 2020)	Observational Study	Agusan del Sur	Manobos	335	24
de Guzman, A.A. (2020) (de Guzman et al. 2020)	Observational Study	Zamboanga Sibugay	Local herbalists	30	5
De La Torre, F.E.L. (2016) (De La Torre et al. 2016)	Observational Study	Cebu	Locals (living at the peak of Mount Manunggal)	Not stated	1
Doctor, T.R. (2014) (Doctor and Manuel 2014)	Observational Study	Benguet	Indigenous people	Not stated	1
Ducusin, M.B. (2017) (Ducusin 2017)	Observational Study	La Union	Indigenous people	40	18
Estrella, M.C.P. (2020) (Estrella et al. 2020)	Observational Study	National Capital Region and Region IV-A	Locals	16	2
Fajardo, W.T. (2017) (Fajardo et al. 2017)	Observational Study	Pangasinan	Sambal-bolinaos	17	1
Fiscal, R.R. (2017) (Fiscal 2017)	Observational Study	Laguna	Traditional practitioners	32	1
Flores, R.L. (2016) (Flores et al. 2016)	Observational Study	Quiapo	Buyers and sellers	17	5
Gruyal, G. (2014) (Gruyal 2014)	Observational Study	Surigao del Sur	Locals	50	2
Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Observational Study	Pampanga	Aeta people	72	13
Montero, J.C. (2021) (Montero and Geducos 2021)	Observational Study	Locals	Surigao del Sur	30	5
Morilla, L.J. (2014) (Morilla et al. 2014)	Observational Study	Zamboanga del Sur	Subanens	9	1
Morilla, L.J. (2019) (Morilla and Demayo 2019)	Observational Study	Zamboanga del Sur	Traditional practitioners	6	3
Naive, M.A.K. (2021) (Naive et al. 2021)	Observational Study	Bukidnon	Talaandig tribe	19	10
Nuneza, O.M. (2021) (Nuneza et al. 2021)	Observational Study	Surigao del Norte and Agusan del Norte	Mamanwa tribe	143	4
Olowa, L.F. (2012) (Olowa et al. 2012)	Observational Study	Lanao del Norte	Higaonons	65	1
Olowa, L. (2015) (Olowa and	Observational Study	Lanao del Norte	Maranaos	228	13

Demayo 2015)					
Ong, H.G. (2014) (Ong and Kim 2014)	Observational Study	Guimaras	Ati Negritos	65	17
Ordas, J.A.D. (2020) (Ordas et al. 2020)	Observational Study	Davao Oriental, Bataan, Eastern Samar, Palaui Island, and Laguna	Community members	202	3
Pablo, C.G.C. (2019) (Pablo, 2019)	Observational Study	Bataan	Aeta people	21	3
Paraguison, L. (2021) (Paraguison et al. 2020)	Observational Study	Agusan del Sur	Manobos	144	6
Peneciba, E.P. (2020) (Peneciba 2020)	Observational Study	Surigao del Sur	Traditional practitioners	15	2
Susaya-Garcia, J. (2018) (Susaya-Garcia et al. 2018)	Observational Study	Leyte	Locals	20	3
Tantengco, O.A.G. (2018) (Tantengco et al. 2018)	Observational Study	Bataan	Aytas	26	3
Villanueva, E.L.C. (2020) (Villanueva and Buot Jr. 2020)	Observational Study	Occidental Mindoro	Alangan Mangyan	60	1
Zabala, Jr. B.A. (2018) (Zabala et al. 2018)	Observational Study	Nueva Ecija	Indigenous herbolarios	Not stated	1

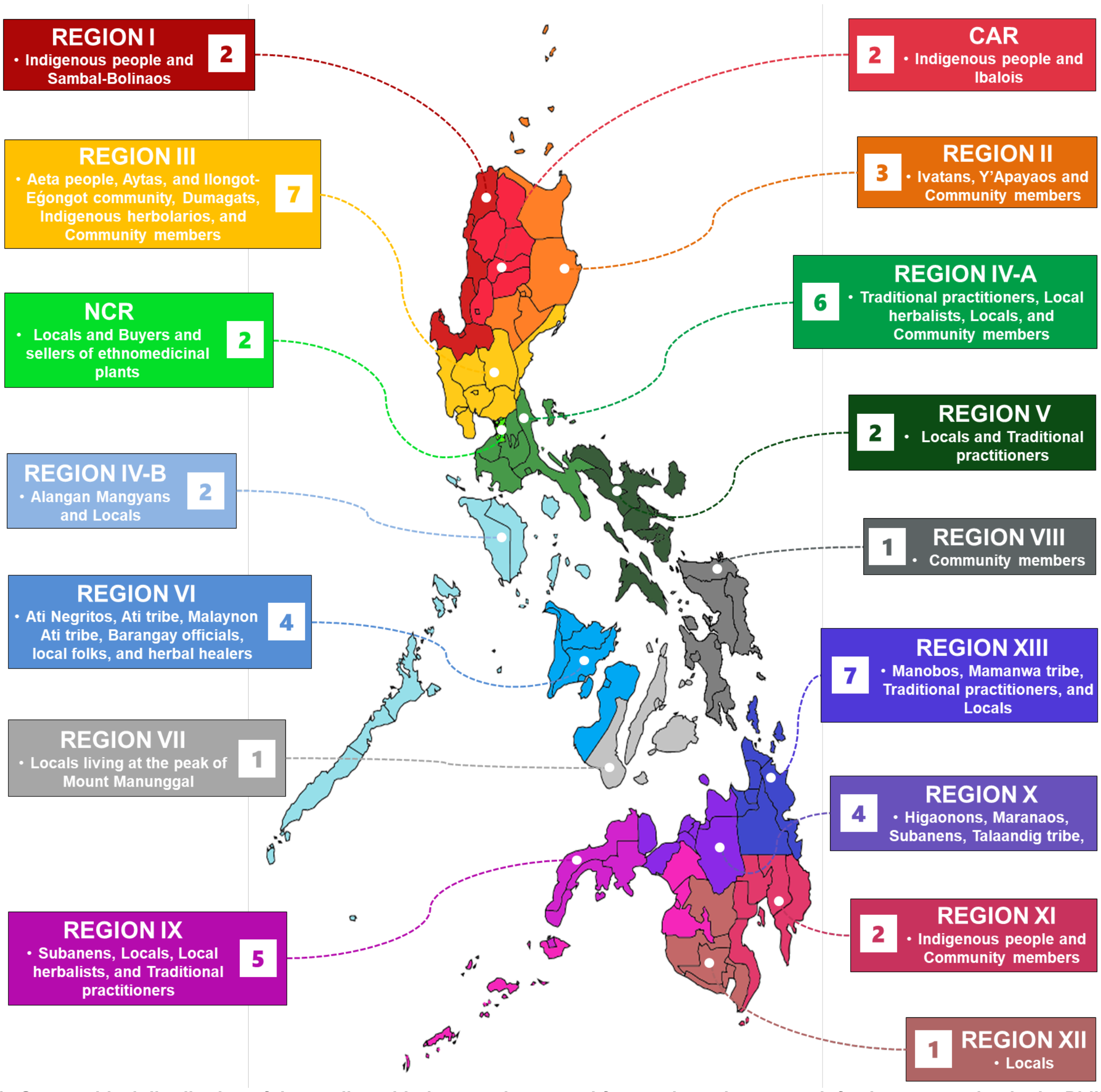

Figure 3: Geographical distribution of the studies with data on plants used for treating urinary tract infections per region in the Philippines and the ethnic groups/users stated on the studies per region

Quality assessment of the studies

Out of the 42 studies reviewed, seven (16.7%) papers did not justify the sample size of the study, and 25 (59.5%) papers did not consult taxonomists to verify medicinal plant species (Figure 4). The overall quality of the studies collected was still generally good, with 22 papers (52.4%) having high quality and 19 papers (45.2%) having regular quality. One paper (2.4%), however, was considered low quality (Figure 4; Supplemental Table 2).

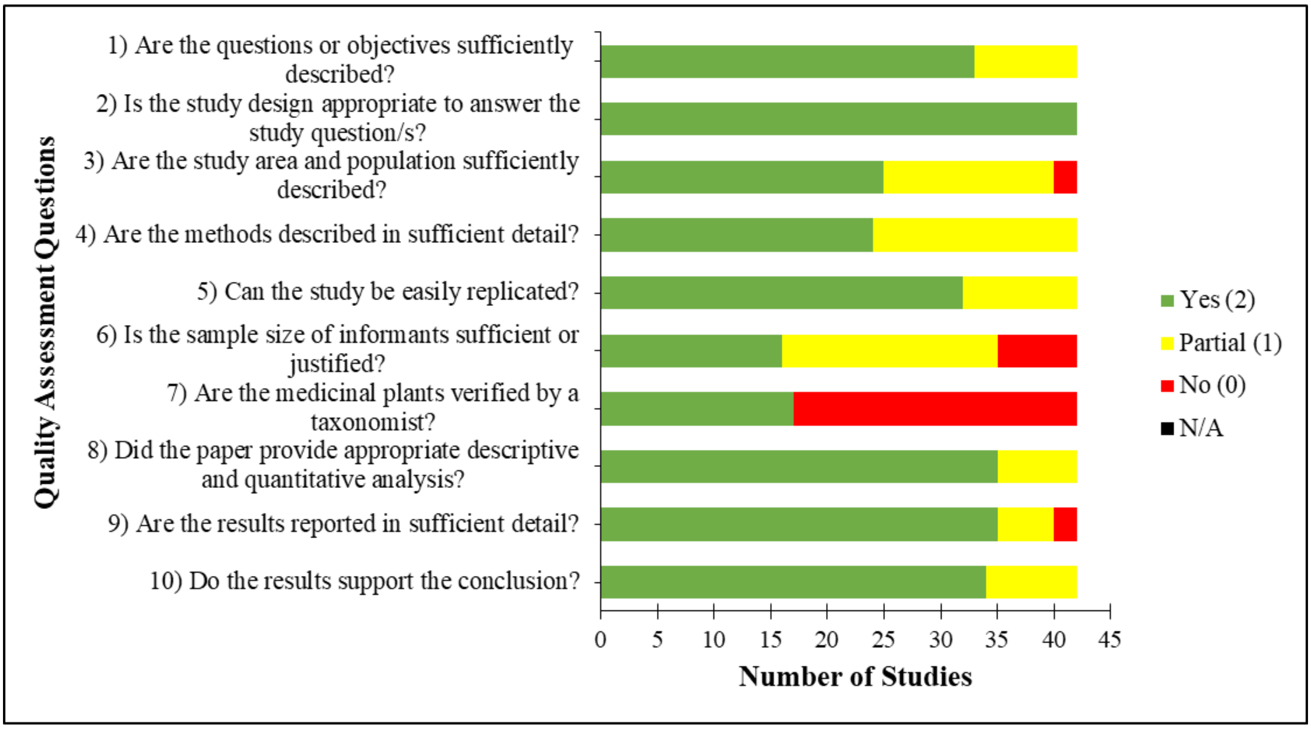

Figure 4: Quality assessment of the studies with data on plants used for treating urinary tract infections in the Philippines. Scoring: fully compliant = 2 points; partially compliant = 1 point; No = 0; N/A = not applicable. Total score: 17-20 = high quality; 11-16 = acceptable quality; 0-10 = low quality.

Most common plant families, genera, and species of medicinal plants used to treat UTI in the Philippines

A total of 47 plant families, 81 genera, and 97 species were documented in this systematic review. The most commonly mentioned family was Poaceae (29 records, 14.4%), followed by Asteraceae (21 records, 10.4%), Arecaceae (14 records, 6.9%), Pandanaceae and Annonaceae (12 records each, 5.9%), and Lythraceae and Lamiaceae (nine records each, 4.5%) (Figure 5A). *Cocos* was the most frequently mentioned genus (13 records, 6.4%), followed by *Pandanus*, *Blumea*, *Annona* (12 records each, 5.9%), *Lagerstroemia* (nine records, 4.45%), *Imperata* (eight records, 4.0%), *Zea, Centella* (six records each, 3.0%), *Musa,* and *Curcuma* (five records each, 2.5%) (Figure 5B). On the other hand, *C. nucifera* L. was the most common plant species mentioned (13 records, 6.4%), followed by *Blumea balsamifera* (L.) DC. (12 records, 5.9%), *A. muricata* L. (11 records, 5.4%), *L. speciosa* (L.) Pers. (nine records, 4.5%), *Imperata cylindrica* (L.) P. Beauv. (eight records, 4.0%), *Zea mays* L., and *Centella asiatica* (L.) Urb. (six records each, 3.0%) (Figure 5C).

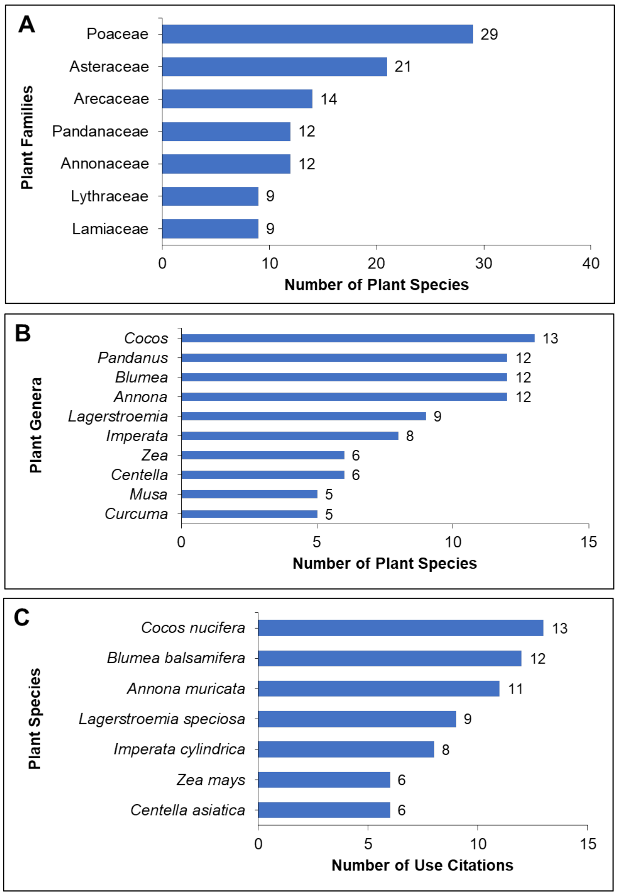

Figure 5: Most common families (A), genera (B), and species (C) of plants used for treatment of urinary tract infections in the Philippines.

Most common plant parts used, route of administration, and method of preparation of medicinal plants used to treat UTI in the Philippines

The most commonly used plant parts among the tested anti-UTI herbal plants were the leaf (73 records, 36.14%), followed by the root (31 records, 15.4%), fruit (20 records, 9.9%), the whole plant (ten records, 5.0%), and the stem (six records, 3.0%) (Figure 6A). The most common route of administration was per-orem, particularly by drinking (170 records, 84.2%) and eating (14 records, 6.9%). They were also applied directly to the affected area (11 records, 5.5%), chewed but not eaten (one record, 0.5%), and bathed with herbal plants (one record, 0.5%) (Figure 6B). The most common methods of preparation were decoction (150 records, 74.3%) and harvest (20 records, 9.9%). Other methods of preparation were washing (four records, 2.0%); crushing, grinding, and pounding (four records each, 2.0%); extracting (three records, 1.5%); and heating directly (two records, 1.0%) (Figure 6C).

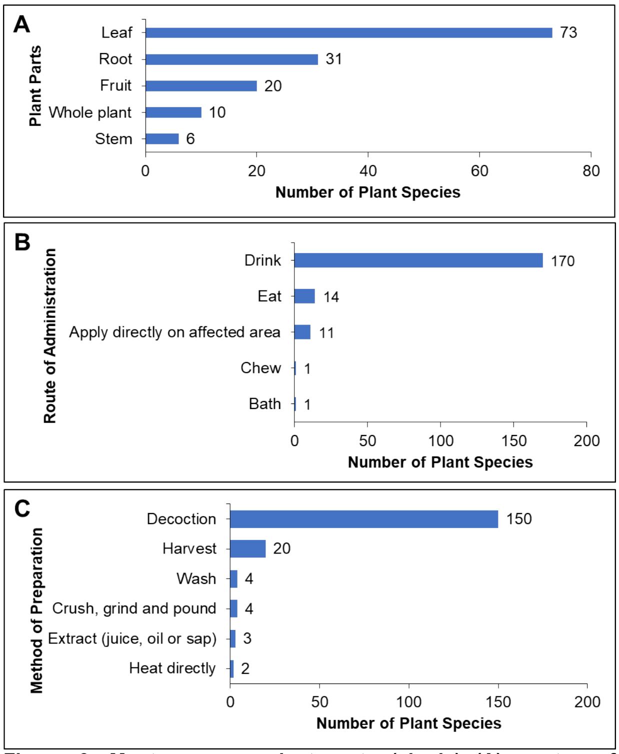

Figure 6: Most common plant parts (single) (A), routes of administration (B), and methods of preparation (C) of plants used for treatment of urinary tract infections in the Philippines.

The plant parts used were classified into three categories: single, mixed, or either. Single plant parts were mentioned 155 times (76.33%) in ethnobotanical literature. The leaf was the most used plant part (73 records, 36.14%), followed by the root (31 records, 20%), fruit (20 records, 15.35%), whole plant (ten records, 4.95%), and stem (six records, 2.97%) (Figure 6A). The use of mixed plant parts in one method of preparation was reported 44 times (21.78%). The leaf and root were the most used (14 records, 6.93%), followed by bark and leaf (five records, 2.48%), leaf and stem (four records, 1.98%), leaf and flower (four records, 1.98%), leaf and fruit (three records, 1.49%), bark and stem (two records, 0.99%), and bark and root (two records, 0.99%) (Supplemental Figure 1A). On the other hand, only three (1.49%) ethnomedicinal records mentioned the use of either of the two parts of a plant, each with one record. These were stem/root, hairs/cobs, and fruit/leaf (Supplemental Figure 1B).

This study also reported several routes of administration, which were divided into three categories: single, multiple, and either. A total of 197 (97.52%) ethnobotanical records used a single route of administration, with drinking being the most common (170, 84.16%), followed by eating (14, 6.93%), applying directly to the affected area (11, 5.46%), chewing (one, 0.5%), and bathing (one, 0.5%) (Figure 6B). In the second category, plants were simultaneously administered through at least two distinct routes. Only two ethnobotanical records (0.99%), each with one mention (0.5%), were recorded in this category. These are: (1) drink 3-5 glasses of whole plant decoction or 1/2 cup leaf sap for adults or 1/2 cup decoction or one teaspoonful leaf sap for babies; (2) drink 3-5 glasses of whole plant decoction or 1/2 cup leaf sap for adults or 1/2 cup decoction or one teaspoonful leaf sap for babies. Both records recommend using decocted leaves as a wash. The third category included records on plants administered using either of two distinct routes. Three records (1.48%) fell into this category, each with one mention (0.5%) also. These are: drink juice or massage the painful area; consume fresh young leaves or a decoction of leaves or roots; and eat or drink a leaf or root decoction (Supplemental Figure 2).

A variety of methods were used to prepare traditional medicinal plants. These methods can be classified into four categories: (1) a single method to prepare a single product; (2) multiple continuous methods to prepare a single product; (3) any of the stated methods to prepare more than one product; and (4) multiple methods to prepare more than one product. Most ethnomedicinal records used only a single step to prepare a product (185 records, 91.58%). Decoction (150 records, 74.26%) was the most frequently reported method in this category, followed by harvesting (20 records, 9.9%), washing (four records, 1.98%), crushing, grinding, and pounding (four records, 1.98%), extract (juice, oil, or sap) (three records, 1.49%), direct heating (two records, 0.99%), scraping, and poultice (one record each, 0.5%) (Figure 6C). Conversely, only one ethnomedicinal record was mentioned in the second category: grind, mix with ash and salt, and wrap the concoction on the body using a leaf (Supplemental Figure 3A). Nine ethnomedicinal records (4.46%) fell into the third category (Supplemental Figure 3B), and seven records (3.47%) were obtained in the fourth category (Supplemental Figure 3C). Most of these included decoction as one of the possible methods.

Toxicity and teratogenic properties of medicinal plants used to treat UTI in the Philippines

The toxicologic and teratogenic effects of the plants included in this study were determined by searching relevant literature, such as toxicity and teratogenicity studies. This step established the safety of the medicinal plants mentioned in this paper. Among the plant species recorded, 71 (73.20%) had data relating to their toxicity and teratogenicity, while 26 (26.8%) lacked data (Supplemental Table 3). Different methods were used to assess the toxicity and teratogenicity of the medicinal plants included in this study. There were 61 records (62.89%) that used the *in vivo* method, while only ten (10.31%) used it *in vitro*. The most common animal models used were Wistar rats (20 records, 29.85%), Sprague-Dawley rats, brine shrimp larvae (ten records each, 14.93%), and Swiss mice (eight records, 14.94%). The five most common tests were as follows: acute toxicity test (40 records, 45.45%); subchronic toxicity test (12 records, 13.64%); subacute toxicity test (11 records, 12.5%); brine shrimp lethality assay (BSLA) (ten records, 11.36%); and MTT assay (six records, 6.82%). Of the 71 reported species with toxicologic and teratogenic data, 45 were nontoxic (63.38%), and 21 were toxic (29.58%). Furthermore, other species had compound properties according to studies: two species (2.82%) were reported as both toxic and teratogenic; the other two were nontoxic and toxic (2.82%); and one was both nontoxic and teratogenic (1.41%) (Figure 7).

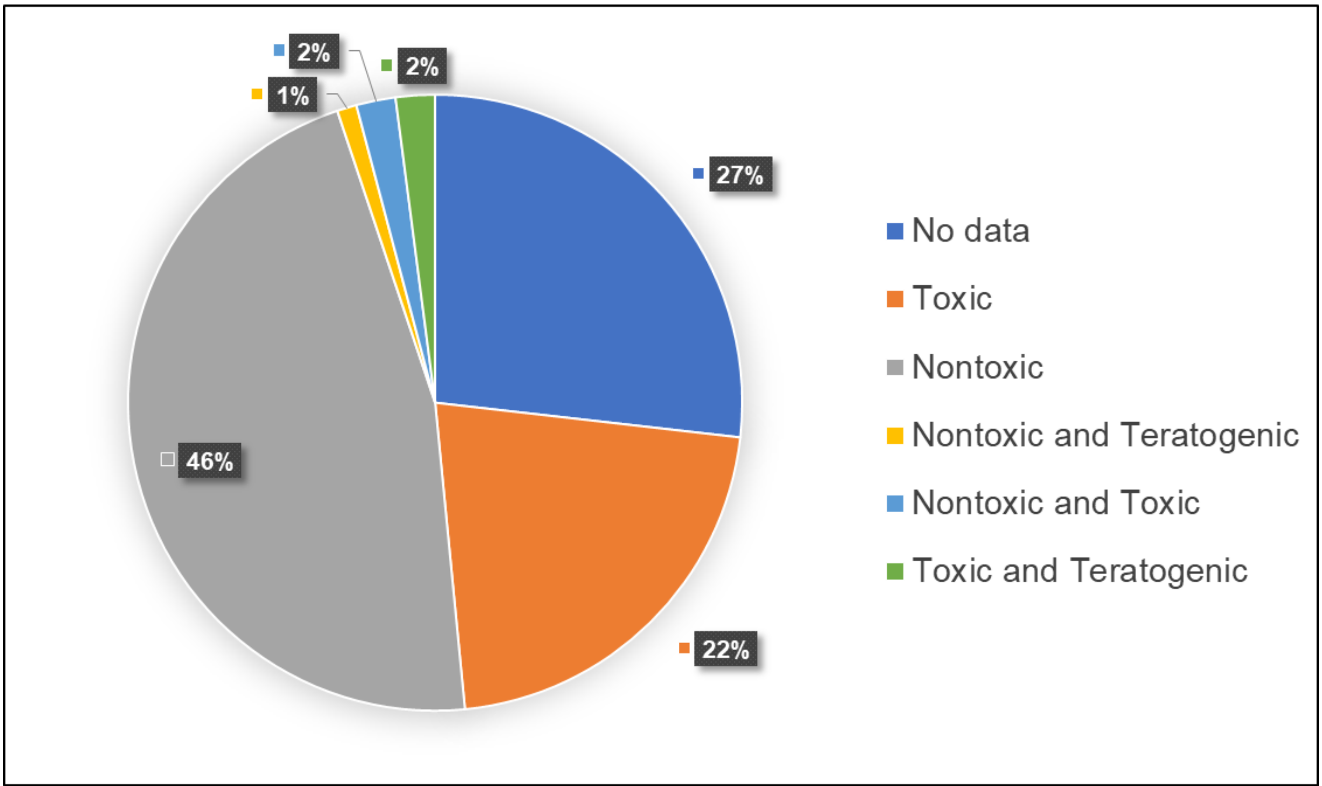

Figure 7: Toxicologic and teratogenic data of plants used to treat urinary tract infections in the Philippines.

As mentioned in the literature, *C. nucifera* L., the most common anti-UTI plant, had no toxic effects in *in vivo* acute toxicity and subacute toxicity tests conducted on Wistar rats administered with the ethyl acetate-soluble proanthocyanidins from its immature inflorescence (Ekanayake et al. 2019). However, its leaf and bark extracts demonstrated toxic effects in zebrafish embryos (David et al. 2016). The volatile oils from leaf *B. balsamifera* (L.) DC., the second most common anti-UTI plant, is said to have demonstrated cytotoxic and antitumor activity in a prawn larva fatality assay (Jiang et al. 2014). Moreover, a 50% survival rate was observed in a BSLA when the specimen was exposed to a 100 mg/mL aqueous extract of *A. muricata* L. However, no toxic effects were noted when the *A. muricata* L. extract was orally administered to mice (Mohd Kamal et al. 2021). On the other hand, no toxic effects were noted for acute and subacute oral toxicity tests of *L. speciosa* (L.) Pers. in Sprague-Dawley rats (Alkahtani et al. 2022). In a study by Konan et al. (2023) (Konan et al. 2023), an extrapolation was made about the Gosselin, Smith, and Hodge scale that the *I. cylindrica* (L.) P.Beauv. root and leaf extracts are nontoxic to humans when taken orally. Conversely, a study by Nayim et al. (2020) (Nayim et al. 2020) showed that immediately after the administration of methanol root extract, some albino Wistar rats experienced agitation and drowsiness; however, these signs disappeared within a few minutes. No abnormalities were also seen in the organs of the specimen. Similarly, no toxic effects were noted for acute and subacute oral toxicity tests of *C. asiatica* (L.) Urb. in Swiss mice (Chauhan and Singh 2012). Unfortunately, no toxicologic or teratogenic data was reported in *Z. mays* L. during the time of the study. With very limited data on the pharmacologic, toxicologic, and teratogenic properties of these anti-UTI plant species, more studies should be done to comprehensively elucidate their potential roles as UTI treatments (Table 2).

DISCUSSION

The data search yielded 498 studies at first, but careful analysis during eligibility screening reduced the final number to 42. A total of 202 ethnobotanical records were extracted from these studies. As seen in the annual trend of the number of ethnobotanical studies done on plants used for anemia, there remains a big gap to fill in on this data. Since its inception in 2012, few UTI treatment-related ethnobotanical studies have been conducted in the Philippines. Meanwhile, we have obtained the most ethnobotanical studies locally documenting the tribes in Region III (Central Luzon), Caraga (Region XIII), and Region IV-A (CALABARZON). With a rich culture and tradition, there are still more tribes in the Philippines to discover to fill the study gap. Despite these ethnobotanical investigations, there are still more tribes in the Philippines to discover to fill the study gap.

There has been a steady increase in the number of yearly studies from 2012 to 2021, but there is still a significant gap between the number of studies published annually and the number of ethnic groups in the Philippines. The quality of the studies based on the assessment tool used was generally good. The most common plant species mentioned were *C. nucifera* L., *B. balsamifera* (L.), DC., and *A. muricata* L. leaves, roots, and fruits were most commonly ingested by drinking. Most plant species had toxicologic data, utilizing various tests such as the BSLA, acute toxicity test, and MTT assay.

As of 2020, UTI is the third leading cause of morbidity in the Philippines, with 154,841 affected individuals, translating to a rate of 142.4 per 100,000 Filipinos, with women being more commonly affected than men (Republic of the Philippines Department of Health 2020). Compounding the burden of UTI is the issue of antibiotic resistance. Gram-negative bacteria such as *Escherichia coli* and *Klebsiella* spp. are common etiologic agents of UTIs, with extended-spectrum β-lactamase (ESBL) production leading to antibiotic resistance (Jean et al. 2016). Unfortunately, the Philippines is one of the countries in the Asia-Pacific region to have had high rates of ESBL production by isolates of UTI-causing *E. coli* and *Klebsiella pneumoniae* from 2010–2013 (Jean et al. 2016).

With modern medicine remaining inaccessible in the country, particularly in rural, geographically isolated, and disadvantaged areas (GIDAs), UTI remains one of the most prevalent diseases. Ninety-one percent of Filipino doctors are based in hospitals, while local health centers, the first points of contact in communities, employ an average of one doctor per facility (Dayrit et al. n.d.). Physical resources are concentrated in the NCR, with an average of 23 beds per 10,000 Filipinos, leaving the rest of Luzon, along with Visayas and Mindanao, with 8.2, 7.8, and 8.3 beds per 10,000, respectively (Dayrit et al. n.d.). Furthermore, the costs of medicines remain high in the Philippines despite price-lowering legislation, as evidenced by the prices of generic drugs being four times higher than international references (Maramba-Lazarte 2020). These disparities, alongside the breadth of historical, cultural, and traditional knowledge of indigenous communities regarding Filipino traditional medicine (Balangcod and Balangcod 2018), contribute to the wide acceptance of medicinal plants in treating UTI in the Philippines.

Several ethnobotanical surveys in the Philippines yielded similar findings, with leaves being the most often used plant part (Demetillo et al. 2019; Fabie-Agapin 2019; Fiscal 2017; Gruyal 2014; Morilla et al. 2014; Morilla and Demayo 2019). One reason for this is that leaves are the easiest to harvest, and, unlike stems and roots, they can be quickly regenerated, preserving the plant's completeness. Furthermore, significant water-soluble chemical components such as tannins and flavonoids are highly concentrated in the leaves (Fabie-Agapin 2019; Morilla et al. 2014). These compounds are then commonly extracted through boiling to produce a medicinal decoction (Fabie-Agapin 2019; Siqueira et al. 2011), which is frequently taken orally to treat ailments such as urinary tract infection, wound infection, stomachache, cough, diabetes, headache, cold, and hypertension (Fiscal 2017). According to a study conducted by Sathiyaraj et al. (2012) (Sathiyaraj et al. 2012), using medicinal plant decoctions and infusions may be congruent with phytopharmacological effects; consequently, plants exposed to these methods have increased efficacy. Hence, drinking leaf decoction allows IPs to utilize the healing properties of plants, making treatment more accessible, cheap, and effective, particularly for IPs living in geographically isolated and deprived locations.

The most common plant species used for UTI in this review was *C. nucifera* L., commonly known as the coconut tree. The plant, known as the "tree of life" and native to coastal Pacific areas such as the Philippines, is an important member of the Arecaceae family. It provides several resources for human use, from food and fuel to medicine (Chan and Elevitch 2006). Different parts of the plant have been traditionally used to treat diseases such as infections, arthritis, hypertension, inflammation, pain, cancer, fever, and dysmenorrhea, among others (Uy et al. 2019). Thus, the versatility of the use of the coconut tree, coupled by its documented efficacy against bacteria, establishes the plant as an ideal source for novel anti-uropathogenic modalities.

To illustrate, fractions of coconut husk fiber crude water extract partitioned with methanol and ethyl acetate historically showed antibacterial activity against *Staphylococcus aureus*, a potential uropathogen (Esquenazi et al. 2002). Fermented coconut water was recently found to have potential antibacterial effects against UTI-causing clinical isolates of *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Streptococcus* sp., and *S. aureus* (Raj et al., 2023). Another study found that coconut root ethanolic extracts similarly had inhibitory effects against *K. pneumoniae*, *Bacillus subtilis*, and *S. aureus*, but were not as efficient as the standard antibiotics chloramphenicol and clotrimazole (Uy et al. 2019).

Aside from direct antibacterial effects against potential uropathogens, *C. nucifera* L. also demonstrated complementary effects against uropathogen virulence. Fermented coconut water inhibited struvite stone formation, a known sequela of recurrent UTIs, via the single gel diffusion method (Raj et al. 2023). Hexane and aqueous coconut extracts were found to advance the bactericidal effects of standard antibiotics such as ampicillin, amoxicillin, penicillin G, chloramphenicol, ciprofloxacin, and tetracycline against *Streptococcus faecalis*, *Escherichia coli*, *Acinetobacter calcaoceticus anitratus*, *B. subtilis*, *Shigella flexineri*, *S. aureus*, as well as multiple species of *Vibrio* and *Listeria* (Akinyele et al. 2017). Furthermore, water from young coconuts had quorum-sensing inhibitory and anti-biofilm formation effects on *Chromobacterium violaceum*, as well as anti-biofilm, anti-pellicle formation against *P. aeruginosa*, indicating the potential for *C. nucifera* L. to have activities against biofilm-forming uropathogens (Sethupathy et al. 2015).

Aside from the coconut tree, species from the most mentioned families (Poaceae, Asteraceae, and Arecaceae), as well as the most frequently mentioned genera (*Cocos, Pandanus, Blumea*) represent some common household plants in the Philippines such as sambong (*Blumea balsamifera* (L.) DC.), and pandan (*Pandanus amaryllifolius* Roxb. ex Lindl.). The ubiquity and availability of these families and genera in a resource-limited setting such as the Philippines thus merit further investigation into the plants' anti-UTI potentials as well. In fact, other plants ethnomedically used in the Philippines to treat UTIs were also found to have antibacterial effects, including *B. balsamifera* (L.) DC. leaf extracts against *S. aureus* and *P. aeruginosa* (Masyudi et al. 2023), and *A. muricata* L. against *S. aureus* and *E. coli* (Da Silva et al. 2021).

The effective, ethnomedicinal use of such plants against UTIs may be explained by the presence of bioactive compounds. For instance, coconut fiber ethanolic extracts were found to contain phenols, tannins, leucoanthocyanidins, flavonoids, steroids, triterpenes, and alkaloids; lyophilized coconut extracts contained polyphenols, catechins, epicatechins, tannins, and flavonoids; while coconut leaf epicuticular wax revealed the presence of lupeol methyl ether, skimmiwallin, and isoskimmiwallin (Lima et al. 2015). Expectedly, similar phytochemicals such as flavonoids, phenols, alkaloids, terpenoids, anthocyanins, tannins, and coumarins were found to be present in the other families and genera as well (Coffie et al. 2014; Lima et al. 2015; Quyen et al. 2020; Rolnik and Olas 2021; Suryawansh et al. 2021).

These plant-derived substances have been shown to exhibit antibacterial, and thus anti-uropathogenic activity due to various mechanisms and pharmacological pathways. Flavonoids are known to disrupt the bacterial cell wall by interacting and complexing with membrane and extracellular soluble proteins, and have been experimentally shown to distort and harm bacterial cell walls directly (AlSheikh et al. 2020). Alkaloids, on another hand, intercalate into bacterial DNA and cell walls, which subsequently harms the peptidoglycan layer (AlSheikh et al. 2020). Phytochemicals are also able to alter and inhibit bacterial physiology. For example, catechins can deplete cellular ATP by facilitating the extravasation of cellular components (AlSheikh et al. 2020). Aside from directly harming bacterial organisms, plant-derived substances are also able to modulate susceptibilities to antibiotics through pathways such as drug efflux pumps, attenuate virulence characteristics of bacteria, and disrupt biofilm formation by precluding quorum-sensing (AlSheikh et al., 2020).

In-depth characterizations and mechanistic analyses regarding the antimicrobial properties of bioactive compounds are warranted in these ethnomedicinal plants due to the increasing and promising evidence pointing towards phytochemicals as new antibiotic modalities and as modulators of antibiotic resistance. Consequently, phytochemical analyses of anti-UTI ethnomedicinal plants in the Philippines serve as an opportunity to discover new drug targets, mechanisms and molecules against UTIs. Toxicologic studies, therefore, would also inform and guide further preclinical and clinical research on such ethnomedicines.

Based on the literature search, there is still a lack of safety and toxicity data regarding 26 plant species used for UTIs, including *C. mercado* Vidal, *Clerodendrum intermedium* Cham., and *Corypha utan* Lam., among others. Furthermore, most studies only assess toxicity and/or teratogenicity using one test, with sparse studies comparing the toxicities of the plants across different assays and modalities. Studies that compare toxicities *in vivo* (62.89% of the studies searched) versus *in vitro* (10.31% of the studies searched) are also lacking. These entail inconsistent, nonstandard results, leading to heterogeneity in the conclusions pertaining to the toxicity of the selected plants.

For *C. nucifera* L., toxicity studies show inconsistent results. Coconut proanthocyanidins had no *in vivo* toxicity in Wistar rats, but leaves and bark extracts had *in vivo* toxicity in zebrafish embryos (Ekanayake et al. 2019) *balsamifera* (L.) DC. had *in vivo* cytotoxic effects in a prawn larva fatality assay (Jiang et al. 2014), but *in vitro studies* were limited. *A. muricata* L. also had variable results regarding toxicity, demonstrated by the absence of toxic effects of orally administered *A. muricata* L. extracts in mice, but only a 50% survival rate in a BSLA administered with aqueous extracts of the same plant.

Due to the heterogeneity of the toxicologic study designs and the results across different studies, the assessment of the toxic and safety profiles of the ethnomedicinal plants used in UTIs in the Philippines is still highly variable and merits further investigation. Identifying specific bioactive compounds in these plants, subjecting these compounds to multiple safety and toxicity assays, and consolidating data on the safety profiles of such plants would yield important results that would progress the development of novel treatment modalities for UTIs based on ethnomedicinal practices.

This systematic review only included articles written in English or Filipino and excluded systematic reviews, literature reviews, letters to the editor, comments, and case reports. Though there is an increasing trend in the studies related to treating UTIs, most of the medicinal plants used in this study have not yet been clinically proven to benefit patients suffering from UTI. In addition, literature is available on the toxicologic and teratogenic data for the three most used plant species. However, their safety and efficacy remain questionable due to preclinical and clinical data scarcity. Those with toxicologic and teratogenic data were only tested on animals *in vitro* and *in vivo*. Furthermore, the plant taxonomic information was based on what was reported in the identified studies. Several studies did not consult a taxonomist and instead relied solely on herbarium specimens to identify plants. As a result, the morphological identification of the plants may result in incorrect identification, compromising the validity of some ethnobotanical data in this study. Despite these, we were able to identify the most commonly used ethnomedicinal plant species, plant parts involved, suggested methods of preparation, and indigenous communities that primarily used these to treat UTIs. This review will also help conserve the geographical areas where these plant species naturally thrive and preserve the knowledge and practices related to treating UTIs. To fill in the gap in the toxicologic and/or teratogenic data, we recommend that the previously documented plants be examined first. In turn, this study can guide future research efforts to investigate active compounds and other potential plant properties that can later be added to the list of medicinal plants officially recognized by the DOH-PITAHC and then incorporated into our current health system as complementary medicine.

CONCLUSION

We highlight in this study the extensive ethnomedicinal use of 97 plants in treating UTI in the Philippines, as the disease is a leading cause of morbidity in the country. More ethnobotanical studies from representative numbers of tribes in the Philippines may aid in consolidating ethnomedicinal knowledge. The most commonly mentioned ethnomedicinal plants in this review, such as *C. nucifera* L., were found to contain numerous phytochemicals that have been shown to be bioactive against bacterial uropathogens through mechanisms such as cell wall synthesis inhibition, bacterial physiology disruption, bacterial virulence attenuation, and antibiotic modulation. However, toxicologic studies confer ambiguous, inconsistent results, underscoring the need for further preclinical and subsequent clinical research regarding these novel anti-UTI modalities. Because medicinal plants are a mainstay in rural and indigenous communities due to their availability and cultural significance versus modern medicine, these plants serve as an important area of inquiry in addressing the burden of UTI in the country and throughout the world.

ACKNOWLEDGMENT

The authors would like to thank Mr. Patrick Tracy Balbin, Ms. Elljhay Cruz, and Ms. Rachelle Guevarra, for their prompt assistance with the study search, data extraction, and result formulation. Their help was highly beneficial to the paper.

CONTRIBUTION OF INDIVIDUAL AUTHORS

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Ourlad Alzeus G. Tantengco: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review and editing

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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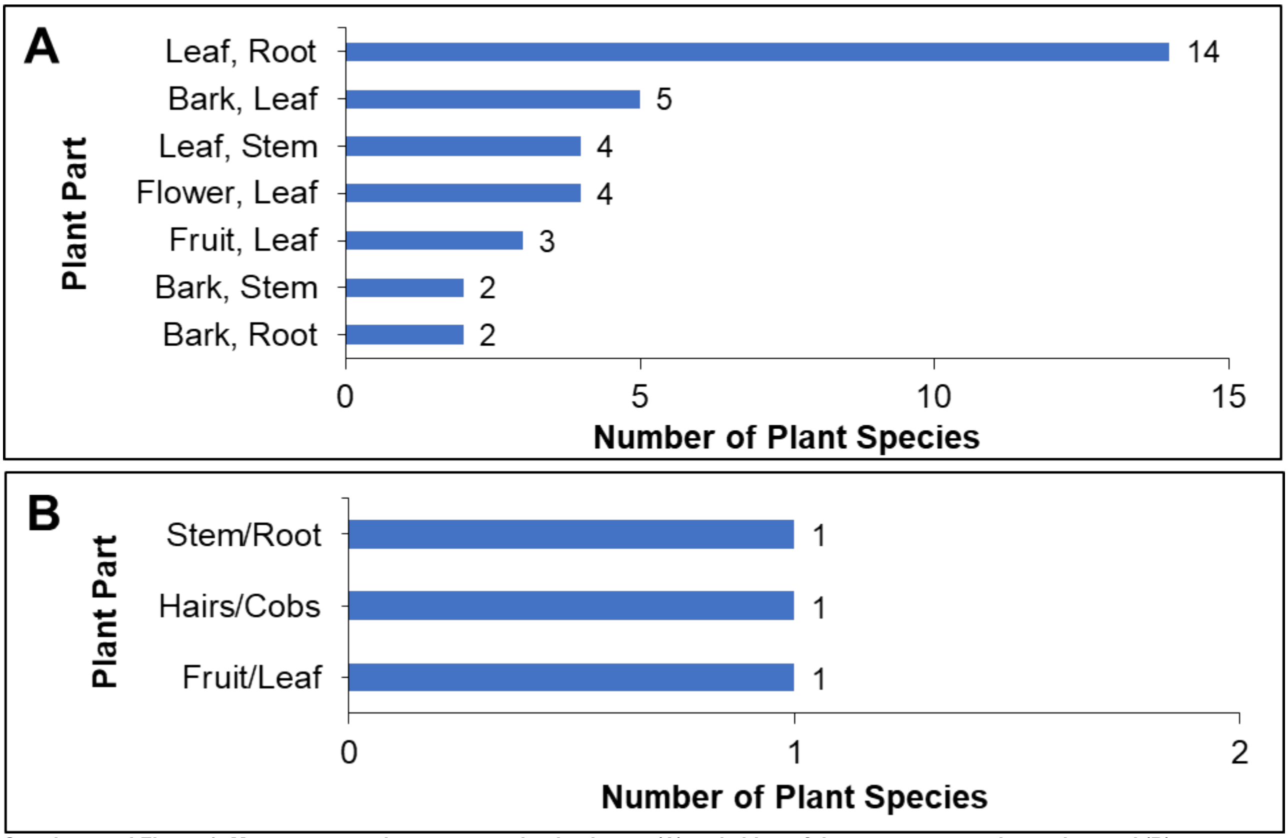
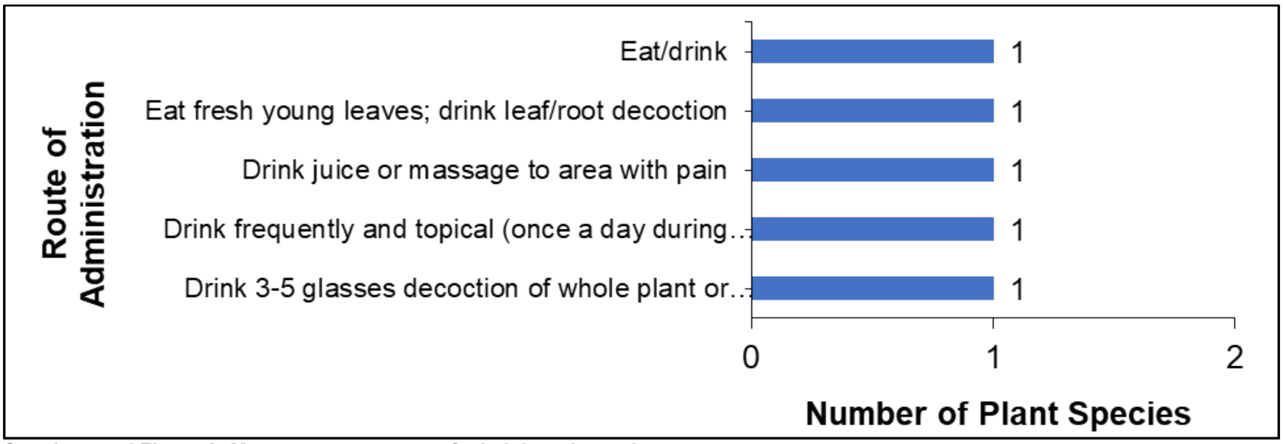
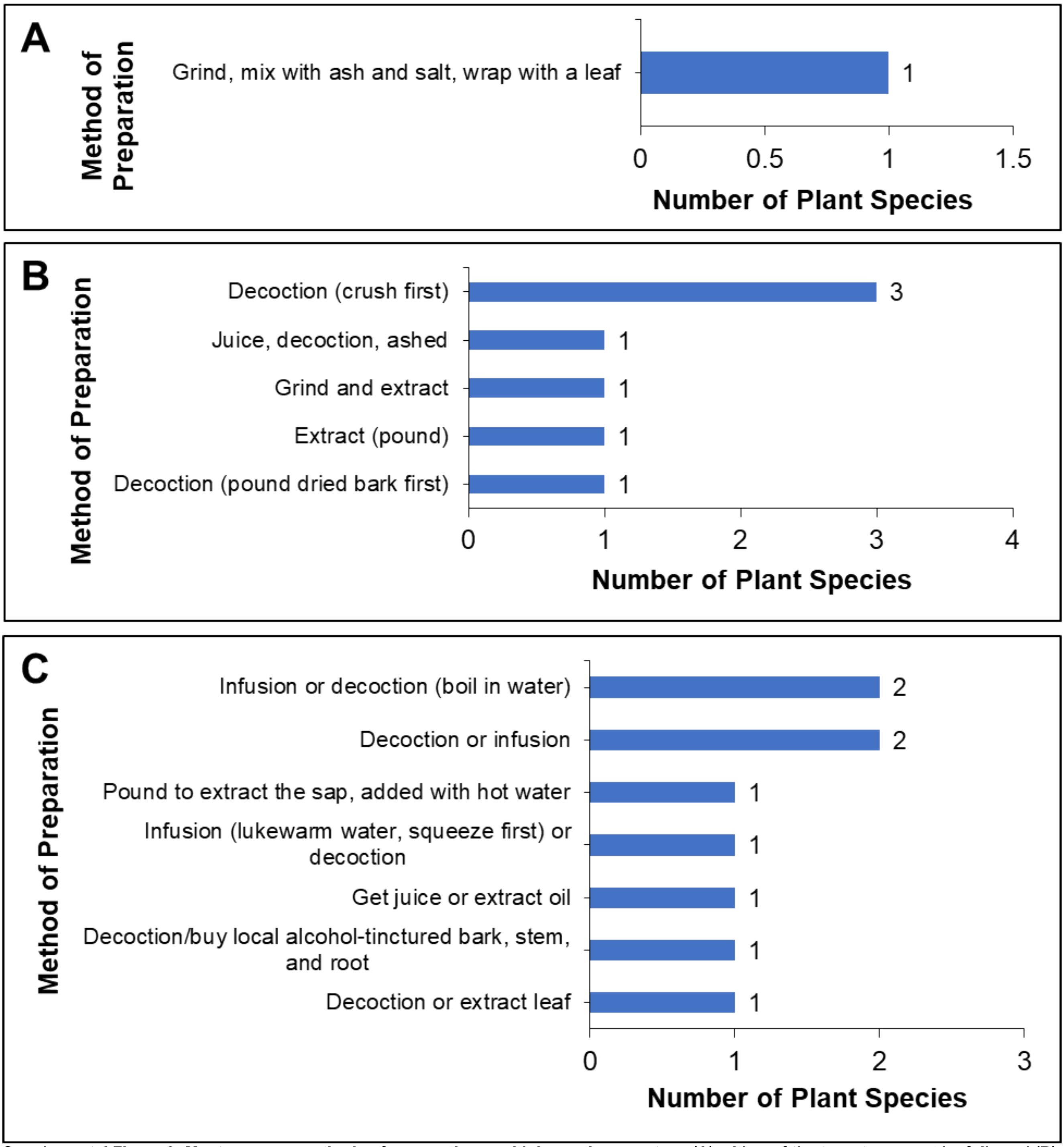


Supplemental Figure 1: Most common plant parts used: mixed parts (A) and either of the two parts stated must be used (B).



Supplemental Figure 2: Most common routes of administration: other routes.



Supplemental Figure 3: Most common methods of preparation: multiple continuous steps (A), either of the two steps must be followed (B), and both of the steps must be done to produce separate products (C).

SUPPLEMENTAL TABLES

Supplemental Table 1: Summary of full-text analysis.

Species	First author and Year	English Name	Family Name	Plant Part Used	Method of Preparation	Route of Administration	Ethnic Group/User	Place of Origin
Acorus gramineus Aiton	Tantengco, O.A.G. (2018) (Tantengco et al. 2018)	Calamus, Flag root, Myrtle grass, Sweet calamus, Sweet flag, Sweet root	Acoraceae	Le	De	Dr	Aytas	Bataan
Albizia saman (Jacq.) Merr.	Naive, M.A.K. (2021) (Naive et al. 2021)	Cow tamarind, False powder puff, Monkey pod tree, Rain tree	Fabaceae	Sh	De	Dr	Talaandig tribe	Bukidnon
Allophylus cobbe (L.) Forsyth fil.	Ong, H.G. (2014) (Ong and Kim 2014)	-	Sapindaceae	Ro	De	Dr	Ati Negritos	Guimaras
Alpinia haenkei C.Presl	Dapar, M.L.G. (2020) (Dapar et al. 2020) Dapar, M.L.G. (2020) (Dapar et al. 2020)	-	Zingiberaceae	Ro	De	Dr	Manobos	Agusan del Sur
Alstonia macrophylla Wall. ex G. Don	Dapar, M.L.G. (2020) (Dapar et al. 2020)	Devil tree, Hard alstonia, Hard milkwood	Apocynaceae	Ba, Le	De	Dr	Manobos	Agusan del Sur
Alstonia scholaris (L.) R. Br.	Cordero, C.S. (2021) (Cordero and Alejandro 2021)	Bitter bark, Devil's Tree, Milky pine, Alstonia, Australian fever bark, Australian quinine bark, Devil's tree, Devil tree of India, Milkwood pine, Scholar's tree, White cheesewood	Apocynaceae	Ba	De	Dr	Ati tribe	Antique
Amaranthus	Dapar,	Callaloo, Needle burr, Pigweed,	Amaranthaceae	Le	De	Dr	Manobos	Agusan del

spinosus L.	M.L.G. (2020) (Dapar et al. 2020)	Prickly amaranth, Prickly calalu, Spiny amaranth, Thorny amaranth, Thorny pigweed						Sur
	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)			Ro		Dr	Aeta people	Pampanga
Ananas comosus (L.) Merr.	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Pineapple	Bromeliaceae	Sp	De	Ba	Aeta people	Pampanga
Andrographis paniculata (Burm. fil.) Nees	Cordero, C.S. (2020) (Cordero et al. 2020)	Chiretta, Green chirayta, Green chiretta, Indian echinacea, King of bitters, White flower	Acanthaceae	Le, Ro	De	Dr	Malaynon Ati tribe	Aklan
Annona muricata L.	Fiscal, R.R. (2017) (Fiscal 2017)	Soursop, Prickly custard apple, Brazilian pawpaw, Graviola	Annonaceae	Fr, Le	De	Ea	Traditional practitioners	Laguna
	Caunca, E.S. (2021) (Caunca and Balinado 2021)			Le		Dr	Local herbalists	Cavite
	Pablo, C.G.C. (2019) (Pablo 2019)						Aeta people	Bataan
	Dapar, M.L.G. (2020) (Dapar et al. 2020)						Manobos	Agusan del Sur
	Dapar, M.L.G. (2020) (Dapar et al. 2020)							
	Morilla, L.J.						Traditional	Zamboanga

	(2019) (Morilla and Demayo 2019)						practitioners	del Sur
	Ong, H.G. (2014) (Ong and Kim 2014)						Ati Negritos	Guimaras
	Cordero, C.S. (2020) (Cordero et al. 2020)						Malaynon Ati tribe	Aklan
	Zabala, Jr. B.A. (2018) (Zabala et al. 2018)			Fr	Ex	Ea/Dr	Indigenous herbolarios	Nueva Ecija
	Naive, M.A.K. (2021) (Naive et al. 2021)				De	Dr	Talaandig tribe	Bukidnon
	Nuneza, O.M. (2021) (Nuneza et al. 2021)			Ro			Mamanwa tribe	Surigao del Norte and Agusan del Norte
Annona squamosa L.	Ong, H.G. (2014) (Ong and Kim 2014)	Sweetsop, Custard apple seed, Sugar apple	Annonaceae	Le	De	Dr	Ati Negritos	Guimaras
Antidesma bunius (L.) Spreng.	Balinado, L.O. (2017) (Balinado and Chan 2017)	Buni-berry, Currant tree, Chinese laurel, Maoberry, Queensland cherry, Salamander tree, Wild cherry	Phyllanthaceae	Ba, Le	De	Dr	Traditional practitioners	Cavite
	Cordero, C.S. (2021) (Cordero and Alejandro 2021)			Ba			Ati tribe	Antique
	Ducusin,			Le			Indigenous	La Union

	M.B. (2017) (Ducusin 2017)						people	
Bambusa vulgaris Schrad. ex J.C.Wendl., nom. cons. prop.	Olowa, L. (2015) (Olowa and Demayo 2015)	Bamboo, Buddha's common bamboo, Giant buddha's belly bamboo	Poaceae	Le	De/In	Dr	Maranaos	Lanao del Norte
Bixa orellana L.	Morilla, L.J. (2019) (Morilla and Demayo 2019)	Lipstick plant	Bixaceae	Le	Ha	Ap	Traditional practitioners	Zamboanga del Sur
Blumea balsamifera (L.) DC.	Abe, R. (2013) (Abe and Ohtani 2013)	Blumea camphor, Buffalo-ear, Ngai camphor	Asteraceae	Le	De	Dr	Ivatans	Batanes
	Balinado, L.O. (2017) (Balinado and Chan 2017)						Traditional practitioners	Cavite
	Balberona, A.N. (2018) (Balberona et al. 2018)						Ilongot-Eǵongot community	Aurora
	Dapar, M.L.G. (2020) (Dapar et al. 2020)			Le, Ro			Manobos	Agusan del Sur
	Ducusin, M.B. (2017) (Ducusin 2017)			Le			Indigenous people	La Union
	Montero, J.C. (2021) (Montero and Geducos 2021)						Locals	Surigao del Sur
	Peneciba, E.P. (2020)						Traditional practitioners	

	(Peneciba 2020)							
	Flores, R.L. (2016) (Flores et al. 2016)					Dr, Ap	Buyers and sellers	Quiapo
	Montero, J.C. (2021) (Montero and Geducos 2021)			Ro		Dr	Locals	Surigao del Sur
	de Guzman, A.A. (2020) (de Guzman et al. 2020)			Le	Ex		Local herbalists	Zamboanga Sibugay
	Estrella, M. C. P. (2020) (Estrella et al. 2020)				In/De	Dr	Locals	National Capital Region and Region IV-A
	Cordero, C. S. (2020) (Cordero et al. 2020)			Le, Ro	De	Ea, Dr	Malaynon Ati tribe	Aklan
Bougainvillea spectabilis Willd.	Naive, M.A.K. (2021) (Naive et al. 2021)	Bougainvillea, Great bougainvillea, Paper flower	Nyctaginaceae	Fl, Ro	De	Dr	Talaandig tribe	Bukidnon
Caesalpinia sappan L.	Nuneza, O.M. (2021) (Nuneza et al. 2021)	Sappan wood, Brazil wood, Bukkum wood, False sandalwood, Indian redwood, Sappan lignum	Fabaceae	Ro	De	Dr	Mamanwa tribe	Surigao del Norte and Agusan del Norte
Carica papaya L.	Naive, M.A.K. (2021) (Naive et al. 2021)	Papaya, Melon tree, Pawpaw, Papau	Caricaceae	Le, Ro	De	Dr	Talaandig tribe	Bukidnon
	Cordero, C.S. (2021) (Cordero			Fr	Ha	Ea	Ati tribe	Antique

	and Alejandro 2021)							
	Olowa, L. (2015) (Olowa and Demayo 2015)			Le	De	Dr	Maranaos	Lanao del Norte
Centella asiatica (L.) Urb.	Canceran, M.L. (2021) (Canceran et al. 2021)	Asiatic pennywort, Indian Hydrocotyle, Pennyworth, Spade leaf, Tiger grass	Apiaceae	Le	De	Dr	Dumagats	Aurora
	Ducusin, M.B. (2017) (Ducusin 2017)						Indigenous people	La Union
	Ducusin, M.B. (2017) (Ducusin 2017)							
	Ong, H.G. (2014) (Ong and Kim 2014)						Ati Negritos	Guimaras
	Balangcod, T.D. (2015) (Balangcod and Balangcod 2015)				De	Ap	Ibalois	Benguet
	Olowa, L. (2015) (Olowa and Demayo 2015)				In	Dr	Maranaos	Lanao del Norte
Cinnamomum mercadoi Vidal	Dapar, M.L.G. (2020) (Dapar et al. 2020)	Kalingag tree	Lauraceae	Ba, Ro, Br	De/Al	Dr	Manobos	Agusan del Sur
Citrullus lanatus (Thunb.) Matsum. and Nakai	Olowa, L. (2015) (Olowa and	Watermelon	Cucurbitaceae	Fr	Wa	Ea	Maranaos	Lanao del Norte

	Demayo 2015)							
Clerodendrum intermedium Cham.	Caunca, E.S. (2021) (Caunca and Balinado 2021)	Glorybower, Bagflower, Bleeding heart, Dragon boat flower, Pagoda flower	Lamiaceae	Fr	Ha	Ea	Local herbalists	Cavite
Cocos nucifera L.	Olowa, L. (2015) (Olowa and Demayo 2015)	Coconut, Coco, Coconut tree	Arecaceae	Fr	Ex	Dr	Maranaos	Lanao del Norte
	de Guzman, A.A. (2020) (de Guzman et al., 2020)				Ha	Ea, Dr	Local herbalists	Zamboanga Sibugay
	Abe, R. (2013) (R. Abe and Ohtani 2013)					Dr	Ivatans	Batanes
	Cordero, C.S. (2021) (Cordero and Alejandro 2021)						Ati tribe	Antique
	De La Torre, F.E.L. (2016) (De La Torre et al. 2016)						Locals (living at the peak of Mount Manunggal)	Cebu
	Ong, H.G. (2014) (Ong and Kim 2014)						Ati Negritos	Guimaras
	Lopez, Z.F.A. (2019) (Lopez and					Dr/Ma	Aeta people	Pampanga

	Solis 2019)							
	Cordero, C.S. (2020) (Cordero et al. 2020)						Malaynon Ati tribe	Aklan
	Ducusin, M.B. (2017) (Ducusin 2017)						Indigenous people	La Union
	Pablo, C.G.C. (2019) (Pablo 2019)					Dr	Aeta people	Bataan
	Villanueva, E.L.C. (2020) (Pablo 2019)						Alangan Mangyan	Occidental Mindoro
	Balangcod, T.D. (2015) (Balangcod and Balangcod 2015)			Fr, Le, Sl	Ex, De, He		Ibalois	Benguet
	Balinado, L.O. (2017) (Balinado and Chan 2017)			Fr	He	Ea	Traditional practitioners	Cavite
Cordyline fruticosa (L.) A. Chev.	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Chinese fire leaf, Good luck plant, King of kings, Tree of kings	Asparagaceae	Le	De	Dr	Aeta people	Pampanga
Corypha utan Lam.	Ong, H.G. (2014) (Ong and Kim 2014)	Buri palm, Cabbage palm, Gebang palm, Gewang palm	Arecaceae	St	Ex	Dr	Ati Negritos	Guimaras
Cucumis sativus L.	Naive, M.A.K. (2021) (Naive et al.	Cucumber	Cucurbitaceae	Fr	Ha	Ea	Talaandig tribe	Bukidnon

	2021)							
Curcuma longa L.	Dalisay, J.A.G.P. (2018) (Dalisay et al. 2018)	Turmeric, Long turmeric	Zingiberaceae	Rh	De	Dr	Barangay officials, local folks, and herbal healers	Antique
	Naive, M.A.K. (2021) (Naive et al. 2021)						Talaandig tribe	Bukidnon
	Estrella, M. C. P. (2020) (Estrella et al. 2020)			Sa	In/De	Dr	Locals	National Capital Region and Region IV-A
	Susaya-Garcia, J. (2018) (Susaya-Garcia et al. 2018)			Le	Po	Ap		Leyte
Curcuma rubescens Roxb.	Dalisay, J.A.G.P. (2018) (Dalisay et al. 2018)	-	Zingiberaceae	Rh	De	Dr	Barangay officials, local folks, and herbal healers	Antique
Cyanthillium cinereum (L.) H. Rob.	Belgica, T.H.R. (2021) (Belgica et al. 2021)	Ash coloured Fleabane, Ironweed, Little ironweed	Asteraceae	Le	De	Dr	Traditional practitioners	Albay
	Olowa, L. (2015) (Olowa and Demayo 2015)			Le, Ro			Maranaos	Lanao del Norte
Cymbopogon citratus (DC.) Stapf	Balinado, L.O. (2017) (Balinado and Chan 2017)	Lemongrass, Citronella grass, Fever grass, Sweet rush, Ginger-grass	Poaceae	Wp	De	Dr	Traditional practitioners	Cavite

	Ducusin, M.B. (2017) (Ducusin 2017)						Indigenous people	La Union
	Ducusin, M.B. (2017) (Ducusin 2017)			Le				
	Flores, R.L. (2016) (Flores et al. 2016)						Buyers and sellers	Quiapo
Dendrocnide meyeniana (Walp.) Chew	Naive, M.A.K. (2021) (Naive et al. 2021)	-	Urticaceae	Ro	De	Dr	Talaandig tribe	Bukidnon
Dendrocnide sp. (Aligatong var.)	Paraguison, L. (2020) (Paraguison et al. 2020)	-	Urticaceae	Ro	De	Dr	Manobos	Agusan del Sur
Dendrocnide sp. (Sagay var.)	Paraguison, L. (2020) (Paraguison et al. 2020)	-	Urticaceae	Ro	De	Dr	Manobos	Agusan del Sur
Dillenia philippinensis Rolfe	Balberona, A.N. (2018) (Balberona et al. 2018)	Philippine catmon, Philippine dillenia	Dilleniaceae	Ba, St	De	Dr	Ilongot-Egongot community	Aurora
Ehretia monopyrena Gottschling and Hilger	Fajardo, W.T. (2017) (Fajardo et al. 2017)	Forest tea, Fukien tea tree, Philippine tea tree, Scorpion bush, Wild tea	Ehretiaceae	Le	De	Dr	Sambal-Bolinaos	Pangasinan
	Caunca, E.S. (2021) (Caunca and Balinado 2021)			Le, St, Bu, Ro	He	Ea	Local herbalists	Cavite
Elephantopus scaber L.	Naive, M.A.K. (2021) (Naive et al. 2021)	Prickly-leaved elephant's foot	Asteraceae	Le, Ro	De	Dr	Talaandig tribe	Bukidnon

Elephantopus tomentosus L.	Paraguison, L. (2020) (Paraguison et al. 2020)	-	Asteraceae	Le	De	Dr	Manobos	Agusan del Sur
Eleusine indica (L.) Gaertn.	Balberona, A.N. (2018) (Balberona et al. 2018)	Crowfoot, Dog's tail, Crab grass, Fowl-foot grass, Goosegrass, Indian Goosegrass, Iron grass, Wiregrass, Yard grass	Poaceae	Wp	De	Dr	Ilongot-Eǵongot community	Aurora
	Montero, J.C. (2021) (Montero and Geducos 2021)						Locals	Surigao del Sur
	Cordero, C.S. (2021) (Cordero and Alejandro 2021)			Ro			Ati tribe	Antique
Equisetum ramosissimum Desf.	Doctor, T.R. (2014) (Doctor and Manuel 2014)	Branched scouring brush, Common horsetail, Branched horsetail	Equisetaceae	Le	De	Dr	Indigenous people	Benguet
	Ducusin, M.B. (2017) (Ducusin 2017)							La Union
Equisetum sp.	Olowa, L. (2015) (Olowa and Demayo 2015)	-	Equisetaceae	St	De	Dr	Maranaos	Lanao del Norte
Erythrina variegata L.	Ong, H.G. (2014) (Ong and Kim 2014)	Tiger's claw, East Indian coral tree, Indian coral tree, Moochy wood tree, Sunshine tree, Thorny dapdap, Tiger's claw	Fabaceae	Ba, Le	Sc	Ap	Ati Negritos	Guimaras
Euphorbia hirta L.	Balinado, L.O. (2017) (Balinado	Asthma plant, Australian asthma weed, Cat's hair, Hairy spurge, Pill-bearing spurge, Snake weed	Euphorbiaceae	Wp	De	Dr	Traditional practitioners	Cavite

	and Chan, 2017)							
	Cordero, C.S. (2020) (Cordero et al. 2020)						Malaynon Ati tribe	Aklan
Ficus cassidyana Elmer	Dapar, M.L.G. (2020) (Dapar et al. 2020)	-	Moraceae	Ba, Ro	De	Dr	Manobos	Agusan del Sur
Ficus elastica Roxb.	Ong, H.G. (2014) (Ong and Kim 2014)	Fig tree, Indian rubber tree, Indian rubber fig, Rubber tree, Rubber plant	Moraceae	Ro	De	Dr	Ati Negritos	Guimaras
Ficus fistulosa Reinw. ex Blume	Dapar, M.L.G. (2020) (Dapar et al. 2020)	-	Moraceae	Ba, Ro	De	Dr	Manobos	Agusan del Sur
Ficus nota Merr.	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Sacking tree	Moraceae	Le	Cr, Mi	Ap	Aeta people	Pampanga
Gynura procumbens (Lour.) Merr.	Alduhisa, G.U. (2019) (Alduhisa and Demayo 2019)	Cholesterol spinach, Leaves of Gods, Longevity greens, Longevity spinach, Moluccan spinach	Asteraceae	Le	Wa	Ea	Subanens	Misamis Occidental
Heliotropium indicum L.	Olowa, L. (2015) (Olowa and Demayo 2015)	Indian heliotrope	Heliotropiaceae	Wp	De	Dr	Maranaos	Lanao del Norte
Hellenia speciosa (J.Koenig) S.R.Dutta	Dapar, M.L.G. (2020) (Dapar et al. 2020)	-	Costaceae	Le, Rh	De	Dr	Manobos	Agusan del Sur
Homalomena philippinensis Engl.	Paraguison, L. (2020)	-	Araceae	Ro	De	Dr	Manobos	Agusan del Sur

	(Paraguison et al. 2020)							
Homonoia riparia Lour.	Cordero, C.S. (2020) (Cordero et al. 2020)	Water willow, Willow-leaved water croton	Euphorbiaceae	St/Ro	De	Dr	Malaynon Ati tribe	Aklan
Hydrocotyle vulgaris L.	Balberona, A.N. (2018) (Balberona et al., 2018)	Common pennyworth, Marsh pennywort, Rot grass, Pennywort, Sheep rot, Waternavel, White rot	Apiaceae	Le	Ha	Ea	Ilongot-Egongot community	Aurora
Hyptis capitata Jacq.	Susaya-Garcia, J. (2018) (Susaya-Garcia et al. 2018)	Buttonweed, False ironwort, Knobweed, Bachelor's button, Knobweed	Lamiaceae	Ro	De	Dr	Locals	Leyte
Imperata cylindrica (L.) P.Beauv.	Belgica, T.H.R. (2021) (Belgica et al. 2021)	Blady grass, Cogon grass, Japanese blood grass, Satin tails, Spear grass, Wooly grass	Poaceae	Fl	De	Dr	Traditional practitioners	Albay
	Canceran, M.L. (2021) (Canceran et al. 2021)			Ro			Dumagats	Aurora
	Dapar, M.L.G. (2020) (Dapar et al. 2020)			Sh			Manobos	Agusan del Sur
	Ducusin, M.B. (2017) (Ducusin 2017)			Ro			Indigenous people	La Union
	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)						Aeta people	Pampanga
	Balinado, L.O. (2017)						Traditional practitioners	Cavite

	(Balinado and Chan 2017)							
	Paraguison, L. (2020) (Paraguison et al. 2020)				Ha	Ch	Manobos	Agusan del Sur
	Pablo, C.G.C. (2019) (Pablo 2019)				Cr	Dr	Aeta people	Bataan
Ipomoea batatas (L.) Lam.	de Guzman, A.A. (2020) (de Guzman et al. 2020)	Sweetpotato	Convolvulaceae	Le, St	De	Ea	Local herbalists	Zamboanga Sibugay
Lagenaria siceraria (Molina) Standl.	Caunca, E.S. (2021) (Caunca and Balinado 2021)	Bottle gourd, Calabash gourd, Common gourd, White-flowered gourd, White pumpkin	Cucurbitaceae	Fl, Le	De	Dr	Local herbalists	Cavite
	Caunca, E.S. (2021) (Caunca and Balinado 2021)							
	Ong, H.G. (2014) (Ong and Kim 2014)			Fr/Le	Cr	Ap	Ati Negritos	Guimaras
Lagerstroemia speciosa (L.) Pers.	Abe, R. (2013) (Abe and Ohtani, 2013)	Pride of India, Queen's flower, Queen of flowers, Queen's Crapemyrtle	Lythraceae	Fr, Le	De	Dr	Ivatans	Batanes
	Baddu, V.D. (2018) (Baddu and Ouano 2018)			Le, St			Y'Apayaos	Cagayan
	Balinado, L.O. (2017) (Balinado and Chan			Ba, Le			Traditional practitioners	Cavite

	2017)							
	Cajuday, L.A. (2019) (Cajuday and Banares 2019)			Le			Locals	Albay
	Dapar, M.L.G. (2020) (Dapar et al. 2020)						Manobos	Agusan del Sur
	Ducusin, M.B. (2017) (Ducusin 2017)			Fr, Le			Indigenous people	La Union
	Ong, H.G. (2014) (Ong and Kim 2014)			Le, Ro			Ati Negritos	Guimaras
	Tantengco, O.A.G. (2018) (Tantengco et al. 2018)			Le, Fr, Peel, St			Aytas	Bataan
	Flores, R.L. (2016) (Flores et al. 2016)			Le			Buyers and sellers	Quiapo
Mimosa pudica L.	Dapar, M.L.G. (2020) (Dapar et al. 2020)	Bashful mimosa, Humble plant, Sensitive plant, Shame plant, Tickle-Me plant, Touch-me-not	Fabaceae	Ro	De	Dr	Manobos	Agusan del Sur
	Ong, H.G. (2014) (Ong and Kim 2014)						Indigenous people	La Union
	Ong, H.G. (2014) (Ong and Kim 2014)						Ati Negritos	Guimaras

	Balangcod, T.D. (2015) (Balangcod and Balangcod 2015)					Ap	Ibalois	Benguet
Morinda citrifolia L., nom. cons.	Ong, H.G. (2014) (Ong and Kim 2014)	Noni, Cheese fruit, Great morinda, Indian mulberry, Pain-killer tree, Tahitian noni, Wild pine	Rubiaceae	Fr, St	De	Dr	Ati Negritos	Guimaras
Moringa oleifera Lam.	Olowa, L.F. (2012) (Olowa et al. 2012)	Ben oil tree, Ben tree, Behn tree, Behen tree, Drumstick tree, Horse-radish tree, Miracle tree	Moringaceae	Le	De	Dr	Higaonons	Lanao del Norte
	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)				Cr, Ex		Aeta people	Pampanga
Musa paradisiaca L.	Balangcod, T.D. (2015) (Balangcod and Balangcod 2015)	Banana	Musaceae	Le	De	Dr	Ibalois	Benguet
	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)			Fr	Ha	Ea	Aeta people	Pampanga
	Gruyal, G. (2014) (Gruyal 2014)			Le		Ap	Locals	Surigao del Sur
	Nuneza, O.M. (2021) (Nuneza et al. 2021)						Mamanwa tribe	Surigao del Norte and Agusan del Norte
Musa spp.	Abe, R. (2013) (R. Abe and Ohtani 2013)	-	Musaceae	Le	De	Dr	Ivatans	Batanes

Nauclea orientalis (L.) L.	Ong, H.G. (2014) (Ong and Kim 2014)	Cheesewood, Leichhardt pine, Leichhardt tree, Pincushion tree, Yellow cheesewood	Rubiaceae	Le, Ro	De	Dr	Ati Negritos	Guimaras
Origanum vulgare L.	Flores, R.L. (2016) (Flores et al. 2016)	Broad Le thyme, Country borage, Indian borage, Oregano	Lamiaceae	Le	De	Dr	Buyers and sellers	Quiapo
Orthosiphon aristatus (Blume) Miq.	Ducusin, M.B. (2017) (Ducusin 2017)	Cat's whisker	Lamiaceae	Le	De	Dr	Indigenous people	La Union
	Olowa, L. (2015) (Olowa and Demayo 2015)				De/In		Maranaos	Lanao del Norte
	Dapar, M.L.G. (2020) (Dapar et al. 2020)			Fl, Le	De		Manobos	Agusan del Sur
	Dapar, M.L.G. (2020) (Dapar et al. 2020)							
Oryza sativa L. (PhilRice Genebank GRD Coll. No.: 14235)	Cabanting, R.M.F. (2016) (Cabanting and Perez 2016)	Asian rice, Rice	Poaceae	Grain	Wa	Dr	Locals	Palawan, Zamboanga del Norte, Zamboanga del Sur and North Cotabato
	Cabanting, R.M.F. (2016) (Cabanting and Perez 2016)							
Pandanus amaryllifolius Roxb.	Abe, R. (2013) (R.	Aromatic pandan, pandan	Pandanaceae	Le, Ro	De	Dr	Ivatans	Batanes

ex Lindl.	Abe and Ohtani, 2013)							
	Abe, R. (2013) (R. Abe and Ohtani 2013)							
	Dapar, M.L.G. (2020) (Dapar et al. 2020)			Le			Manobos	Agusan del Sur
	Dapar, M.L.G. (2020) (Dapar et al. 2020)							
	Balinado, L.O. (2017) (Balinado and Chan 2017)						Traditional practitioners	Cavite
Pandanus dubius Spreng.	Gruyal, G. (2014) (Gruyal 2014)	-	Pandanaceae	Le	De	Dr	Locals	Surigao del Sur
Pandanus luzonensis Merr.	Ordas, J.A.D. (2020) (Ordas et al. 2020)	-	Pandanaceae	Le	De	Dr	Community members	Davao Oriental, Bataan, Eastern Samar, Palaui Island, and Laguna
	Ordas, J.A.D. (2020) (Ordas et al. 2020)							
Pandanus sp.	Flores, R.L. (2016) (Flores et al. 2016)	-	Pandanaceae	Le	De	Dr	Buyers and sellers	Quiapo
	Lopez, Z.F.A.						Aeta people	Pampanga

	(2019) (Lopez and Solis 2019)							
	Tantengco, O.A.G. (2018) (Tantengco et al. 2018)						Aytas	Bataan
Pandanus tectorius Parkinson ex Du Roi	Ordas, J.A.D. (2020) (Ordas et al. 2020)	Screw-pine	Pandanaceae	Fr, Sh	De	Dr	Community members	Davao Oriental, Bataan, Eastern Samar, Palaui Island, and Laguna
Paspalum conjugatum P.J.Bergius	Paraguison, L. (2020) (Paraguison et al. 2020)	Buffalo grass, Carabao grass, Hilograss, Sour grass, Sour paspalum	Poaceae	Le	De	Dr	Manobos	Agusan del Sur
Peperomia pellucida (L.) Kunth	Caunca, E.S. (2021) (Caunca and Balinado 2021)	Clear weed, Pepper-elder, Rat-ear, Shiny bush, Silver bush	Piperaceae	Le, Bu	De	Dr	Local herbalists	Cavite
	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)			Le			Aeta people	Pampanga
	Montero, J.C. (2021) (Montero and Geducos 2021)			Le, St			Locals	Surigao del Sur
	Peneciba, E.P. (2020) (Peneciba 2020)						Traditional practitioners	
Persea americana Mill.	Ducusin, M.B. (2017) (Ducusin	Alligator pear, Avocado	Lauraceae	Ba, Le	De	Dr	Indigenous people	La Union

	2017)							
Phyllanthus amarus Schumach. and Thonn.	Dapar, M.L.G. (2020) (Dapar et al. 2020)	Seed-under-leaf, Shatterstone, Stonebreaker	Phyllanthaceae	Wp	De	Dr/Wa	Manobos	Agusan del Sur
Pityrogramma calomelanos (L.) Link	Aya-Ay, A.M. (2016) (Aya-Ay 2016)	Silver fern, Silverback fern	Pteridaceae	Le	De	Dr	Indigenous people	Davao
Pogostemon heyneanus Benth	Susaya-Garcia, J. (2018) (Susaya-Garcia et al. 2018)	False patchouli, Indian patchouli, Java patchouli	Lamiaceae	Le	De/Ex	Dr	Locals	Leyte
Polyscias scutellaria (Burm.f) Fosberg	Olowa, L. (2015) (Olowa and Demayo 2015)	Balfour aralia, Cup-leaved papua, Dinner plate aralia, False panax, Leaf bowl, Saucer-leaf, Shell-leaf, Shield aralia	Araliaceae	Le, Ro	De	Dr	Maranaos	Lanao del Norte
Portulaca oleracea L.	Ong, H.G. (2014) (Ong and Kim 2014)	Common purslane, Flowering purslane, Little hogweed, Pigweed, Purslane, Purslane weed, Pursley, Wild portulaca	Portulacaceae	Wp	Cr	Ap	Ati Negritos	Guimaras
	Olowa, L. (2015) (Olowa and Demayo 2015)				De	Dr	Maranaos	Lanao del Norte
Proiphys amboinensis (L.) Herb.	Morilla, L.J. (2014) (Morilla et al. 2014)	Cardwell lily, Christmas lily, Northern Christmas lily, Seashore eurycles	Amaryllidaceae	Le, Ro	Cr	Ap	Subanens	Zamboanga del Sur
Pseudelephantopus spicatus (Juss. ex Aubl.) Rohr	Dapar, M.L.G. (2020) (Dapar et al. 2020)	Dog's tongue, False elephant foot, Ironweed, Tobacco weed	Asteraceae	Le, Ro	De	Dr	Manobos	Agusan del Sur
	Dapar, M.L.G. (2020) (Dapar et al.							

	2020)							
	Dapar, M.L.G. (2020) (Dapar et al. 2020)							
Psidium guajava L.	Montero, J.C. (2021) (Montero and Geducos 2021)	Guava, Round guava, Tropical guava	Myrtaceae	Le	De	Dr	Locals	Surigao del Sur
Pterocaulon redolens (Willd.) Fern. -Vill.	Ducusin, M.B. (2017) (Ducusin 2017)	Wing stem grass	Asteraceae	Le	De	Dr	Indigenous people	La Union
Rauvolfia amsoniifolia A.DC.	Ong, H.G. (2014) (Ong and Kim 2014)	-	Apocynaceae	Ro	De	Dr	Ati Negritos	Guimaras
Rubus fraxinifolius Poir.	Naive, M.A.K. (2021) (Naive et al. 2021)	-	Rosaceae	Ro	De	Dr	Talaandig tribe	Bukidnon
Saccharum officinarum L.	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Noble Cane, Sugar cane	Poaceae	St	De	Dr	Aeta people	Pampanga
	Morilla, L.J. (2019) (Morilla and Demayo 2019)						Traditional practitioners	Zamboanga del Sur
	Olowa, L. (2015) (Olowa and Demayo 2015)				Ex		Maranaos	Lanao del Norte
Saccharum	Lopez,	Fodder cane, Serio grass, Thatch	Poaceae	Ro	De	Dr	Aeta people	Pampanga

spontaneum L.	Z.F.A. (2019) (Lopez and Solis 2019)	grass, Tiger grass, Wild cane, Wild sugarcane						
Smilax bracteata C.Presl	Ong, H.G. (2014) (Ong and Kim, 2014)	Sarsaparilla vine	Smilacaceae	Ro	De	Dr	Ati Negritos	Guimaras
Stenomeris borneensis Oliv.	Dapar, M.L.G. (2020) (Dapar et al. 2020) Dapar, M.L.G. (2020) (Dapar et al. 2020)	-	Dioscoreaceae	Ro	De	Dr	Manobos	Agusan del Sur
Synsepalum dulcificum (Schumach. and Thonn.) Daniell	de Guzman, A.A. (2020) (de Guzman et al. 2020)	Magic fruit/Miracle fruit/Magic berry/Miraculous berry/Sweet berry/Synsepalum wood	Sapotaceae	Fr	Ha	Ea	Local herbalists	Zamboanga Sibugay
Syzygium cumini (L.) Skeels	Balberona, A.N. (2018) (Balberona et al. 2018)	Jambolan, Java plum, Black plum, Duhat plum, Indian blackberry	Myrtaceae	Ba, St	De	Dr	Ilongot-Eġongot community	Aurora
Tabernaemontana pandacaqui Lam.	Ong, H.G. (2014) (Ong and Kim 2014)	-	Apocynaceae	Le	De	Dr	Ati Negritos	Guimaras
Triumfetta rhomboidea Jacq.	Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Diamond burbark, Burweed, Chinese burr	Malvaceae	Ro	De	Dr	Aeta people	Pampanga
Vigna unguiculata subsp. *sesquipedalis* (L.) Verdc.	Ducusin, M.B. (2017) (Ducusin 2017)	Chayote, Choyote, Choko, Christophine, Pipinella, Vegetable pear	Fabaceae	Le	Ha	Ea	Indigenous people	La Union
Vitex negundo L.	Ducusin, M.B. (2017) (Ducusin 2017)	Five leaved chaste tree, Chaste tree, Chinese chaste tree, Cut leaf vitex	Lamiaceae	Le	De	Dr	Indigenous people	La Union

Zea mays L.	Caunca, E.S. (2021) (Caunca and Balinado 2021)	Corn, Maize	Poaceae	Le	De	Dr	Local herbalists	Cavite
	de Guzman, A.A. (2020) (de Guzman et al. 2020)			Ha/Co				Zamboanga Sibugay
	Ducusin, M.B. (2017) (Ducusin 2017)			Le			Indigenous people	La Union
	Ducusin, M.B. (2017) (Ducusin 2017)			Si				
	Naive, M.A.K. (2021) (Naive et al. 2021)			Se			Talaandig tribe	Bukidnon
	Nuneza, O.M. (2021) (Nuneza et al. 2021)			Ha			Mamanwa tribe	Surigao del Norte and Agusan del Norte
Zingiber officinale Roscoe	Olowa, L. (2015) (Olowa and Demayo 2015)	Ginger, Common ginger	Zingiberaceae	St (Rh)	Ex		Maranaos	Lanao del Norte

Legend:

Plant Part Used: Bark= Ba; Branch= Br; Fruit= Fr; Flower= Fl; Grain= Gr; Leaf= Le; Non-rice materials= Nm; Peel= Pe; Pith= Pi; Pod= Po; Rhizome= Rh; Root= Ro; Seed= Se; Shoot= Sh; Sprout= Sp; Stem= St; Vine= Vi; Whole plant= Wp
Method of Preparation: Cook= Co; Crush, grind, and pound = Cr; Decoction= De; Extract= Ex; Harvest= Ha; Heat directly= He; Infusion= In; Local alcohol-tinctured plant part= Al; Poultice= Po; Processed/preserved= Pr; Roast= Ro; Scrape= Sc; Steam= St; Wash= Wa
Route of Administration: Apply directly on affected area= Ap; Bath= Ba; Drink= Dr; Eat= Ea; Inhale= In; Massage= Ma; Sit on it= Si; Use as accessory= Ac; Use as warm compress= Co; Use as wash= Wa; Wrap on body part= Wr

Supplemental Table 2: Quality assessment of the studies with data on plants used for treatment of urinary tract infections in the Philippines.

QUALITY ASSESSMENT

Scoring:
Fully compliant= 2 points,
Partially compliant= 1 point,
Not compliant= 0;
N/A= not applicable

Total score:
17–20 = High quality,
11–16= Regular quality,
0–10= Low quality

Questions:
Are the questions or objectives sufficiently described? (Q1)
Is the study design appropriate to answer the study question/s? (Q2)
Is the study area and population sufficiently described? (Q3)
Are the methods described in sufficient detail? (Q4)
Can the study be easily replicated? (Q5)
Is the sample size of informants sufficient or justified? (Q6)
Are the medicinal plants verified by a taxonomist? (Q7)
Did the paper provide appropriate descriptive and quantitative analysis? (Q8)
Are the results reported in sufficient detail? (Q9)
Do the results support the conclusion? (Q10)

First Author and Year	Title	Journal	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	Quality
Abe, R. (2013) (Abe and Ohtani 2013)	Ethnobotanical investigation of Matigsalug Ethnic Group in Sitio Patag, Brgy. Datu Salumay, Marilog District, Davao City	An undergraduate thesis presented to the faculty of the Department of Natural and Physical Science College of Arts and Sciences, University of Southeastern Philippines, Barrio Obrero, Davao City	1	2	1	1	2	0	0	1	2	2	12	Regular
Alduhisa, G.U. (2019) (Alduhisa and Demayo 2019)	Ethnomedicinal plants used by the Subanen tribe in two villages in Ozamis City, Mindanao, Philippines.	Pharmacophore	1	2	2	1	2	2	0	2	2	2	16	Regular
Aya-Ay, A.M. (2016) (Aya-Ay 2016)	Ethnobotany of ferns and fern allies in Mount Macabol, Marilog District, Davao City, Philippines	International Journal of Applied Business and Economic Research	2	2	2	2	2	0	2	1	2	2	17	High
Baddu, V.D. (2018) (Baddu and Ouano 2018)	Ethnobotanical survey of medicinal plants used by the Y'Apayaos of Sta. Praxedes in the Province of Cagayan, Philippines.	Mindanao Journal of Science and Technology	2	2	1	1	1	1	2	2	2	2	16	Regular
Balangcod, T.D. (2015) (Balangcod and Balangcod 2015)	Ethnomedicinal plants in Bayabas, Sablan, Benguet Province, Luzon, Philippines	Electronic Journal of Biology	2	2	2	2	2	1	0	2	2	1	16	Regular

Balberona, A.N. (2018) (Balberona et al. 2018)	Ethnomedicinal plants utilized by the Ilongot-Eģongot community of Bayanihan, Maria Aurora, Aurora, Philippines	International Journal of Agricultural Technology	2	2	1	1	2	1	0	2	1	1	13	Regular
Balinado, L.O. (2017) (Balinado and Chan 2017)	An ethnomedicinal study of plants and traditional health care practices in District 7, Cavite, Philippines	International Conference on Chemical, Agricultural, Biological and Medical Sciences	2	2	2	2	2	1	0	2	2	2	17	High
Belgica, T.H.R. (2021) (Belgica et al. 2021)	Quantitative ethnobotanical study of medicinal flora used by local inhabitants in selected barangay of Malinao, Albay, Philippines	Biodiversitas	2	2	2	2	2	2	2	2	2	2	20	High
Cabanting, R.M.F. (2016) (Cabanting and Perez 2016)	An ethnobotanical study of traditional rice landraces (*Oryza sativa* L.) used for medical treatment in selected local communities of the Philippines	Journal of Ethnopharmacology	2	2	2	2	1	2	0	2	2	2	17	High
Cajuday, L.A. (2019) (Cajuday and Banares 2019)	Analysis of traditional knowledge of medicinal plants from residents near Kalikasan Park, Albay, Philippines	BU RandD Journal	2	2	2	2	2	1	0	2	2	1	16	Regular
Canceran, M.L. (2021) (Canceran et al. 2021)	Ethnomedicinal plants of the Dumagat community of Paraiso, Culat, Casiguran, Aurora, Philippines	International Journal of Biosciences	1	2	0	1	1	1	2	2	1	2	13	Regular
Caunca, E.S. (2021) (Caunca and Balinado 2021)	The practice of using medicinal plants by local herbalists in Cavite, Philippines	Indian Journal of Traditional Knowledge	2	2	2	2	2	2	2	2	2	2	20	High
Cordero, C. S. (2020) (Cordero et al. 2020)	Ethnobotanical documentation of medicinal plants used by the Ati tribe in Malay, Aklan, Philippines	Journal of Complementary Medicine Research	1	2	2	2	2	2	2	2	2	2	19	High
Cordero, C.S. (2021) (Cordero and Alejandro 2021)	Medicinal plants used by the indigenous Ati tribe in Tobias Fornier, Antique, Philippines	Biodiversitas	2	2	2	2	2	1	2	2	2	2	19	High
Dalisay, J.A.G.P. (2018) (Dalisay et al. 2018)	Taxonomic studies and ethnomedicinal uses of Zingiberaceae in the mountain ranges of Northern Antique, Philippines	Biological Forum	2	2	1	1	1	0	2	2	1	2	14	Regular
Dapar, M.L.G. (2020) (Dapar et al. 2020)	Quantitative ethnopharmacological documentation and molecular confirmation of medicinal plants used by the Manobo tribe of Agusan del Sur, Philippines	Journal of Ethnobiology and Ethnomedicine	2	2	1	2	2	1	2	2	2	2	18	High
de Guzman, A.A. (2020) (de Guzman et al. 2020)	Ethnobotany and physiological review on folkloric medicinal plants of the Visayans in Ipil and Siay, Zamboanga Sibugay, Philippines	International Journal of Herbal Medicine	1	2	1	1	2	1	0	2	2	2	14	Regular
De La Torre, F.E.L. (2016) (De La Torre et al. 2016)	Species diversity and assessment of the ethnobotanical uses of Arecales at the peak of Mt. Manunggal, Cebu, Philippines	A research presented to the Faculty of Biology Program University of the Philippines Cebu Lahug, Cebu City	2	2	0	1	2	0	0	2	2	2	13	Regular
Doctor, T.R. (2014) (Doctor and Manuel 2014)	Phytochemical screening of selected indigenous medicinal plants of Tublay, Benguet province, Cordillera administrative region, Philippines	International Journal of Scientific and Research Publications	2	2	1	2	1	0	0	2	2	1	13	Regular
Ducusin, M.B. (2017) (Ducusin 2017)	Ethnomedicinal knowledge of plants among the indigenous peoples of Santol, La Union, Philippines	Electronic Journal of Biology	2	2	2	2	2	1	0	2	2	2	17	High
Estrella, M. C. P. (2020)	Ethnomedicinal study on herbal plants and traditional practices	A research presented to the Philippine	2	2	2	2	2	1	0	2	2	2	17	High

(Estrella et al. 2020)	among groups in the National Capital Region and Region 4-A, Philippines	Science High School–CALABARZON Region Campus, Department of Science and Technology, Sitio Sampaga West, Sampaga, Batangas City												
Fajardo, W.T. (2017) (Fajardo et al. 2017)	Ethnobotanical study of traditional medicinal plants used by indigenous Sambal-Bolinao of Pangasinan, Philippines	PSU Journal of Natural and Allied Sciences	2	2	1	1	2	0	0	2	2	1	13	Regular
Fiscal, R.R. (2017) (Fiscal 2017)	Ethnomedicinal plants used by traditional healers in Laguna, Philippines	Asia Pacific Journal of Multidisciplinary Research	2	2	2	1	2	2	0	1	1	2	14	Regular
Flores, R.L. (2016) (Flores et al. 2016)	Ethnomedicinal study of plants sold in Quiapo, Manila, Philippines	Scholars Academic Journal of Biosciences	2	2	1	1	2	2	0	2	2	2	16	Regular
Gruyal, G. (2014) (Gruyal 2014)	Ethnomedicinal plants used by residents in Northern Surigao del Sur, Philippines	Natural Products and Chemistry Research	2	2	2	2	2	2	0	2	2	2	18	High
Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Ethnomedicinal plants of the Aeta of Sitio Target, Barangay Sapang Bato, Angeles City, Pampanga, Philippines	An undergraduate thesis submitted to the Department of Biology College of Arts and Sciences University of the Philippines Manila Padre Faura, Manila	2	2	2	2	2	1	0	2	2	2	17	High
Montero, J.C. (2021) (Montero and Geducos 2021)	Ethnomedicinal plants used by the local folks in two selected villages of San Miguel, Surigao del Sur, Mindanao, Philippines	International Journal of Agricultural Technology	2	2	2	2	2	1	0	2	2	2	17	High
Morilla, L.J. (2014) (Morilla et al. 2014)	Medicinal plants of the Subanens in Dumingag, Zamboanga del Sur, Philippines	International Conference on Food, Biological and Medical Sciences	2	2	2	2	2	1	2	2	2	2	18	High
Morilla, L.J. (2019) (Morilla and Demayo 2019)	Medicinal plants used by traditional practitioners in two selected villages of Ramon Magsaysay, Zamboanga Del Sur	Pharmacophore	2	2	2	1	1	1	0	1	0	1	11	Regular
Naive, M.A.K. (2021) (Naive et al. 2021)	Plants with benefits: Ethnomedicinal plants used by the Talaandig Tribe in Portulin, Pangantucan, Bukidnon, Philippines	Indian Journal of Traditional Knowledge	2	2	2	2	2	2	2	2	2	2	20	High
Nuneza, O.M. (2021) (Nuneza et al. 2021)	Ethnobotanical survey of medicinal plants used by the Mamanwa tribe of Surigao del Norte and Agusan del Norte, Mindanao, Philippines	Biodiversitas	2	2	1	1	1	2	2	2	2	2	17	High
Olowa, L. (2015) (Olowa and Demayo 2015)	Ethnobotanical uses of medicinal plants among the Muslim Maranaos in Iligan City, Mindanao, Philippines	American-Eurasian Network for Scientific Information Journals	1	2	1	1	2	1	2	1	2	1	14	Regular
Olowa, L.F. (2012) (Olowa et al. 2012)	Medicinal plants used by the Higaonon tribe of Rogongon, Iligan City, Mindanao, Philippines	Advances in Environmental Biology	2	2	2	2	2	2	0	2	2	2	17	High
Ong, H.G. (2014) (Ong and Kim 2014)	Quantitative ethnobotanical study of the medicinal plants used by the Ati Negrito indigenous group in Guimaras island, Philippines	Journal of Ethnopharmacology	2	2	2	2	2	2	2	2	2	2	20	High
Ordas, J.A.D. (2020) (Ordas et al. 2020)	Ethnobotanical uses of Pandanaceae species in selected rural communities in the Philippines	Economic Botany	2	2	1	2	1	1	0	2	2	2	15	Regular
Pablo, C.G.C. (2019) (Pablo 2019)	Botika sa kalikasan: medicinal plants used by Aetas of Sitio Parapal Hermosa Bataan, Philippines	Journal of Social Health	2	2	1	1	1	2	0	2	2	2	15	Regular

Paraguison, L. (2020) (Paraguison et al. 2020)	Medicinal plants used by the Manobo Tribe of Prosperidad, Agusan Del Sur, Philippines -an Ethnobotanical Survey	Asian Journal of Biological and Life Sciences	2	2	2	2	2	2	2	2	2	2	20	High
Peneciba, E.P. (2020) (Peneciba 2020)	Ethnomedicinal plants used by traditional healers in Barobo, Surigao Del Sur, Philippines	Asian Journal of Basic and Applied Sciences	1	2	1	1	2	1	0	1	1	2	13	Regular
Susaya-Garcia, J. (2018) (Susaya-Garcia et al. 2018)	An ethnobotanical study of medicinal plants and perceptions on plant biodiversity conservation in Leyte, Philippines	Journal of Human Ecology	1	2	2	2	2	2	2	1	2	2	18	High
Tantengco, O.A.G. (2018) (Tantengco et al. 2018)	Ethnobotanical survey of medicinal plants used by Ayta communities in Dinalupihan, Bataan, Philippines	Pharmacognosy Journal	2	2	2	1	1	1	2	2	2	2	17	High
Villanueva, E.L.C. (2020) (Villanueva and Buot Jr. 2020)	Useful plants of the Alangan Mangyan of Halcon Range, Mindoro Island, Philippines	Journal of Marine and Island Cultures	2	2	2	2	2	2	0	2	2	2	18	High
Zabala Jr., B.A. (2018) (Zabala et al. 2018)	Traditional plants utilized by indigenous people "herbolarios"	International Journal of Social Science and Humanities Research	1	2	1	1	2	0	0	2	0	1	10	Low

Supplemental Table 3: Toxicologic and teratogenic data of plants used for treatment of urinary tract infections in the Philippines

Plant Species	Study Design	Type of Study	Treatment	Duration of Treatment	Toxicologic and Teratogenic Effects Data	Reference (First Author and Year)
Acorus gramineus Aiton	Preclinical study	*In vivo*: Fischer 344 mice	Subchronic toxicity: *A. gramineus* rhizome administered by oral gavage at doses of 0 (control), 25, 74, 222, 667, or 2,000 mg/kg/day, five times per week.	13 weeks	No toxic effects	Lee, Y. H. (2016) (Lee et al. 2016)
Albizia saman (Jacq.) Merr.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: *A. saman* pods were extracted at different extract concentrations of 10, 100, 1,000, and 10,000 ppm with a final volume of 5 mL were used.	24 hours	Cytotoxic	Jacob, J. K. S. (2021) (Jacob et al. 2021)
		In vivo: zebrafish embryo	*A. saman* pods ethanol extracts were diluted with embryo water at concentrations of 0.05 ppm and 0.5 ppm, and 4 mL of each treatment concentration was distributed into each well of a 12-well enzyme-linked immunosorbent assay (ELISA) plate.	48 hours	Embryotoxic	
Allophylus cobbe (L.) Forsyth fil.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality bioassay: *A. cobbe* crude extracts at varying concentrations, 10.5, 9.0, 7.5, 6.0, 4.4, 3.0, 1.5, 0.75, 0.375, and 0.1875 µg/ml.	-	Cytotoxic	Islam, M. (2012) (Islam et al. 2012)
Alpinia haenkei C.Presl	No toxicologic or teratogenic data					
Alstonia macrophylla Wall. ex G. Don	Preclinical study	*In vitro*: human lung cancer cell lines (COR-L23-large cell carcinoma and MOR-P-adenocarcinoma) were further tested on human normal cell lines (breast fibroblasts) and human cancer cell lines (StMl 1 1a-melanoma, Caki-2-renal cell carcinoma, MCF-7-breast adenocarcinoma, LS174T-colon adenocarcinoma).	Sulphorodamine B (SRB) assay: each plate containing the cells were treated with the alkaloids from root bark (0.05, 0.1, 0.5, 1, 5, 10, 50, and 100 µM) was incubated.	Cells are incubated for 1, 2, 4, 22, and 144 hours	The indole alkaloids are cytotoxic.	Keawpradub, N. (1999) (Keawpradub et al. 1999)
Alstonia scholaris (L.) R. Br.	Preclinical study	*In vivo*: Sprague-Dawley rats	Acute toxicity test: total indole alkaloids from dried *A. scholaris* leaf extract was administered orally to seven groups of rats with doses of 0, 2.2, 3.1, 4.4, 6.3, 9.0, and 12.8 g/kg body weight, respectively.	14 days	In a dose-response relationship, it induced significant toxic responses in rats, including prone position, tachypnea, whooping, and convulsions.	Zhao, Y. L. (2020) (Zhao et al. 2020)
			Chronic toxicity test: total indole alkaloids were administered orally to four groups of rats at doses of 0, 50, 100, or 300 mg/kg body weight at an amount of 10 mL/kg daily.	13 weeks	Food and water consumption did not change significantly.	
Amaranthus spinosus L.	Preclinical study	*In vivo*: male Wistar rats	Acute toxicity test: doses up to 2,000 mg/kg of *A. spinosus* methanol extract were administered to rats	14 days	No behavioral changes or mortality were observed.	Ashok Kumar, B. S. (2014) (Ashok

			orally.			Kumar et al. 2014)
Ananas comosus (L.) Merr.	Preclinical study	*In vivo*: Wistar rats	Acute toxicity test: up to a dose of 4,000 mg/kg body weight of hydroalcoholic extract from *A. comosus* were administered to the rats.	72 hours	No toxic effects	Saxena, P. (2014) (Saxena and Panjwani 2014)
Andrographis paniculata (Burm. fil.) Nees	Preclinical study	*In vitro*: human cell lines (liver-HepG2 and im HC, kidney-H2-K, intestine-Caco-2 lung- Calo-3 and brain-SH-SY5Y)	MTT assay: the crude extract of *A. paniculata* at varying doses of 0-100 µg/mL per plate was incubated with the cells.	4 hours	The extract *of A. paniculata* had no cytotoxic effects on the cell lines examined, with a CC_{50} of >100 µg/mL.	Sa-ngiamsuntorn, K. (2021) (Sa-ngiamsuntorn et al. 2021)
Annona muricata L.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: *A. muricata* leaf water extract was dissolved in water to obtain a concentration of 100 mg/mL.	24 hours	The LC_{50} values were not detected and the brine shrimp survival was above 50% .	Mohd Kamal, N. H. (2021) (Mohd Kamal et al. 2021)
		In vivo: mice (unspecified)	Acute toxicity test: initially, one rat is orally administered with *A. muricata* leaf water extract at a dose of 300 mg/kg. This is followed by treatment of another rat with a dose of 2,000 mg/kg. Furthermore, four mice were treated with 2000 mg/kg.	24 hours, 24 hours, and 14 days, respectively.	No mortality was observed even after 14 days.	
Annona squamosa L.	Preclinical study	*In vivo*: male albino Wistar rats	Acute toxicity study: the mice were given 10, 100, 1,000, 1,600, 2,900, and 5,000 mg/kg body weight of the methanolic leaf extract of *A. squamosa* bark administered orally.	30 days	Nontoxic and relatively safe when administered in low dosage	Saleh, J. (2021) (Saleh et al. 2021)
Antidesma bunius (L.) Spreng.	Preclinical study	*In vivo*: ICR (Institute of Cancer Research) mice	Acute toxicity test: ethanolic extract of *A. bunius* fruit up to a dose of 2,00 mg/kg body weight was administered orally.	14 days	No toxic effects	Muñoz, M. N. M. (2021) (Muñoz et al. 2021)
Bambusa vulgaris Schrad. ex J.C.Wendl., nom. cons. prop.	Preclinical study	*In vivo*: female Wistar rats	Acute toxicity test: groups 1 and 2 received 300 mg/kg and 2,000 mg/kg of *B. vulgaris* leaf aqueous extract respectively.	14 days	The aqueous extract is weakly toxic at a dose of 300 mg/kg and lethal at a dose of 2,000 mg/kg.	Abe, A. S. (2020) (A. S. Abe et al. 2020)
Bixa orellana L.	Preclinical study	*In vivo*: Sprague-Dawley rats	Subchronic oral toxicity test: annatto extract (norbixin) from seeds at doses of 0, 0.5, 1.5, and 5.0% were administered to the rats.	14 days	No toxic effects	Hagiwara, A. (2003) (Hagiwara et al. 2003)
Blumea balsamifera (L.) DC.	Preclinical study	*In vivo*: prawn larva	Prawn larva fatality biological determining method: varying concentrations (10, 50, 100, 500, and 1,000 µg/mL) of *B. balsamifera* volatile oils from leaf were exposed to prawn larva.	24 hours	The death rate is 28% at 10 g/mL, 64% at 100 g/mL, and 100% at 1000 g/mL, with an LC_{50} value of 65 g/mL indicating that its volatile oil has rather substantial cytotoxicity on prawn larva and has a certain antitumor activity.	Jiang, J. L. (2014) (Jiang et al., 2014)
Bougainvillea spectabilis Willd.	Preclinical study	*In vivo*: Swiss albino mice	Subacute toxicity test: the animals have received a dose of 100 mg/kg body weight (increasing every two days up to 1.5 g/kg) of methanol extract from leaves.	2 weeks	No toxic effects	Mandal, G. (2014) (Mandal et al. 2015)
Caesalpinia sappan L.	Preclinical study	*In vivo*: male Wistar rats	Acute toxicity test: groups 1, 2, and 3 were given 100, 1000, and 2000 mg/kg body weight of *C. sappan* aqueous extracts, respectively. Furthermore, 2500,	28 days	No mortality and significant changes in body weight and organ (kidney, liver, and abdomen) weights were observed.	Athinarayanana, G. (2017) (Athinarayanana et

			3500, and 5000 mg/kg body weight doses were administered orally during the second phase.			al. 2017)
Carica papaya L.	Preclinical study	*In vivo*: chick (unspecified sp.)	Acute toxicity test: varying concentrations (40, 80, 160, 320, 640, 1280, 2560, and 5120 mg/kg) of hydroalcoholic extracts were administered orally to different groups of chicks.	14 days	Neither lethality nor adverse changes in the general behavior were observed.	Nghonjuyi, N. W. (2016) (Nghonjuyi et al. 2016)
		In vivo: chick (unspecified sp.) and chorioallantoic membrane	Subchronic toxicity test: varying concentrations (40, 60, 160, 320, and 640 mg/kg) of hydroalcoholic extracts of the leaves or seeds of C. papaya were administered orally to chicks of either sex.	6 weeks	No significant changes in almost all biochemical and hematological parameters were recorded.	
Centella asiatica (L.) Urb.	Preclinical study	*In vivo*: male and female Swiss mice	Acute toxicity test: acetone extracts from leaves at 100, 500, 1,000, 2,000, and 4,000 mg/kg were administered to the mice.	24 hours	Water and food consumption were not reduced, and none of the groups died.	Chauhan, P. K. (2012) (Chauhan and Singh 2012)
			Subacute toxicity test: acetone extracts from leaves at 100, 500, 1,000, 2,000, and 4,000 mg/kg were administered to the mice daily.	15 days	There was also a slight change in liver weight, but it did not affect the hepatic enzymes, suggesting that liver function was not altered.	
Cinnamomum mercadoi Vidal	No toxicologic or teratogenic data					
Citrullus lanatus (Thunb.) Matsum. and Nakai	Preclinical study	*In vivo*: Wistar rats	Acute toxicity study of ethanolic extracts from the seeds of *C. lanatus* seed (EECLS) at a single dose of 2000 mg/kg BW administered via the oral route.	14 days	No toxic effects	Belemkar, S. (2021) (Belemkar and Shendge 2021)
			Subacute toxicity tests of EECLS wherein the treatment group received 250, 500, and 1000 mg/kg of seed extract administered orally.	28 days		
Clerodendrum intermedium Cham.	No toxicologic or teratogenic data					
Cocos nucifera L.	Preclinical study	*In vivo*: female Wistar rats	Acute toxicity test: a single dose of ethyl acetate soluble proanthocyanidins (EASPA) from immature inflorescence was dissolved in tap water and administered at 2000 mg/kg body weight.	14 days	No toxic effects	Ekanayake, C. P. (2019) (Ekanayake et al. 2019)
			Subacute toxicity test: the rats were orally administered with EASPA from immature inflorescence dissolved in tap water daily at doses of 1.75, 3.5, 7, and 14 mg/kg body weight.	28 days		
Cordyline fruticosa (L.) A. Chev.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: ethanolic extract from leaves at concentrations of 800, 400, 200, 100, 50, 25, 12.5, and 6.25 mg/ml were exposed to the brine shrimp larvae.	24 hours	Toxic	Naher, S. (2019) (Naher et al. 2019)
Corypha utan Lam.	No toxicologic or teratogenic data					
Cucumis sativus L.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: ethanolic extract from peels at concentrations of 1,000, 500, 250, 125, 50,	24 hours	Cytotoxic	Mallik, J. (2012) (Mallik and Akhter

			and 25 μg/mL were exposed to the brine shrimp larvae.			2012)
Curcuma longa L.	Preclinical study	*In vivo*: Wistar rats	Acute toxicity test: doses of 1.0, 2.5, and 5.0 g/kg body weight of essential oil from rhizomes dissolved in paraffin oil were administered to the rats.	14 days	No mortality was observed, and the body weight, clinical signs, and food and water consumption were insignificantly different from the control group.	Liju, V. B. (2013) (Liju et al. 2013)
			Subchronic toxicity test: doses of 0.1, 0.25, and 0.5 g/kg body weight of essential oil from rhizomes dissolved in paraffin oil were administered to the rats.	13 weeks	General conditions, including body weight, food and water consumption, and the behavior of rats, were not adversely affected. There were also no significant changes in serum enzymes or the internal organs of the rats.	
Curcuma rubescens Roxb.	No toxicologic or teratogenic data					
Cyanthillium cinereum (L.) H. Rob.	Preclinical study	*In vitro*: human breast carcinoma cell line (MDA-MB-435S)	XTT assay: different groups of cells were treated with 200 μL of crude extracts of *C. cinereum* hexane, chloroform, methanolic, and aqueous extracts, respectively.	24 hours	Cytotoxic	Guha, G. (2011) (Guha et al. 2011)
Cymbopogon citratus (DC.) Stapf	Preclinical study	*In vivo*: Swiss albino mice	Acute toxicity test: *C. citratus* leaf and stalk essential oil was administered orally at 2000 mg/kg body weight.	14 days	No mortality or sign of toxicity was observed in female mice treated with 2000 mg/kg of *C. citratus* essential oil. Hence, the lethal dose (LD_{50}) of *C. citratus* essential oil administered orally was found to be greater than 2000 mg/kg.	Lulekal, E. (2019) (Lulekal et al. 2019)
			Subacute toxicity test: *C. citratus* leaf and stalk essential oil was given once daily at 2000 mg/kg body weight.	21 days	In comparison to the control, there was no significant difference in body weights, gross organ abnormalities, or biochemical markers. In the organs examined, no histological alterations were seen.	
Dendrocnide meyeniana (Walp.) Chew	No toxicologic or teratogenic data					
Dendrocnide sp. (Aligatong var.)	No toxicologic or teratogenic data					
Dendrocnide sp. (Sagay var.)	No toxicologic or teratogenic data					
Dillenia philippinensis Rolfe	Preclinical study	*In vivo*: Sprague-Dawley rats	Acute toxicity test: ethanolic leaf extract at a dose of 2,000 mg/kg were administered to the rats.	14 days	No toxic effects	Ansari. S. S. (2021) (Ansari et al. 2021)
Ehretia monopyrena Gottschling and Hilger	No toxicologic or teratogenic data					
Elephantopus scaber L.	Preclinical study	*In vivo*: albino mice (unspecified sp.)	Acute toxicity test: doses of 5 up to 8,000 mg/kg of crude extract of the whole plant were administered to	96 hours	No toxic effects	Nguyen, T. H. P. (2020) (Nguyen

			the mice.			et al. 2020)
Elephantopus tomentosus L.	Preclinical study	*In vivo*: Sprague-Dawley rats	Acute toxicity test: doses of up to 5,000 mg/kg of ethanol extract of the whole plant were administered to the rats.	14 days	No toxic effects	Yam, M. F. (2009) (Yam et al. 2009)
Eleusine indica (L.) Gaertn.	Preclinical study	*In vivo*: Sprague-Dawley rats	Acute oral toxicity test: *E. indica* hexane extract at a dose of 300 and 2000 mg/kg was exposed to the rats.	14 days	Mortality, clinical toxicity symptoms, gross pathologic, or histopathologic damage was not observed.	Ong, S. L. (2017) (S. L. Ong et al. 2017)
Equisetum ramosissimum Desf.	Preclinical study	*In vitro*: human and rat melanoma cell lines (A375, A375.S2, A2058, and B16-F10)	MTT assay: varying concentrations (0-100 μg/mL) of crude extract from the whole plant were exposed to the cells.	2 hours	Mildly cytotoxic	Li, P. (2016) (Li et al. 2016)
Equisetum sp.	No toxicologic or teratogenic data					
Erythrina variegata L.	Preclinical study	*In vivo*: male Wistar rats	Acute toxicity test: ethanolic extract of seed at increasing doses (initially, 5 mg/kg body weight, then another 5 mg/kg body weight if only one mortality was recorded, then increasing doses of 50, 300, and 2,000 mg/kg body weight if no mortality was observed) were administered to rats.	96 hours	No toxic effects	Balamurugan, G. (2010) (Balamurugan and Shantha 2010)
Euphorbia hirta L.	Preclinical study	*In vivo*: Swiss albino mice	Acute toxicity test: the plant extract (aerial parts as well as the fresh juice of leaves) was administered to groups of mice at different concentrations (2, 4, 6, 8, and 10 g/kg body weight).	14 days	No significant changes in behavior, food, or water intake were observed.	Pingale, S. S. (2013) (Pingale 2013)
Ficus cassidyana Elmer	No toxicologic or teratogenic data					
Ficus elastica Roxb.	Preclinical study	*In vivo*: ICR (Imprinting Control Region) mice	Acute toxicity test: the aqueous crude extract of stem bark was administered orally to mice at doses of 100, 500, and 1,000 mg/kg.	14 days	No toxic effects	Ifijen, I. H. (2020) (Ifijen et al. 2020)
Ficus fistulosa Reinw. ex Blume	Preclinical study	*In vitro*: Huh7it cell line	MTT assay: leaf ethanol extract of *F. fistulosa* at > 200 μg/ml were exposed to the cells.	46 hours	No toxic effects	Hafid, A. F. (2016) (Hafid et al. 2016)
Ficus nota Merr.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: *F. nota* extract were exposed at 1000, 500, and 100 g/mL to the brine shrimp larvae.	24 hours	Crude ethanol extract and the chloroform extract were both toxic to *A. salina*, with LC values of 79.43 g/ml and 206.5 g/m. respectively.	Latayada, F. S. (2016) (Latayada and Uy 2016)
Gynura procumbens (Lour.) Merr.	Preclinical study	*In vivo*: adult male Sprague-Dawley rats	Acute toxicity test: 2 and 5 g/kg of ethanolic extract of the leaves were administered to the rats.	14 days	No toxic effects	Amin, Z. A. (2011) (Amin et al. 2011)
Heliotropium indicum L.	Preclinical study	*In vivo*: Swiss mice	Ethanol extract of the leaves at doses of 0.5 to 12.0 g/kg body weight was administered to mice daily.	14 days	No toxic effects	Owolabi, M. A. (2015) (Owolabi et al. 2015)
			Ethanol extract of the leaves at doses of 0.5 to 2.0 g/kg body weight was administered to mice daily.	5 months		
Hellenia speciosa (J. Koenig) S. R.	No toxicologic or teratogenic data					

Dutta						
Homalomena philippinensis Engl.	No toxicologic or teratogenic data					
Homonoia riparia Lour.	No toxicologic or teratogenic data					
Hydrocotyle vulgaris L.	No toxicologic or teratogenic data					
Hyptis capitata Jacq.	Preclinical study	*In vitro*: T47D, WidR, and Vero cell line	MTT assay: methanol and chloroform extracts of the whole plant at doses of 200, 100, 50, 25, and 12.5 µg/mL were exposed to the cells.	24 hours	High cytotoxicity	To'Bungan, N. (2022) (To'bungan et al. 2022)
Imperata cylindrica (L.) P.Beauv.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: 70% ethanol and 30% acetone extracts of the leaves and roots, obtained by maceration and reflux methods, were introduced to 10 artemia larvae.	24 hours	According to Clarkson classification the root extracts are moderately toxic (LC_{50}: 168.47 µg/mL), and leaf extracts are weakly toxic (LC_{50}: 527.25 µg/mL). Nonetheless, the extrapolation made in relation to the Gosselin, Smith, and Hodge scale, made them conclude that the *I. cylindrica* root and leaf extracts as non-toxic to humans by oral route.	Konan A. (2023) (Konan et al. 2023)
Imperata cylindrica (L.) P.Beauv.	No toxicologic or teratogenic data	*In vivo:* albino Wistar rats	Acute toxicity test: the methanol root extract of the plant was administered orally to female rats at a single dose of 5000 mg/kg.	14 days	Immediately after the extract administration, some animals experienced agitation and drowsiness; however, these signs disappeared within a few minutes. Thus, the LD_{50} of the plant extract was estimated to be greater than 5000 mg/kg b.w.	Nayim P. (2020) (Nayim et al. 2020)
			Subchronic toxicity test: the methanol root extract of the plant was orally administered daily to male and female rats at different doses (250, 500 and 1000 mg/kg per b.w.).	30 days	Observation of signs, behavior and health status of the animals showed no abnormality in the groups of animals treated with the extract. Significant variation of the relative body weights of heart and kidney were observed at dose a 1000 mg/kg b.w.	
Ipomoea batatas (L.) Lam.	Preclinical study	*In vitro*: L929 fibroblasts	MTT assay: aqueous extracts from the leaves of the purple and white variety of *I. batatas* at concentrations of 50, 100, and 1000 g/mL were exposed to the cells.	27 hours	At a concentration of 1000 µg/mL, the extract from the purple variety had no cytotoxic potential, but the extract from the white variety did. The viability of the white variety was 86.37% at 50 µg/mL, 89.58% at 100 µg/mL, and 56.66% at 1000 µg/mL. As a result, the highest concentration was potentially cytotoxic, as it was less than 70%.	Moura, I. O. (2020) (Moura et al. 2020)
Lagenaria siceraria (Molina) Standl.	Preclinical study	*In vivo*: Swiss albino mice	Acute toxicity test: four groups of mice were administered with an increasing dose of 0.5, 1.0, 1.5, and 2 g/kg of methanol extract of the aerial parts.	72 hours	No toxic effects	Saha, P. (2011) (Saha et al. 2011)

			Subchronic toxicity test: the mice received a dose of 400 mg/kg of methanolic extract of the aerial parts every 72 hours.	6 weeks		
Lagerstroemia speciosa (L.) Pers.	Preclinical study	*In vivo*: Sprague-Dawley rats	Acute oral toxicity test: the rats were administered with 2,000 mg/kg of unspecified part extract of *L. speciosa.*	14 days	No toxic effects	Alkahtani, S. (2021) (Alkahtani et al. 2022)
			Subacute oral toxicity test: a dose of 200 mg/kg of extract (unspecified) was administered to the rats daily.	28 days		
Mimosa pudica L.	Preclinical study	*In vivo*: BALB/c mice	Acute toxicity test: methanol, ethanol, and chloroform extracts (2000, 1000, and 500 mg/kg body weight) of *M. pudica* leaf were administered to the mice.	14 days	No reaction or death occurred. All extracts were safe up to 2000 mg/kg b.w.	Aziz, U. (2014) (Aziz et al. 2014)
Morinda citrifolia L., nom. cons.	Preclinical study	*In vivo*: Wistar rats	Hepatotoxicity study: fruit and leaf extract of *M. citrifolia* were orally administered with a high dose of 2 mg/ml drinking water and leaf extract with a dose of 1 and 2 mg/ml.	20 days	Did not cause maternal toxicity but delayed ossification in fetuses.	Marques, N. F. Q. (2010) (Marques et al. 2010)
		In vivo: ICR (Imprinting Control Region) mice		6 months	Fruit aqueous extract may induce hepatotoxicity, weight loss, and ultimate mortality, but chronic consumption of aqueous leaf extract generated no obvious toxic effects, including fetal ossification.	Shalan, N. A. A. M. (2017) (Shalan et al. 2017)
Moringa oleifera Lam.	Preclinical study	*In vivo*: Sprague-Dawley rats	Two groups of rats were orally given doses of 1000 mg/kg body weight and 3000 mg/kg body weight of aqueous leaf extract. After 48 hours, the mice were euthanized, and the femur bone marrow aspirate was studied.	14 days	No mortality, behavioral changes, or adverse hematological effects were recorded. It was cytotoxic at 20 mg/mL and genotoxic at supra-supplementation levels of 3000 mg/kg b.wt.	Asare, G. A. (2012) (Asare et al. 2012)
		In vivo: Wistar albino rats	Acute oral toxicity test: aqueous-methanolic leaf extract was given at a 2000 mg/kg dose orally for 48 hours to establish the median fatal dose.	-	No toxic manifestations or mortality at 2000 mg/kg. However, it had potential toxic effects at higher doses.	Okumu, M. (2016) (Okumu et al. 2016)
		In vivo: zebrafish embryo	Zebrafish embryo-toxicity and teratogenicity assay: 10 mL of the different concentrations of leaf and bark extracts (300 ppm, 1500 ppm, 3000 ppm, and 6000 ppm) were prepared by dilution in embryo water.	12, 24, and 48 hours	Teratogenicity was evident due to the embryos' low hatchability percentage, lack of or low heartbeat rate, growth retardation, and morphological abnormalities, including yolk deformity and a stunted tail. After 12 and 24 hours, it was highly toxic to embryos.	David, C. R. S. (2016) (David et al. 2016)
Musa paradisiaca L.	Preclinical study	*In vivo*: Swiss Albino mice	Acute toxicity test: during the first phase, each animal group received a different dose of ethanol extract of the leaf of *M. paradisiaca* (10, 100, and 1,000 mg/kg body weight). Animals were given varied doses (200, 400, 600, and 800 mg/kg body weight) in the second phase, after which they were watched for 24 hours, and mortality was recorded.	24 hours	Toxic	Asuquo, E. G. (2016) (Asuquo et al. 2016)
		In vivo: mice (unspecified)	Acute toxicity test: a single dose of 500, 1000, 2000, and 5000 mg/kg of fermented extract of *M.*	14 days	No toxic effects	Ugbogu, E. A. (2018) (Ugbogu et

			paradisiaca fruit were orally administered to the mice.			al. 2018)
			Subacute toxicity test: 200, 400 and 800 mg/kg/day doses of fermented extract of *M. paradisiaca* fruit were administered to the mice.			
Musa sp.	No toxicologic or teratogenic data					
Nauclea orientalis (L.) L.	Preclinical study	*In vivo*: Wistar rats	Acute toxicity test: Control group was administered with a single dose of water (10 mL/kg) orally. The second group was treated with a single dose (2.0 g/kg) of aqueous extract of *Nauclea orientalis* bark. Individual animals were inspected during the initial half an hour, then from time to time within the first 24 h, giving special attention during the initial 4 h. Then they were observed daily for 2 weeks by giving attention to changes in the mucous membranes, eyes, skin, fur, and general behaviors. Further, the signs of toxicity such as lethargy, salivation, diarrhea, tremors, sleep, convulsions, and coma were also observed.	2 weeks		Sandamali, J. A. N. (2022) (Sandamali et al. 2022)
			Subchronic toxicity test: The control group of rats was given an oral dose of H_2O daily throughout one month, and the second group of rats received freeze-dried aqueous bark extract of *Nauclea orientalis* (2.0 g/kg) daily throughout one month via oral route. The experimental rats were inspected during the one-month period for the signs of toxicity and mortality. After 24 h of the last dose, the animals were sacrificed after 16 h fasting, and blood samples were collected into two tubes: one with EDTA for the assessment of haematological parameters including red blood cell (RBC) count, white blood cell (WBC) count, platelet count, haematocrit, haemoglobin concentration, mean corpuscular haemoglobin (MCH), mean corpuscular volume (MCV), and mean corpuscular haemoglobin concentration (MCHC) and the other without additives for the assessment of biochemical parameters including AST, alanine aminotransferase (ALT), alkaline phosphatase (ALP), creatinine, and blood urea. The weighed organs (heart, lungs, kidney, liver, small intestine, and spleen) were fixed in 10% buffered formalin for the detection of histologic evidences of toxicity	One month	No toxic effects	
Origanum vulgare L.	Preclinical study	*In vivo*: Wistar rats	Subchronic toxicity test: doses of 50, 100, and 200 mg/kg body weight of essential oil (unspecified) were administered to the rats.	90 days	No toxic effects	Llana-Ruiz-Cabello, M. (2017) (Llana-Ruiz-

						Cabello et al. 2017)
Orthosiphon aristatus (Blume) Miq.	No toxicologic or teratogenic data					
Oryza sativa L. (PhilRice Genebank GRD Coll. No.: 14235)	No toxicologic or teratogenic data					
Pandanus amaryllifolius Roxb. ex Lindl.	No toxicologic or teratogenic data					
Pandanus dubius Spreng.	No toxicologic or teratogenic data					
Pandanus luzonensis Merr.	No toxicologic or teratogenic data					
Pandanus sp.	No toxicologic or teratogenic data					
Pandanus tectorius Parkinson ex Du Roi	No toxicologic or teratogenic data					
Paspalum conjugatum P.J.Bergius	No toxicologic or teratogenic data					
Peperomia pellucida (L.) Kunth	Preclinical study	*In vivo*: zebrafish embryo	Acute toxicity test: methanolic extract at concentration of 60.61 mg/L for embryotoxicity and 30 mg/L for teratogenicity test.	4 days	Embryotoxic and teratogenic	Dy, A. E. S. (2017) (Dy and Olotu 2017)
		In vivo: DDY mice	Acute toxicity test: methanolic extract with a dose of 4,000 mg/kg body weight was administered to the mice.	14 days	No toxic effects	Waty, D. R. (2017) (Waty et al. 2017)
Persea americana Mill.	Preclinical study	*In vivo*: male BALB/c mice	Acute toxicity test: ethanol extracts of the seed at doses of 125, 250, 500, 1,000, and 2,000 mg/kg were administered to five groups of mice.	7 days	At a concentration of 500 mg/kg, the extract caused death, indicating an acute toxic effect. However, there was no evidence of the in vivo mutagenicity of the seed extract on peripheral blood cells.	Padilla- Camberos, E. (2013) (Padilla-Camberos et al. 2013)
Phyllanthus amarus Schumach. and Thonn.	Preclinical study	*In vivo*: Wistar albino rats	Acute toxicity test: *P. amarus* leaf extract was administered to kidney tissue up to a dose of 8,000 mg/kg.	28 days	No toxic effects	Adomi, P. (2017) (Adomi et al. 2017)
Pityrogramma calomelanos (L.) Link	Preclinical study	*In vitro*: mammalian murine J774 macrophages	Cytotoxicity assay: hexane fractions of the leaves at doses of 5, 12, 25, and 50 mg/mL were exposed to the cells.	24 hours	No toxic effects	De Souza, T. M. (2012) (de Souza et al. 2012)
Pogostemon	No toxicologic or teratogenic data					

heyneanus Benth						
Polyscias scutellaria (Burm.f) Fosberg	Preclinical study	*In vivo*: Wistar rats	Subchronic toxicity test: three groups of mice received doses of 500, 1,000, and 1,500 mg/kg of ethanol extract of the leaves.	28 days	No toxic effects	Andriani, Y. (2018) (Andriani et al. 2018)
Portulaca oleracea L.	Preclinical study	*In vivo*: Swiss albino mice	Acute toxicity test: methanolic extract at doses of 2,250, 2,000, 1,750, 1,500, 1,250, and 1,000 mg/kg-1 were administered to different groups of mice.	24 hours	Moderately toxic	Musa, K. Y. (2007) (Musa et al. 2007)
Proiphys amboinensis (L.) Herb.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: concentrations up to 9,978 ppm (fresh stem) and 3,980 ppm (dried stem) of stem extract were exposed to the brine shrimp larvae.	-	Highly toxic	Dapas, C. C. (2014) (Dapas et al. 2014)
Pseudelephantopus spicatus (Juss. ex Aubl.) Rohr	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: three kinds of extracts, ethanol, ethanol-water, and decoction of the mature leaves, at doses of 10, 100, 500, and 1,000 ppm, were exposed to the brine shrimp larvae.	6 and 24 hours	Mildly toxic (ethanol extract only)	Lalisan, J. A. (2014) (Lalisan et al. 2014)
Psidium guajava L.	Preclinical study	*In vivo*: brine shrimp larvae	Brine shrimp lethality assay: concentrations of 1000, 500, and 100 µg/mL of *P. guajava* leaf and bark extracts were used.	12 hours	Bark extract was more toxic and had a higher mortality rate than leaf extract, with an LC_{50} value of 480.14 µg/mL and 949.13 µg/mL, respectively.	Bautista, M. L. (2018) (Bautista et al. 2018)
Pterocaulon redolens (Willd.) Fern.-Vill.	Preclinical study	*In vitro*: human tumor cell lines (BC and NCI-H187)	Sulforhodamine B (SRB) assay: coumarins 1-7 and flavonoids 8-10 were extracted from the aerial parts of the plant and exposed to the cells.	72 hours	Cytotoxic	Kanlayavattanakul, M. (2003) (Kanlayavattanakul et al. 2003)
Rauvolfia amsoniifolia A.DC.	No toxicologic or teratogenic data					
Rubus fraxinifolius Poir.	No toxicologic or teratogenic data					
Saccharum officinarum L.	Preclinical study	*In vivo*: adult Wistar and Sprague-Dawley rats	Acute toxicity test: D-003 (a mixture of higher aliphatic primary acids sourced from *S. officinarum*) at doses of 50, 200, and 2,000 mg/kg were administered to the rats.	14 days	No toxic effects	Gámez, R. (2000) (Gámez et al. 2000)
			Subchronic toxicity test: D-003 (a mixture of higher aliphatic primary acids sourced from *S. officinarum*) at doses of 50, 500, and 1,250 mg/kg were administered to the rats.	90 days		
Saccharum spontaneum L.	No toxicologic or teratogenic data					
Smilax bracteata C.Presl	No toxicologic or teratogenic data					
Stenomeris borneensis Oliv.	No toxicologic or teratogenic data					

Synsepalum dulcificum (Schumach. and Thonn.) Daniell	Preclinical study	*In vivo*: albino mice	Acute toxicity test: at phase 1, methanolic extract of *S. dulcificum* pulp at doses of 10, 100 and 1,000 mg/kg were administered to three groups of mice; at phase 2, doses of 1,600 and 2,900 mg/kg were administered to three mice.	24 hours (phase 1) and 24 hours (phase 2)	No toxic effects	Nkwocha, C. C. (2015) (Nkwocha and Njoku 2015)
Syzygium cumini (L.) Skeels	Preclinical study	*In vivo*: adult nulliparous non-pregnant female Wistar rats	Acute toxicity test: stem bark ethanol extract at doses of 2,000 and 5,000 mg/kg body weight were administered to groups of rats.	14 days	No toxic effects	Prasad, M. (2016) (Prasad et al. 2016)
Tabernaemontana pandacaqui Lam.	No toxicologic or teratogenic data					
Triumfetta rhomboidea Jacq.	Preclinical study	*In vitro*: HepG2 cell line	MTT assay: 10µL of methanol crude extract from *T. rhomboidea* leaf concentrations of 0.1, 1, 10, and 100 µg/ml were exposed to the cells	24 hours	Cytotoxic	Tembe-Fokunang, E. (2017) (Tembe-Fokunang et al. 2017)
			Neutral red assay: 10µL methanol crude extract of *T. rhomboidea* isolated from the leaf at concentrations of 0.1, 1, 10, and 100µg/mL were exposed to the cells.			
Vigna unguiculata subsp. *sesquipedalis* (L.) Verdc.	No toxicologic or teratogenic data					
Vitex negundo L.	Preclinical study	*In vivo*: non-pregnant nulliparous mice	Acute toxicity test: non-pregnant female mice weighing 20–30 g received a single dose (1 mL) using an oral feeding needle with 5, 50, 300, and 2000 mg/kg of methanol leaf extract of *V. negundo.*	14 days	No toxic effects	Rajasekaran, A. (2014) (Rajasekaran et al. 2014)
		In vivo: female Wistar albino rats (7-8 weeks old, 20-30 g) and female Wistar rats (10-12 weeks old, 150-200 g)	Subchronic toxicity test: methanol leaf extract of *V. negundo* at a dose of 400 mg/kg was administered.	45 days		
Zea mays L.	No toxicologic or teratogenic data					
Zingiber officinale Roscoe	Preclinical study	*In vivo*: Sprague-Dawley rats in the gestation period	Rhizomes of *Z. officinale* were grated and infused into the drinking water of rats at 20 g/liter or 50 g/liter to test their cytotoxicity.	Day 6 to 15 of gestation	No cytotoxic effects	Wilkinson, J. M. (2000) (Wilkinson 2000)
		In vivo: Wistar rats in the organogenesis period	A patented *Z. officinale* extract from rhizomes called EV.EXT 33 was administered by oral gavage in concentrations of 100, 333, and 1000 mg/kg to test its teratogenicity.		No toxic effects	Weidner, M. S. (2001) (Weidner and Sigwart 2000)

Supplemental Table 4: Qualitative synthesis of the studies with data on plants used for urinary tract infections in the Philippines.

First Author and Year	Study Design	Province	Informants	Sample Size	Number of Plant Species Used in Urinary Tract Infections
Abe, R. (2013) (Abe and Ohtani 2013)	Observational Study	Batanes	Ivatan	116	7
Alduhisa, G.U. (2019) (Alduhisa and Demayo 2019)	Observational Study	Misamis Occidental	Subanen	83	1
Aya-Ay, A.M. (2016) (Aya-Ay 2016)	Observational Study	Davao City	Indigenous people	138	1
Baddu, V.D. (2018) (Baddu and Ouano 2018)	Observational Study	Cagayan	Y'Apayaos	39	1
Balangcod, T.D. (2015) (Balangcod and Balangcod 2015)	Observational Study	Benguet	Ibalois	80	4
Balberona, A.N. (2018) (Balberona et al. 2018)	Observational Study	Aurora	Ilongot-Eǵongot community	22	5
Balinado, L.O. (2017) (Balinado and Chan 2017)	Observational Study	Cavite	Traditional practitioners	18	8
Belgica, T.H.R. (2021) (Belgica et al. 2021)	Observational Study	Albay	Traditional practitioners	350	2
Cabanting, R.M.F. (2016) (Cabanting and Perez 2016)	Observational Study	Palawan, Zamboanga del Norte, Zamboanga del Sur, North Cotabato	Locals	39	2
Cajuday, L.A. (2019) (Cajuday and Banares 2019)	Observational Study	Albay	Locals	24	1
Canceran, M.L. (2021) (Canceran et al. 2021)	Observational Study	Aurora	Dumagat	9 families	2
Caunca, E.S. (2021) (Caunca and Balinado 2021)	Observational Study	Cavite	Local herbalists	94	7
Cordero, C.S. (2020) (Cordero et al. 2020)	Observational Study	Aklan	Malaynon Ati tribe	31	6
Cordero, C.S. (2021) (Cordero and Alejandro 2021)	Observational Study	Antique	Ati tribe	22	5
Dalisay, J.A.G.P. (2018) (Dalisay et al. 2018)	Observational Study	Antique	Barangay officials, local folks, and herbal healers	Not stated	2
Dapar, M.L.G. (2020) (Dapar et al. 2020)	Observational Study	Agusan del Sur	Manobos	335	24
de Guzman, A.A. (2020) (de Guzman et al. 2020)	Observational Study	Zamboanga Sibugay	Local herbalists	30	5
De La Torre, F.E.L. (2016) (De La Torre et al. 2016)	Observational Study	Cebu	Locals (living at the peak of Mount Manunggal)	Not stated	1
Doctor, T.R. (2014) (Doctor and	Observational Study	Benguet	Indigenous people	Not stated	1

Manuel 2014)					
Ducusin, M.B. (2017) (Ducusin 2017)	Observational Study	La Union	Indigenous people	40	18
Estrella, M.C.P. (2020) (Estrella et al. 2020)	Observational Study	National Capital Region and Region IV-A	Locals	16	2
Fajardo, W.T. (2017) (Fajardo et al. 2017)	Observational Study	Pangasinan	Sambal-bolinaos	17	1
Fiscal, R.R. (2017) (Fiscal 2017)	Observational Study	Laguna	Traditional practitioners	32	1
Flores, R.L. (2016) (Flores et al. 2016)	Observational Study	Quiapo	Buyers and sellers	17	5
Gruyal, G. (2014) (Gruyal 2014)	Observational Study	Surigao del Sur	Locals	50	2
Lopez, Z.F.A. (2019) (Lopez and Solis 2019)	Observational Study	Pampanga	Aeta people	72	13
Montero, J.C. (2021) (Montero and Geducos 2021)	Observational Study	Locals	Surigao del Sur	30	5
Morilla, L.J. (2014) (Morilla et al. 2014)	Observational Study	Zamboanga del Sur	Subanens	9	1
Morilla, L.J. (2019) (Morilla and Demayo 2019)	Observational Study	Zamboanga del Sur	Traditional practitioners	6	3
Naive, M.A.K. (2021) (Naive et al. 2021)	Observational Study	Bukidnon	Talaandig tribe	19	10
Nuneza, O.M. (2021) (Nuneza et al. 2021)	Observational Study	Surigao del Norte and Agusan del Norte	Mamanwa tribe	143	4
Olowa, L.F. (2012) (Olowa et al. 2012)	Observational Study	Lanao del Norte	Higaonons	65	1
Olowa, L. (2015) (Olowa and Demayo 2015)	Observational Study	Lanao del Norte	Maranaos	228	13
Ong, H.G. (2014) (Ong and Kim 2014)	Observational Study	Guimaras	Ati Negritos	65	17
Ordas, J.A.D. (2020) (Ordas et al. 2020)	Observational Study	Davao Oriental, Bataan, Eastern Samar, Palaui Island, and Laguna	Community members	202	3
Pablo, C.G.C. (2019) (Pablo 2019)	Observational Study	Bataan	Aeta people	21	3
Paraguison, L. (2021) (Paraguison et al., 2020)	Observational Study	Agusan del Sur	Manobos	144	6
Peneciba, E.P. (2020) (Peneciba 2020)	Observational Study	Surigao del Sur	Traditional practitioners	15	2
Susaya-Garcia, J. (2018) (Susaya-Garcia et al. 2018)	Observational Study	Leyte	Locals	20	3

Tantengco, O.A.G. (2018) (Tantengco et al. 2018)	Observational Study	Bataan	Aytas	26	3
Villanueva, E.L.C. (2020) (Villanueva and Buot Jr. 2020)	Observational Study	Occidental Mindoro	Alangan Mangyan	60	1
Zabala, Jr. B.A. (2018) (Zabala et al. 2018)	Observational Study	Nueva Ecija	Indigenous herbolarios	Not stated	1

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