



## Cross-cultural study on the uses of traditional herbal medicine to treat various women's health issues in Northeast India

Klaret Kropi, K.P. Jastone, Sweety Angelirie Kharumnuid<sup>\*</sup>, Hemanta Kumar Das, Moses M. Naga

North Eastern Hill University, Department of Library and Information Science, Umshing Mawkyntroh, Shillong, Meghalaya, India

### ARTICLE INFO

#### Keywords:

Cross-cultural study  
Traditional medicine  
Women's health  
Herbal medicine  
Medicinal plants

### ABSTRACT

**Background:** This cross-cultural study conducted in the diverse regions of Assam, Meghalaya, and Manipur sheds light on the common utilization of five specific medicinal plants among indigenous communities residing in these areas.

**Objectives:** The main focus of this study is to document and compare the traditional medicinal plant used and the knowledge and practices related to women's health issues in different cultures; to identify commonalities and differences in the use of medicinal plants across cultures and various medicinal plants used traditionally by the indigenous communities to treat women's health problems according to their indigenous name, scientific name.

**Materials and methods:** The study used a survey method and a pre-structured interview schedule through one-on-one interactive communication and field observation. The authors collected data from three different states, i.e., Assam (Karbi Anglong district & Udalguri district), Meghalaya (East Khasi Hills district), and Manipur (Senapati district) by personally meeting and interacting with traditional herbal medicinal practitioners. For this study, 10 practitioners from each area of study were interviewed. During the data collection process, the vernacular name of the medicinal plant, methods of preparation, mode of application, and probable dosage were compiled and documented involving practitioners belonging to four different communities, i.e. Bodo, Karbi, Khasi, and Poumai Naga of the selected states.

**Results:** A total of 39 plant species were meticulously collected and documented across the Karbi Anglong district and Udalguri district in Assam, East Khasi Hills district in Meghalaya, and Senapati district in Manipur. Turmeric (*Curcuma longa*), ginger (*Zingiber officinale*), gooseberry (*Emblica officinalis*), papaya (*Carica papaya*), and passion fruit (*Passiflora edulis*) have emerged as common medicinal resources within these communities. Poaceae, represented by 5 species, emerged as the dominant family among the collected plants, highlighting the diversity and significance of these botanical remedies. *Zingiber officinale* Roscoe " has the highest usage report of 18 with an RFC (Relative frequency citation) of 0.45.

**Conclusion:** The study's findings reveal a rich repository of traditional herbal knowledge in the northeast regions of India. Notably, the indigenous communities of these regions use plant resources to cure a wide range of ailments. This study emphasizes the necessity of documenting, preserving, and transmitting traditional herbal medicinal knowledge for both cultural and practical reasons. It also provides vital insights into the importance of cross-cultural study in promoting different cultures, the richness of traditional medicinal knowledge by engaging with diverse cultures and demonstrates the possibilities for incorporating traditional medicine into modern healthcare systems, particularly in treating women's health issues across these culturally diverse regions.

### 1. Introduction

Since time immemorial, plants have been an integral part of human civilization, providing sustenance, shelter, and a plethora of resources. However, one of the most remarkable aspects about plants is that they

can be used as medicine. People from many cultures have understood and used plants' healing abilities to treat illnesses and promote wellness. Using plant-based treatments to cure many diseases is known as herbal medicine. It is firmly entrenched in age-old customs that run across all nations and civilizations. The practice of herbal medicine comprises the

Peer review under responsibility of Transdisciplinary University, Bangalore.

<sup>\*</sup> Corresponding author.

E-mail address: [angeliriek@gmail.com](mailto:angeliriek@gmail.com) (S.A. Kharumnuid).

<https://doi.org/10.1016/j.jaim.2024.101024>

Received 22 September 2023; Received in revised form 20 May 2024; Accepted 21 June 2024

0975-9476/© 2024 The Authors. Published by Elsevier B.V. on behalf of Institute of Transdisciplinary Health Sciences and Technology and World Ayurveda Foundation This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

extraction and use of various plant components, including leaves, flowers, stems, and roots, which are rich in biologically active substances. Medicinal plants have emerged as promising alternatives to conventional treatments, offering potential benefits with fewer side effects [1].

Regarding women's health, herbal medicine offers a diverse range of remedies utilized for centuries to address specific health concerns unique to women. Women's health refers to the health issues relating to, or specific to, human female anatomies, such as menstruation, contraception, childbirth, menopause, and breast cancer, particularly women's capacity to produce and nurture children [2]. It also includes proper nutrition, especially during pregnancy, childbirth, and child nursing. It is a vital component of global well-being and development. It encompasses emotional, physical, mental, social, cultural, and spiritual aspects, all of which are crucial for the overall progress of individuals, families, and communities.

Women's health and traditional herbal medicine have a significant relationship, as they have been vital in addressing women's specific health needs and promoting their overall well-being since time immemorial. Traditional medicine encompasses indigenous healing systems, including herbal remedies, acupuncture, and other culturally rooted practices like Ayurveda and Traditional Chinese Medicine. Traditional medicine offers a range of remedies and practices to support women's reproductive health throughout different stages of life. These include herbal treatments for menstrual irregularities, traditional therapies for fertility issues, and postpartum care practices that promote healing and rejuvenation. Traditional medicine offers a wealth of knowledge and practices related to pregnancy and childbirth. Traditional midwives, for example, may provide guidance and support during pregnancy, offer natural remedies for common discomforts, and utilize techniques for promoting a smooth and healthy labor experience. These healing practices are often deeply connected to life's cultural, spiritual, and ecological aspects. While modern medicine has made remarkable advancements in healthcare, traditional medicine plays a significant role in many communities, providing a holistic and alternative approach to well-being [3].

Knowledge of folk/traditional medicines is transmitted orally from parents to children or from one generation to another. Even though modern medical systems are available, most people still depend on rich local health traditions for women's healthcare problems [4]. Plant-based traditional medicines are necessary for primary healthcare among tribal societies for being cheap, easy to access, and adaptation to local cultures for cheap and easy access. Modern medicines do not reach many interior tribal pockets, or many resource-poor families cannot afford costly medicines; many households do not practice some such medicines on social and religious grounds. Many cultures have practiced precision with traditional medicines and indigenous wisdom to cure and manage women's health [5].

Despite the rich cultural heritage and extensive use of traditional medicine in North East India, there exists a significant research gap in comprehensively understanding and documenting the diverse practices related to women's health issues. The dearth of cross-cultural studies examining the utilization and efficacy of traditional medicinal practices specifically tailored to address women's health concerns in this region is conspicuous in the global research literature. Existing studies primarily focus on general traditional medicine practices or specific medicinal herbs, neglecting the broader spectrum of women's health issues and their cultural treatments in this distinct geographical and cultural context. Research into traditional medicinal practices for women's health in North East India preserves indigenous knowledge and cultural heritage. Understanding these practices can integrate holistic healthcare, offering alternative solutions. Integrating traditional practices promotes culturally sensitive healthcare and equity. Uncovering effective remedies enhances treatment options and informs policies, fostering collaborations and improving healthcare delivery. As a result, bridging this research gap through cross-cultural exploration of traditional

medicine for women's health in North East India not only fills a significant void in scientific knowledge but also holds promise in offering culturally relevant, effective, and inclusive healthcare solutions benefiting the society at large.

## 2. Methodology

The study used a qualitative research method i.e. interview through one-on-one interactive communication and field observation. The one-on-one interview method involves a direct interaction between an interviewer and a participant. A single interviewer interviews one participant at a time, focusing on gathering specific information, opinions, or experiences from that individual. A predefined set of questions or topics were arranged in an organized manner to guide an interview. It ensures consistency across interviews and allows for standardization of data collection. These questions are designed beforehand to cover various aspects of the topic being studied. A systematic and structured observation of behaviors, events, or phenomena in their natural settings was also employed. This complements the interview component by providing firsthand, real-time data about the subject under study. Observations offer insights into behaviors, patterns, or contextual information that might not be captured through interviews alone. The authors collected data from three different states, i.e., Assam (Karbi Anglong district & Udalguri district), Meghalaya (East Khasi Hills district), and Manipur (Senapati district) by personally meeting and interacting with traditional herbal medicinal practitioners. For this study, practitioners from each area were interviewed. During the data collection process, the vernacular name of the medicinal plant, methods of preparation, mode of application, and probable dosage were compiled and documented. Multiple surveys had been carried out in the villages for the last four years (i.e. from March 2019 to August 2023) in which 39 different medicinal plants were compiled and recorded involving practitioners belonging to four different communities, i.e. Bodo, Karbi, Khasi, and Poumai Naga of the selected states. Data are documented and presented with tables and diagrams. The study ensured ethical considerations by briefing participants on the research's intent before obtaining their verbal consent. Each participant willingly agreed to take part and had the freedom to stop the interviews at any point.

To study the Cross-cultural uses of plants by the selected communities, i.e., Karbi, Bodo, Poumai, and Khasi, the uses of plants are compared regarding their uses, similarities, and dissimilarities in treating various diseases and presented with tables and diagrams.

## 3. Study area

Udalguri district, or Odalguri, in Assam, India, spans 1852.16 km<sup>2</sup>, bordering Bhutan and Arunachal Pradesh to the north, Sonitpur to the east, Darrang to the south, and Tamulpur to the west. It's a major Assam tea-growing region, inhabited predominantly by the Bodo people, along with Assamese, Bengali, Adivasi, Nepali, Marwari, and other tribes. The Bodo community holds rich ancestral customs and knowledge, including unique practices developed through generations of experimentation [6, 7].

East Khasi Hills, a Meghalaya district, covers 2748 sq km between 25°07' and 25°41' N latitude and 91°21' and 92°09' E longitude. It borders Ri-Bhoi District to the north, Jaintia Hills District to the east, Bangladesh to the south, and West Khasi Hills District to the west [8]. Predominantly inhabited by Khasi, Jaintia, and Garo tribes, this region celebrates its culture through art, music, dance, and cuisine. Meghalaya's indigenous communities possess traditional knowledge of medicinal plants and healing practices, deeply rooted in oral traditions [9–11].

The Poumai Naga, a Tibeto-Burman ethnic group, primarily reside in Manipur's Senapati District and in some villages in Nagaland's Phek District. This study is carried out only in Senapati District in Manipur. Senapati District is located between 93.29° and 94.15° East Longitude

and 24.37° and 25.37° North Latitude, with elevations ranging from 1061 to 1788 m above sea level [12]. Renowned as one of the largest and oldest Naga tribes, their rich cultural heritage encompasses traditional songs, folktales, customs, dances, feasts, games, festivals, attire, ornaments, rituals, practices, crafts, and more, all reflecting their ancestral society's existence [13].

Karbi Anglong, one of Assam's hill districts, covers 10,424 sq. km, equivalent to 13.29% of the state's total geographical area. Situated between 92°90' E to 93°54' E and 25°30' N to 26°36' N latitude, it includes Diphu and Bokajan subdivisions. Karbis, a prominent tribe, reside alongside Bodo, Dimasa, Mech, Garo, Kuki, Rengma Naga, Jaintia, Tiwa, Hajong, Rabha, Hmar, and other communities. Karbis, of Mongoloid ethnicity, and Tibeto-Burman, specifically the Kuki-Chin language group, are believed to have migrated from Western Myanmar's Chindwin River valley [14]. They predominantly engage in agriculture, practicing jhum (shifting cultivation) in the hills and settled farming in the plains and valleys [15].

The rationale for taking these four areas of study is that each tribe within these areas holds distinct insights into herb usage, preparation, and applications for specific health conditions. In each of these tribes, cultural diversity shapes the herbal practices, and traditional knowledge is deeply embedded in their cultural identity. The intimate relationship between cultural heritage and herbal remedies underscores the importance of preserving indigenous knowledge and integrating it into modern healthcare practices, ensuring the continuation of these valuable traditions.

#### 4. Significance of the study

Women's active involvement in rural economic development is vital. They undertake diverse roles in developing areas, including crop cultivation, animal care, and income generation. These responsibilities encompass providing crucial resources like food, water, and fuel for their families, as well as tending to the sick, elderly, and children. Additionally, women confront gender-specific health challenges, including breast cancer and hormonal-influenced gynecological issues. Moreover, women are susceptible to diseases like HIV/AIDS, malaria, and tuberculosis, often due to sexual intercourse or occupational exposures. Neglecting their health due to household duties and limited hygiene knowledge exacerbates these issues. Consequently, researching traditional women's health medicine is imperative [16].

Diverse cultures harbour unique herbal medicine traditions that offer valuable insights into women's health. Cross-cultural studies enable exploration and learning from these practices, enhancing our grasp of herbal remedies' effectiveness and safety across cultures. These studies reveal potential herbal treatments worthy of thorough examination within modern medicine, potentially yielding novel solutions for women's health.

Global healthcare disparities persist, with specific populations encountering barriers to conventional medical access. Investigating diverse cultural herbal practices allows us to identify alternative, culturally appropriate treatments. This contributes to reducing healthcare disparities and promoting equitable access. Furthermore, conducting cross-cultural studies aids in documenting and preserving traditional knowledge. As cultural practices evolve, there's a risk of losing indigenous herbal wisdom. Scientific scrutiny and documentation of these practices safeguard traditional knowledge for future generations [17].

Conducting a cross-cultural exploration of traditional medicine for women's health in North East India brings forth various challenges. Cultural nuances and taboos around women's health might hinder access to certain practices, necessitating a delicate approach. Accurately documenting and translating traditional practices, navigating biases, respecting ethical considerations, addressing logistical hurdles, interpreting data contextually, engaging communities, and dealing with limited resources all demand a culturally sensitive and collaborative

approach. This necessitates working closely with local stakeholders to ensure ethical and meaningful research.

#### 5. Literature review

##### 5.1. The importance of cross-cultural study in documenting traditional knowledge: a literature review

The indigenous communities of North Eastern States in India have a wealth of knowledge on traditional medicine, and therefore, Mao (2019) highlighted the need for cross-cultural ethnobotanical studies. He stated that researchers on ethnobotany have failed to highlight the cross-cultural aspects-to compare and analyze how different communities or tribes use the same plant in different ways to treat various illnesses [18]. After anthropologist George Peter Murdock conducted comparative research using a statistical compilation of cultural data, the term "cross-cultural" first appeared in the 1930s. The phrase gradually came to refer to cultural interaction. Phrases like "a cross-cultural perspective," "cross-cultural contrasts," "a cross-cultural study of ..." and similar expressions all carry a comparison sense [19]. Cross-cultural studies on traditional herbal medicine indicate the similarities, differences, and uniqueness in the uses of different types of medicinal plants, methods of preparation, mode of applications, dosages, etc., by different tribes or communities. Studies in this regard have indicated that the treatment method for different/same illnesses differs from one community to another based on their socioeconomic structure, ancient traditional knowledge, environmental condition, and cultural beliefs [20].

Traditional knowledge, passed down through generations, encompasses a wealth of information and practices deeply rooted in various cultures worldwide. The documentation and preservation of this knowledge are crucial for understanding cultural heritage, sustainable development, and global collaboration [21]. Cross-cultural studies play a pivotal role in documenting traditional knowledge by promoting cultural exchange, fostering mutual understanding, and facilitating the preservation and transmission of invaluable ancestral wisdom.

Following are some of the importance of cross-cultural study in documenting traditional knowledge.

##### > Preserving Indigenous Knowledge:

Cross-cultural studies enable the documentation and preservation of indigenous knowledge within specific cultural contexts. For instance, Mir et al. (2022) highlight the significance of cross-cultural analysis in documenting the ethnomedicinal knowledge of ethnic communities in the Northern Regions of Jammu and Kashmir, India [22]. Researchers can document traditional healing methods, plant uses, and ecological knowledge by engaging with local communities, providing valuable insights into sustainable healthcare and biodiversity conservation

##### > Enhancing Intercultural Understanding:

Cross-cultural studies promote intercultural understanding by encouraging debate and interaction among cultures. Documenting traditional knowledge across cultures allows researchers to discover shared practices, beliefs, and values, thereby promoting cultural appreciation and mutual respect. For example, Thompson and Balkwil (2010) in their study exploring how music may be similar or different across cultures, stated that researchers can uncover universal principles and cultural influences that shape our emotional responses to music. Additionally, researchers avoid cultural biases and enhance the interpretation of their findings by being aware of their cultural perspectives and consulting with different cultures [23].

##### > Informing Sustainable Development:

Cross-cultural studies help to promote sustainable development by

incorporating traditional knowledge systems into modern operations. Such research emphasizes the ecological wisdom hidden in traditional knowledge, allowing for the identification of sustainable ways for resource management, agriculture, and land use. Mazzocchi (2006) in his study emphasizes the importance of incorporating indigenous knowledge into environmental decision-making processes. It highlights the need for cross-cultural collaborations to develop effective conservation policies that respect traditional ecological knowledge [24].

### 5.2. Cross-cultural studies on herbal medicinal plants: a literature review

Numerous studies have examined the cross-cultural usage of herbal medicinal plants for women's related diseases. These studies highlight herbal remedies' rich traditional knowledge and therapeutic potential across different cultures and regions. One such study by Jiao et al. (2022) focused on comparing herbal remedies for menstrual disorders. The research involved medicinal plants worldwide, revealing the use of plants such as *Vitex agnus-castus*, *Paeonia lactiflora*, and *Carica papaya* for regulating menstrual cycles [25]. A similar cross-cultural study by Johnson et al. (2019) explored herbal remedies for menopausal symptoms worldwide. The study identified plants such as Wild Yam (*Dioscorea*), Dong Quai (*Angelica sinensis*), and Maca (*Lepidium meyenii*) as commonly used herbal treatments for hot flashes and other menopausal symptoms [26]. A study by Mir et al. (2022) examined cross-cultural studies on medicinal plant utilization among the four ethnic communities in the northern regions of Jammu and Kashmir, India. The study found that Leaves of *Taraxacum officinale* (Handh) are cooked and eaten to treat menstrual bleeding, weakness, and dyspepsia in all four investigated tribes [22].

### 5.3. Traditional herbal medicine for gynecological problems (international)

With the growing popularity of herbal medicines, researchers around the globe have performed several studies to test the effectiveness and safety of herbal medicine used to treat menstrual disorders. In South Africa, 16 new plant species were found to be recorded for the first time in literature to treat gynecological-related problems. The three most common conditions were Dysmenorrhea, infertility and menorrhagia [27]. A study by Motti et al. (2019) on herbal remedies used in women's health care in Italy documented 197 plants treating seven main ailments related to women's problems. The author has also concluded that a study needs to be conducted to understand their effectiveness, manner of use, posology and side effects [28]. Several plants utilized worldwide for pregnancy, delivery, and postpartum care are reviewed by Karemore and Avari (2017). About 122 plant species belonging to 50 different families were documented. The study shows 36 plants were used for complications that are common during pregnancy, 32 plants for inducing labor, 24 plants are used in the recovery of women after childbirth, to treat postpartum weakness, hemorrhage and reconstitute women, and 32 plants are used in other ailments during pregnancy and childbirth. The study also emphasizes proper scientific validation of the plants to safeguard against potential toxicity [4]. Mirabi et al. (2014) performed an extensive literature review on Iranian herbal medicine and Cho et al. (2017) in Korea. While both works complemented herbal medicine as a suitable replacement for treating menstrual pain, they also suggested further scientific research to see possible health risks [29,30].

### 5.4. Traditional herbal medicine for gynecological problems (India)

Yadav et al. (2006) surveyed by interacting with herbal practitioners and older women with knowledge of herbal medicine from eight districts of Haryana and documented 17 plant species for combating menstrual disorders [31] Rajith et al. (2012), reported 19 plant species for treating menorrhagia, 26 plants for treating Dysmenorrhea, 25 plants for oligomenorrhea, five plants for hypomenorrhea, four plant species

for amenorrhea and also listed 18 plant species as dietary supplements during the menstrual cycle in Kerala [32].

Kim Sooi and Lean Keng (2013) conducted a cross-sectional, descriptive study among Malay women admitted to the prenatal and postnatal wards to ascertain the prevalence and use of herbal remedies during pregnancy and the fundamental components of the most used herbs. 460 women in total were questioned. 34.3% of pregnant women used herbal remedies, and 73% did so during labor because they thought that may hasten and ease the process. Similarly, a study on traditional plants used for treating gynecological disorders in Vedaranyamtaluk, South India, documented 66 medicinal plants for treating 36 ailments related to gynecological disorders [33].

### 5.5. Traditional herbal medicine for gynecological problems (Northeast India)

Ethno-gynecological practices of the Karbis and the plant medicines used have yet to receive the attention of researchers. Therefore, the study by Teronpi et al. (2014) emphasized the uses of plants, plant products, and gender aspects of gynecological knowledge. Though men and women have equal knowledge about medicinal plants and their usage, knowledge of women's health in gynecology was acquainted only with women. The Karbis use 28 medicinal plants for various gynecological problems. The study suggests that herbal remedies constitute an essential and effective component of the healthcare system among Karbis, whose use needs to be encouraged and promoted. Further pharmacological investigation would aid in proving the efficacy of the medicines and evidence for tribal claims in the efficiency of the ethno-medicines [15].

A study by Bora et al. (2016), reports on folkloric medicinal herbs that Assamese rural and tribal communities have historically used to cure a variety of female healthcare-related diseases conditions, including gynecological problems such as leucorrhoea, dysmenorrhoea, menstruation disorders and pregnancy-related issues. A total of 101 plant species are recorded. It is found that 28 plants are used for leucorrhoea, 22 plants are used to treat dysmenorrhoea, 16 plants for menstruation disorders and 13 plants are used for pregnancy-related issues [34].

It is observed from the literature that works on women's health and traditional herbal medicine have been carried out in India and abroad, but the goal still needs to be reached. In North-Eastern India, only Assam has covered some work on this, and the remaining states still need documentation. Therefore, this paper documents a cross-cultural study of women's health and traditional herbal medicine. The study can guide women, especially in rural areas, to use traditional herbal medicine more accurately where modern medicine is not accessible. It will also compare the similarities and differences of the knowledge on various plants used to alleviate women's health among the indigenous tribes of the North-Eastern states in India.

Despite the authors' extensive study of the literature on traditional medicine and women's health, they discovered a lack of thorough cross-cultural studies on how traditional medicine is used in North East India to treat various women's health issues. Previous research may have focused on women's health or traditional medical practices, but they did not investigate the relationship between the two in the setting of North East India. The absence of studies in the literature emphasizes the need for additional research and cross-cultural investigation, particularly into traditional medicinal practices connected to women's health in North East India. This would provide essential insight into an underrepresented field and lead to a better understanding of traditional medicine's role in addressing women's health issues across cultures.

## 6. Results and discussions

Some traditional healers used herbal therapeutic plants both externally and orally. The medication is prepared differently by each

traditional herbal medicine practitioner. They utilize various concoction or mixture procedures with comparable or different medicinal herbs to create medicine.

### 6.1. Results

39 plant species belonging to twenty-eight families were found to treat various illnesses that affect women's health. The plant species belong to different habitus like herbs, shrubs, climbers, trees, and grass. The plants are either cultivated by medicinal practitioners or grown in the wild in and around the four areas of the study.

Among the different parts used for the preparation of medicines, leaves (48.48%) were found to be the most frequently used plant parts in the preparation of medicines, followed by roots (18.18%), rhizomes (12.12%), Seeds and flowers (9.09%), fruits and barks (6.06%), and stems (3.03%) and whole plants (2.72%).

The method of preparation (dosage form) were decoction (36.36%), followed by infusion (24.24%), concoction (18.18%), raw paste (15.15%) and plants either consumed as fruits, vegetables or salads (6.07%)

The maximum number of plants is used for curing menstrual disorders (dysmenorrhoea, leucorrhoea, gonorrhoea, oligomenorrhoea, amenorrhoea, menorrhagia, etc.), followed by abortion, white discharge, and anemia.

The cross-cultural study conducted in Assam (Karbi Anglong district & Udalguri district), Meghalaya (East Khasi Hills district), and Manipur (Senapati district) has yielded intriguing findings regarding the common utilization of five specific plants, namely turmeric (*Curcuma longa*), ginger (*Zingiber officinale*), gooseberry (*Emblica officinalis*), papaya (*Carica papaya*), and passion fruit (*Passiflora edulis*), as medicinal resources within these communities.

*Curcuma longa* (Turmeric), known for its anti-inflammatory and antimicrobial properties [35], features prominently in the medicinal repertoire of all four tribes. Its versatile uses range from wound healing to digestive aid, with each tribe possessing distinct preparation methods and applications. Similarly, *Zingiber officinale* Roscoe (ginger), renowned for its digestive and anti-nausea qualities [36], is a shared resource among the tribes. The variations in the recipes and remedies derived from ginger showcase the diverse ways in which traditional knowledge is shaped and preserved within each community. *Phyllanthus emblica* L (Gooseberry), valued for its high vitamin C content and antioxidant properties [34], finds utility across the tribes, particularly in boosting immunity and addressing common ailments such as colds and coughs. *Carica papaya* (Papaya), with its digestive enzymes and wound-healing attributes [37], is another plant that transcends tribal boundaries and serves as a remedy for various health concerns. *Passiflora edulis* (Passion fruit), though primarily known for its dietary benefits [38], also exhibits medicinal qualities in these communities, including its application in treating digestive disorders.

Table 1 represents data on various plants used within different ethnic communities or tribes—Bodo, Khasi, Poumai, and Karbi—alongside their corresponding usage reports and Relative Frequency of Citation (RFC). In qualitative ethnobotany, the Relative Frequency of Citation (RFC) is a measure used to assess the importance of plant species within a community or culture based on their citation frequency in ethnobotanical studies. It helps identify the most cited or important plants within a particular community for various purposes such as medicinal, cultural, ritualistic, or other uses.

The RFC formula in ethnobotany is slightly modified to suit the qualitative nature of the data:

$$RFC = \frac{\text{Total Number of Informants Citing a Plant Species}}{\text{Total number of Informants}}$$

The 'No. of use report' column indicates how many times each plant species was reported or mentioned. For instance, "*Zingiber officinale* Roscoe" has the highest usage report of 18, meaning it was mentioned

18 times as a herbal medicine among the traditional medicinal practitioners in the four different areas of study. Similarly, "*Curcuma longa* L." has a usage report of 15, indicating it was reported fifteen times across all the study areas for its medicinal usage. The 'Relative Frequency of Citation (RFC)' column provides a measure of the importance or significance of each plant within the respective community's herbal practices. The more the number of use reports the higher the RFC and vice versa.

### 6.2. Discussions

The study adopted a qualitative research method, specifically one-on-one interactive discussion and field observation. One-on-one discussions allow participants to openly communicate their views, feelings, and experiences, resulting in deep and thorough insights. Field observations allow researchers to watch behaviours and interactions in their natural setting, providing a more comprehensive grasp of the subject. Thirty-nine (39) plant species have been found in the four regions (Udalguri district of Assam, East Khasi Hills District of Meghalaya, Senapati District of Manipur and Karbi Anglong, one of Assam's hill districts) in North-east India for treating women's health issues. This suggests that indigenous peoples in these locations often possess a deep understanding of the medicinal properties of plants and have used them for generations to address a variety of health concerns, including those specific to women. Five plants were revealed to be used in common by all four regions. The use of certain families, such as Poaceae, Caesalpinaceae, Zingiberaceae, and Acanthaceae, to treat women's health issues shows the broad botanical diversity that contributes to traditional herbal medicinal practices of the practitioners in the four different regions. Furthermore, the emphasis on using specific plant parts for treatment, such as leaves, roots, and rhizomes, revealed the communities' thorough understanding of the properties and utility of different plant components. When asked how they learned to identify the various plant species and parts of the plants to be used as medicine, the majority of practitioners stated that it was through knowledge passed down from generation to generation as well as trial and error. The use of decoction (medicinal preparation made by boiling plant parts or herbs in water to extract their beneficial properties), infusion (An infusion is a medicinal liquid made by steeping plant material or herbs in hot water, typically for a shorter duration than a decoction), concoction (A concoction is a mixture of various ingredients, often including herbs or plants, blended or prepared in a specific way for medicinal or therapeutic purposes), and raw paste for medicinal preparation showed the many techniques used by these cultures, as well as a full understanding of extraction procedures for getting the medicinal benefits of these plants. The herbal remedies indicated for various ailments reflect community-specific traditional knowledge passed down through generations. The widespread use of five plants across the four regions, namely turmeric (*Curcuma longa*), ginger (*Zingiber officinale*), gooseberry (*Emblica officinalis*), papaya (*Carica papaya*), and passion fruit (*Passiflora edulis*), shows their cultural significance and deep-rooted presence in North East India's indigenous traditions. The fact that different tribes employ these herbs although the method of preparation and dosage may differ from one tribe to another suggests that they all believe them to be safe and effective [34–38]. Supplementary Table 1 shows that in all communities, *Phyllanthus emblica* or *Emblica officinalis* fruits can be consumed raw or boiled, with Karbi and Khasi communities favouring boiled water as juice. The Khasi community also applies the juice to hair or mixes it with shampoo to promote hair growth. However, the Bodo community recommends drinking refined water with the fruit on an empty stomach, while the Poumai community boils the fruits with sugar or jaggery to create syrup to be consumed orally. Regarding *Passiflora edulis* Sims, leaves or fruits are orally consumed in all communities. However, the Khasi and Poumai communities consume leaves, while the Bodo and Karbi communities favour the fruits. Additionally, the Poumai community specifically uses this plant to treat Dysmenorrhoea and for its

**Table 1**  
The Relative Frequency of citation (RFC) of each plant.

Sl. No.	Plants	No. of use report	Relative Frequency of Citation (RFC)
<b>a. Bodo</b>			
1.	<i>Terminalia chebula</i> Retz.	2	0.05
2.	<i>Syzygium cumini</i> (L) Skeels	2	0.05
3.	<i>Imperata cylindrica</i> (L) Raeusch.	1	0.02
4.	<i>Tylophora asthmatica</i> (L.f) Wight & Arn.	2	0.05
5.	<i>Acoras calamas</i> L	2	0.05
6.	<i>Cynodon dactylon</i> L	1	0.02
<b>Common Plants among the 4 areas (Bodo, Khasi, Poumai, and Karbi)</b>			
7.	* <i>Phyllanthus emblica</i> L or <i>Emblica officinalis</i>	12 Bodo=3 Khasi=2 Poumai=3 Karbi=4	0.3
8.	* <i>Passiflora edulis</i> Sims	11 Bodo=3 Khasi=3 Poumai=2 Karbi=3	0.27
9.	* <i>Carica papaya</i> L.	10 Bodo=3 Khasi=2 Poumai=3 Karbi=2	0.25
10.	* <i>Curcuma longa</i> L.	15 Bodo=3 Khasi=5 Poumai=4 Karbi=3	0.37
11.	* <i>Zingiber officinale</i> Roscoe	18 Bodo=4 Khasi=5 Poumai=5 Karbi=4	0.45
<b>b. Khasi</b>			
12.	<i>Sonchus brachyotus</i> DC.	1	0.02
13.	<i>Begonia roxburghii</i> (Miq.)A.DC.	3	0.07
14.	<i>Sechium edulis</i> Jacq.	3	0.07
15.	<i>Artemisia douglasiana</i> Besser	1	0.02
16.	<i>Urtica dioica</i> L	4	0.1
<b>c. Poumai</b>			
17.	<i>Rhododendron arboreum</i> Sm.	2	0.05
18.	<i>Justicia adatoda</i> L.	1	0.02
19.	<i>Ricinus communis</i> L.	1	0.02

20.	<i>Citrus x limon</i> (L.) Osbeck	5	0.12
<b>d. Karbi</b>			
21.	<i>Bambusa bambos</i> (L.) Voss	4	0.1
22.	<i>Caesalpinia pulcherrima</i> (L.) Sw.	3	0.07
23.	<i>Cardiospermum halicacabum</i> L.	2	0.05
24.	<i>Senna alexandrina</i> var. <i>alexandrina</i>	3	0.07
25.	<i>Cynodon dactylon</i> (L.) Pers.	4	0.1
26.	<i>Phlogocanthus wallichii</i> C.B.Clarke	2	0.05
27.	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	3	0.07
28.	<i>Saraca asoca</i> (Roxb.) W.J.de Wilde	3	0.07
29.	<i>Sida cordifolia</i> L.	3	0.07
30.	<i>Solanum indicum</i> . Linn	3	0.07
31.	<i>Trigonella foenum-graecum</i> L.	3	0.07
32.	<i>Cyanthillium cinereum</i> (L.) H.Rob.	3	0.07
33.	<i>Annona squamosa</i> L.	3	0.07
34.	<i>Coix lacryma-jobi</i> L.	3	0.07
35.	<i>Amaranthus Spinousus</i> L	3	0.07
36.	<i>Diplazium esculentum</i> (Retz)	3	0.07
37.	<i>Impatiens Tripeta</i> Roxb. ex DC.	3	0.07
38.	<i>Bauhinia racemose</i> Lam	3	0.07
39.	<i>Vernonia cinera</i> (L.) Less.	3	0.07

sedative effects. In terms of *Zingiber officinale* Roscoe, rhizomes are consumed orally across all communities. Yet, the Bodo and Khasi communities grind or ground the rhizomes for consumption, the Poumai community prepares lemon-ginger tea with the rhizomes to alleviate painful menstruation, and the Karbi community consumes the rhizomes raw. The fruit of *Carica papaya* L. is orally consumed in all communities,

yet the Poumai community distinguishes itself by using crushed seeds mixed with honey to regulate and induce menstrual cycles. As for *Curcuma longa* L., rhizomes are universally utilized across communities. However, the Bodo community consumes dried rhizomes with milk to treat acidity, the Khasi community consumes raw rhizomes, the Poumai community applies ground rhizome paste externally for itching or

washes affected areas with a paste-water mixture, and the Karbi community applies ground rhizomes to infected areas. Overall, while there are commonalities in plant usage among communities, differences in preparation methods and specific applications highlight the rich diversity of traditional medicinal practices and cultural interpretations within each community.

Table 1 shows use reports and Relative Frequency of Citation (RFC) for numerous plants used in herbal treatments by different ethnic communities or tribes (Bodo, Khasi, Poumai, and Karbi). The RFC is a measurement used in ethnobotanical research to determine the importance of a plant species within a given community or culture. Each section (a, b, c, and d) corresponds to a specific tribe or community, and the plants listed within each subsection are the plants used in that community, together with their usage reports and RFC values. The RFC values represent the significance or prominence of each plant species in the community's herbal traditions. Plants such as turmeric (*Curcuma longa*), ginger (*Zingiber officinale*), gooseberry (*Phyllanthus emblica* L), papaya (*Carica papaya*), and passion fruit (*Passiflora edulis*) have more usage reports and a higher RFC value across these communities, indicating their consistent mention and significance in herbal practices among these ethnic groups.

Although there has long been anecdotal evidence supporting the advantages of these plants, scientific study is beginning to establish the safety and efficacy of several herbal plants in addressing female-specific health conditions. The safety, well-being, and improvement of healthcare are dependent on scientific evidence proving the efficacy of plants as medicines. It ensures that patients and society receive safe, effective, and evidence-based therapies. Furthermore, it establishes a connection between traditional medicinal knowledge and modern medicine, resulting in more inclusive and comprehensive healthcare systems.

## 7. Conclusion

Cross-cultural studies are important for documenting traditional knowledge because they help preserve, interpret, and transmit varied cultural practices and wisdom. Researchers can capture the richness of traditional knowledge by engaging with diverse cultures, which can then be used to inform sustainable development, cultural development, and intercultural understanding. The authors suggest further study is needed to confirm and improve existing approaches, as well as to encourage collaboration between modern healthcare specialists and traditional healers in the development of evidence-based treatments. This study is a timely reminder to healthcare practitioners about the importance of providing more inclusive patient care. Understanding and implementing traditional medicines into modern healthcare can broaden treatment options, improve patient satisfaction, and promote general health. This study has practical implications for policymakers since it highlights the necessity of preserving and adopting traditional healing approaches in healthcare systems. Recognizing and confirming these practices via research, financing, and regulatory frameworks can result in more comprehensive and culturally appropriate healthcare policies.

## Ethical approval

The contents present in this article, "Cross-cultural study on the uses of traditional medicine to treat various women's health issues in Northeast India", is fully my and my co-authors' research, and there is no conflict of interest. All the data collected are solely for research purposes and will not be misused in any way. I and my co-authors take responsibility for all the contents of this research.

## Funding sources

This research received no specific grant from any funding agency in the public, commercial, or non-profit sectors.

## Data availability statement

The data presented in this article, about Cross-cultural study on the uses of traditional medicine to treat various women's health issues in Northeast India, are available upon request. Researchers interested in accessing the data for legitimate research purposes may submit a formal request.

## Conflict of interest

The authors declare there is no conflict of interest regarding this article.

## Author contributions

Klaret Kropi: Contributed to the concept of the article, acquired data and analyzed it. Revised the article critically for intellectual content. K P Jastone : Contribute to the concept of the article, acquired data and analysed it. Revised the article critically for intellectual content. Sweetey Angeliriar Kharumnuid: Contributed to the concept of the article, acquired data, interpretation and analysed the data. Drafted the article and revised it critically for intellectual content. Hemanta Kumar Das: Contributed to the concept of the article, acquired data, analysed the data and revised it critically for intellectual content. Moses M. Naga: Contributed to the concept of the article, analysed the data and revised it critically for intellectual content.

## Declaration of Generative AI and AI-assisted technologies in the writing process

The authors used Grammarly to check spellings, punctuation, and grammar correction.

## Acknowledgment

The authors are thankful to all traditional practitioners for their cooperation and sharing of their valuable information during the survey.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jaim.2024.101024>.

## References

- [1] Petrovska BB. Historical review of medicinal plants' usage. *Pharmacogn Rev* 2012; 6(11):1–5. <https://doi.org/10.4103/0973-7847.95849>. PMID: 22654398; PMCID: PMC3358962.
- [2] Weisman CS. Changing definitions of women's health: implications for health care and policy. *Matern Child Health J* 1997;1(3):179–89. <https://doi.org/10.1023/a:1026225513674>. PMID: 10728242.
- [3] World Health Organisation. WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems. 2004. ISBN: 9241592214.
- [4] Sharma PP, Sharma SP. *Int J Res Med Sci* 2023;11(10):3803–18. <https://doi.org/10.18203/2320-6012.ijrms20233039>.
- [5] Uniyal SK, Singh KN, Jamwal P, Lal B. Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *J Ethnobiol Ethnomed* 2006;2:14. <https://doi.org/10.1186/1746-4269-2-14>. PMID: 16545146; PMCID: PMC1435742.
- [6] Baro NS. Tea tribes in Assam in historical perspective with special reference to Udalguri district, Assam. *Herit J Multidiscip Stud Archaeol* 2021;9:1051–60.
- [7] Singh D, Bargayary N. Traditional knowledge and social taboos of the Bodo on birth. *History Research Journal* 2019 Sep 27;5:120–9.
- [8] National Informatics Centre, Ministry of Electronics & Information Technology, Government of India. Website of East Khasi Hills District. Available from: <https://eastkhasihills.gov.in/>. [accessed on 2023 September 16].
- [9] Bhalerao AK, Kumar B, Singha AK, Jat PC, et al., editors. Agricultural folk songs of Meghalaya. Umiam, Meghalaya, India: ICAR-Agricultural Technology Application Research; 2016. Available from: [https://icarzcu3.gov.in/book\\_publications/4%20Meghalaya\\_Folk%20Song.pdf](https://icarzcu3.gov.in/book_publications/4%20Meghalaya_Folk%20Song.pdf). [Accessed 6 June 2023].
- [10] Hynniewta SR, Kumar Y. Herbal remedies among the Khasi traditional healers and village folks in Meghalaya. *Indian J Tradit Knowl* 2008;7(4):581–6.



- [11] Lyngdoh JP, Syiem D, Mao AA, Martin. Pattern of traditional medicine usage in East Khasi hills of Meghalaya. *Indian Journal of Traditional Knowledge* 2014;13(1):164–70.
- [12] Kapesa A. Ethnographic study of the Mao Naga tribe of Manipur, India. *Int J Adv Res* 2017;5:1119–24. <https://doi.org/10.21474/IJAR01/3614>.
- [13] Veikho SL. Grammar of Poumai Naga (Poula). In: Brill's Tibetan Studies Library, Vol. 25; Languages of the Greater Himalayan Region, vol. 25. Leiden: Brill; 2021. p. 1–22. [https://doi.org/10.1163/9789004437982\\_002](https://doi.org/10.1163/9789004437982_002). E- book ISBN: 9789004437982.
- [14] Phangcho PC. The Karbis: A Spatio-Temporal Analysis in Tribal Geography. 1st ed. Guwahati: Angik Publication; 2003.
- [15] Teronpi V, Singh HT, Tamuli AK, Teron R. Ethnoichthyological study of the Karbis of Assam (India) and Indigenous Knowledge of Management of Fish Resources. *NeBio* 2013;4(2):22–8.
- [16] Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. *Lancet* 2010;376:41–8. [https://doi.org/10.1016/S0140-6736\(10\)60548-X](https://doi.org/10.1016/S0140-6736(10)60548-X).
- [17] Venero Aguirre B, Boyd T, editors. Documenting Traditional Knowledge – A Toolkit. Geneva: World Intellectual Property Organization (WIPO); 2017.
- [18] Mao AA, Roy DK. Ethnobotanical Studies in North East India: A Review. In: Jain AK, editor. *Indian Ethnobotany: Emerging Trends*. India: Scientific Publishers; 2014.
- [19] Rai S, Jha A. A study on cross-cultural issues of pharmaceutical companies located in mountainous regions. *Int J Pharm Sci Bus Manag* 2014;2(4):1–14. Available from: [https://www.ijpsbm.com/contents/volume\\_2\\_issue\\_4](https://www.ijpsbm.com/contents/volume_2_issue_4). [Accessed 6 June 2023].
- [20] Palanisamy N, Nautiyal S, Thiagarajan K, Chandrasekaran R. Cross-cultural ethnobotany and conservation of medicinal and aromatic plants in the Nilgiris, Western Ghats: a case study. *Med Plants - Int J Phytomedicines Rel Ind* 2011;1(3):27–35. <https://doi.org/10.5958/j.0975-4261.3.1.004>.
- [21] Senanayake SGJN. Indigenous knowledge as a key to sustainable development. *J Agric Sci* 2006;2:10–5. <https://doi.org/10.4038/jas.v2i1.8117>.
- [22] Mir TA, Jan M, Jan HA, Bussmann RW, Sisto F, Fadlalla IMT. A cross-cultural analysis of medicinal plant utilization among the four ethnic communities in Northern Regions of Jammu and Kashmir, India. *Biology (Basel)* 2022;11(11):1–24. <https://doi.org/10.3390/biology11111578>.
- [23] Thompson WF, Balkwill L-L. Cross-cultural similarities and differences. In: Juslin PN, Sloboda JA, editors. *Handbook of music and emotion: theory, research, applications*. Oxford: Oxford University Press; 2010. p. 755–88.
- [24] Mazzocchi F. Western science and traditional knowledge: Despite their variations, different forms of knowledge can learn from each other. *EMBO Rep* 2006;7(5):463–6. <https://doi.org/10.1038/sj.embor.7400693>.
- [25] Jiao M, Liu X, Ren Y, Wang Y, Cheng L, Liang Y, et al. Comparison of herbal medicines used for women's menstruation diseases in different areas of the world. *Front Pharmacol* 2022;12:1–20. <https://doi.org/10.3389/fphar.2021.751207>.
- [26] Johnson A, Roberts L, Elkins G. Complementary and alternative medicine for menopause. *J Evid Based Integr Med* 2019;24:1–14. <https://doi.org/10.1177/2515690X19829380>.
- [27] de Wet H, Ngubane SC. Traditional herbal remedies used by women in a rural community in northern Mputaland (South Africa) for the treatment of gynaecology and obstetric complaints. *South Afr J Bot* 2014;94:129–39.
- [28] Motti R, Bonanomi G, Emrick S, Lanzotti V. Traditional herbal remedies used in Women's Health Care in Italy: a review. *Hum Ecol* 2019;47:942–72. <https://doi.org/10.1007/s10745-019-00125-4>.
- [29] Mirabi P, Alamolhoda SH, Esmailzadeh S, Mojab F. Effect of medicinal herbs on primary dysmenorrhoea: a systematic review. *Iran J Pharm Res* 2014;13(3):757–67 [accessed 2023 Sep 6].
- [30] Cho HN, Choi E, Seo DH, Suh M, Lee HY, Park B, et al. The Korean study of Women's Health-Related Issues (K-Stori): rationale and study design. *BMC Public Health* 2017;17(1). <https://doi.org/10.1186/s12889-017-4531-1>.
- [31] Rajith NP, Ambily D V, Dan VM, Sree Devi P, George V, Pushpangadan P. A survey on ethnomedicinal plants used for menstrual disorders in Kerala. *Indian J Tradit Knowl* 2012;11(3):453–60.
- [32] Yadav JP, Kumar S, Siwach P. Folk medicine used in gynecological and other related problems by rural population of Haryana. *Indian J Tradit Knowl* 2006;5(3):323–6.
- [33] Balamurugan S, Vijayakumar S, Prabhu S, Morvin Yabesh JE. Traditional plants used for the treatment of gynaecological disorders in Vedaranyam taluk, South India - an ethnomedicinal survey. *J Tradit Complement Med* 2018 Apr 1;8(2):308–23.
- [34] Bora D, Mehmud S, Das KK, Medhi H. Report on folklore medicinal plants used for female health care in Assam (India). *Int J Herbal Med* 2016;4(6):4–13.
- [35] Kumar N, Kumar Sakhya S. Ethnopharmacological properties of *Curcuma longa*: a review. *Int J Pharmaceut Sci Res* 2013;4(1):103–12.
- [36] Chen CX, Barrett B, Kwekkeboom KL. Efficacy of oral ginger (*Zingiber officinale*) for dysmenorrhea: a systematic review and meta-analysis. *Evid Based Compl Alternat Med* 2016;2016:6295737. <https://doi.org/10.1155/2016/6295737>.
- [37] Ali A, Devarajan S, Waly MI, Essa MM, Rahman MS. Nutritional and medicinal values of papaya (*Carica papaya* L.). In: *Natural Products and Their Active Compounds on Disease Prevention*. Nova Science Publishers, Inc; 2012. p. 307–24. ISBN-9781621001539.
- [38] Kaikade AR, Gunjarkar SB, Gurunani SG, Pandel TW, Shrekar SA, Kaikade PR, et al. Phyto-Pharmacognostic review on *Passiflora* species. ~ 35. *J Med Plants Stud* 2023;11(3):35–50.