



Traditional knowledge and use of medicinal plants in the Ayllu Niño Corin (Prov. Bautista Saavedra, La Paz, Bolivia)

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Research

Abstract

Background: The traditional knowledge of the use of medicinal plants in the Kallawaya region of Bolivia has been extensively studied and documented, however there are no studies for the Ayllu Niño Corin, which is part of the municipality of Charazani, and where research has focused mainly on the festivity and music of Qanthus.

Methods: The data were collected through semi-structured interviews, participant observation, and walks to collect specimens. A total of four local experts and 25 general participants between the ages of 18 and 80 were interviewed to document their knowledge. The data obtained were systematized into 19 subcategories of medicinal use, and three ethnobotanical indices were applied to identify the most important species.

Results: A total of 90 species were reported, distributed in 42 botanical families. The Asteraceae family, presents the highest number of species, followed by the Lamiaceae and Solanaceae, with a higher proportion of native species in relation to the introduced ones. A total of 88 diseases were recorded, distributed in 17 categories. Fifty-three percent of all uses reported in the Ayllu corresponded to experts. The greatest use of medicinal plants applies to General ailments with unspecified symptoms, Digestive system, Musculoskeletal system, Reproductive system and sexual health, and Respiratory system. The most frequent diseases are cough, fever, bile, stomach-ache, female problems, worms, cancer and rheumatism. *Clinopodium bolivianum* (locally called Muña), is the single most important species in common for both sages and general participants.

Conclusions: These results confirm the importance of medicinal plants for primary health care in rural and isolated areas, and the differences found between the two types of participants allow us to confirm the role of experts within the communities, mainly in the Andes.

Keywords: Healer, Kallawaya, traditional medicine, community health.

Background

Several studies have highlighted the importance and contribution of traditional knowledge to community health in rural areas (Vandebroek *et al.* 2004a, 2008, Alves & Rosa 2007, McDade *et al.* 2007, Mignone *et al.* 2007). The World Health Organization (WHO) has estimated that more than 80% of developing countries in the world rely on traditional medicine to provide primary health care (Zhang & WHO 2002, Bermudez *et al.* 2005, WHO 2013). Traditional medicine encompasses a diverse set of health-related practices, approaches, knowledge and beliefs that incorporate the use of plants, animals and/or minerals, with spiritual therapies, manual techniques and exercises applied individually or in combination to maintain wellness and address the treatment, diagnosis and prevention of illness, physical and/or mental ailments (WHO 2002). This valuable knowledge is often part of a social group and is transmitted orally from generation to generation (Correa 2001, Zuluaga & Correa 2002, Vandebroek *et al.* 2004a, Mathez-Stiefel & Vandebroek 2012a). In this context, the use of plants as medicine is one of the most recognized ecosystem services and is based on their active principles and therapeutic properties. This practice constitutes an important part of local knowledge, contributing significantly to local livelihoods, which in many cases allows providing primary health care in areas where conventional medical services are not available (Farnsworth & Soejarto 1991, Vandebroek 2010, Leonty & Casu 2013).

In the Bolivian Andes, medicinal plants and the knowledge associated with them have been used as a vital component of traditional medicine for curing diseases and ailments (Bastien 1987, Pestalozzi 1998, Baixeras, 2002, Vandebroek *et al.* 2008, Mathez-Stiefel *et al.* 2012b), particularly the traditional medicine of the Kallawaya nation, located in the Bautista Saavedra province of the department of La Paz (Oblitas 1963). This area was notable for the historical presence of itinerant Andean wise men, healers, and herbalists: the “Kallawaya,” a term that comes from the Aymara phonemes “Qolla waya,” meaning “to bring medicine or relief,” whose practice is characterized by incorporating plants from different altitudes and origins into their cures (Oblitas 1969, 1971, Bastien 1987, Girault 1987, Krippner and Glenney 1997, Saignes 1983). The knowledge of traditional medicine of the Kallawaya, their worldview, and its importance were recognized by UNESCO as part of the Oral and Intangible Heritage of Humanity on November 7, 2003 (Loza 2004, Baixeras 2004, Hachmeyer 2018, Álvarez 2021).

However, most ethnographic studies on the traditional use of medicinal plants in the Kallawaya region were based only on traditional knowledge from Kallawaya healers and didn't include knowledge from the rest of the population, including midwives (Girault 1987, Ranaboldo 1986, Nina 2004). These studies were conducted mainly in the communities of Curva Chajaya, Chari, and Kaata, where most of the Kallawaya doctors lived, and were carried out since 60's and published before the 1990s (Bastien 1987, Girault 1987, van Kessel 1993, Rösing 1990).

Currently, there are 64 Ayllus in the Kallawaya region (Alderman 2015), and although the tradition of medicinal plant use is recognized in all of them, there are no recent publications to support this. Among them is the Niño Corín ayllu, which is part of the municipality of Charazani, where research has focused mainly on the Fiesta de la Cruz and the music of Qanthus, but has not addressed traditional knowledge related to traditional medicine (Romero 2016, Rocabado 2017, Hachmeyer 2018).

In this research, we will focus on studying traditional knowledge related to the use of medicinal plants in the Niño Corin ayllu. Ethnomedicinal knowledge will be documented in two groups of participants: 1) experts (called “sabios kallawaya” in local Spanish) recognized locally for their practice of traditional medicine, and 2) the general population without locally recognized ethnomedicinal knowledge. We work with these two groups to determine the difference in their knowledge and better understand the role of experts in treating the health of the local population.

Materials and Methods

Study area

Ayllu Niño Corin is located at about 3200 m.a.s.l. and 15° 9' 33"S and 68° 59' 10" W, approximately 8 km west of the town of Charazani, the capital of the Bautista Saavedra province in the Department of La Paz (Fig.1). No on-site climate data are available, but the nearest village of Charazani (3200 m.a.s.l.) is characterized by average annual temperature in Charazani is 15 °C (see the climate map of Charazani) and fluctuates slightly, from just over 12 °C in June/July to just under 17 °C in November/December. Annual precipitation is approximately 750 mm, with a four-month dry season from May to August, with monthly precipitation below 25 mm, contrasting with a rainy summer from December to March, during which monthly precipitation sometimes exceeds 100 mm (GAM 2016). The study area is defined as a transition zone (ecotone) between the puna and the dry valley (Beck & Garcia 1991). The valley ecosystems are located between 2.800 and 3.500 m asl, between the canyons and adjacent terrains, which are the lower portions with surfaces covered by extensive terraces of fluvio-glacial origin with xerophytic vegetation and stunted shrubs (Seibert 1994, Beck *et al.* 2002). The forest formations are very limited

and follow rivers and streams, both in the wider valleys and in the narrow ravines. The natural forests of *Polylepis* spp. grow alongside streams and on the banks of their courses. The forests of *Alnus acuminata* are scarcer and more scattered in their distribution. The main rivers in the municipality are the Charazani, Curva, Chullina, and Amarete, but the most important is the Charazani River because it provides water for human consumption, livestock maintenance, and, to a lesser extent, irrigation of crops along its entire length (ANMIN-A. 2004).

According to the 2024 Census, Niño Corin was consisting of 159 households (292 inhabitants, 143 men and 149 women) of Quechua-speaking subsistence farmers (INE 2025). The 56% of the population speaks Quechua, and 40% speaks Spanish, mainly people who interact outside the ayllu for temporary work or commercial reasons (F. Patty 2017, personal communication). All households have access to electricity (at an average monthly cost of 25 bs) and a connection to non-potable water (annual cost of 15 bs). The community does not have any health centers; the nearest hospital is in Camata (an hour and a half walk or 20 minutes by car) and the largest hospital is the first-level hospital in Charazani. The community has a multi-grade primary school and a single teacher. To receive secondary education, students can attend a boarding school in the community of Caata or migrate to the city (T. Choque 2017, personal communication). Access to the community is limited, there is no public transportation, and alternatives include taking a bus from La Paz to Curva (once a week), getting off halfway and walking about 20 minutes, or taking a bus to Charazani (daily connection from La Paz) and walking for at least two hours from there (January 2017, personal observation).

The main productive activity is the cultivation of corn (*Zea mays* subsp. *mexicana* (Schrad) Ittis), wheat (*Triticum aestivum* var. *hybernum* (L) Fiori), peas (*Pisum sativum* L.), squash (*Cucurbita maxima* Duchesne in Lam.), beans (*Phaseolus vulgaris* L.) and broad beans (*Vicia faba* L.) (M. Ríos 2017 and F. Patty 2023 pers. comm.). This production is mainly intended for self-consumption or exchange, with a small remainder sold at fairs and regional festivals. A current problem is the lack of land for cultivation, as the allocation of plots from parents to children reduces the area of land available for cultivation, a situation that largely drives the migration of younger people to cities (Schulte 1998, M. Ríos 2017 pers. comm.). Another way to generate family income is through participation in traditional music groups known as “Qanthus,” one of the best-known and most important musical expressions of Kallaway culture (Romero 2016). In addition to the sale of handmade textiles by women, such as “lilixllas,” “aqsus,” “kapacho,” “chuspas,” “winchas,” and woolen woven belts, which are important in clothing as part of their Kallaway identity (M. Ríos and R. Carita 2017, personal communication).

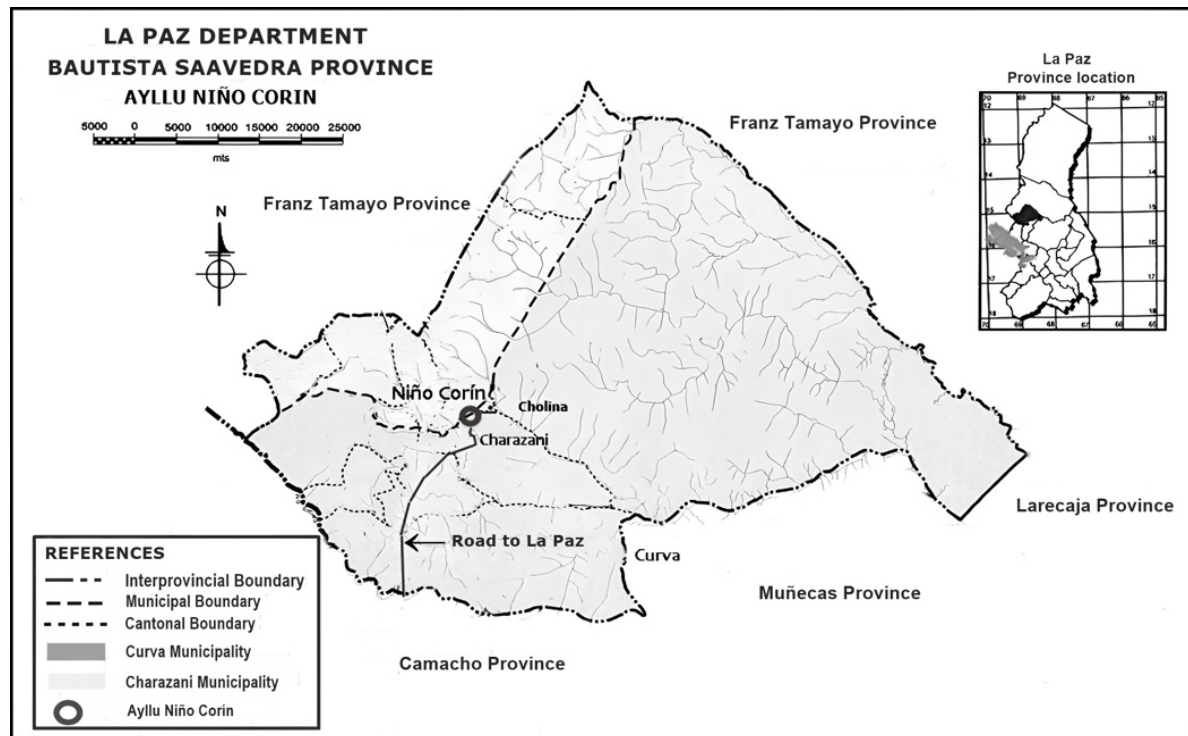


Figure 1. Location of Niño Corin Ayllu in Bautista Saavedra Province, Department of La Paz (Bolivia) (Source: Adapted based on map website <https://www.educa.com.bo/geografia/provincia-bautista-saavedra-mapa>).

In the history of the Kallawaya culture, Niño Corin is part of the Qollahuaya ayllu of the 16th and 17th centuries, belonging to the larger ayllu of Kaata (Bastien 1985), and during the Hacienda era, was important because of its agricultural production plots in different ecological zones and a significant number of indigenous people who paid tribute (Bastien 1985, 1996). Also the name of Niño Corin is mentioned because of the discovery of 77 objects extracted from the funerary cave of the so-called “Man of Niño Korín” and that could have been part of the grave goods of a “traditional healer” because *Ilex guayasa* (villca) leaves, tobacco, tablets, inhalation tubes and a container made of monkey skin were found (Rydén 1947, Wassén 1972, Bruhn *et al.* 1976, Muñoz 2011, Wassén 1965).

Based on the process of social and political reconstitution undertaken by the Kallawaya and in relation to the notion of collective identity, the inhabitants of the Kallawaya region (Kallawaya Nation) identify themselves as “Kallawaya” (Alderman 2015). However, this self-identification does not imply that all people in the Bautista Saavedra province possess knowledge of traditional medicine. In this context, healing practices and rituals are performed only by certain individuals who, through their experience, have gained recognition within the Ayllu for their specialization as doctors, herbalists, ritualists, or midwives. They are designated as “sabios kallawaya” (Jampiy yachaq, man who cures diseases; Ñawiyuq yachaq, ritualist who reads coca; warmi yachaq, wise woman), distinguishing themselves from the rest of the population because they are “the chosen ones” to incorporate ancestral medicine into their practices.

Collection of information on medicinal plants

The first step for the development the research was to obtain permission and prior informed consent from the recognized authorities in the Ayllu (Appendix). The collection of information about the knowledge of the use of medicinal plants in the Ayllu was conducted between November 2016 and May 2018 using semi-structured interviews applied to two groups of participants: 1) experts and 2) general participants.

The “experts,” called “sabios kallawaya” in local Spanish or “yachaj, ñawiyuq” in Quechua, are recognized locally for their expertise practicing traditional medicine and for attending to the wellness needs in both physical health and emotional and spiritual healing in the Ayllu, some of them are even recognized throughout the Charazani region. Self-identification as “sabios kallawaya” is mainly related to the notion of collective self-identity acquired by all inhabitants of the kallawaya region (Kallawaya Nation, Alderman 2015) and to local recognition of their knowledge. However, each of them has mentioned that this designation does not identify them as the “ancestral kallawayas”, since the processes of learning and applying their knowledge have not been the same (D. Carita and F. Patty 2017, personal communication) and they prefer to identify themselves with the complementary name that also refers to their skills (Rocabado 2023). Among the ten experts identified in the community, only those who used plants in their medical treatments were selected, in this case four (three men and one woman) (Table 1).

Table 1. Description of the experts collaborators interviewed from the Niño Corin ayllu, and their specialties as described by the members of the Ayllu. (q): Quechua

Expert Name (age)	Local professional name	Specialty description
Damian Carita (80)	Ritualist and healer	Perform diagnosis of illnesses/ailments by reading coca leaves and cards, and healings only through rituals that include the offering of ritual “mesas” where they use certain plants.
Rosa Carita (57)	Kallawaya midwife “Yachaj warmi” (q)	Attends births and treats women's health problems, both in the Niño Corin ayllu and in nearby communities. She mainly uses medicinal plants for her treatments and reads coca leaves to identify other health problems. She is the only midwife in the region.
Mario Rios (55)	Kallawaya ritualistic herbalist doctor	Diagnoses and cures physical ailments and “ailments of the soul” using medicinal plants and performs health rituals that include preparing “white tables” to make “payments” to Pachamama.
Feliciano Patty (55)	Kallawaya Herbalist	Diagnoses physical illnesses/ailments and recommends which plants to use to cure them, as well as offering recommendations related to people's spiritual well-being. He is the only expert who has conducted specialized studies on medicinal plants.

The “general participants” correspond to the general population of the community, without any specialty related to traditional medicine recognized or highlighted by the community, they were selected for their willingness to contribute to the research. Twenty-five general participants were interviewed, 10 men and 15 women (with an age distribution between 18 and 80 years) (Table 2).

Table 2. Distribution of gender and age of general participants interviewed in Ayllu Niño Corin.

Age (years)	Male	Female	Total
18-29 years	1	4	5
30-49 years	1	2	3
50-69 years	6	7	13
≥ 70 years	2	2	4
Total	10	15	25

Information was obtained by semi-structured interviews and personal conversation with the experts and general participants. Interviews were conducted in Quechua, Spanish, or in both languages, according to the participants' preference and language ability, with the help of a native Quechua-speaking translator. In most of the cases the interviewers were approached in their own houses and then were accompanied into the field to find and collect the species they mentioned. The data registered for the medicinal plants were: common name, habit, part of the plant that is used, preparation, administration, and illness treated. The interviews were complemented with other research techniques, including participant observation and walks through the areas where people collect medicinal plants.

Reference specimens of most medicinal plants were collected during walks conducted mainly with the four experts who were interviewed. Information on the collection number, date, location, participant, and local names of the plants was recorded. At the end of the day, the specimens were pressed and dried according to standard botanical practices. Reference specimens were identified by specialists and deposited under the code ERI-TESIS - No. 1-111 at the National Herbarium of Bolivia (LPB) in La Paz, Bolivia.

Once the individual interviews with both experts and general participants had been completed, a workshop was held with the aim of reaching consensus and complementing the information provided by each of the interviewees. This workshop aimed to reach consensus on the taxonomic identification of medicinal plant species reported only under their local names. To this end, herbarium specimens collected with the experts and taxonomically identified at the National Herbarium of Bolivia were used. In cases where a plant did not have an herbarium reference, it was sought and collected for correct taxonomic identification. The workshop did not include consensus on information related to medicinal use reported by participants, as this type of information was in some cases considered personal and, as in the case of the experts, forms part of the particular knowledge that could provide them with certain benefits and advantages over other residents.

Data Analysis

The accuracy of the scientific names of plants and authors' names was verified using the World Flora Online (WFO 2023). Regarding the biogeographic origin of the species, the national level was considered; that is, whether they are exotic or native to Bolivia.

Data analyses were conducted at the species level. For these analyses we defined "medicinal use" as the use of a given species associated with a medicinal subcategory and a specific disease/pain. To analyze the abundance of medicinal uses, we defined the term "use report" as the individual medicinal use of a species mentioned by an expert or general participant (Macía *et al.* 2011).

All medicinal uses reported in the interviews were classified into 19 medicinal subcategories following Macía *et al.* (2011) (Table 3). When the description of the medicinal use did not contain sufficient information to assign it to one of the described subcategories, it was included in the subcategory "not specified".

Table 3. Subcategories of medicinal use, employed to systematize the knowledge of medicinal plant use in the Niño Corin ayllu, modified from Macía *et al.* (2011).

Medicinal subcategory	Description
General ailments with non-specific symptoms	General ailments, such as body aches, malaise, weakness, headache, fever.
Pregnancy, childbirth and puerperium	Gestation, hemorrhage, childbirth, postpartum, lactation and abortion.
Diseases disorders and cultural	Ailments or disorders of magical-religious origin that are recognized in a given culture (e.g., air, rapture, fright, curse, fright, sullenness).
Infections and infestations	Malaria, leishmaniasis, measles, anthelmintic, lice, fleas, chiggers, scabies.
Skin and subcutaneous tissue	Acne, boils, eczema, burns, removal of thorns stuck in the skin.
Dental health	Cavities, toothache, fillings or caps, oral hygiene, teething.
Blood and cardiovascular system	Anemia, cardiovascular problems and ailments, gangrene, heart disease, varicose veins, hypertension, hypotension, hemorrhoids.
Digestive System	Carminative, colic, flatulence, emetic, indigestion, purgative, gastric or intestinal ulcers, diarrhea, laxative, liver and gallbladder disorders, hepatitis.
Endocrine system	Diabetes
Metabolic nutrition system and	Obesity, weight loss.
Musculoskeletal system	Rheumatism, sprains, fractures, sciatica, lumbago, hernias.
Nervous system and mental health	Migraines, mental disorders, epilepsy, paralysis, nervous disorders.
Reproductive system and sexual health	Menstruation, fertility, venereal disease, prostate, impotence, menopause, aphrodisiacs, contraceptives
Respiratory system	Flu, cold, aphonia, bronchitis, pneumonia, expectorant, cough.
Sensory system	Eye infections, cataracts, loss of vision or smell, deafness, otitis.
Urinary System	Diuretic, kidney stones, urinary incontinence, urinary tract infections, cystitis.
Veterinary	Medicinal use of treatment in animals
Not specified	Medicinal use or with pharmacological properties, but with insufficient information to assign to any of the described subcategories.
Others	Medicinal uses not classifiable within the previous subcategories (e.g. tumors, cancer).

For the quantitative evaluation of the knowledge of medicinal plants, three different indexes were used to reflect the relative importance of the species identified in the study area:

The Value of Use (VU) index which was calculated as $VUc = \sum U / ns$, where U= sum of the number of use reports from all participants for a given species, and ns= total number of participants (Albuquerque *et al.* 2006).

The Relative Importance Index (RI), which was calculated as $RI = NP + NCS$, where NP= number of uses (reported for the specific ailments) attributed to a plant species divided by the total number of medicinal uses attributed to the most versatile plant species (species with the highest number of uses); NCS= number of subcategories of medicinal use for a given plant species divided by the total number of subcategories of medicinal use reported for the most versatile species (Bennett & Prance 2000, Albuquerque *et al.* 2006). Species with RI=2.0, the highest possible value, are those with the greatest diversity of medicinal use.

The Friedman Index (FI), which was calculated as $FI = (Ip/It) \times 100$, where Ip=number of informants who mentioned a given species (frequency of mention); It=total number of informants (Friedman *et al.* 1986). This index allows estimating the relative importance of each species based on the degree of consensus among informants.

Results

Plant pharmacopeia and most important families

A total of 90 medicinal plant species was recorded during the present study, distributed in 42 botanical families and 81 genera (Table 4). In general, the knowledge of the experts is greater and includes most of the knowledge reported by the general participants (Table 5). In both groups of participants most of the medicinal species reported correspond to native species.

Table 5. Diversity and origin of medicinal plants in the Ayllu of Niño Corin. (*) number of plants reported only by this group of participants, (#) number of plants reported in common for both groups of participants.

	Participant Type		Grand total
	Experts	General participants	
No. Families	41 (15*)	27 (1*)	42 (26#)
No. Genera	79 (33*)	48 (2*)	81 (46#)
No. Species	88 (41*)	49 (2*)	90 (47#)
No. Native Species	59 (28*)	31	59 (31#)
No. Introduced Species	29 (13*)	18 (2*)	31(16#)

Only three of the 42 botanical families account for nearly 40% of all reported medicinal plant species. Asteraceae was the family with the largest number of medicinal species (20 sp.), followed by Lamiaceae (9 sp.) and Solanaceae (6 sp.) (Fig. 2). These three families together represent 39% of the total medicinal species found in Niño Corin. The remaining 61% of species belonged to 39 families, each represented by one, two or three species. In general, we found that all species included in each of the families were reported by the experts, including all species from the 27 families reported by the general participants, except *Apium graveolens* (Apiaceae) and *Ruta chalepensis* (Rutaceae) which were reported only by the general participants (Table 4). The genera with the highest number of medicinal taxa were *Brugmansia* and *Tagetes* (with three species each), and *Baccharis*, *Hemionitis*, *Malva*, *Mentha* and *Plantago* (with two species each).

The 90 medicinal plant species reported presented six life forms, corresponding mostly to herbaceous (59%) and native (33%) plants, followed by shrubs (17%), mostly also native species (12%). Independently, each participant group also reported mostly herbaceous (58% experts and 61% general participants) and native (56% experts and 62% general participants) medicinal species. Many of the native species within the different life forms were only reported by experts (Table 6).

Diversity of medicinal uses in the Ayllu of Niño Corin

This study reported a total of 285 medicinal uses (medicinal use is defined here as the use of a specific plant species for a specific health condition, regardless of the preparation or part of the plant used and as mentioned by one or more participants), included within 17 subcategories of medicinal use and 88 different diseases/ailments (Table 7). However, only five of the 17 subcategories concentrate 60% of the reported medicinal uses, these were General ailments with non-specific symptoms (21%), Digestive system (15%), Musculoskeletal system (8%), Reproductive system and sexual health (8%), and Respiratory system (7%).

The experts reported 215 medicinal uses (17 subcategories, 74 ailments/diseases, 74 species) and the general participants reported 133 medicinal uses (17 subcategories, 52 ailments/diseases, 49 species). These same subcategories were the ones that reported the most medicinal uses among both groups, although among the general participants, the Nervous System and Mental Health subcategory was replaced by the Reproductive System and Sexual Health subcategory (Table 7).

Both groups reported 63 medicinal uses in common, included in 14 subcategories, 33 ailments and/or diseases, and 41 plant species. The experts reported 152 unique medicinal uses (17 subcategories, 70 ailments/diseases, 74 species) and the general participants reported 70 unique uses (14 subcategories, 14 ailments/diseases, 38 species) (Table 7).

Table 4. Medicinal plant species reported in the Ayllu Niño Corin. Local name: (s) Spanish, (q) Quechua, (a) Aymara. EXP: Experts, GP: General participants. Subcategories of medicinal use (Subcat) (1): General ailments with non-specific symptoms, (2): Pregnancy, childbirth and puerperium, (3): Diseases disorders and cultural, (4): Infections and infestations, (5): Skin and subcutaneous tissue, (6): Dental health, (7): Blood and cardiovascular system, (8): Digestive System, (9): Endocrine system, (10): Metabolic nutrition system and, (11): Musculoskeletal system, (12): Nervous system and mental health, (13): Reproductive system and sexual health, (14): Respiratory system, (15): Sensory system, (16): Urinary System, (17): Veterinary, (18): Not specified, (19): Others.

Family	Specie (Voucher number)	Local Name	Origen	Life form	Illness (subcat)
Amaranthaceae	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants (ERI Tesis 10)	Payqu (q, a)	Native	Herb	EXP: Bloating (1), Worm infestation ("gusanera") (4), Wounds (5), Stomach pain (8)
					GP: Gallbladder (bile) (8), Diabetes (9)
Anacardiaceae	<i>Schinus molle</i> L. (ERI Tesis 30)	Molle (s), Mulli (q)	Native	Tree	GP: Rheumatism (11)
					EXP/GP: Rickets ("larpa") (10), Cough (14)
Apiaceae	<i>Apium graveolens</i> L. (ERI Tesis 111)	Apio (s)	Introduced	Herb	GP: Blood cleansing (19)
Apiaceae	<i>Petroselinum crispum</i> (Mill.) Fuss (ERI Tesis 81)	Perejil (s)	Introduced	Herb	GP: Headache, Nausea (1), Stomach pain (8), Anxiety (12), Cold (14)
					EXP/GP: Gallbladder (bile) (8)
Asparagusaceae	<i>Agave americana</i> L. (ERI Tesis 88)	Penca (s)	Introduced	Herb	EXP: "Frio" (18)
Asteraceae	<i>Achyrocline venosa</i> Rusby (ERI Tesis 39)	Huira huira hembra o macho (s)	Native	Herb	GP: Body pain (1), Wounds (5), Pneumonia (14), Kidneys (16)
					EXP/GP: Cold, Cough (14)
Asteraceae	<i>Ageratina pentlandiana</i> (DC.) R.M. King & H. Rob. (ERI Tesis 90)	Pichitilka (q)	Native	Shrub	EXP: Dislocations (11)
Asteraceae	<i>Ambrosia arborescens</i> L. (ERI Tesis 5)	Altamisa (s)	Native	Subshrub	EXP: Headache, Waist pain (1), "Arrebato" (3), Uterus, Abortion (13)
Asteraceae	<i>Baccharis genistelloides</i> (Lam.) Pers. (ERI Tesis 92)	Kimsa K'ucho (q)	Native	Shrub	EXP: Diabetes (9), Uterus (13), Louse (16)
Asteraceae	<i>Baccharis latifolia</i> Ruiz & Pav. (ERI Tesis 28)	Chilka (a)	Native	Shrub	EXP: Bruises (1), Tendinitis (11)

					GP: Liver (8)
					EXP/GP: Dislocations (11)
Asteraceae	<i>Bidens andicola</i> Kunth (ERI Tesis 12)	Soñela (s)	Native	Herb	EXP: Cancer (without specifying type) (10), Kidneys (16), "Frio" (18), Sunstroke (19)
					EXP/GP: Diarrhea (8)
Asteraceae	<i>Calendula officinalis</i> L. (ERI Tesis 105)	Caléndula (s), Uchu k'aspa (q)	Introduced	Herb	EXP: Ritual ceremony (3)
Asteraceae	<i>Chromolaena tenuicapitulata</i> (Hieron.) R.M. King & H. Rob. (ERI Tesis 91)	Ishpinku (q)	Native	Shrub	EXP: Retention of urine (16)
Asteraceae	<i>Encelia canescens</i> Lamark (ERI Tesis 60)	Sunch'u (q)	Native	Herb	EXP/GP: Rheumatism (11)
Asteraceae	<i>Hebeclinium macrophyllum</i> (L.) DC. (ERI Tesis 19)	Chojriquilla (q)	Native	Herb	EXP: Bruises (1), "Frio" (18)
					GP: Dislocations (11)
					EXP/GP: Body pain (1)
Asteraceae	<i>Matricaria chamomilla</i> L. (ERI Tesis 25)	Manzanilla (s)	Introduced	Herb	EXP: Fever (1), Insomnia (12)
					GP: Headache (1), Washing of childbirth and washing of the newborn (2), Stomach pain (8), Anxiety (12), Cold (14), For all ailments, Various body inflammations (18)
					EXP/GP: Swelling (1), Skin rash (inflammation of the skin) (5)
Asteraceae	<i>Mutisia acuminata</i> Ruiz & Pav. (ERI Tesis 11)	Lurihuicho, Chinchiercoma (q)	Native	Shrub	EXP: Cough (14)
Asteraceae	<i>Smallanthus sonchifolius</i> (Poepp.) H. Rob. (ERI Tesis 20)	Yacón (s), Llacón Q'ora (q), Aricoma (a)	Native	Subshrub	EXP: Infected tumors ("chupu") (4), Diabetes (9), Back pain (11)
					GP: Muscle pain (11)
					EXP/GP: Gallbladder (bile) (8)
Asteraceae	<i>Sonchus asper</i> (L.) Hill (ERI Tesis 8)	Janapacu (s), Qhanapaqo, Qhanapaku (q,a)	Introduced	Herb	EXP: Fever (1), Headache (1)
					GP: "Coleron" (3)

					EXP/GP: Gallbladder (bile) (8)
Asteraceae	<i>Tagetes filifolia</i> Lag. (ERI Tesis 4)	Anis hierba (s), Pampa anis (q, a)	Native	Herb	EXP: Gastritis (8)
					EXP/GP: Stomach pain (8), "Frio" (18)
Asteraceae	<i>Tagetes minuta</i> L. (ERI Tesis 17)	Huacataya (s), Wacataya (a), Chijchipa (q)	Native	Herb	EXP: Postpartum (2), Liver (8), Nerves (12)
					GP: Headache (1), Menstruation (13), Neuralgia (12)
					EXP/GP: Blood cleansing (19)
Asteraceae	<i>Tagetes pusilla</i> Kunth (ERI Tesis 99)	Anis menta (s)	Native	Herb	EXP: Cold (14)
Asteraceae	<i>Tanacetum parthenium</i> (L.) Sch. Bip. (ERI Tesis 57)	Ajenko (s), Santa María (s)	Introduced	Herb	EXP: Worm infestation ("gusanera") (4), Stomach pain (8)
Asteraceae	<i>Taraxacum officinale</i> F.H. Wigg (ERI Tesis 100)	Diente de León (s)	Introduced	Herb	EXP: Gallbladder (bile) (8)
Asteraceae	<i>Xanthium spinosum</i> L. (ERI Tesis 15)	Amore seco (s), Alqo khikcha (q), Anu ch'aphi (a)	Native	Herb	EXP: Fertility (13)
					EXP/GP: Fever (1)
Betulaceae	<i>Alnus acuminata</i> Kunth (ERI Tesis 35)	Lambrám (s)	Native	Tree	EXP: Waist pain (1)
					GP: Body pain, Headache, Heartburn (1)
					EXP/GP: Foot pain and burning (1), Uterus (13)
Betulaceae	<i>Brassica rapa</i> L. (ERI Tesis 72)	Nabo silvestre (s)	Introduced	Herb	EXP: Cancer (without specifying type) (10)
Betulaceae	<i>Lepidium bipinnatifidum</i> Desv. (ERI Tesis 44)	Januk'ara (q)	Native	Herb	EXP: Worm infestation ("gusanera") (4)
Calceolariaceae	<i>Calceolaria sparsiflora</i> Kunze (ERI Tesis 66)	Puli puli (q)	Native	Shrub	EXP: Induce labor (2)
Cucurbitaceae	<i>Cucurbita maxima</i> Duchesne (ERI Tesis 102)	Cola de zapallo (s), Calaysu (q)	Introduced	Herb	EXP: Induce labor (2)
					GP: Childbirth (2)

Equisetaceae	<i>Equisetum bogotense</i> Kunth (ERI Tesis 63)	Cola de caballo (s), Moku moku jachu (q)	Native	Herb	EXP: Retention of urine (16)
					EXP/GP: Kidneys (16)
Euphorbiaceae	<i>Euphorbia peplus</i> L. (ERI Tesis 74)	Wachanka (q), Wachancara (a)	Introduced	Herb	GP: Worm infestation ("gusanera") (4), Stomach pain (8)
					EXP/GP: Toothache (6)
Fabaceae	<i>Medicago sativa</i> L. (ERI Tesis 22)	Alfa alfa (c, q, a)	Introduced	Herb	EXP: Weakness (18)
Fabaceae	<i>Otholobium pubescens</i> J. W. Grimes (ERI Tesis 37)	Wilia (q, a)	Native	Shrub	EXP: Blows or tumors (1), Scabies (4), Wounds (5)
					GP: Diarrhea, Gallbladder (bile) (8)
					EXP/GP: Liver (8), Cancer (without specifying type) (10), Kidneys (16)
Fabaceae	<i>Senna birostris</i> (Dombey ex Vogel) H.S. Irwin & Barneby (ERI Tesis 82)	Tako (q)	Native	Subshrub	EXP: "Awila o chullpa" (3), Infected tumors ("chupu") (4), Wounds (5), Gallbladder (bile) (8), Rickets ("larpa") (10)
Gunneraceae	<i>Gunnera boliviana</i> Morong ex Rusby (ERI Tesis 78)	Pusilla (s), Paju de pusilla (q)	Native	Herb	EXP: Fever (1), Diarrhea (8), Cancer (without specifying type) (10)
					EXP/GP: Kidneys (16)
Iridaceae	<i>Iris germánica</i> L. (ERI Tesis 108)	Lirio (s)	Introduced	Herb	EXP: Body pain (1), Fractures (11), Uterus (13)
Iridaceae	<i>Sisyrinchium chilense</i> Hooker, William Jackson (ERI Tesis 76)	Ayka ayka (s)	Native	Herb	EXP: Diarrhea (8)
Juglandaceae	<i>Juglans australis</i> Griseb (ERI Tesis 83)	Nogal (s)	Native	Tree	EXP: Indigestion ("empacho") (8)
					GP: Cramps (11)
					EXP/GP: Pneumonia (14)
Juncaceae	<i>Distichia muscoides</i> Nees & Meyen (ERI Tesis 55)	Ñajcha ñajcha (q)	Native	Herb	EXP: Gallbladder (bile) (8)

Lamiaceae	<i>Clinopodium bolivianum</i> (Benth) Kuntze (ERI Tesis 42)	Muña menta (s), Muña (q), K'oa (a)	Native	Subshrub	GP: Induce labor (2), "Frio" (18)
					EXP/GP: Body pain, Headache (1), Diarrhea, Gastritis, Stomach pain (8), Dizziness (12), Uterus (13), Cold (14), Kidneys (16)
Lamiaceae	<i>Hedeoma mandoniana</i> Wedd (ERI Tesis 49)	Salvia (s), Pampa saluya (q)	Native	Herb	GP: Rheumatism (11), Dizziness (12), Uterus (13)
					EXP/GP: Cold (14)
Lamiaceae	<i>Marrubium vulgare</i> L.	Itapallo negro (s), Itapallu kora (q)	Introduced	Herb	EXP: Blows or tumors, Swelling (1), Wounds (5), Toothache (6), Blood cleansing (19)
					GP: Dislocations (11)
Lamiaceae	<i>Mentha piperita</i> L. (ERI Tesis 29)	Menta (s)	Introduced	Herb	EXP: Digestion (8)
Lamiaceae	<i>Mentha spicata</i> L. (ERI Tesis 24)	Hierba buena negra, Hierba buena crespá (s)	Introduced	Herb	EXP: "Frio" (18)
					GP: Diarrhea (8), Dizziness (12)
					EXP/GP: Worm infestation ("gusanera") (4), Indigestion ("empacho"), Stomach pain (8),
Lamiaceae	<i>Minthostachys mollis</i> Griseb (ERI Tesis 43)	Martín Muña, Pampa Muña (q)	Native	Herb	EXP: Headache, Bloating (1), Coccyx pain (11), Dizziness (12), "Frio", Body sores (18)
					GP: Gastritis (8)
					EXP/GP: Stomach pain (8)
Lamiaceae	<i>Origanum vulgare</i> L. (ERI Tesis 18)	Orégano (s)	Introduced	Herb	EXP: Induce labor (2)
Lamiaceae	<i>Rosmarinus officinalis</i> L. (ERI Tesis 31)	Romero (s)	Introduced	Shrub	EXP/GP: Toothache (6)
Lamiaceae	<i>Salvia haenkei</i> Benth (ERI Tesis 16)	Salvia grande (s), Pampa saluya (q)	Native	Subshrub	EXP: Bedsores (pressure sores) (4), Gastritis (8)
					EXP/GP: Worm infestation ("gusanera") (4), Memory (12)
Loranthaceae	<i>Ligaria cuneifolia</i> Thieg (ERI Tesis 3)	Jamillo, Jamillo de sipiñico (s)	Native	Parasite	EXP: Injuries (1), Wounds (5), Dislocations (11), Uterus (13)
					GP: Body pain (1)

Malvaceae	<i>Malva assurgentiflora</i> (Kellogg) M.F. Ray (ERI Tesis 75)	Violeta (s)	Introduced	Shrub	EXP: Fever (1)
Malvaceae	<i>Malva neglecta</i> Wallr (ERI Tesis 13)	Malva (s), Q'ara Malva (q)	Introduced	Herb	EXP: Purgative (18)
					GP: Body pain (1)
					EXP/GP: Fever (1), Gallbladder (bile) (8)
Myrtaceae	<i>Eucalyptus globulus</i> St.-Lag. (ERI Tesis 9)	Eucalipto (s)	Introduced	Tree	EXP: Fever (1), Cleansing the environment (18)
					GP: Headache (1), Dizziness (12), Uterus (13), Cold (14), Throat pain (14)
					EXP/GP: Cough (14)
Myrtaceae	<i>Myrtus communis</i> L. (ERI Tesis 26)	Arrayán (s)	Introduced	Shrub	EXP: Toothache (6), "Frio" (18)
Nyctaginaceae	<i>Colignonia glomerata</i> Griseb (ERI Tesis 96)	Sachaparaqay (q)	Native	Subshrub	EXP: Fever (1)
Onagraceae	<i>Oenothera rosea</i> L'Hér. ex Aiton (ERI Tesis 56)	Yawar Ch'unqa (q)	Native	Herb	EXP: Bruises (1)
Oxalidaceae	<i>Oxalis flagellata</i> (Rusby) Lourteig (ERI Tesis 64)	Chullku, Chullco (q)	Native	Herb	EXP: Fever (1)
Papaveraceae	<i>Bocconia integrifolia</i> Bonpl. (ERI Tesis 45)	Amak'ari (q), Yanali (q)	Native	Tree	EXP: Worm infestation ("gusanera") (4), Rickets ("larpa") (10), Rheumatism (11), Uterus (13)
Piperaceae	<i>Peperomia galioides</i> Kunth (ERI Tesis 51)	Cuchancha (ni)	Native	Herb	EXP: For children to walk (3)
Piperaceae	<i>Piper acutifolium</i> Ruiz & Pav. (ERI Tesis 93)	Matico matico (s)	Native	Tree	EXP: Abortion (13), Fractures (11), Uterus (13)
					EXP/GP: Rheumatism (11)
Plantaginaceae	<i>Plantago afra</i> Lam. (ERI Tesis 95)	Sakarara (q)	Introduced	Herb	EXP: Fever (1), Gallbladder (bile) (8)
Plantaginaceae	<i>Plantago major</i> L. (ERI Tesis 23)	Llantén (s), Q'ara Saqarara (q)	Introduced	Herb	EXP: Swelling (1), Uterus (13), Purgative (18), Hangover ("chaqui") (18)
					GP: Bruises (1), Constipation, Gallbladder (bile) (8), Dislocations (11), Anxiety (12), Kidneys (16)

					EXP/GP: Headache (1), Liver (8)
Poaceae	<i>Cortaderia rudiusscula</i> Stapf (ERI Tesis 50)	Cortadera (s), Sewenka (q)	Native	Herb	EXP: Cough (14), Throat pain (14)
					EXP/GP: For children to talk (3)
Poaceae	<i>Cymbopogon citratus</i> (DC). Stapf (ERI Tesis 36)	Hierba Luisa (s)	Introduced	Herb	EXP: Uterus (13)
					GP: Stomach pain (8)
Poaceae	<i>Zea mays</i> L. (ERI Tesis 103)	Cabello de maíz (s)	Introduced	Herb	EXP/GP: Kidneys (16)
Polemoniaceae	<i>Cantua buxifolia</i> Juss ex Lam (ERI Tesis 47)	Kantuta roja (s)	Native	Tree	EXP/GP: Kidneys (16)
Polygonaceae	<i>Muehlenbeckia volcanica</i> (Benth.) Endl. (ERI Tesis 70)	Mullaka (q)	Native	Herb	GP: Prostate (13)
					EXP/GP: Fever (1)
Polypodiaceae	<i>Niphidium crassifolium</i> (L.) Lellinger (ERI Tesis 40)	Calahuala, Calaguala (s)	Native	Herb	EXP: Body pain (1), Toothache (6)
Pteridaceae	<i>Adiantum orbignyanum</i> Kuhn (ERI Tesis 48)	Pimpinela (s)	Native	Herb	EXP: "Amartelo" (3), Nerves (12)
					GP: Grief ("pena") (3)
					EXP/GP: "Susto" (3)
Pteridaceae	<i>Argyroschisma nivea</i> (Poir.) Windham (ERI Tesis 85)	Ojos colantos (s)	Native	Herb	EXP: Uterus (13), Cough, Pneumonia (14)
Pteridaceae	<i>Pellaea ternifolia</i> (Cav) Link. (ERI Tesis 87)	K'ita marancera (q)	Native	Herb	EXP: Uterus (13)
Rhamnaceae	<i>Kentrothamnus weddellianus</i> (Miers) (ERI Tesis 7)	Chuju, Q'omerchuju (q)	Native	Shrub	EXP: "Susto" (3), Rickets ("Iarpa") (10)
Rosaceae	<i>Prunus persica</i> (L.) Batsch (ERI Tesis 65)	Durazno (s)	Introduced	Tree	EXP: Worm infestation ("gusanera") (4)
					GP: Stomach pain (8)

Rosaceae	<i>Rosa alba</i> L.	Rosa blanca (s)	Introduced	Shrub	GP: Anxiety (12), Dizziness (12)
					EXP/GP: Grief ("pena") (3)
Rubiaceae	<i>Galium corymbosum</i> Ruiz & Pav. (ERI Tesis 61)	Qallu Jasut'i (q)	Native	Herb	EXP: For children to talk (3), Stuttering in children (12)
Rubiaceae	<i>Uncaria tomentosa</i> (Willd) (ERI Tesis 89)	Uña de gato (s)	Native	Vine	EXP: Uterus (13)
Rutaceae	<i>Ruta chalepensis</i> L. (ERI Tesis 110)	Ruda (s)	Introduced	Herb	GP: Fainting (18), Rheumatism (11)
Scrophulariaceae	<i>Buddleja americana</i> L. (ERI Tesis 1)	Kiswara (q), Qhiswara (a)	Native	Shrub	EXP: Bone pain (11), Prostate (13)
Solanaceae	<i>Brugmansia arborea</i> (L.) Lagerh. (ERI Tesis 6)	Floripondio rojo (s), Puka Q'utupu (q)	Native	Tree	EXP: Blows or tumors, Bruises, Foot pain and burning, Swelling (1)
Solanaceae	<i>Brugmansia sanguinea</i> (Ruiz & Pav.) D.Don (ERI Tesis 59)	Floripondio rojo (s), Puka Q'utupu (q)	Native	Tree	EXP: Rheumatism (11)
					EXP/GP: Bruises (1)
Solanaceae	<i>Brugmansia suaveolens</i> (Willd.) Sweet (ERI Tesis 62)	Floripondio amarillo (s)	Native	Tree	EXP: Bruises, Foot pain and burning, Swelling (1)
Solanaceae	<i>Cestrum parqui</i> L'Hér. (ERI Tesis 27)	Hediondilla (s), Andrés huaylla (q), Ariuma (a)	Native	Shrub	EXP: Swelling (1), Skin ulcers (sores) (4), Wounds (5), Blood cleansing (19)
					EXP/GP: Fever (1)
Solanaceae	<i>Jaltomata herrerae</i> C.V. Morton (ERI Tesis 2)	Chilto (s)	Native	Herb	EXP/GP: Dislocations (11)
Solanaceae	<i>Nicotiana undulata</i> Ruiz & Pav. (ERI Tesis 38)	Sayre (s), K'ama saire, K'ita tabaco (q), Sairi sairi (a)	Native	Herb	EXP: Headache, Swelling, Swollen feet (1), Skin ulcers (sores) (4), Cancer (without specifying type) (10), Syphilis (chancroid) (13), Castration of animals (16)
Thelypteridaceae	<i>Macrothelypteris torresiana</i> (Gaudich.) Ching (ERI Tesis 33)	Helecho (s), Raque raque (q)	Native	Herb	EXP: Wounds (5)
Ulmaceae	<i>Ulmus minor</i> subsp. <i>Minor</i> (ERI Tesis 32)	Pampa Lambrám (q)	Introduced	Tree	EXP: Cold (14)
					GP: Gallbladder (bile), Liver (8), Kidneys (16)

					EXP/GP: Uterus (13)
Urticaceae	<i>Urtica urens</i> L. (ERI Tesis 41)	Ortiga hembra (s), China Itaphillu (q)	Introduced	Herb	EXP: Cough (14), Kidneys, Retention of urine (16)
Verbenaceae	<i>Aloysia citrodora</i> Paláu (ERI Tesis 109)	Cedrón (s)	Native	Shrub	EXP: Rheumatism (11)
Verbenaceae	<i>Junellia tridactylites</i> (Lag.) Moldenke	Verbena (s)	Native	Herb	GP: Uterus (13)
					EXP/GP: Gallbladder (bile), Stomach pain (8), Alcoholism (18)
Viburnaceae	<i>Sambucus peruviana</i> Kunth (ERI Tesis 21)	Sauco (s), Kola, Qhula, Kholá sauku (q)	Native	Tree	EXP: Bruises (1)
					EXP/GP: Scabies (4)

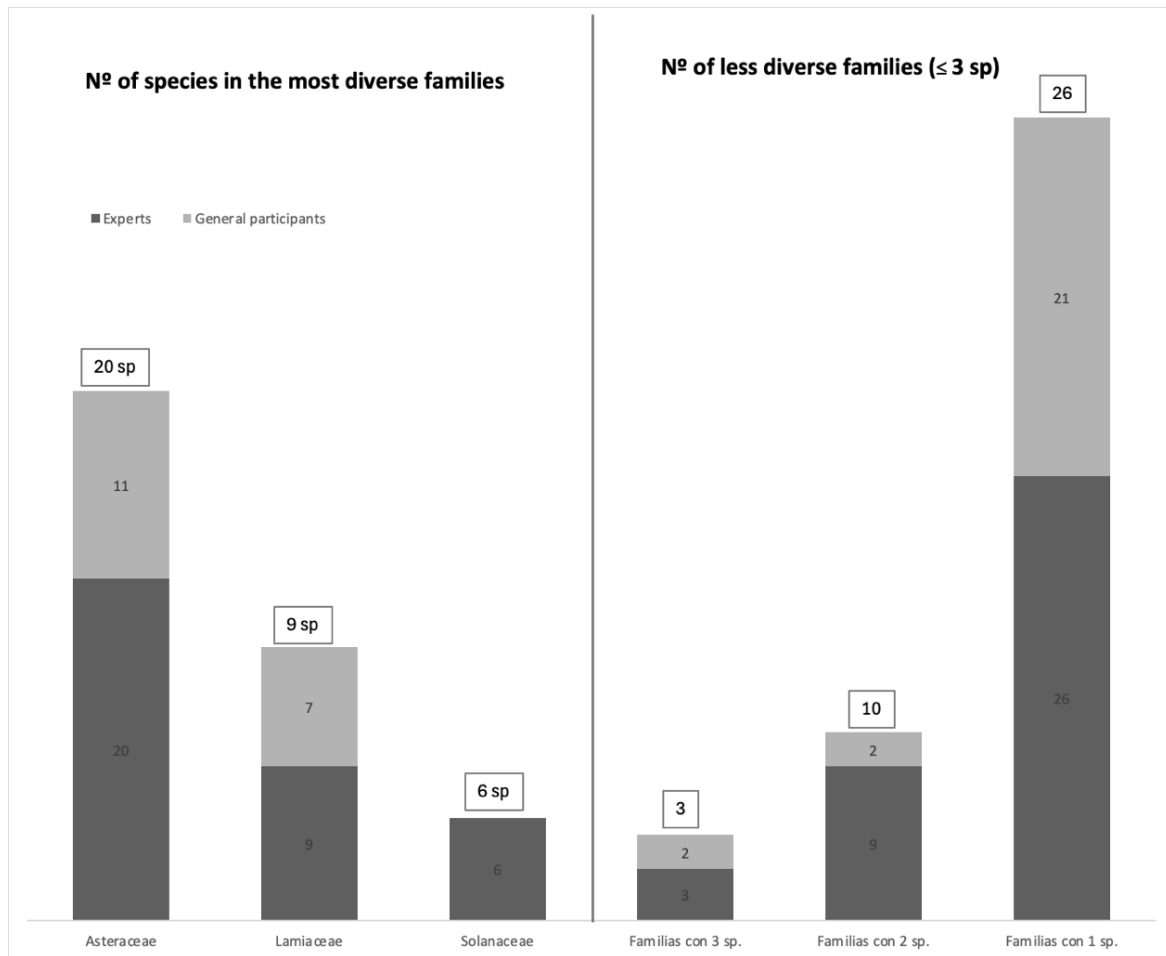


Figure 2. Composition of the medicinal flora in the Ayllu of Niño Corin reported by the experts and general participants. On the left are the most diverse families (the numbers in boxes correspond to the total number of species reported) and on the right the number of botanical families with a greater than or equal to three medicinal plant species reported (the numbers in boxes correspond to the total number of families reported).

Table 6. Life forms and origin of medicinal plant species reported in the Ayllu of Niño Corin. (*) number of species reported only by this group of participants.

Life forms	No. Native Species			No. Introduced Species		
	Experts	General participants	Total Species	Experts	General participants	Total Species
Tree	10 (3*)	7	10	3	3	3
Shrub	11 (8*)	3	11	4 (2*)	2	4
Subshrub	6 (3*)	3	6	-	-	-
Herb	30 (13*)	17	30	22 (11*)	13 (2*)	24
Vines	1(*)	-	1	-	-	-
Parasite	1(*)	1	1	-	-	-

Table 7. Distribution of knowledge of medicinal plant use reported in the ayllu of Niño Corin in subcategories of medicinal use differentiated for sages and general participants. (*) number of uses reported only by this group of participants, (#) number of uses reported in common for both groups of participants.

Medicinal subcategory	No. of reported medicinal uses		
	Total	Experts	General participants
General ailments with non-specific symptoms	60 (11#)	48 (37*)	23 (12*)
Digestive system	44 (16#)	29 (13*)	31 (15*)
Musculoskeletal system	23 (4#)	15 (11*)	12 (8*)

Reproductive system and sexual health	23 (3#)	18 (15*)	8 (5*)
Respiratory system	20 (7#)	15 (8*)	12 (5*)
Not specified	17 (2#)	13 (11*)	6 (4*)
Nervous system and mental health	16 (2#)	7 (5*)	11 (9*)
Infections and infestations	15 (3#)	14 (11*)	4 (1*)
Urinary system	14 (6#)	11 (5*)	9 (3*)
Diseases and cultural disorders	12 (3#)	10 (7*)	5 (2*)
Skin and subcutaneous tissue	9 (1#)	8 (7*)	2 (1*)
Metabolic system and nutrition	9 (2#)	9 (7*)	2
Pregnancy, childbirth and puerperium	7	4*	3*
Others	5 (1#)	4 (3*)	2 (1*)
Dental health	5 (2#)	5 (3*)	2
Endocrine system	3	2*	1*
Veterinary	3	3*	-
Total	285 (63#)	215 (152*)	133 (70*)

The 285 medicinal uses reported recorded 530 use reports, 53% of these reports correspond to the four experts. Thirty-four percent of medicinal uses (180 uses) have only one reported use, and 70% of these correspond only to the experts (Table 4). Among the general participants, 62% of medicinal uses had only one report of use (mentioned by one interviewee), and only six medicinal uses (5%) had more than five reports of use. In the case of the experts, 76% of medicinal uses had a single report (mentioned by one of the experts) and only 11 medicinal uses had more than three reports of use (Table 8). There is only one use in common among the uses with the highest number of reports among both groups of participants, the use of *Achyrocline venosa* to treat cough.

Table 8. Medicinal uses with the highest use reports among experts and general participants in Ayllu Niño Corin.

Subcategory medicinal use	Illness / Disease	Species	No. use reports
General Participants			
Respiratory system	Cough	<i>Eucalyptus globulus</i>	10
Respiratory system	Cough	<i>Schinus molle</i>	8
No specification	Various body inflammations	<i>Matricaria chamomilla</i>	8
General ailments with non-specific symptoms	Fever	<i>Malva neglecta</i>	7
Respiratory system	Cough	<i>Achyrocline venosa</i>	5
Digestive system	Gallbladder (bile)	<i>Junellia tridactylites</i>	5
Experts			
Respiratory system	Cough	<i>Achyrocline venosa</i>	4
General ailments with non-specific symptoms	Fever	<i>Colignonia glomerata</i>	4
Digestive system	Gallbladder (bile)	<i>Sonchus asper</i>	4
Digestive system	Gallbladder (bile)	<i>Junellia tridactylites</i>	3
Digestive system	Stomach pain	<i>Tagetes filifolia</i>	3
Reproductive system and sexual health	Uterus	<i>Alnus acuminata</i>	3
Reproductive system and sexual health	Uterus	<i>Ulmus minor</i> subsp. <i>minor</i>	3
Pregnancy, birth and puerperium	Induce labor	<i>Calceolaria sparsiflora</i>	3
Infections and infestations	"Gusanera"	<i>Tanacetum parthenium</i>	3
Other	Cancer	<i>Brassica rapa</i>	3
Musculoskeletal system	Rheumatism	<i>Aloysia citrodora</i>	3

Although differences were evident in relation to the medicinal uses most reported by both groups of interviewees, we found that the most significant difference in knowledge between the two groups was in the medicinal plant species used to treat the diseases/ailments they reported in common. Both groups of interviewees reported 37 diseases/ailments in common (Table 9). The largest number of species in common corresponded to the use of four different ailments: kidney problems (Urinary system), stomach pain (Digestive system), gallbladder (Digestive system), and fever (General ailments with non-specific symptoms). Regarding the common species used for different ailments/diseases, *Clinopodium bolivianum* was reported as used for body pain, diarrhea, stomach pain, gastritis, headache, dizziness, uterine pain, colds, and kidney problems, and *Verbena bonarienses* was used for stomach pain, diabetes, gallbladder problems, and drunkenness, among the two most commonly used. Five diseases/ailments did not report any species in common: Induce labor (Pregnancy, birth and puerperium), wounds (Skin and subcutaneous tissue), diabetes (Endocrine system), prostate (Reproductive system and sexual health) and sore throat (Respiratory system), highlighting cases such as medicinal plants to treat wounds reported only by the experts, unlike a single species reported by the general participants.

Table 9. Medicinal plant species, common and unique, reported for the diseases/illnesses reported in common by experts and general Participants in the Ayllu of Niño Corin.

Subcategory	Ailment/illness	Species common to both types of participants	Species reported only by the experts	Species reported only by general participants
General ailments with non-specific symptoms	Fever	<i>Cestrum parqui</i> , <i>Malva neglecta</i> , <i>Muehlenbeckia volcanica</i> , <i>Xanthium spinosum</i>	<i>Colignonia glomerata</i> , <i>Eucalyptus globulus</i> , <i>Gunnera boliviana</i> , <i>Malva assurgentiflora</i> , <i>Matricaria chamomilla</i> , <i>Oxalis flagellata</i> , <i>Plantago afra</i> , <i>Sonchus asper</i>	-
	Body pain	<i>Clinopodium bolivianum</i> , <i>Hebeclinium macrophyllum</i>	<i>Niphidium crassifolium</i> , <i>Iris germanica</i>	<i>Achyrocline venosa</i> , <i>Alnus acuminata</i> , <i>Ligaria cuneifolia</i> , <i>Malva neglecta</i>
	Bruises	<i>Brugmansia sanguinea</i>	<i>Baccharis latifolia</i> , <i>Brugmansia arborea</i> , <i>Brugmansia suaveolens</i> , <i>Hebeclinium macrophyllum</i> , <i>Oenothera rosea</i> , <i>Sambucus peruviana</i>	<i>Plantago major</i>
	Swellings	<i>Matricaria chamomilla</i>	<i>Brugmansia arborea</i> , <i>Brugmansia suaveolens</i> , <i>Cestrum parqui</i> , <i>Marrubium vulgare</i> , <i>Nicotiana undulata</i> , <i>Plantago major</i>	-
	Foot pain and burning	<i>Alnus acuminata</i>	<i>Brugmansia arborea</i> , <i>Brugmansia suaveolens</i>	-
	Headache	<i>Clinopodium bolivianum</i> , <i>Plantago major</i>	<i>Ambrosia arborescens</i> , <i>Minthostachys mollis</i> , <i>Nicotiana undulata</i> , <i>Sonchus asper</i>	<i>Alnus acuminata</i> , <i>Eucalyptus globulus</i> ,

				<i>Matricaria chamomilla</i> , <i>Petroselinum crispum</i> , <i>Tagetes minuta</i>
Pregnancy, birth and puerperium	Induce labor	-	<i>Calceolaria sparsiflora</i> , <i>Cucurbita maxima</i> , <i>Origanum vulgare</i>	<i>Clinopodium bolivianum</i>
Cultural diseases	Grief ("pena")	<i>Rosa alba</i>	-	<i>Adiantum orbignyianum</i>
	Getting children to talk	<i>Cortaderia rudijscula</i>	<i>Galium corymbosum</i>	-
	"Susto"	<i>Adiantum orbignyianum</i>	<i>Kentrothamnus weddellianus</i>	-
Infections and infestations	Worm infestation ("gusanera")	<i>Mentha spicata</i> , <i>Salvia haenkei</i>	<i>Bocconia integrifolia</i> , <i>Dysphania ambrosioides</i> , <i>Lepidium bipinnatifidum</i> , <i>Prunus persica</i> , <i>Tanacetum parthenium</i>	<i>Euphorbia peplus</i>
	Scabies	<i>Sambucus peruviana</i>	<i>Otholobium pubescens</i>	-
Skin and subcutaneous tissue	Wounds	-	<i>Cestrum parqui</i> , <i>Dysphania ambrosioides</i> , <i>Ligaria cuneifolia</i> , <i>Macrothelypteris torresiana</i> , <i>Marrubium vulgare</i> , <i>Otholobium pubescens</i> , <i>Senna birostris</i> ,	<i>Achyrocline venous</i>
	Skin rash (inflammation of the skin)	<i>Matricaria chamomilla</i>	-	-
Dental health	Toothache	<i>Euphorbia peplus</i> , <i>Rosmarinus officinalis</i>	<i>Marrubium vulgare</i> , <i>Myrtus communis</i> , <i>Niphidium crassifolium</i>	-
Digestive system	Stomach pain	<i>Clinopodium bolivianum</i> , <i>Junellia tridactylites</i> , <i>Mentha spicata</i> , <i>Minthostachys mollis</i> , <i>Tagetes filifolia</i>	<i>Dysphania ambrosioides</i> , <i>Tanacetum parthenium</i>	<i>Cymbopogon citratus</i> , <i>Euphorbia peplus</i> , <i>Matricaria chamomilla</i> , <i>Petroselinum crispum</i> , <i>Prunus persica</i> ,
	Gallbladder (bile)	<i>Junellia tridactylites</i> , <i>Malva neglecta</i> , <i>Petroselinum crispum</i> , <i>Smallanthus sonchifolius</i> ,	<i>Distichia muscoides</i> , <i>Plantago afra</i> , <i>Senna birostris</i> , <i>Taraxacum officinale</i>	<i>Dysphania ambrosioides</i> , <i>Otholobium pubescens</i> , <i>Plantago major</i> , <i>Ulmus minor subsp.</i>

		<i>Sonchus asper</i>		<i>minor, Ulmus minor subsp.</i>
	Diarrhea	<i>Bidens andicola, Clinopodium bolivianum</i>	<i>Gunnera boliviana, Sisyrinchium chilense</i>	<i>Mentha spicata, Otholobium pubescens</i>
	Liver	<i>Otholobium pubescens, Plantago major</i>	<i>Tagetes minuta</i>	<i>Baccharis latifolia, Ulmus minor subsp. minor.</i>
	Gastritis	<i>Clinopodium bolivianum</i>	<i>Salvia haenkei, Tagetes filifolia</i>	<i>Minthostachys mollis</i>
	Indigestion ("empacho")	<i>Mentha spicata</i>	<i>Juglans australis</i>	-
Endocrine system	Diabetes	-	<i>Baccharis genistelloides, Smallanthus sonchifolius</i>	<i>Dysphania ambrosioides</i>
Metabolic system and nutrition	Rickets ("Iarpa")	<i>Schinus molle</i>	<i>Bocconia integrifolia, Kentrothamnus weddellianus, Senna birostris</i>	-
	Cancer (without specifying type)	<i>Otholobium pubescens</i>	<i>Bidens andicola, Brassica rapa, Gunnera boliviana, Nicotiana undulata</i>	-
Musculoskeletal system	Rheumatism	<i>Encelia canescens, Piper acutifolium</i>	<i>Aloysia citrodora, Bocconia integrifolia, Brugmansia sanguinea</i>	<i>Hedeoma mandoniana, Ruta chalepensis, Schinus molle</i>
	Dislocations	<i>Baccharis latifolia, Jaltomata herrerae</i>	<i>Ageratina pentlandiana, Ligaria cuneifolia</i>	<i>Hebeclinium macrophyllum, Marrubium vulgare, Plantago major</i>
Nervous system and mental health	Dizziness	<i>Clinopodium bolivianum</i>	<i>Minthostachys mollis</i>	<i>Eucalyptus globulus, Hedeoma mandoniana, Mentha spicata, Rosa alba</i>
	Memory	<i>Salvia haenkei</i>	-	-
Reproductive system and sexual health	Uterus	<i>Alnus acuminata, Clinopodium bolivianum, Ulmus minor subsp. minor</i>	<i>Argyrochosma nivea, Ambrosia arborescens, Baccharis genistelloides, Bocconia integrifolia, Cymbopogon citratus, Iris germánica, Ligaria cuneifolia, Piper acutifolium, Plantago major, Uncaria tormentosa</i>	<i>Eucalyptus globulus, Hedeoma mandoniana, Junellia tridactylites</i>

	Prostate	-	<i>Buddleja americana</i>	<i>Muehlenbeckia volcanica</i>
Respiratory system	Cough	<i>Achyrocline venosa</i> , <i>Eucalyptus globulus</i> , <i>Schinus molle</i>	<i>Argyrochosma nivea</i> , <i>Cortaderia rudijscula</i> , <i>Mutisia acuminata</i> , <i>Urtica urens</i>	-
	Cold	<i>Achyrocline venosa</i> , <i>Clinopodium bolivianum</i> , <i>Hedeoma mandoniana</i>	<i>Tagetes pusilla</i> , <i>Ulmus minor subsp. minor</i>	<i>Eucalyptus globulus</i> , <i>Matricaria chamomilla</i> , <i>Petroselinum crispum</i>
	Pneumonia	<i>Juglans australis</i>	<i>Argyrochosma nivea</i>	<i>Achyrocline venosa</i>
	Throat pain	-	<i>Cortaderia rudijscula</i>	<i>Eucalyptus globulus</i>
Urinary system	Kidneys	<i>Cantua buxifolia</i> , <i>Clinopodium bolivianum</i> , <i>Equisetum bogotense</i> , <i>Gunnera boliviana</i> , <i>Otholobium pubescens</i> , <i>Zea mays</i>	<i>Bidens andicola</i> , <i>Urtica urens</i>	<i>Achyrocline venosa</i> , <i>Plantago major</i> , <i>Ulmus minor subsp. minor</i>
Not specified	"Frío"	<i>Tagetes filifolia</i>	<i>Agave americana</i> , <i>Bidens andicola</i> , <i>Mentha spicata</i> , <i>Minthostachys mollis</i> , <i>Myrtus communis</i>	<i>Clinopodium bolivianum</i>
	Alcoholism	<i>Junellia tridactylites</i>	-	-
Other	Blood cleansing	<i>Tagetes minuta</i>	<i>Cestrum parqui</i> , <i>Marrubium vulgare</i>	<i>Apium graveolens</i>

The most important medicinal plants in the ayllu Niño Corin

The three measures of relative importance used to determine the most important medicinal plant species allowed us to identify groups of species that were more similar **within** the two groups of participants, and with more differences **between** the groups of participants.

The five most important species, with the highest VU, RI and IF, among experts were: *Clinopodium bolivianum* (Local name: Muña), *Nicotiana undulata* (LN: Saire hembra), *Otholobium pubescens* (LN: Willia), *Minthostachys mollis* (LN: Martin Muña) and *Plantago major* (NL: Llantén), all except the Llantén correspond to native species. In the case of the general participants the five most important species were: *Clinopodium bolivianum*, *Matricaria chamomilla* (LN: Manzanilla), *Eucalyptus globulus* (LN: Eucalyptus), *Achyrocline venosa* (LN: Huira huira), *Petroselinum crispum* (LN: Parsley) and *Plantago major*, of these only Muña and Huira were to native species (Table 10).

Comparing the groups of important species obtained for each index **between** the groups of interviewees, we found that *Clinopodium bolivianum* had the highest values for both experts and general participants. The other important species were the same, but the hierarchy of importance was not the same in any of the cases (Table 10). These differences were best explained by comparing the specific medicinal uses that both groups of respondents reported for these medicinal plant species (Table 11). Where we observe that although these species are used to treat numerous diseases/ailments

reported in common by both groups of interviewees, many of them were used to treat a greater number of diseases/ailments reported only by the general participants.

Table 10. Comparison of the three measures of relative importance used to identify the most important medicinal plant species (the species correspond to the five highest values within each index) reported in the Ayllu of Niño Corin. The most important species in each index are shown in bold. (*) species common within the same index in both groups of participants; (n) native species.

Experts				General participants			
Most important species by VU	UV	RI	FI	Most important species by VU	UV	RI	FI
<i>Clinopodium bolivianum</i> (n) (*)	2.5	2.0	100	<i>Clinopodium bolivianum</i> (n) (*)	0.7	2.0	60
<i>Minthostachys mollis</i> (n)	2.3	1.6	100	<i>Matricaria chamomilla</i>	0.7	1.6	72
<i>Nicotiana undulata</i> (n)	2.0	1.8	100	<i>Eucalyptus globulus</i>	0.7	0.9	60
<i>Otholobium pubescens</i> (n) (*)	1.8	1.7	100	<i>Achyrocline venosa</i> (n) (*)	0.6	1.0	56
<i>Sonchus asper</i>	1.8	0.9	100	<i>Plantago major</i> (*)	0.6	1.3	56
<i>Cestrum parqui</i> (n)	1.8	1.2	75	<i>Petroselinum crispum</i>	0.6	1.0	48
<i>Bocconia integrifolia</i> (n)	1.8	1.1	75	<i>Mentha spicata</i>	0.4	0.8	36
<i>Senna birostris</i> (n)	1.8	1.4	75	<i>Schinus molle</i> (n)	0.4	0.6	36
<i>Achyrocline venosa</i> (n) (*)	1.5	0.4	100	<i>Malva neglecta</i>	0.4	0.5	36
<i>Plantago major</i> (*)	1.5	1.5	100	<i>Otholobium pubescens</i> (n) (*)	0.3	0.8	100
<i>Gunnera boliviana</i> (n)	1.5	1.1	100	<i>Alnus acuminata</i> (n)	0.3	0.8	75
<i>Marrubium vulgare</i>	1.5	1.2	100	<i>Junellia tridactylites</i> (n)	0.3	0.8	75
<i>Ambrosia arborescens</i> (n)	1.5	1.2	75	<i>Tagetes minuta</i> (n)	0.3	0.7	25
<i>Ligaria cuneifolia</i> (n)	1.5	1.1	75	<i>Hedeoma mandoniana</i> (n)	0.3	0.8	50
Most important species by IR	RI	UV	FI	Most important species by IR	RI	UV	FI
<i>Clinopodium bolivianum</i> (n) (*)	2.0	2.5	100	<i>Clinopodium bolivianum</i> (n) (*)	2.0	0.7	60
<i>Nicotiana undulata</i> (n)	1.8	2.0	100	<i>Matricaria chamomilla</i>	1.6	0.7	72
<i>Otholobium pubescens</i> (n)	1.7	1.8	100	<i>Plantago major</i> (*)	1.3	0.6	56
<i>Minthostachys mollis</i> (n)	1.6	2.3	100	<i>Achyrocline venosa</i> (n)	1.0	0.6	56
<i>Plantago major</i> (*)	1.5	1.5	100	<i>Petroselinum crispum</i>	1.0	0.6	48
<i>Senna birostris</i> (n)	1.4	1.8	75	<i>Eucalyptus globulus</i>	0.9	0.7	60
Most important species by FI	FI	UV	RI	Most important species by FI	FI	UV	RI
<i>Clinopodium bolivianum</i> (n) (*)	100	2.5	2.0	<i>Matricaria chamomilla</i> (*)	72	0.7	1.6
<i>Minthostachys mollis</i> (n)	100	2.3	1.6	<i>Clinopodium bolivianum</i> (n) (*)	60	0.7	2.0
<i>Nicotiana undulata</i> (n)	100	2.0	1.8	<i>Eucalyptus globulus</i>	60	0.7	0.9
<i>Otholobium pubescens</i> (n)	100	1.8	1.7	<i>Plantago major</i> (*)	56	0.6	1.3
<i>Sonchus asper</i>	100	1.8	0.9	<i>Achyrocline venosa</i> (n) (*)	56	0.6	1.0
<i>Plantago major</i> (*)	100	1.5	1.5	<i>Petroselinum crispum</i>	48	0.6	1.0
<i>Marrubium vulgare</i>	100	1.5	1.2	<i>Mentha spicata</i> (*)	36	0.4	0.8
<i>Gunnera boliviana</i> (n)	100	1.5	1.1	<i>Malva neglecta</i>	36	0.4	0.5
<i>Achyrocline venosa</i> (n) (*)	100	1.5	0.4	<i>Schinus molle</i> (n)	36	0.4	0.6
<i>Mentha spicata</i> (*)	100	1.3	0.9				
<i>Matricaria chamomilla</i> (*)	100	1.3	0.9				
<i>Mentha spicata</i> (*)	100	1.3	0.9				
<i>Tagetes filifolia</i> (n)	100	1.3	0.7				
<i>Hebeclinium macrophyllum</i> (n)	100	1.3	0.7				
<i>Tanacetum parthenium</i>	100	1.0	0.6				

Table 11. Comparison of the diseases/diseases reported for the most important medicinal plant species identified using the relative importance indices to experts and participants in general. Origin: **(n)** native species, **(i)** introduced species. **(LN)** Local name.

Species	Reported ailments and/or illnesses (<i>Medicinal Subcategory</i>)		
	In common	Experts	General participants
<i>Clinopodium bolivianum</i> LAMIACEAE (LN: <i>Muña</i>)(n)	<ul style="list-style-type: none"> – Diarrhea; stomach pain; gastritis (<u>Digestive System</u>) – Headache; body aches (<u>General ailments with nonspecific symptoms</u>) – Dizziness (<u>Nervous System and Mental Health</u>) – Uterus (<u>Reproductive System and Sexual Health</u>) – Cold (<u>Respiratory System</u>) – Kidneys (<u>Urinary System</u>) 	-	<ul style="list-style-type: none"> – Inducing labor (<u>Pregnancy, birth, and postpartum period</u>) – “Frío” (<u>Not specified</u>)
<i>Otholobium pubescens</i> FABACEAE (LN: <i>Willia</i>) (n)	<ul style="list-style-type: none"> – Liver (<u>Digestive System</u>) – Kidneys (<u>Urinary System</u>) – Cancer (<u>Other</u>) 	<ul style="list-style-type: none"> – Scabies (<u>Infection and infestation</u>) – Wounds (<u>Skin and subcutaneous tissue</u>) – Bruises or tumors (<u>General disorders with nonspecific symptoms</u>) 	<ul style="list-style-type: none"> – Diarrhea; gallbladder (bile) (<u>Digestive System</u>)
<i>Achyrocline venosa</i> ASTERACEAE (LN: <i>Huira huira</i>) (n)	<ul style="list-style-type: none"> – Cold; cough (<u>Respiratory System</u>) 	-	<ul style="list-style-type: none"> – Body pain (<u>General ailments with nonspecific symptoms</u>) – Wounds (<u>Skin and subcutaneous tissue</u>) – Pneumonia (<u>Respiratory system</u>) – Kidneys (<u>Urinary system</u>)
<i>Minthostachys mollis</i> LAMIACEAE (LN: <i>Martin Muña</i>) (n)	<ul style="list-style-type: none"> – Stomach pain (<u>Digestive system</u>) 	<ul style="list-style-type: none"> – Headache (<u>General ailments with non-specific symptoms</u>) – Coccyx pain (<u>Musculoskeletal system</u>) – Swollen stomach (<u>General ailments with non-specific symptoms</u>) – Dizziness (<u>Nervous system and mental health</u>) – Body aches, “Frío” (<u>Not specified</u>) 	<ul style="list-style-type: none"> – Gastritis (<u>Digestive System</u>)
<i>Plantago major</i> PLANTAGINACEAE (LN: <i>Llantén</i>) (i)	<ul style="list-style-type: none"> – Liver (<u>Digestive System</u>) – Headache (<u>General ailments with nonspecific symptoms</u>) 	<ul style="list-style-type: none"> – Swelling (<u>General ailments with nonspecific symptoms</u>) – Uterus (<u>Reproductive system and sexual health</u>) – Purgative, hangover (<u>Not specified</u>) 	<ul style="list-style-type: none"> – Gallbladder; constipation (<u>Digestive System</u>) – Sprains (<u>Musculoskeletal System</u>) – Bruises (<u>General ailments with nonspecific symptoms</u>) – Kidneys (<u>Urinary System</u>) – Anxiety (<u>Nervous System and Mental Health</u>)
<i>Matricaria chamomilla</i> ASTERACEAE	<ul style="list-style-type: none"> – Skin rash (inflammation of the skin) (<u>Skin and subcutaneous tissue</u>) 	<ul style="list-style-type: none"> – Fever (<u>General ailments with nonspecific</u>) 	<ul style="list-style-type: none"> – Headache (<u>General ailments with nonspecific symptoms</u>)

(LN: Manzanilla) (i)	– Swelling (<u>General disorders with nonspecific symptoms</u>)	<u>symptoms</u> – Insomnia (<u>Nervous system and mental health</u>)	– Stomach pain (<u>Digestive system</u>) – Cold (<u>Respiratory system</u>) – Birth washing and washing of the newborn (<u>Pregnancy, birth, and postpartum</u>) – Anxiety (<u>Nervous system and mental health</u>) – Various inflammations of the body; for all ailments (<u>Not specified</u>)
<i>Mentha spicata</i> LAMIACEAE (LN: Hierba buena negra) (i)	– Stomachache; indigestion (<u>Digestive System</u>) – Intestinal parasites (worms) (<u>Infections and infestations</u>)	– “Frío” (<u>Not specified</u>)	– Dizziness (<u>Nervous system and mental health</u>)
<i>Eucalyptus globulus</i> MYRTACEAE (LN: Eucalyptus) (i)	– Cough (<u>Respiratory system</u>)	– Fever (<u>General ailments with non-specific symptoms</u>) – Cleans the environment (<u>No specification</u>)	– Cold; sore throat (<u>Respiratory System</u>) – Headache (<u>General ailments with non-specific symptoms</u>) – Dizziness (<u>Nervous system and mental health</u>) – Uterus (<u>Reproductive system and sexual health</u>)
<i>Petroselinum crispum</i> APIACEAE (LN: Parsley) (i)	– Gallbladder (<u>Digestive System</u>)	–	– Stomach pain (<u>Digestive System</u>) – Cold (<u>Respiratory System</u>) – Nausea (<u>General ailments with non-specific symptoms</u>)

Discussion

Our results agreed with other studies carried out in similar eco-regions in Bolivia or Andean nearby countries (De la Cruz *et al.* 2007, Cussy-Poma *et al.* 2017, Corroto *et al.* 2019, Falter 2019). In absolute terms, the number of medicinal plants reported in Niño Corin is very similar to that documented in other communities in the Andes (Fernandez *et al.* 2003, Apaza 2008, Monigatti *et al.* 2013, Gonzales *et al.* 2014, Mathez-Stiefel & Brandt 2018). However, compared to the pharmacopoeia reported for the Kallawayas healers, which according to Bastien (1987) consists of approximately one thousand different species of medicinal plants, it is very small. However, it is important to clarify that Kallawayas doctors followed a traditional Andean pattern of specialization in their medicinal practices, which are no longer practiced today (Bastien 1987, Janni & Bastien 2000, Fischer 2023). This pattern was characterized by taking advantage of the availability of specific resources at the different ecological levels among which they moved (not only among Andean communities), often reinforced by reciprocity, that is, the exchange of medicinal resources between specialized communities (e.g. with the Amazon region) (Saignes 1983, Loza 2003). They strengthened their skills acquired through practice and transmitted through oral traditions by using a secret language, a vestige of the now extinct Puquina language (they called it “machaj-juyai,” which means “language of people”) and the maintenance of this reputation by the elders through a network of trust between communities that exchanged resources, thereby preserving the reputation of a community established by its specialists in traditional medicine (Bastien 1982, 1987, Thomas *et al.* 2009).

Although certain patterns of continuity link today's healers with their distant Kallawayas ancestors, a number of the species reported by Kallawayas doctors in works documenting their knowledge (Bastien 1987, Girault 1987) are still used, and the wise men know from experience and tradition the therapeutic effects of these species on specific symptoms, they recognize that their tradition has undergone many changes. Among these changes are the quechuaization of the “secret language of the Kallawayas” with puquina roots (Gisbert 1987), the incorporation of the Spanish language and the fragmentation and reduction of their lands. Some migrated to the cities, motivated by their

children's education and entry into wage labor, where their practice was influenced by new factors such as the incorporation of Spanish and the loss of their original language, as well as change from their traditional dress to Western clothing (abandoning the symbolism associated with their clothing). Another aspect to consider is the physical distance from their Ayllu and their lands as an integral part of their territorial configuration and their universe, and fundamental to healing, as well as the incorporating natural medicine from sources outside the Kallawaya tradition and modern medicine (including books and publications on "traditional" medicine) (Bastien 1987, Fischer 2023). Although knowledge is still transmitted from parents to children, even within the extended family, the diversity of their practices shows that today's Kallawaya healers follow a popular tradition that is subject to change and experience. They mention that there has been a marked decrease in the number of medicinal plants used in healing, that the environment offers less abundance of species, so healers have reduced their treks and journeys, and that while many illnesses are cured, diseases are treated more effectively with synthetic drugs (R. Carita, personal communication 2017). Some have expanded their traditional role into the urban sphere, to include shamanism, spiritualism, and divination in their healing practices, demonstrating their ability to adapt their practice to different local contexts and needs.

The most cited plant families in our study are included among the most important in other Andean medicinal plants works, being Asteraceae as the family with the highest number of medicinal species, and Lamiaceae and Solanaceae among the most important families (e.g. Pestalozzi 1998, Ureña 2001, Arrázola *et al.* 2002, Fernandez *et al.* 2003, Apaza 2008, Thomas *et al.* 2009, Cussy-Poma *et al.* 2017). These families also stand out among the most widely used in the documentation of Kallawaya medicinal knowledge, as evidenced by the works of Girault (1987), Oblitas (1963), and Bastien (1987).

The preference for Asteraceae has been supported by numerous pharmacological studies that have demonstrated their efficacy in treating various ailments due to their different therapeutic properties, including antioxidant, antimicrobial, antibacterial, antifungal, and antiviral properties, and the wide range of bioactive components they contain, as well as the greater likelihood that people will experiment with species from this family as a result of the typical bitter phytochemicals they often contain (Rzedowski 1993, Heinrich *et al.* 1998, Casagrande, 2002, Osorio 2009, Bussmann & Sharon 2015, Castillo *et al.* 2017, Falter 2019). Similarly, various studies have highlighted and confirmed the importance of the Lamiaceae in local pharmacopoeias (not only in the Andes) due to the essential oils found in the plants (mainly terpenoids, phenolic compounds, flavonoids and iridoids) and their anti-inflammatory, analgesic and digestive properties, which make them important for treating ailments affecting the digestive, nervous and respiratory systems (Herrera *et al.* 2015, Reyes *et al.* 2025). In addition, many species of this family are used as an important ingredient in traditional Andean cuisine, which reinforces their local importance (Schmidt-Lebuhn 2008). Likewise, the Solanaceae is a family well known to contain highly bioactive species, which in many cases relates to the presence of alkaloids (Shah *et al.* 2013; Thomas *et al.* 2009).

The prevalence of herbaceous plants in Niño Corin's pharmacopoeia is not surprising. Several studies have linked the popularity of herbs in traditional medicine to their greater likelihood of containing bioactive phytochemicals compared to woody growth forms (e.g. Bennett & Prance 2000, Stepp & Moerman 2001, Stepp 2004, Voeks 2004, Ceuterick 2011). However, the significant therapeutic use of shrubs, subshrubs, and trees may be related to their greater visibility and availability to people throughout the year (cf. Turner 1988, Thomas *et al.* 2008). In fact, during the dry season, almost all annual herbs disappear (except in irrigated land, crops, and humid areas). Woody plants persist during the dry season and are therefore the only medicinal alternative for half of the year, for this reason, they are more likely to be better known to the population, also as sources of herbal medicines (cf. Voeks 2004, Thomas *et al.* 2008, Thomas 2013).

The uses of medicinal plants in the community of Niño Corin support the findings of other studies on the importance of medicinal plants for primary health care in rural and isolated areas (Bastien 1982, Kinman 1999, Perry & Gesler 2000, Sikkink 2000). At the same time, like other research on medicinal plants, our research has shown that knowledge is not always evenly distributed and that not all members necessarily possess the same knowledge. This is especially true in the case of experts, those who could be considered "specialists" and who possess richer, more diverse, and deeper knowledge compared to the general population (Apaza 2008, Vandebroek *et al.* 2004b).

The differences found between the knowledge of experts and general participants could be explained as part of an adaptive response related to how ethnomedical knowledge is acquired and retained. In the case of experts, their exposure to a wider range of diseases would lead them to have a more extensive medical knowledge base, enhanced by the possibility of experimenting with and testing more plant species. A good example of this could be the knowledge of midwives who, due

to the nature of the care they provide in communities, covering not only care for the mother and newborn, but also for all family members, have diversified the use of plants, developing specialized and unique knowledge that has already been documented in other areas where they are considered the only experts (Bussmann & Glenn 2010; Monigatti *et al.* 2013). In addition, this rich knowledge could be enhanced by the prevalence of certain disorders and ailments, such as those most frequently reported in rural Andean communities (e.g., diarrhea, coughs, colds, infections, fever), which are very common in Niño Corin according to the health report of the Autonomous Municipal Government of Charazani (2016), and which could lead to the preferential use of certain species of medicinal plants, the most prominent or available, to treat more common health conditions compared to their use to treat other rarer ailments. This difference in knowledge compared to that of the non-expert population is clearly seen in the composition of the species used by experts to treat the most common ailments in the community (Bussmann & Sharon 2014, Ceuterick *et al.* 2011, De Feo 2003, Vandebroek *et al.* 2004b, Corroto & Macía 2021).

One point that stands out is that, despite having more than 200 medicinal uses reported, and more than 500 reports of these uses, it is striking that a high percentage have only one report of use (62% of general participants and 76% of experts). This low level of consensus may seem surprising, especially considering that more than half of uses were provided by traditional healers. However, this finding is consistent with a widespread trend (e.g. Friedman *et al.* 1986, Casagrande 2002), according to which the distribution of knowledge about plant remedies follows a pattern in which few remedies are known to almost everyone, while most knowledge is idiosyncratic, in some cases even posing an upper limit on the knowledge that can be transferred and distributed (Casagrande 2002). On the other hand, the idiosyncratic nature of ethnomedical knowledge could be related to the fact that the preparation and use of medicinal plants is more difficult to learn compared to other categories of use, such as food, which can be learned throughout a person's lifetime (Thomas *et al.* 2009).

In addition, the relative importance metrics of the most important medicinal plants helped us better visualize the differences in knowledge between the two types of participants and showed how the choice of species was guided by experience, differentiated practice, and the need to meet local needs. The more specialized knowledge of the experts is clearly linked mainly to native species, in contrast to the general participants, who tend to use mainly introduced species, possibly related to the type of ailments initially treated at home requiring a quicker and simpler response, such as the collection of introduced species that are usually available in the vicinity of homes, such as chamomile (*Matricaria chamomilla*), eucalyptus (*Eucalyptus globulus*), llanten (*Plantago major*) or parsley (*Petroselinum crispum*) which are among the most important. In contrast to the treatments applied by experts, which are related to ailments and/or diseases that are more difficult to treat and require the use of species that are often native, such as muña (*Clinopodium bolivianum*), saire hembra (*Nicotiana undulata*), willia (*Otholobium pubescens*), martin muña (*Minthostachys mollis*), or huira huira (*Achyrocline venosa*), which must be sought out in certain places and at certain times of the year and preserved so that they are available throughout the year. This coincidence in all the indices that were applied to identify the most important species within each group of participants could reflect the effectiveness of these medicinal plant species used to treat ailments locally. This fact highlights the importance of using different indices to obtain more complete information when suggesting species as important (Paniagua-Zambrana *et al.* 2017).

Finally, these findings support an observation that appears in the literature: indigenous pharmacopoeias around the world are far from being random collections. Some families clearly contain more medicinal species than would be expected by chance, and some species are more frequently used because of their pharmacological characteristics. The same reasoning seems to apply to Niño Corin, where the most important species are those commonly cited in any Andean ethnomedicinal work for similar uses (Bussmann & Sharon 2006, Thomas *et al.* 2009, Gonzales *et al.* 2014).

Conclusion

Similar to other Andean communities, traditional medicine in Niño Corin is a cultural tradition of great importance developed as a strategy for adapting to an environment with difficult access to Western medicine and conditions that favor the spread of infectious diseases, which, combined with harsh living conditions, had led to the accumulation of extensive knowledge about the use of medicinal plants. This knowledge plays a fundamental role in primary health care for the local population. In addition, the differences found in knowledge of the medicinal use of plants among community members confirm the important role that experts or “wise men” play in healthcare in communities, mainly in the Andes

Being in an area with a recognized tradition in the use of medicinal plants dating back to pre-Columbian times, such as that of the Kallawaya doctors, similar knowledge would have been expected. However, our results have shown us that knowledge about medicinal plants, as in other places in the Andes, is dynamic and seems to be driven largely, though not exclusively, by demand, which means that knowledge develops—basically through experimentation—when there is a need.

The composition of the identified pharmacopoeia suggests that most species used for medicinal purposes: (1) belong to certain botanical families, such as Asteraceae, Lamiaceae, or Solanaceae, which may contain higher proportions of bioactive or aromatic species compared to other plant families; (2) are native and have an herbaceous, shrubby, or arboreal growth form, available most of the year. In this sense, the present study corroborates the widely recognized notion that indigenous pharmacopoeias, in this case the pharmacopoeia of the Kallawaya region, are non-random subsets of the local flora.

Declarations

List of abbreviations: Not applicable

Ethics approval and consent to participate: The development of the study followed the ethical and legal guidelines for the development of research on traditional knowledge. The permissions requested from the community have been included as an Appendix in the manuscript.

Consent for publication: Not applicable

Availability of data and materials: Not applicable

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