


REVIEW ARTICLE

Therapeutic resources used by traditional communities of the Brazilian Amazon: a scoping review

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ABSTRACT:

Introduction: The traditional communities of the Brazilian Amazon possess significant knowledge regarding the huge therapeutic arsenal available from natural sources that can be used to care for their health problems. This study aimed to identify, map and synthesize the scientific evidence on the use of traditional medicine as a therapeutic resource when used by traditional communities of the Brazilian Amazon.

Methods: This is a scoping review, which is a method used to map the main concepts of a research area, the available evidence and its sources. It is developed in five steps: (1) identification of the research question; (2) identification of relevant studies; (3) selection of studies; (4) data analysis; and (5) grouping, synthesis and presentation of data.

Results: Medicinal plants, vertebrates and invertebrates, among other medicinal products, are elements that are widely used by traditional populations. Plant stems, bark, leaves, flowers, fruits, seeds, roots, tubers and even the whole plant are prepared in various forms, such as teas, infusions, smoke for rituals, baths, **Keywords:**

Brazil, Indigenous, medicinal plants, quilombolas, riverine, zotherapy.

macerations, oils, ointments, concoctions, dressings, incenses and exfoliants, among others. The main structures and forms used from animals are lards, fats, viscera, horns, cocoons, nests, feathers and beaks of birds, eggs and roes. These therapeutic practices are often carried out using endogenous, wild and domesticated natural resources present in the biodiverse environments of traditional populations. They involve magical-religious beliefs to treat all types of illnesses, including cultural syndromes that affect children, young people, adults and the elderly.

Conclusion: This scoping review has an important role to disseminate and expand the discussion of traditional medicine practices, inviting readers – whether they are health professionals, community members, managers or decision-makers – to a continuing debate using an intercultural dialogue necessary to improve approaches. From this perspective, it is essential to consider the comprehensive legal and legal framework that guides the public policies of national health systems.

FULL ARTICLE:

Introduction

WHO defines traditional, complementary and integrative medicines as a broad set of healthcare practices based on theories and experiences from different cultures used for health promotion, prevention and recovery, taking into account the integral being in all its dimensions^{1,2}. Traditional medicine has a long history of ancestry or tradition that is added to knowledge, capabilities and practices based on theories, beliefs and experiences of different cultures. These may or may not be explainable by current scientific methods, and can be used to maintain health and prevent, diagnose, improve or treat physical and mental diseases^{1,2}. In this context, traditional medicine has been used by many different populations in the world³⁻⁷, and in Brazil in various situations in the treatment of physical and spiritual diseases⁸⁻¹⁰.

Brazil is a world reference in the field of traditional, complementary and integrative medicines, especially with regard to the insertion of these practices in the Unified Health System (*Sistema Único de Saúde*), which constitutes an important model of health care that in recent decades has been intensified through the National Policy of Integrative and Complementary Practices. This policy makes services in the branches of phytotherapy, homeopathy, traditional Chinese medicine/acupuncture and anthroposophical medicine available to the population¹¹.

In the context of the Amazon, healing practices are common for solving physical, spiritual and magical-religious problems, using traditional medicine from natural resources, with emphasis on the use of medicinal plants in the form of teas, infusions, dressings, exudates, oils, incenses and smoke for rituals¹², in addition to zotherapy¹³. Thus, ethnoknowledge and ethnomedicine have an important role among these peoples, who use them in the treatment of less complex diseases, such as fevers, diarrhea, emesis, headache, gastrointestinal disorders, insect bites, injuries, nausea and myalgia, and even diseases associated with cultural syndromes, such as the evil eye, spells and bad luck^{14,15}.

'Zotherapy' is a polysemic term. In this study, its use concerns remedies made from parts of the bodies of animals, from products of their metabolism, such as body secretions and excrement, or from materials constructed with them, such as nests and cocoons, which are used in the treatment and prevention of diseases and disorders that affect humans^{16,17}. The logistics and availability of resources influence the choice of zotherapy since there are animals that are close to homes, and that are domesticated, and others in the forest domains, which are wild. Thus, the production of home remedies is done using parts of the animals or from the whole animal – meat, fats, bones, eggs, livers, urine and extracted substrates, such as honey or wax – though animal fat is the most prevalent¹⁶.

Given the above, the mapping of the main practices of traditional medicine can contribute to the improvement of health care of traditional peoples and communities, and subsidize the practice of professionals who work mainly in the context of primary care and other levels of health care. It is worth remembering that, in this context, several health policies and organizational arrangements, such as the riverine and fluvial family health teams, have been implemented in the Unified Health System, and have aimed at reducing social inequalities in health and expanding these populations' access to health care. Therefore, this study aimed to identify, map and synthesize scientific evidence on the use of traditional medicine as therapeutic resources when used by traditional communities of the Brazilian Amazon.

Methods

Concepts and definitions

In Brazil, traditional peoples and communities are recognized by the national policy of sustainable development of traditional peoples and communities, established by the Brazilian government's decree 6040 of 7 February 2007¹⁸. This decree recognizes them as culturally differentiated groups with their own forms of social organization, and that they occupy and use territories and natural resources as a condition for their social, cultural, religious, ancestral and economic reproduction¹⁹.

The Indigenous, riverine, *quilombolas*, *caboclos*, rubber tappers, fishers, farmers, extractivists and jute farmers, among others, are considered the traditional native populations of the Brazilian Amazon. These populations reside in rural areas, have contact with local natural resources and a vast knowledge regarding the cultivation and preservation of the flora and fauna of the environment, and this has been passed from generation to generation^{20,21}.

The Brazilian Amazon is a large territorial extension and has an area of 5 217 423 km², representing 61% of the national territory. It is a region with low demographic density, where more than 17 million people live, and covers, in its entirety, the states of Acre, Amapá, Amazonas, Mato Grosso, Pará, Roraima, Rondônia and Tocantins and, partially, the state of Maranhão (west of meridian 44°)²².

Type of study

This is a scoping review, which is a method used to map the main concepts of a research area, available evidence and its sources, and can be carried out using complex topics or areas that have not yet been reviewed. The value of a scoping review for evidence-based health and practice lies in examining a broader area to identify gaps in the research knowledge base, clarify key concepts and report on the types of evidence that address and inform practice in the field.

This scoping review was registered in the Open Science Framework platform (Open Science Framework; <https://osf.io/453zw> [<https://osf.io/453zw>]), and was developed based on the recommendations of the PRISMA-ScR International Guide²³ and the method proposed by the Joanna Briggs Institute reviewers' manual 2020²⁴, which uses five steps: (1) identification of the research issue; (2) identification of relevant studies; (3) selection of studies; (4) analysis of data; and (5) grouping, synthesis and presentation of data²⁴.

For the construction of the research, we used the strategy of participants, concept and context (PCC), in which P is traditional populations; C is traditional medicine; and C is the Brazilian Amazon. Thus, the question of the research was 'What is the main scientific evidence on the use of traditional medicine as a therapeutic resource among the traditional communities of the Brazilian Amazon?'

Data sources and research strategy

To obtain the scientific production on the use of traditional medicine as a therapeutic resource among the traditional communities of the Brazilian Amazon, the following five databases were used: PubMed/Medline, Lilacs, Scopus, Web of Science and ScienceDirect.

The search strategy in the databases used the following combination of MeSH controlled descriptors (medical subject headings) and DeCS (health sciences descriptors) in English and in Portuguese: *Traditional Medicine*, *Medicina Tradicional*; *Traditional Communities*, *Comunidades Tradicionais*; *Brazil*, *Brasil*.

Data collection

The database search took place between August and November 2022. The selection criteria were the following: scientific articles published in Portuguese or English, containing full texts and available in full, whose investigation made reference to the use of traditional medicine by traditional peoples and communities of the Brazilian Amazon. Abstracts and proceedings of congresses, comments, editorials, expert opinions, short communications and reports, theses and dissertations were excluded.

Data management

All scientific articles selected for the scoping review were imported into the Mendeley desktop bibliographic manager v1.19.8 (Mendeley; <https://www.mendeley.com>). Duplicate studies were removed manually when identified in the process of reading the abstracts. In the screening process, the scientific articles that met the scope of the research question were maintained in Mendeley for full reading and application of the instrument for extracting relevant information from each study.

Data analysis

The titles and abstracts of the articles retrieved in the search were read and analyzed by peers in order to identify those potentially eligible for the study. When there was no consensus among the reviewers, the article was kept in the database for the next phase, which involved the full reading of each selected article, and was evaluated by a third reviewer with the aim of confirming the main question of the research and, if positive, extracting the data of interest.

In the separation stage, the summary of the main scientific evidence was grouped into a structured instrument (Appendix I), as proposed by the Joanna Briggs Institute reviewers' manual 2020²⁴. This instrument consists of the following items: title, authors, language, database, journal, place of study and publication, objective, type of study, population involved and the main scientific evidence of each study.

Therefore, the synthesis and presentation of the results took place with the intention of showing the general view of the practices of

traditional medicine among the peoples and traditional communities of the Brazilian Amazon.

Results

The initial search in the five databases using the controlled descriptors of MeSH and DeCS, as well as their combinations, and totaled 1431 scientific articles. In the first screening, 207 studies

were pre-selected; of these, 139 were excluded for not meeting the scope of the study, and another seven were excluded due to duplication. Therefore, the scoping review included 31 articles retrieved from the databases, which were distributed as follows: Lilacs 11 (36%), Pubmed/Medline 8 (26%), ScienceDirect 5 (16%), Scopus 5 (16%) and Web of Science 2 (6%). Among these articles, 22 (71%) were published in English and 9 (29%) were published in Portuguese (Fig1).

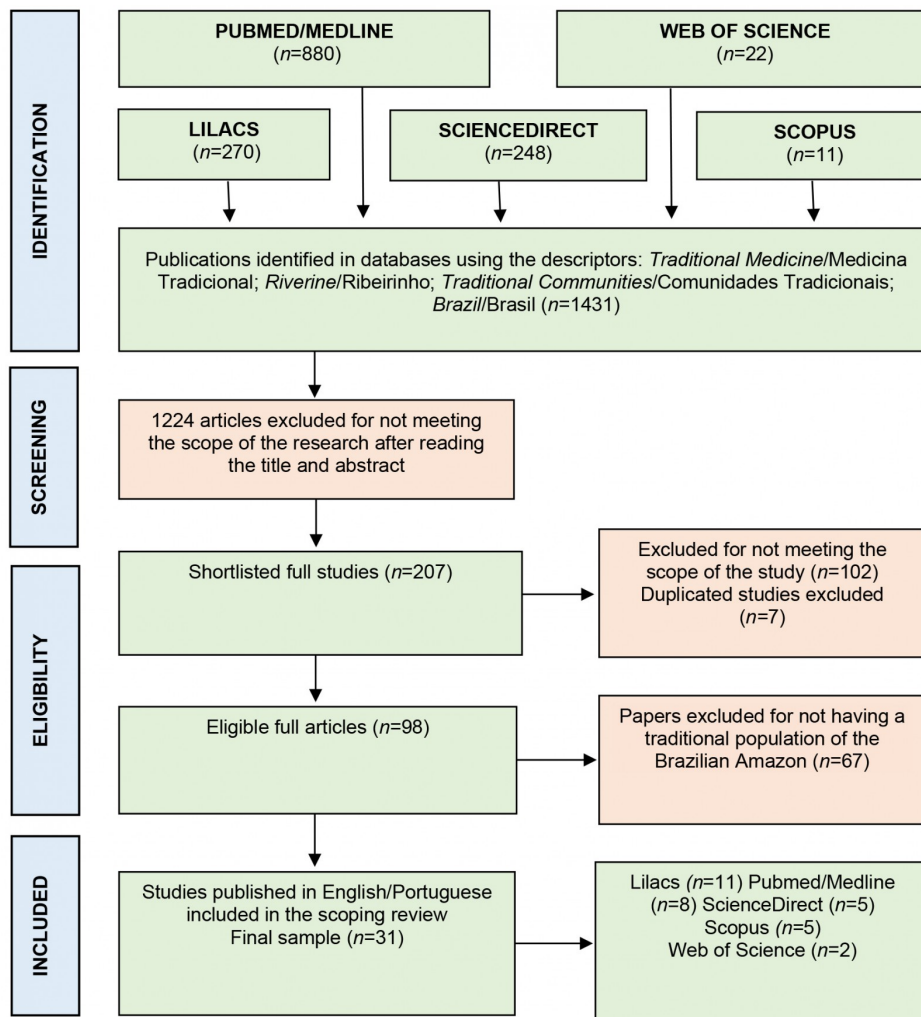


Figure 1: PRISMA-ScR²³ flowchart used to operationalize the selection of articles regarding the use of traditional medicine as a therapeutic resource by traditional communities of the Brazilian Amazon.

The studies conducted with traditional peoples and populations of the Brazilian Amazon occurred in six states: Para (11/36%), Amazonas (11/36%), Rondônia (3/10%), Acre (2/6%), Amapa (2/6%) and Mato Grosso (2/6%). Almost half of the studies (15/49%) were published in Brazilian scientific journals, and the rest were distributed among the following countries: Ireland (7/23%), Great Britain (6/19%), the United Arab Emirates (1/3%), Portugal (1/3%) and the US (1/3%).

Regarding the journals in which the scientific production on traditional medicine was published, 7 (23%) articles were published

in the *Journal of Ethnopharmacology*, 4 (13%) in the *Journal of Ethnobiology and Ethnomedicine*, 2 (7%) in the *Brazilian Journal of Medicinal Plants*, 2 (7%) in the *Brazilian Journal of Pharmacognosy*, 2 (7%) in *Acta Amazonica*, among other national and international scientific journals (Fig2).

Regarding the types of studies adopted by the authors of the articles included in the scoping review, the classification was as follows: ethnobotanical studies (14/45%), ethnopharmacological (6/20%), ethnoecological (4/13%), among other associations of approaches and techniques of data collection (Table 1, Fig3).

Table 1: Synthesis of scientific publications on the use of traditional medicine as a therapeutic resource by traditional communities of the Brazilian Amazon²⁵⁻⁵²

Author(s) [ref.]	Title	Population	Location	Type of study
da Silva (2008) [25]	Animais medicinais: conhecimento e uso entre as populações ribeirinhas do rio Negro, Amazonas, Brasil	Indigenous and Riverine	Santa Isabel do Rio Negro and Barcelos (Amazonas)	Ethnoecological
Haverroth et al (2010) [26]	Ethnobiology and Health among the Kulina People from the Upper Envira River, State of Acre, Brazil	Indigenous	Kulina do Rio Envira and Jaminawa indigenous lands, Envira (Acre)	Ethnobiological and Ethnoecological
Oliveira et al (2011) [27]	Estudo etnofarmacognóstico da saracuramirã (<i>Ampelozizyphus amazonicus</i> Ducke), uma planta medicinal usada por comunidades quilombolas do Município de Oriximiná-PA, Brasil	Quilombolas	Pancada, Jauari, Serrinha, Arancuã do Meio and Bacabal communities (Pará)	Ethnobotanical
Barros et al (2011) [28]	Use and knowledge of the razor-billed curassow <i>Pauxi tuberosa</i> (Spix, 1825) (galliformes, cracidae) by a riverine community of the Oriental Amazonia, Brazil	Hunters and extractivists	Riozinho do Anfriso Extractive Reserve, Altamira (Pará)	Ethnoecological
da Mata et al (2012) [29]	The participation of Wajãpi women from the State of Amapá (Brazil) in the traditional use of medicinal plants – a case study	Women of the Wajãpin tribe	Wajãpi indigenous community (Amapá)	Ethnobotanical
de Santos et al (2012) [30]	Observations on the therapeutic practices of riverine communities of the Unini River, AM, Brazil	Riverine	Unini River, Barcelos (Amazonas)	Ethnographic
Barros et al (2012) [31]	Medicinal use of fauna by traditional community in the Brazilian Amazonia	Riverine	Riozinho Anfriso Extractive Reserve (Pará)	Ethnoecological
Santos et al (2014) [32]	Medicinal plants used in Rondônia, Western Amazon, Brazil	Farmers and extractivists	Ariquemés, Buriti, Candelas do Jamarí, Cujubim and Itapoã do Oeste (Rondônia)	Ethnobotanical
Barros and Azevedo (2014) [33]	Common opossum (<i>Didelphis marsupialis</i> Linnaeus, 1758): food and medicine for people in the Amazon	Riverine	Sagrado Coração de Jesus community, Abaetetuba (Pará)	Ethnoecological
Vásquez et al (2014) [34]	Etnobotânica de plantas medicinais em comunidades ribeirinhas do Município de Manacapuru, Amazonas, Brasil	Riverine	Bom Jardim, São Raimundo, Nossa Senhora do Livramento and Rei Davi, (Amazonas)	Ethnobotanical
Veigas and Scudeller (2015) [35]	Etnobotânica e medicina popular no tratamento de malária e males associados na comunidade ribeirinha Julião – baixo Rio Negro (Amazônia Central)	Riverine	Julião community, Tupé Sustainable Development Reserve, Manaus (Amazonas)	Ethnobotanical
Bieski et al (2015) [36]	Ethnobotanical study of medicinal plants by population of Valley of Juruna Region, Legal Amazon, Mato Grosso, Brazil	Riverine	Vale do Juruna (Mato Grosso)	Ethnobotanical
Oliveira et al (2015) [37]	Ethnopharmacological evaluation of medicinal plants used against malaria by quilombola communities from Oriximiná, Brazil	Quilombolas	Bacabal and Arancuã-de-Cima communities, of the Trombetas region, and Serrinha, Jauari and Pancada communities, of the Erepecuru region (Pará)	Ethnopharmacological and Ethnobotanical
Frausin et al (2015) [38]	An ethnobotanical study of anti-malarial plants among indigenous people on the upper Negro River in the Brazilian Amazon	Indigenous	Santa Isabel do Rio Negro (Amazonas)	Ethnopharmacological and Ethnobotanical
Lago et al (2016) [39]	Exudates used as medicine by the 'caboclos river-dwellers' of the Unini River, Amazonas, Brazil – classification based in their chemical composition	Riverine	Tapiira, Terra Nova, Rio Unini River communities (Amazonas)	Ethnopharmacological
Pedrollo et al (2016) [40]	Medicinal plants at Rio Jauaperi, Brazilian Amazon: Ethnobotanical survey and environmental conservation	Indigenous and riverine	Xixuauá, Itaquera and Sumaúma (Roraima) communities; São Pedro and Gaspar communities (Amazonas)	Ethnobotanical
Pagani et al (2017) [14]	Culture-Bound Syndromes of a Brazilian Amazon Riverine population: Tentative correspondence between traditional and conventional medicine terms and possible ethnopharmacological implications	Riverine	Jau National Park and Unini River Extractive Reserve (Amazonas)	Ethnopharmacological
Ribeiro et al (2017) [41]	Ethnobotanical study of medicinal plants used by Ribeirinhos in the North Araguaia microregion, Mato Grosso, Brazil	Riverine	Araguaia Norte micro-region (Mato Grosso)	Ethnobotanical
Pereira and Coelho-Ferreira (2017) [42]	Uso e diversidade de plantas medicinais em uma comunidade quilombola na Amazônia Oriental, Abaetetuba, Pará	Quilombolas	Tauerá-Açu community, Abaetetuba (Pará)	Ethnobotanical
Lima et al (2017) [15]	Práticas populares de cura e o uso de plantas medicinais por mães ribeirinhas no cuidado infantil	Riverine	Vila Nova Maringá (Amazonas)	Ethnobotanical
Albuquerque et al (2017) [8]	Brazilian Amazon traditional medicine and the treatment of difficult to heal leishmaniasis wounds with <i>Copaifera</i>	Farmers and extractivists	Brazilian Amazon	Ethnopharmacological
Rodrigues et al (2018) [43]	Nests of 'caba-leão' wasps (<i>Sceliphron</i> sp., Sphecidae) used in traditional medicine by riverine communities of the Jau and Unini Rivers, Amazon, Brazil: ethnopharmacological, chemical and mineralogical aspects	Riverine	Unini and Jau Rivers (Amazonas)	Ethnopharmacological
da Silva et al (2019) [44]	Ethno-knowledge and attitudes regarding snakebites in the Alto Juruá region, Western Brazilian Amazonia	Riverine, Indigenous and extractivists	Cruzeiro do Sul (Acre)	Survey
Moraes et al (2019) [45]	Ethno-knowledge of medicinal plants in a community in the eastern Amazon	Riverine	São Tomé community (Amapá)	Ethnobotanical
da Silva and Lobato (2019) [46]	Plantas medicinais e seus usos em um quilombo Amazônico: o caso da comunidade quilombola do Abacatal, Ananindeua (PA)	Indigenous	Abacatal Quilombola community (Pará)	Ethnobotanical
Zandonadi Meneguelli et al (2020) [47]	Ethnopharmacological and botanical evaluation of medicinal plants used by Brazilian Amazon Indian community	Indigenous	Lourdes Creek (Rondônia)	Ethnopharmacological and Ethnobotanical
Guedes and Corbin (2020) [48]	Mulheres quilombolas e medicina popular: um estudo de caso em santa Rita de Barreira, Pará	Quilombolas	Santa Rita da Barreira community (Pará)	Ethnobotanical
Marques et al (2020) [49]	Medicinal plants used by riverside communities in the Amazon Estuary	Riverine	Ilha das Onças community, Barcarena (Pará)	Ethnobotanical
Abrão et al (2021) [50]	Zootherapeutic practices in the Amazon Region: chemical and pharmacological studies of Green-anaconda fat (<i>Eunectes murinus</i>) and alternatives for species conservation	Farmers and extractivists	Pimenteiras do Oeste (Rondônia)	Ethnopharmacological
Albino et al (2021) [51]	Amazonian medicinal smokes: Chemical analysis of Burseraceae pitch (<i>breu</i>) oleoresin smokes and insights into their use on headache	Quilombolas	Oriximiná (Pará)	Ethnopharmacological
Maciel Salazar et al (2021) [52]	Snakebites in 'Invisible Populations': A cross-sectional survey in riverine populations in the remote western Brazilian Amazon	Riverine	Purus, Juruá and Solimões rivers (Amazonas)	Transversal

AM, Amazonas. PA, Pará.

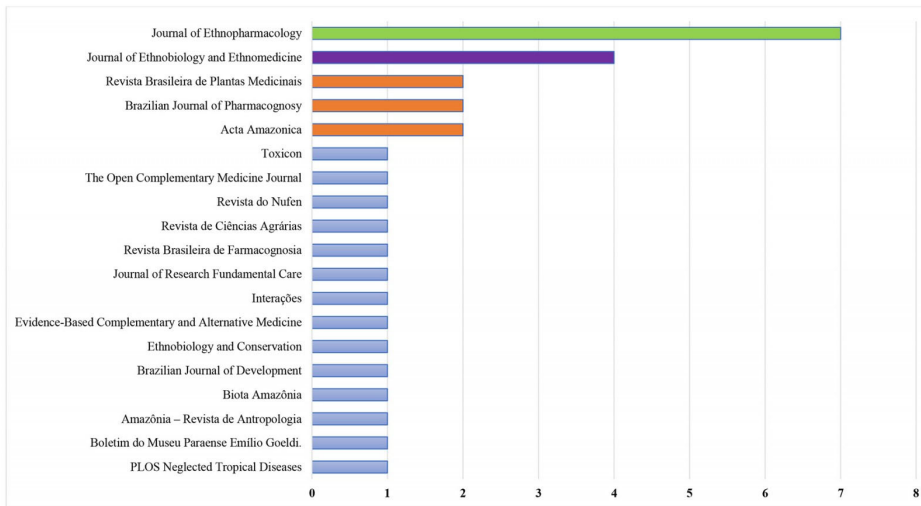


Figure 2: Journals with articles on the use of traditional medicine as a therapeutic resource utilized by traditional communities of the Brazilian Amazon.

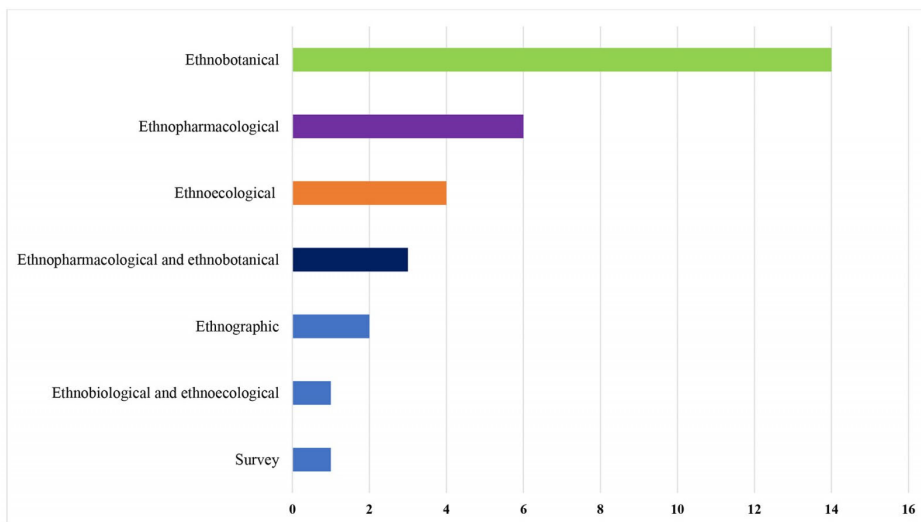


Figure 3: Types of scientific production on traditional medicines used as therapeutic resources in traditional populations in the Brazilian Amazon.

Regarding the culturally differentiated groups of the Brazilian Amazon in this study, the scoping review identified the following populations: riverine (14/45%); Indigenous (5/16%); *quilombolas* (5/16%); farmers and extractivists (3/10%); riverine and Indigenous (2/7%); hunters and extractivists (1/3%); and riverine, indigenous and extractivists (1/3%) (Table 1, Fig4).

In the present study, it was identified that medicinal plants are

present in the vast majority of therapeutic practices used by traditional populations of the Brazilian Amazon, followed by vertebrate animals. In the category 'medicinal products', there are materials that do not fit the other three classifications; they are used for curative purposes in the form of tea made with shavings from the board of a pier or steps of a house, gunpowder tea, salt, sugar, limestone, gasoline and black stone (Fig5).

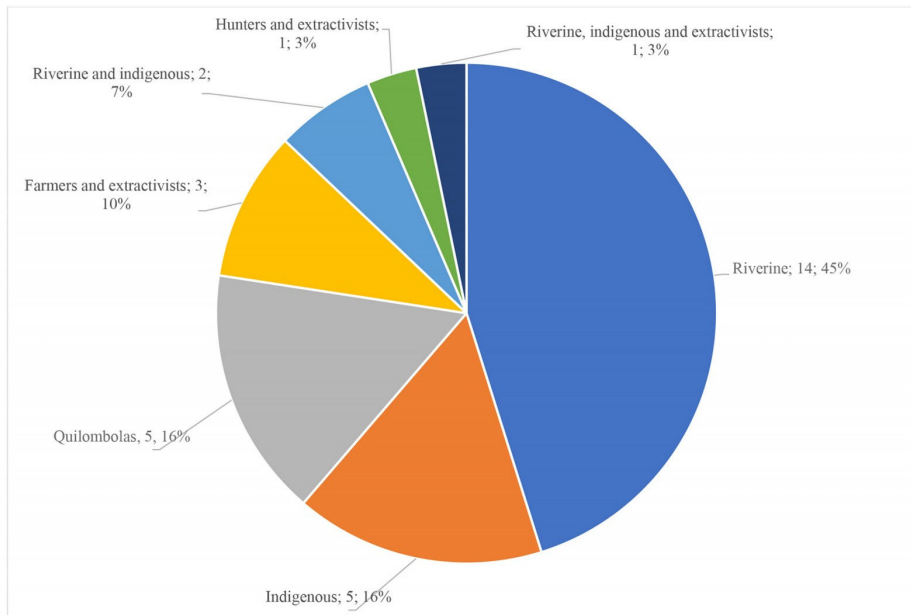
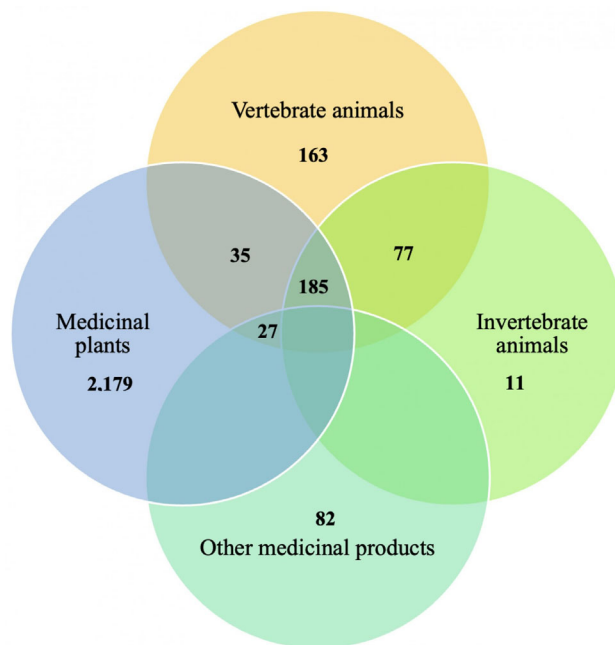


Figure 4: Traditional populations that participated in the studies included in the scoping review on the use of traditional medicine as a therapeutic resource by traditional communities of the Brazilian Amazon.



[†] The category 'other medicinal products' refers to those that are mentioned quantitatively, but does not present the name of the product and/or are biological derivatives that do not fit into the other categories. The values of the intersections refer to the total value of therapeutic resources used in more than one category.

Figure 5: Venn diagram showing total number of therapeutic resources used for medicinal purposes classified into four categories.[†]

The following medicinal plants stood out for having wide consumption as therapeutic resources: mint (*Mentha* spp.), saracuramira (*Ampelozizyphus amazonicus* Ducke), arruda (*Ruta graveolens*), carapanauba (*Apidosperma* spp.), andiroba (*Carapa guianensis*), copaiba (*Copaifera multijuga* Hayne, *Copaifera langsdorffii*), açaí (*Euterpe oleracea*, *Euterpe precatoria*), quebra-pedra (*Phyllanthus niruri*), paregoric elixir (*Piper callosum*) and lemongrass (*Cymbopogon citratus*). The use of the rosin from white pitch (*Protium heptaphyllum*) and black pitch (*Trattinnickia*

burserifolia) is also a common practice among traditional populations of the Brazilian Amazon, especially in the form of smoke inhalation.

Among the parts of the plants used are the stem, bark, leaves, flowers, fruits, seeds, roots, tubers and whole plants. These are prepared in various manners, such as teas, infusions, smoke for rituals, baths, macerations, oils, ointments, concoctions, dressings, incense and exfoliants.

In this scoping review, the animals of great importance in traditional Amazonian medicine are mammals, reptiles and fish. In this context, we observed the use of these animals or part of them: green anacondas (*Eunectes murinus*), alligators (*Paleosuchus* sp.), white caimans (*Caiman crocodilos*), black caimans (*Melanosuchus niger*), stingrays (*Potamotrygon* sp.), capybaras (*Hydrochoerus hydrochaeris*), wolf fish (*Hoplias malabaricus*) and the razor-billed curassow (*Pauxi tuberosa*), among other animals. The main parts are lards, fats, visceras, horns, cocoons, nests, feathers and beaks of birds, eggs and roe.

Included in the diseases and disorders observed in the literature in which traditional populations resort to traditional medicine are malaria, respiratory diseases, strokes, rheumatism, asthma, diarrheal diseases and verminoses, leishmaniasis, snakebites, pneumonia, erectile dysfunction, ptiriasis versicolor, liver and gastrointestinal diseases, bruises, sprains and dislocations. Cultural syndromes are also highlighted, such as the evil eye, spells and bad luck (Table 2). Treatments for syndromes and other diseases in general are usually performed by or with the help of Amazonian healers, such as shamans, folk healers, midwives, mediums, faith healers and sorcerers.

Table 2: Descriptions of the main culture-bound syndromes that affect the traditional populations of the Brazilian Amazon

Culture-bound syndrome	Group(s) affected	Characteristics, cultural description and treatment
<i>Quebrante</i> or <i>quebranto</i> (evil eye)	Newborns and children	A disease of spiritual nature, characterized by drowsiness, loss of appetite, vomiting, diarrhea, flaccid eyes, fever and greenish diarrhea. It is caused by the look or touch of a person with envy or hunger, or by the look of admiration, without any bad feeling. It affects the gastrointestinal tract and is normally treated with blessings.
<i>Doença do ar</i> (air diseases)	Children	It manifests fever, oscillation of consciousness, groans, disjointed speech, headache and neckache, twisting of the body and tremors, convulsions, drooling and vomiting. It usually occurs after exposure to wind or a frightening event. It can also occur with a decrease in vaccination. Treatments are carried out with baths and fumigation with vegetables and animal parts accompanied by prayers.
<i>Mãe do corpo</i> (mother of the body)	Women after childbirth	After childbirth, the 'mother of the body' begins to move in search of the fetus and this causes pain. It manifests itself by presenting abdominal pain and movements that occur after childbirth, or pain in the back and other regions of the body. Usually treatment takes place by means of prayers and baths with decoctions made from animals and plants.
<i>Panema</i> (unhealthy, bad luck)	Adults	Characterized by apathy, pessimism and expectation of bad luck in all daily activities and relationships. Men are unable to hunt or fish. It can occur spontaneously without presumed cause or be transmitted by another person, voluntarily or not. It is often attributed to a pregnant woman who wants something or to a man who does not share the fruits of his hunting or fishing with other people in the community. It can be treated with baths with decoctions of plants.
<i>Mau olhado</i> (evil eye)	Teenagers and adults	A cultural syndrome caused by negative energies transmitted person-to-person, preventing the realization of plans and achievements. Signs and symptoms are drowsiness, loss of appetite, vomiting, flaccid eyes, fever and greenish diarrhea. It is caused by the look or touch of a person with envy or hunger, or by the look of admiration, without any bad feeling. It is a cultural syndrome that affects the gastrointestinal tract and is usually treated with prayers, blessings and baths.
<i>Espante</i> or <i>espanto</i> (fright)	Newborns	This manifests itself as fever, restlessness, dizziness, crying and a frightened face. There is loss of sleep and hunger. Weight loss can also occur. It is caused by a frightening event, such as a scream, threat or fall from a hammock or by an enchantment by a dolphin or a snake. It can be treated with prayers, blessings and white magic.

Adapted from Pagani et al (2017) [ref. 14]

Discussion

The scientific production included in this scoping review (Fig2) draws attention to the fact that studies on traditional medicine in the Brazilian Amazon have a very heterogeneous distribution in journals in the areas of biological, health and social sciences, such as anthropology. In this context, it is important to look at this knowledge production in a positive way, considering that it is a transversal topic, of interest to different academic areas, where each one needs the other's theoretical bases and techniques to better understand these practices as a relevant therapeutic resource, especially for health professionals who work with these populations⁵³⁻⁵⁵.

Among the traditional populations of the Brazilian Amazon, mint has been widely used for the treatment of colic, nausea and heartburn^{15,26,34,36,42}. Other studies also show the use of mint for the same treatment purpose by populations from other regions of Brazil^{56,57}.

Copaiba oil is an exudate extracted from copaiba trees, which has been used as a traditional medicine for more than 500 years. The use of copaiba oil is common in traditional populations as an anti-inflammatory and a healing agent, as well as in the treatment of hemorrhoids, respiratory diseases, insect bites, ulcers and lesions, especially in cases of leishmaniasis. In addition to numerous applications in cosmetics and other industries, there are a number of indications for its use in medicine⁵⁸.

In some cases, copaiba oil has been proven to have antimicrobial, anti-inflammatory, and anti-neoplastic activity. Some studies have addressed the potential use of copaiba oil in dentistry, especially in the composition of endodontic cements and in the prevention and

combat of periodontal disease⁵⁹⁻⁶¹. A recently published study proved that, after three annual applications, copaiba-based varnish demonstrated significant antimicrobial activity against *Streptococcus mutans* for up to 12 months in children at high risk of caries. The fluoridated copaiba-based varnishes showed good results in the prevention of dental caries⁶².

Another exudate widely used in the Amazon is andiroba oil, which is widely used as an anti-inflammatory, especially in the treatment of otitis, muscle pain and throat problems, in addition to its use as a healing agent, antimalarial and a natural insect repellent^{29,37,48}. Andiroba oil is recognized in traditional medicine and has anti-inflammatory and analgesic potential, both of which are basic prerequisites for a therapeutic agent. In this sense, the use of andiroba oil is able to reduce, for example, the severity of oral mucositis and relieve pain due to the disease, thus resulting in a decrease in the severity of signs and symptoms in dental patients⁶³.

Saracuramira stands out for its potential use as an antimalarial, a depurative, a nerve tonic and in the treatment of liver diseases. Secondary use of this species also includes treatments for anemia, memory, stomach pain, diabetes mellitus, minor illnesses and malaria^{27,37,38,40}. Studies also indicate the use of saracuramira as an aphrodisiac, a stimulant, and as an anti-inflammatory, in addition to being used as a treatment for tumors and other diseases^{64,65}. Its antimicrobial action against isolated fungi has also been tested⁶⁶.

In the Amazonian context, common rue (arruda) has been reported for the treatment of headaches, fevers, flu, diarrhea, viruses and parasites, among other uses^{15,27,37,42}. It is a plant used in traditional medicine to minimize muscle pain, dermatitis, rheumatism and influenza symptoms, as it has antibacterial, anti-

inflammatory, analgesic and antidiabetic properties⁶⁷. This plant has remarkable biological activity and has become a medicinal plant in many countries, especially in the Mediterranean⁶⁸.

Carapanauba is used as an anti-inflammatory, antimalarial and an analgesic, and is usually used in the treatment of diabetes mellitus and urinary tract infections^{27,37,38,40}. In the Amazon, malaria is an endemic parasitic disease caused by organisms of the genus *Plasmodium* and the riverine communities of the municipalities of Pauini and Xapuri in the states of Amazonas and Acre, respectively, reported that carapanauba is one of the most used medicinal plants in the treatment of malaria⁶⁹.

The açai berry, in addition to being an important source of energy in the diet of traditional populations, is also used in the treatment of malaria, hepatitis, anemias, gastrointestinal inflammations, snakebite, muscle pain and general inflammations^{15,35-37,44}. Brazil is the largest producer of açai in the world and the foreign market has been investing in its importation for use both in the food and the pharmaceutical industries. Because it is a fruit that is rich in anthocyanins, which act by modulating lipid metabolism to minimize damage to the body caused by oxidative stress, triggered by chronic diseases, açai has been tested for the treatment of metabolic syndrome⁷⁰. One systematic review pointed out that flavonoids present in açai have the potential for the treatment of diseases such as Parkinson's disease and Alzheimer's disease, and are now drug candidates in future clinical research. However, there is a need for *in vitro* and *in vivo* studies of polyphenols that prove and ratify the therapeutic potential of this fruit for these neurodegenerative diseases⁷¹.

The exudate of white pitch and black pitch has been reported to have been used for stroke, respiratory diseases and as an anti-inflammatory; its resin is often used for the treatment of headaches, inflammation and as an expectorant. Studies show that inhaling the smoke of white pitch and black pitch is effective for the relief of headaches. In this context, all the pitch oleoresins share the presence of volatile terpenoids and triterpenoids. These compounds are also present in crude resins and could potentially be responsible for the anti-inflammatory, antinociceptive and analgesic relief of headaches^{30,39,51}. These *Protium* species (known as *breus*) produce a resin that is considered sacred to the Indigenous and riverine peoples, and is widely used by the Amazonian healers (shamans, folk healers, faith healers and sorcerers) in ceremonies and healing rituals to ward off evil spirits, and also in the treatment of physical problems of the populations of the entire Amazon. It can be used for the cure of headaches, as a nasal decongestant, to immobilize fractures and as a natural insect repellent^{72,73}.

Quebra-pedra, or stonebreaker, can be used for the treatment of intestinal infections, kidney stones and renal colic, and has a secondary use for malaria and jaundice^{36,37}. One study prospectively evaluated the effect of *P. niruri* on urinary metabolic parameters of patients with urolithiasis and revealed that ingestion is safe and does not cause significant adverse effects. It increases the urinary excretion of magnesium and potassium, thus causing a significant decrease in urinary oxalate and uric acid in patients with hyperoxaluria and hyperuricosuria, and contributes to the elimination of kidney stones⁷⁴.

Paregoric elixir appears to treat gastrointestinal diseases, and lemongrass is also used to treat gastrointestinal problems, in

addition to respiratory problems. They can be used as antidepressants, since they are both used as tranquilizers^{15,34,37,48}. In the Amazon region, paregoric elixir is sold fresh, dried, chopped and sometimes powdered or as an ingredient in artisanal preparations for medicinal purposes⁷⁵. Lemongrass leaves are also sold at fairs and markets. Domestic cultivation is very common among traditional populations.

In addition to using medicinal plants, the practice of zootherapy as a therapeutic resource is common among traditional communities in the Amazon. In this study, we observed the use of the following animals or part of them: green anacondas, alligators, white caimans, black caimans, stingrays, capybaras, wolf fish and the razor-billed curassow (*Pauxi tuberosa*), among other animals^{14,25,28,31,33,43,44,50}. In this context, animal fats and oils are used to treat muscle strains, bone dislocations, inflammatory processes, respiratory diseases, rheumatic diseases, in addition to helping wound healing.

In other situations, the white-lipped peccary (*Tayassu pecari*) can be used in the treatment of pneumonia, indigestion and asthma; the razor-billed curassow can be used to treat bleeding, snakebite, indigestion and stroke; the armadillo (*Priodontes maximus*) can be used for treating snakebite, ear pain, asthma, colds and rheumatism; the tapir (*Tapirus terrestres*) can be used for indigestion, menstrual pain, hernia, sexual impotence, muscle pain, rheumatism and stroke²⁸. Another animal study refers to the medicinal use of the opossum (*Didelphis marsupialis*) and consists of the extraction of its fat, since its oil has numerous therapeutic purposes consisting of anti-inflammatory treatments for rheumatism, bruises, asthma and sore throats. It is also recommended that pregnant women use opossum oil to diminish labor pains³³.

One study analyzed the substances present in home remedies used by riverine communities in the Amazon that were the result of an insect, mineral and vegetable oil interaction. The results of the analyses showed that the main component was from the nests of black mud dauber wasps (*Sceliphron* sp.), which is used by riverine populations as a topical medicine in the treatment of mumps and ear pain. The inorganic components are formed by minerals (quartz, kaolinite, illite and gibbsite) that were identified by x-ray diffraction and infrared spectroscopy, and are common in the soil of the region. X-ray fluorescence analyses indicated that the most common oxides within the minerals are SiO₂, Al₂O₃ and Fe₂O₃⁴³.

In the present study, cultural syndromes emerge, and are those associated with a specific symptomology of a certain population. In this context, one can find a certain cultural child or adult's disease for which the treatment is performed by Amazonian healers, who are people who understand the healing process for this type of disease. Among them, spells, bad luck and the evil eye stand out. In these cases, treatments can be made based on medicinal plants, animal, blessings, consultations with mediums, baths, concoctions and others^{14,15}. In this same perspective, another study with riverine populations in the region of the Middle Negro River (Amazonas, Brazil) showed the use of canuaru resin, which is an animal- and plant-based drug extracted from a species of frog known as the canuaru or Amazon milk frog (*Phrynohyas resinifictrix*) that is used to treat headaches via inhalation, and childhood diseases through fumigation⁷⁶.

It is important to note that, in the Brazilian Amazon, therapeutic practices are often carried out with endogenous, wild and domesticated natural resources, which are present in the biodiverse environments of the traditional populations and involve magical-religious beliefs to treat all types of illnesses, including cultural syndromes that affect children, youths, adults and the elderly.

In addition, the interaction of traditional knowledge and biomedicine by traditional populations is common and has become a hybrid of popular knowledge and scientism during a treatment. However, these practices still need to be widely perceived and discussed by professionals from all health services, since they usually maintain a vertical relationship with patients, and the psychosocial and cultural determinants are of little interest for diagnosis and therapeutic conduct⁷⁷.

Although the present study was geographically limited to the experiences of traditional peoples who inhabit the Brazilian Amazon, it is important to explain that these practices can be widely extended to several other peoples in South America, especially in those countries with a strong Indigenous presence in their demographic composition⁷⁸⁻⁸², and also to other regions of the world^{83,84}. These practices are influenced by local culture and vary according to the availability of natural resources in each territory, being passed on to future generations within the family and community.

Conclusion

This scoping review has an important role to disseminate and expand the discussion of traditional medicine practices, inviting readers, whether they are health professionals, community members, managers or decision-makers, to a continuing debate using an intercultural dialog necessary to improve approaches.

interdisciplinary. From this perspective, it is essential to consider the comprehensive legal and legal framework that guides the public policies of national health systems.

In Brazil, the Unified Health System has the National Policy of Integrative and Complementary Practices (*Política Nacional de Práticas Integrativas e Complementares*) that implements approaches in different government instances that seek qualified listening to popular knowledge with an expanded view of the health–disease–care process. In the Brazilian indigenous context, the National Health Care Policy for Indigenous Peoples includes a guideline to guarantee the articulation of traditional Indigenous health systems, from the perspective that all human societies have their own systems for interpreting, preventing and treating illnesses, which must be taken into consideration holistically.

Finally, it is important to reinforce that it is necessary that health professionals who work with traditional populations must seek at least an understanding of the other's differences using the concept of otherness and interculturality to avoid a colonial imposition in daily practices during the provision of health care for these people.

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Conflicts of interest

The authors declare no conflicts of interest for this study.

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Appendix I: Structured instrument for main scientific evidence

Nº	Source / Authors	Language	Database	Name of the journal	Area studied	Type of study	Study population	Study objective	Principal evidence

• Does 'indisposition' refer to minor illnesses in this article?
YES.

• Does 'an energetic' refer to 'a stimulant' in this article?
YES.

• Please supply your reference list with all journal names spelt out in full. For any journal references that have non-English article titles, please supply an English title with the original language specified afterwards in square brackets, e.g. '[in Portuguese]'. I will also insert these where required in Table 1.
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