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RESEARCH ARTICLE

Exploring the medicinal plants and traditional knowledge for common respiratory ailments among farmers in Ilocos Sur, Philippines

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Abstract

Globally, medicinal plants have long been used in ethnomedicine across various cultures and traditions. However, there is still limited information on their specific use by farmers. This descriptive study explored the taxonomy and use of medicinal plants and the traditional knowledge for treating common respiratory ailments among farmers in Ilocos Sur, Philippines. It utilized a descriptive research design, a survey questionnaire, an interview and observation, with frequencies, percentages and mean for data analysis. The study identified 22 species of medicinal plants from 17 families used by Ilocano farmers as traditional treatments for respiratory ailments such as coughs and colds. Various plant parts were utilized, including the whole *Vitex negundo* L. plant, the leaves of *Origanum vulgare* L. and *Psidium guajava* L., the leaves and roots of *Zingiber officinale* Roscoe and the fruit of *Citrofortunella microcarpa*. These were prepared as decoctions or juices, consumed orally, or used in aromatic herbal baths to relieve asthma, cough and colds. Traditional healing practices also included drinking warm decoctions of *Citrofortunella microcarpa* fruit, taking hot baths with a combination of boiled medicinal leaves and performing steam bath rituals. The use of medicinal plants for locally common respiratory ailments among farmers reflected traditional knowledge as these plants are available at no cost. This is a first-time study in this area to bridge the gap between traditional knowledge and synthetic medicine for screening of phytochemical and pharmacological properties of plants, as only a few of these plants are commercially available in the market.

Keywords: good health; plant-based medicines; respiratory infections; sustainability; traditional practices

Introduction

Farmers face health challenges due to prolonged exposure to organic dust, pesticides and airborne pollutants from agricultural activities (1-3). This poses health concerns to improve the well-being of farmers and their productivity (4). Herbal remedies are significant in providing alternative therapies for various health conditions (5). This is due to cultural practices and beliefs, the availability of resources in the environment and the complexity of geographical factors (6, 7). Moreover, many plant species are historically utilized to combat respiratory infections (8) and there is increasing interest in plant-derived medicinal products in different nations (9). Members of the community usually access cost-effective healthcare options for respiratory problems are standard (10-13). Respiratory ailments have affected humanity for centuries, prompting diverse cultures to develop many remedies and practices to improve these conditions (14-17). Traditional medicinal plant practices are vital in managing respiratory ailments, especially in rural communities with rich ethnobotanical traditions and facing barriers to accessing formal health services (18).

The ethnobotanical importance of medicinal plants has predominantly served to maintain public health from an era of time in many cultures and traditions worldwide. In contrast, the importance of medical plants has predominantly served (19). The World Health Organization (WHO) officially promoted traditional medicine in developing countries in 1978 and the amalgamation of traditional medicine into the modern healthcare system is manifested in the 2030 Sustainable Development Agenda 3 (SDG) and the WHO Global Traditional Medicine Centre (20, 21). Exploring the use of medicinal plants and traditional remedies may not only preserve cultural heritage but also serve as an eye-opener to enhance modern medical treatments.

"Traditional Medicine is the total of the knowledge, skills and practices based on the theories, beliefs and experiences of Indigenous to different cultures, whether explicable or not used in the maintenance of health as well as in the prevention, diagnosis, improvement, or treatment of physical and mental illness" (22). Traditional medicine is still recognized as the preferred primary healthcare system in many communities, with over 60 % of the worlds'

population and about 80 % in developing countries depend directly on medicinal plants for their medical purposes due to affordability, accessibility and low cost (23).

Further, a variety of Indigenous medical systems and practices and about 80 % of the worlds' population depend on traditional medicine for their primary healthcare needs (24). It relies on natural products to diagnose, prevent illness, treat disease, or maintain health, irrespective of their explicability (25) and has been utilized in traditional medicine and worldwide ethnomedicine (26). Their ancient parents influenced and developed beliefs and practices on the use of TM. Patients with respiratory diseases drink lukewarm water and milk and bathe in warm water (27).

The prevalence of traditional medicine use in low-income countries is estimated to be between 40 % and 71 % (28). In sub-Saharan Africa, it is estimated at 58.2 % on average in the general population, but prevalence rates vary widely among studies (29). In many regions of the world, 'traditional medicine' is an essential element of healthcare (30). Humans have accumulated considerable survival experience through the implemented prevention and epidemiological protection measures (31).

Three hundred eighty-four species belonging to 85 families were used to treat cough, asthma, colds and bronchitis. Moreover, the traditional healers prepare decoction from the leaves and roots of these plant species (32). Various parts of plants, such as leaves, stems, bark, roots, etc., are used to prevent, alleviate symptoms or restore abnormal conditions to normal levels and almost 50 % of the medicines developed were derived from plants (33, 34). There is a wide variety of medicinal plants for respiratory disorders. The high availability of medicinal plants providing low-cost health care has been widely used for respiratory disorders in local communities (35). Locals used traditional healing practices to treat common colds and coughs (36, 25, 37), flu, COVID-19 (33) and respiratory infections (29).

Countries such as Pakistan, China and Nigeria depend on their local flora to treat various respiratory disorders (38). Medicinal plants are widely used in traditional cultures worldwide and they are becoming increasingly popular in modern society as natural Alternatives (38, 39). Many populations relied on traditional healers and herbal medication since it was part of their tradition and culture (40, 41). It was also often attributed to limited access to healthcare facilities and low-cost treatment for the local community (42).

In the Philippines, health care services are delivered through the Department of Health and private sectors. Considering the limited health funding and insurance and the importance of alternative health care in the Philippines, the Department of Health circulated a list of "Ten scientifically validated" Philippine medicinal plants in 1992 (RA. No. 8423 - Philippine. Traditional healers used the Institute of Traditional Alternative Health Care. Likewise, the local community has indigenous knowledge of using medicinal plants. Hence, they conserved and preserved these plants (43-45).

Many individuals still rely on plants due to the belief that plants possess medical potency. The Talaandig tribe in Bukidnon, Philippines, uses 97 medicinal plants, with *Vitex negundo* and *Psidium guajava* being the most important in treating respiratory and circulatory system diseases (46). The indigenous communities of the province of Ilocos Sur have vast information and knowledge on using 66 ethnomedicinal plants. Medicinal plants bridge the gap between ancient healing methods and modern medicine, making them an essential resource for health and wellness (47). To realize their full potential and guarantee their availability for future generations, ongoing research and sustainable practices are crucial. The study is aligned with SDG 3- good health and well-being of the United Nations (43).

There has not yet been a study on how farmers use medicinal plants and their traditional practices for common respiratory ailments. This study would help document the local practices of using plants as medicine for respiratory illnesses. This study will also reveal and generate a database of valuable plant species for managing common respiratory ailments in the Province of Ilocos Sur. Moreover, it could provide effective preventive practices and efficient programs that lessen the incidence of respiratory ailments.

This study investigated the medicinal plants and traditional knowledge used by selected farmers in Ilocos Sur, Philippines, to treat common respiratory ailments. Specifically, it identified the taxonomy of these medicinal plants, examined their applications for respiratory conditions and documented traditional healing practices.

Material and Methods

Study site

Ilocos Sur is one of the provinces of the Philippines, located on the northwestern coast of Luzon Island, with coordinates of 17° 11' 54.672'' N and 120° 32' 31.164 E. The study was conducted in five selected municipalities and one city of Ilocos Sur, namely: Sta. Catalina, Bantay, Vigan City, Santa, Narvacan and Sta. Maria with identified farmers who were using medicinal plants as treatment for their respiratory ailments (Fig. 1).

Demographic characteristics of participants

A total of 60 farmer participants were involved in the study. It is composed of male (63.33 %) and female (36.67 %), aged 40 to 85 years, mostly married (93.33 %), obtained an elementary education (48.33 %), earned an average annual family income of below 10000 pesos (93.33 %) and used medicinal plants to cure their common respiratory ailments.

Data collection and analysis

The data were collected through a survey- questionnaire developed by the researchers and validated by three experts who rated it as "Very High" (4.21). It consisted of two parts: Part 1 gathered information on the medicinal plants participants used for respiratory ailments, including the plant parts utilized and their preparation methods. Part 2 consisted of an 11-item rating scale used to determine the participants' level of traditional knowledge on the treatment of common respiratory ailments. Below are the norms for interpretation:

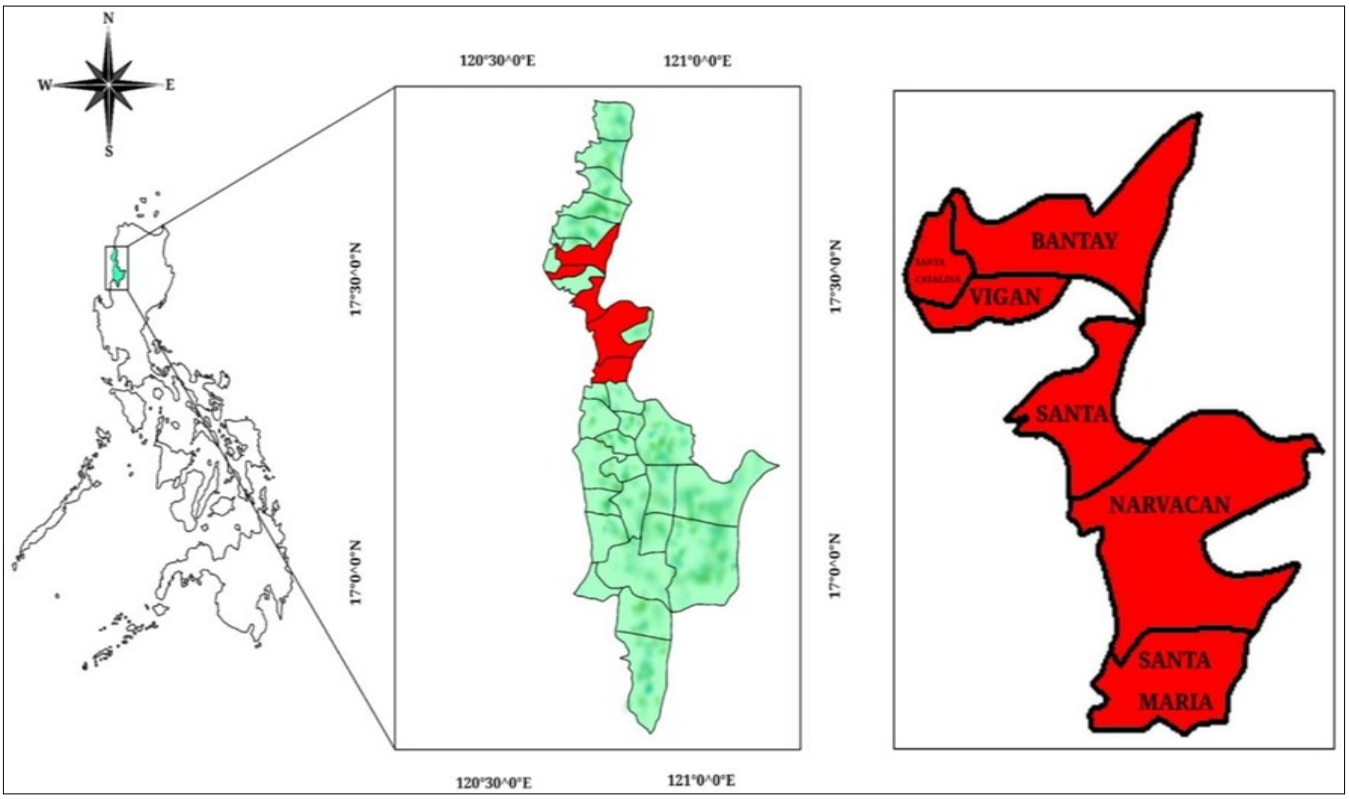

Fig. 1. Study area Map-Ilocos Sur, Philippines.

Statistical range	Descriptive rating	Overall Mean descriptive rating
4.21 - 5.00	Always (A)	Very High (VH)
3.41 - 4.20	Often (O)	High (H)
2.61 - 3.40	Sometimes (S)	Moderately (M)
1.81 - 2.60	Seldom (SP)	Low (L)
1.00 - 1.80	Never (NP)	Very Low (VL)

An interview was also utilized to validate the participants' responses in the survey questionnaire. Questions were asked using Ilokano, the native language of Ilocos Sur as a communication medium. With the participants' help, the local name medicinal plants were identified and photographs and specimens of plants mentioned during the interview were collected from the study areas. Frequency and percentage described the medicinal plants used by the participants and mean to determine the respondents' traditional practices in treating common respiratory ailments. Ethical approval (No. A-21-731) for this study was obtained from the Ethics Review Committee (ERC) of the University of Northern Philippines before the conduct of the study. Then, informed consent from participants was sought before the collecting data to ensure ethical rules in their participation. Privacy, confidentiality and anonymity were strictly maintained to avoid harming the respondents.

Plant collection and identification

The medicinal plant samples were collected from the participants' backyards and labelled with their local names as identified by the participants. The samples were carefully pressed, dried and mounted on herbarium sheets to ensure accuracy. To verify the scientific names and facilitate identification, the "Flora of Pakistan" (48) was used as a primary reference, along with online databases such as World Online Flora" (49), the "International Plant Names Index" (50), "India Biodiversity Portal" (51) and "StuartXchange" (52).

Results

Taxonomy of medicinal plants for common respiratory ailments

The participants used 22 medicinal plants from 17 families to treat common respiratory ailments such as cough, colds and asthma. The Flora of Pakistan as a primary reference and online databases such as World Online Flora, the International Plant Names Index, India Biodiversity Portal and StuartXchange, these medicinal plants are classified under the division tracheophyte and family members of Lamiaceae Myrtaceae Rutaceae Poaceae, Zingiberaceae, Annonaceae, Asteraceae, Lythraceae, Arecaceae, Clusiaceae, Cucurbitaceae, Apocynaceae, Bromeliaceae, Apiaceae, Fabaceae, Phyllanthaceae and Amaryllidaceae. Five plant families of Lamiaceae, Asteraceae, Annonaceae, Poaceae and Rutaceae were mainly utilized as remedies of the participants against cough, colds and asthma (Table 1).

Medicinal plants used for commonly respiratory ailments

The medicinal plants used to treat common respiratory ailments among Ilocos Sur, Philippines farmers were *Vitex negundo* L., *Origanum vulgare* L., *Psidium guajava, Citrofortunella microcarpa* and *Zingiber officinale.* Most farmers use the whole part of *Vitex negundo* to treat asthma, cough and colds. It is usually prepared as a decoction, taken orally and as an aromatic herbal bath as needed (Table 2). Moreover, *Origanum vulgare* (L.) leaves were taken orally, prepared as a decoction and used in an aromatic herbal bath for asthma, cough and colds when needed.

Likewise, the *Psidium guajava* leaves were also used as a decoction, orally taken and as an aromatic herbal bath for coughs and colds only when needed. The fruits of *Citrofortunella microcarpa* were prepared as juice drinks for coughs and colds also when needed. Further, *Zingiber officinale* leaves and roots are prepared as decoction and taken orally as needed for asthma, cough and colds.

Table 1. Taxonomy of the medicinal plants for common respiratory ailments

Family	*Scientific name*	Ilokano local Name /common name	f	%
Lamiaceae	*Vitex negundo* (L.)	Dangla/lagundi	52	87
	Origanum vulgare (L.)	Oregano	40	67
Myrtaceae	*Psidium guajava* (L.)	Guava/Bayabas	18	30
Rutaceae	*Citrofortunella microcarpa*	Calamansi	17	28
	Citrus limon	Lemon	2	3
Poaceae	*Cymbopogon citratus*	lemongrass/baraniw	13	22
	Imperata cylindrica (L.) Raeusch	Pan-aw	1	2
Zingiberaceae	*Zingiber officinale* Roscoe	Luya/Laya	12	20
Annonaceae	*Annona muricata* (L.)	Guyabano	12	20
	Annona squamosa (L.)	Atis	1	2
Asteraceae	*Blumea balsamifera* (L.)	Subusob/sambong	9	15
	Artemisia vulgaris (L.)	Erbaka	1	2
Lythraceae	*Lagerstroemia speciosa* (L.) *Pers*	Banaba	3	5
Arecaceae	*Cocos nucifera* (L.)	Coconut	3	5
Amaryllidaceae	*Allium sativum* (L.)	Bawang	3	5
Apocynaceae	*Rauvolfia serpentina* (L.) *Benth. Ex Kurz*	Serpentina	2	3
Clusiaceae	*Garcinia mangostana* (L.)	Mangosteen	1	2
Cucurbitaceae	*Momordica charantia* (L.)	Ampalaya	1	2
Bromeliaceae	*Ananas comosus* (L.) Merr	Pineapple	1	2
Apiaceae	*Angelica keiskei (Miq.) Koidz.*	Ashitaba	1	2
Fabaceae	*Mimosa pudica* (L.)	Bain bain	1	2
Phyllanthaceae	*Phyllanthus acidus* (L.) Skeels	Karamay	1	2

Table 2. Medicinal plants used for common respiratory ailments among farmers in Ilocos Sur, Philippines

Scientific name	Traditional uses	Part of Medicinal plants used	Mode of preparation	Mode of Application	Common dosage
Vitex negundo L.	Asthma, Cough, Colds	Whole plant	Decoction	Oral, Aromatic herbal bath	As needed
Origanum vulgare (L.)	Asthma, Cough, Colds	Leaves	Decoction	Oral, aromatic herbal bath	As needed
Psidium guajava	Cough, Colds	Leaves	Decoction	Oral, Aromatic herbal bath	As needed
Citrofortunella microcarpa	Cough, Colds	Fruit	Juice	Oral	As needed
Zingiber officinale Roscoe	Asthma, Cough, Colds	Leaves, Roots	Decoction	Oral	As needed

The findings suggest that various plant parts, including leaves, whole plants, fruits and roots, were typically gathered and used as needed. Commonly utilized medicinal plants were prepared as decoctions or juices, consumed orally, or applied as aromatic herbal baths to alleviate asthma, cough and colds. These observations were confirmed from the responses of the participants in the interview to wit:

Participant 1 claimed, "I usually boil the leaves or roots of *Vitex negundo* L. for 15 min and drink the decoction while it is still warm three times a day to stop my cough". Participants 4 and 5 claimed they drink decoction or pounded leaves in the morning to expel the phlegm and take an aromatic herbal bath. Other participants said, "I usually boil the leaves or roots of *Vitex negundo* L. in 15 min and drink the decoction while it is still warm three times a day to stop my cough "(Participant 7) and "I drink in the morning the decoction, or pounded plant to expel the phlegm" and "I do the steam bath" (Participants 8 and 10).

Furthermore, after using the medicinal plants, all the participants claimed they felt better and they could save money because they no longer buy medicines. Supporting this are their responses when they were asked to describe what they experienced during the healing process; they claimed, "I feel better after drinking, the medicinal plants cured my ailments" and "I do not need to buy medicines" (Participants 2, 3, 4, & 7).

On the other hand, the leaves of *Imperata cylindrica* L Raeusch, *Annona squamosa* L, *Artemisia vulgaris* L., *Garcinia mangostana* L., *Momordica charantia*, *Ananas comosus*, *Angelica keiskei* L and *Phyllanthus acidus* and the stem of *Mimosa pudica* var. *pudica* were uncommonly used by the Ilocano farmers in Ilocos Sur, Philippines for the treatment of cough and colds.

Traditional practices for common respiratory ailments

The participants have a "very high" level of practice in treating common respiratory ailments, as manifested by the overall mean rating of 4.24. Drinking 6-10 glasses of water in a day, taking enough rest, eating citrus food and drinking hot liquids of *Vitex negundo* L. and *Origanum vulgare* L. are "always." practiced by the farmers. On the other hand, they "often" drinking warm juices early in the morning or before bedtime, performed steam bath rituals and gargling with warm water and salt obtained the lowest mean ratings of 3.41 to 4.20 (Table 3).

The participants have a very high level of practice in treating common respiratory ailments, which is supported by their responses in the interview. They drink decoctions of leaves, roots, or bark of medicinal plants, with a few who chew or pound leaves to treat their respiratory ailments like cough or asthma (Table 3).

Participant 1 said, "I drink a decoction of leaves, roots, or bark of medicinal plants." Others answered, "Chew the leaves" or " Pound/chop the leaves." One participant answered that they use *Vitex negundo* L. to treat cough and oregano for asthma. Likewise, Participants 2,3 and 6 answered: " I drink warm boiled leaves of the medicinal plants."

Table 3. Traditional knowledge for common respiratory ailments among farmers in Ilocos Sur, Philippines

Traditional knowledge for the treatment of respiratory ailments	$\overline{X}$	DR
1. Drinking hot liquids from *Zingiber officinale*, *Vitex negundo L, Origanum vulgare (L),* etc.	4.32	Average
2. Drinking hot soups of chicken and vegetables, or rice porridge	4.28	Average
3. Drinking warm water mixed with or without honey three to four times a day.	4.16	Often
4. Drinking warm fruit juices early in the morning or before bedtime.	3.92	Often
5. Drinking 6 to 8 glasses of water in a day.	4.74	Average
6. Gargling with warm water and salt.	4.08	Often
7. Eating citrus food.	4.34	Average
8. Rubbing menthol on the chest, nose and back and cover with blankets to sleep better and sweat out.	4.16	Often
9. Taking enough rest.	4.54	Average
10. Performing a steam bath ritual.	3.98	Often
11. Taking a hot bath of three combined boiled leaves of *medicinal plants*	4.08	Often
Overall	4.24	Very High

Discussion

Vitex negundo L.*, Origanum vulgare* L. and *Psidium guajava* L. were the most popular plant for treating respiratory ailments, as these were used by 67 %, 87 % and 30 % Farmer-participants respectively. The dominance of medicinal plants for treating common respiratory ailments are attributed to availability in the locality, abundance, adaptability and at no cost of the 22 medicinal plants being used by the Ilocano farmers. *Vitex negundo L.* and *Psidium guajava* L. are two of the 10 medicinal plants approved by the Department of Health (DOH) for cough, asthma and fever and treatment of wounds and diarrhoea Respectively (53).

This finding is similar to a previous study in Ethiopia that Lamiaceae was the most cited family, followed by Asteraceae and Fabaceae, for cough, which was primarily cited as being treated by MPs and scored the highest frequency of citation, followed by the common cold and asthma. The most common conditions treated by species were cough, bronchitis, cold and asthma (54). In Africa, medicinal plants were represented mainly by Lamiaceae, Apiaceae and Asteraceae, Fabaceae and the *Origanum vulgare* (L.) are the most commonly used species against respiratory disorders (55). Also, there were 87 plant species reported in the research region, mainly belonging to the Fabaceae family, which is used for treating coughs associated with respiratory conditions (55, 56). Moreover, 384 species from 85 families of medicinal plants are utilized to treat respiratory conditions in Pakistan. Most plants belong to Asteraceae and Solanaceae, followed by Moraceae, Poaceae and Amaranthaceae (28). Also, *Citrofortunella microcarpa* or calamansi was used as a medicinal plant because it contains volatiles, physicochemical properties and non-volatiles (57) and is an excellent source of Vitamin C, D-Limonene and essential oils, providing benefits to the immune system, as well as anti-inflammatory, anti-cancer, anti-diabetic, anti-angiogenic and anti-cancer properties. It exhibits various therapeutic effects (58).

Leaves of medicinal plants were primarily utilized for treating common respiratory ailments since they were readily available, easily gathered and prepared. Moreover, gathering the leaves does not destroy the plants; hence, it can still provide an endless source of medicine. In addition, the leaves are the center of photochemical reactions, making them rich in metabolites. On the other hand, the predominance of decoction and oral administration may be explained by the simple preparation of the medicinal plants. The decoction is done using one medicinal plant species or in a combination of two or more taken orally and occasionally used for body steaming, bathing and washing.

This result affirms the previous findings that the medicinal plant leaves were the most frequently used plant part and decoction was the preferred form of preparation (59, 60). Most plant-based medicines developed by pharmaceutical companies have their beginnings in ethnomedicine. The Philippine government funds academic and research institutions for drug discovery research, providing opportunities for discovering and developing new and less expensive plant-based medicines.

The farmers have a very high level of practice in treating common respiratory ailments, which is supported by their responses in the interview. They drink decoctions of leaves, roots, or bark of medicinal plants, with few who chew or pound leaves to treat respiratory ailments like cough or asthma. The above findings indicate that the Ilocano farmers have indigenous knowledge and practices about medicinal plants to treat common respiratory ailments. Truly, medicinal plants have been used across the world in various ways (41, 35, 22).

Conclusion

The Ilocano farmers used 22 species of medicinal plants belonging to 17 families of Lamiaceae, Myrtaceae, Rutaceae, Poaceae, Zingiberaceae, Annonaceae, Asteraceae, Lythraceae, Arecaceae, Amaryllidaceae, Apocynaceae, Clusiaceae, Cucurbitaceae, Bromeliaceae, Apiaceae, Fabaceae and Phyllanthaceae as traditional treatment for respiratory ailments. The whole plant part of *Vitex negundo* (L.), leaves of *Origanum vulgare* (L.) and *Psidium guajava*, the leaves and roots of *Zingiber officinale* Roscoe and the fruit of *Citrofortunella microcarpa*, were usually prepared as decoction or juice, taken orally, or as aromatic herbal bath and use as needed for asthma, cough and colds. The Ilocano farmers demonstrated indigenous knowledge in using medicinal plants for common respiratory ailments.

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Authors' contributions

CGP contributed equally to the study's conceptualization and completion. JARP performed statistical analysis, interpretation of the data and taxonomic classification of the medicinal plants.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interest to declare.

Ethical issues: None

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