

Traditional Medicinal Plants for Diarrhea Treatment in Eastern Indonesia: An Ethnomedicinal Perspective

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ABSTRACT: Diarrhea is still one of the main endemic diseases in Indonesia, especially in rural and remote areas spread across various provinces, including eastern Indonesia. Although modern medicine has been widely available, the use of medicinal plants as a form of traditional medicine to overcome diarrhea is still widely found in various regions of Indonesia. This article aims to analyze and inventory the diversity of medicinal plants used by the people of eastern Indonesia in treating diarrhea. This article uses the literature review method of journal articles published between 2015 and 2024 to examine how local people in eastern Indonesia deal with diarrhea. The results of the study show that there are 15 species from 12 plant families used by 13 ethnic groups, with the highest frequency in guava (*Psidium guajava*) and the dominant family used is Myrtaceae. The most widely used part of the plant is the leaves, while the most common processing method is by boiling and the way to use it by drinking, which is considered more practical and effective. This study emphasizes the importance of preserving traditional knowledge and developing ethnomedical-based phytopharmaceuticals.

KEYWORDS: antidiarrhea; ethnomedicine; traditional medicine; medicinal plants

1. INTRODUCTION

Diarrhea is still one of the main endemic diseases in Indonesia, especially in rural and remote areas spread across various provinces, including in eastern Indonesia such as Sulawesi, Nusa Tenggara, Maluku and Papua. Based on the Indonesian Health Profile report (Ministry of Health of the Republic of Indonesia, 2022), there were 536,361 cases of diarrhea throughout Indonesia, with the highest prevalence occurring in children under five. The World Health Organization (WHO, 2021) also noted that globally, diarrhea causes about 1.6 million deaths each year, with the majority of cases occurring in developing countries, including Indonesia. In the midst of the widespread availability of modern treatments such as ORS and antibiotics, some communities, especially those in eastern Indonesia, who often face limited access to modern health services, still rely on traditional medicine based on medicinal plants as an effort to overcome diarrhea. Interestingly, this hereditary practice is not only maintained, but also proven to be able to help people survive and recover from disease, so it remains the first choice in handling high cases in local communities.

The phenomenon of utilizing plants as a source of traditional medicine shows that local plant-based medicine still has an important role in the public health care system, especially in geographically remote or hard-to-reach areas. These practices evolve within local cultural traditions and are based on empirical experiences that have been tested over generations. The use of various plant species, such as *Psidium guajava*, *Zingiber officinale*,

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and *Curcuma domestica*, is a clear example of the utilization of local knowledge in the natural treatment of diarrhea. However, the lack of systematic documentation of ethnomedicine practices has led to the marginalization of this local potential, as Indonesia is one of the megabiodiverse countries with thousands of medicinal plant species that have not been optimally studied. The urgency of documenting and reviewing ethnomedicine practices is all the more pressing given the risk of loss of traditional knowledge due to modernization, lifestyle changes, and lack of regeneration of local knowledge, as well as the great potential of local medicinal plants in supporting nature-based medicine innovation. In line with global efforts to integrate traditional medicine into national health systems (WHO, 2019), the exploration and documentation of ethnomedicine knowledge in Eastern Indonesia is very important, both in terms of cultural preservation and the potential for sustainable phytopharmaceutical development. Comprehensive documentation of ethnomedicine practices can prevent the loss of local knowledge that has only been passed down orally and is prone to extinction over time.

Previous studies have revealed the richness and diversity of medicinal plants used by Indonesians to treat diarrhea. There are many studies that show that communities in eastern Indonesia actively utilize medicinal plants to treat diarrhea. In South Sulawesi, (Syamsuri et al., 2023) reported that Bugis people use betel leaves, ginger and turmeric leaves as traditional antidiarrheal herbs. The Bugis tribe in Pinrang, South Sulawesi also used guava leaves for generations to treat diarrhea (Fadhil et al., 2024). In Central Maluku, Ukratalo, (2025) noted that Maluku people use papaya leaves and guava leaves as traditional antidiarrheal ingredients. Meanwhile, Hamzah et al (2022) reported that the Buton people in Southeast Sulawesi also use areca palm as an antidiarrheal. In East Nusa Tenggara, the people of Flores use temu lawak leaves, turmeric leaves, and betel leaves as a traditional herb (Tima et al., 2020). The Sumba tribe in East Nusa Tenggara also uses areca nut and nutmeg as antidiarrheal (Fajarwati, 2024).

These studies show that ethnomedicinal practices in diarrhea management are widespread in various provinces and ethnicities in Eastern Indonesia, with variations in plants, parts used, and processing techniques that show the richness of local biodiversity and culture. However, there is no comprehensive study that summarizes data on the systematic use of medicinal plants based on the distribution of regions and ethnic groups in eastern Indonesia for diarrhea cases.

Therefore, this article aims to analyze and inventory the diversity of medicinal plants used by the people of eastern Indonesia in dealing with diarrhea. The utilization of medicinal plants from various regions and ethnicities includes the types of medicinal plants used by the people of eastern Indonesia in the treatment of diarrhea, the parts of the plants used, the processing methods used, and their distribution by region and ethnic group. By using a literature study approach to articles published between 2015 and 2024, this article is expected to provide a scientific basis for the preservation of traditional knowledge and the development of ethnomedicine-based phytopharmacology.

2. METHODOLOGY

The method used in this article is a narrative review, where the literature is taken from various journal articles explored from Google Scholar. The search for scientific articles discussed in this article was selected from 2015 to 2024 which were available in full paper form, openly accessible, focused on ethnomedicine research, and had use value in the results of plants found to have antidiarrheal properties. The keywords used in the literature search included the main phrase "antidiarrheal medicinal plants", combined with additional keywords based on tribes/ethnicities in Eastern Indonesia, such as Papua, Maluku, Sulawesi, East Nusa Tenggara (NTT), and West Nusa Tenggara (NTB). The results of the study were categorized based on plant names, plant families, plant parts, processing methods, and frequency of plants according to ethnicities from various communities in the Eastern Indonesia Region.

3. DISCUSSION AND RESULT

3.1 Ethnic Diversity and Plant Utilization to Overcome Diarrhea in Eastern Indonesia Region

Indonesia is a tropical country inhabited by various ethnic groups with each distinctive culture. Local wisdom that is unique to each ethnic group has a culture and tradition that has been inherited from its predecessors (Widiyanto et al., 2024). The eastern part of Indonesia is known as an area with very high ethnic diversity. This diversity creates a unique cultural richness, including in the field of traditional medicine. People in this region have special ways of dealing with various health problems, one of which is diarrhea. Challenging geographical factors, such as remote areas and limited health infrastructure, cause the community's access to modern health services to be limited. This condition makes them rely more on traditional medicine sourced from ancestral knowledge and the surrounding environment.

Traditional medicine in eastern Indonesia is closely related to the use of medicinal plants. The plants that grow in this region not only serve as a source of food, but also as medicinal ingredients that are believed to be effective in overcoming various diseases, including diarrhea. The various tribes in this region have different ways of selecting, processing and using these plants, resulting in a rich variation in traditional medicine. This knowledge has been passed down from generation to generation and is still very much maintained in local communities (Jumhafni et al., 2024).

The use of medicinal plants also reflects local wisdom in utilizing the environment in a sustainable manner. The community does not only utilize plants carelessly, but also pays attention to the parts of the plant used and the processing methods so as not to damage the plants and the surrounding ecosystem. In this way, traditional knowledge not only helps maintain human health, but also preserves the environment.

3.2 Ethnic Distribution in Eastern Indonesia

In eastern Indonesia, especially in the provinces of East Nusa Tenggara (NTT) and eastern Sulawesi, ethnicity is still high and a serious public health problem. Based on the 2019 NTT Riskesdas, the prevalence rate of diarrhea in this province reached 9.77%, higher than the national average of 8.0% and the provincial average of 7.05%. Data from BPS NTT also shows an increase in the number of diarrhea cases in East Sumba District by 48.07% in 2017-2018, from 5,345 cases to 7,910 cases. In Kampera Sub-district, East Sumba Regency, diarrhea ranks third highest in the list of infectious diseases with 398 cases in 2019, and in the January-October 2022 period, 208 cases were recorded with a fluctuating trend (Bon et al., 2023).

The main factors contributing to the high prevalence of diarrhea in eastern Indonesia include poor clean water quality, inadequate community sanitation, poor handwashing behavior, and food and water processing habits. Therefore, efforts to improve access to clean water, educate clean and healthy living behaviors, and improve environmental sanitation are very important to reduce the incidence of diarrhea in this region (Jumhafni et al., 2024).

Based on table 1 which contains data on ethnicities and regions, Eastern Indonesia such as Papua and Southeast Sulawesi with provinces that have many ethnicities that are often used as diarrhea medicinal plants. Of the various ethnicities in eastern Indonesia, it can be seen that indigenous tribes have a greater percentage, which is around 93%, while migrants account for about 7% of the total population, the immigrant tribe of the percentage is the Buton tribe while the original Tolaki tribe. Each ethnic group in this region has traditional medicine from generation to generation, in addition to this knowledge. generally develops among those who live in rural areas with limited access to modern health services.

Table 1. Tribes and Regions

No	Tribe/Ethnicity	City/District	Reference
1	Dani	Puncak Jaya District, Jayawijaya Regency, Papua	Mabel <i>et al.</i> , 2016
2	Kanume	Marauke District, Papua, Papua	Widya <i>et al.</i> , 2015
3	Oirata	Sub-district of Outermost Islands, North Maluku Regency, Maluku	Rupilu & Watuguly, 2018
4	Samata	Somba Upo sub-district, Goa district, South Sulawesi	Wahidah & Husain, 2018
5	Tolaki	North Kolaka district, Southeast Sulawesi	Syamsuri & Alang, 2021
		Sabulakoa village, South Konawe district, Southeast Sulawesi	Haris, 2023
6	Marind	Kaliki village, Merauke regency, Papua	Ibo & Arifa, 2021
7	Kupang	Manutapen district, NTT	Seran <i>et al.</i> , 2023
8	Muna	Oe Nsuli village, Southeast Sulawesi	Darlian <i>et al.</i> , 2023
9	Kaili	Tompou village, Sigi district, Central Sulawesi	Ifandi & Sulistiyaningsih, 2022
10	Malacca	Kletek village, Malaka district, NTT	Suek <i>et al.</i> , 2023
11	Buton	Roda village, South Konawe, Southeast Sulawesi	Arniawati <i>et al.</i> , 2022
12	Donggo	Bima district, West Nusa Tenggara	Suryani <i>et al.</i> , 2024
13	Bugis	Tompou village, Sigi district, Central Sulawesi	Ifandi & Sulistiyaningsih, 2022
14	Mamasa	Tondok Bakarua village, Mamasa district, West Sulawesi	Alang <i>et al.</i> , 2022

3.3 Plant Species Diversity in the Eastern Indonesia Region

Eastern Indonesia is widely known to use traditional medicine as a form of treatment for diarrheal diseases. The use of medicinal plants to treat diarrhea is not only found in rural areas that are remote and difficult to reach by health services, but also in areas that are relatively more accessible. The high prevalence of diarrhea

in these areas reflects that the disease is still a serious public health burden and requires more attention, both in terms of prevention.

In situations of limited access to adequate medical care facilities, especially in remote areas of Eastern Indonesia, local communities rely on traditional medical knowledge that has been passed down from generation to generation in the form of ethnomedicine practices. This knowledge covers various aspects, ranging from the identification of plant species used for medicinal purposes, local naming that varies according to the language and culture of each tribe, plant parts that are considered effective in treatment, to traditional processing methods, such as boiling, pounding, or soaking. Further details on the types of plants used, their local names, parts used, as well as processing methods and uses in overcoming diarrheal diseases are presented systematically in the following table.

Eastern Indonesian regions such as Papua, Maluku, South Sulawesi, Southeast Sulawesi, Central Sulawesi, East Nusa Tenggara and West Nusa Tenggara have diverse biodiversity, including in their use as medicinal plants to treat diarrhea. This study reveals the use of various types of medicinal plants by local communities as a form of utilization of natural resources in handling diarrheal diseases.

Table 2. Inventory List of Antidiarrheal Plants Used in Several Ethnicities in Eastern Indonesia

No	Family	Local name	Latin name	Plant part	Ethnicity	Reference
1	Myrtaceae	Guava Glawas, Guava, Jambu jampu, gejawas	<i>Psidium guajava</i>	Leaf	Muna tribe; Malacca tribe; Marind tribe; Dani tribe; Oirata tribe; Samata tribe Samata	Darlian <i>et al.</i> , 2023; Suek <i>et al.</i> , 2023 ; Ibo & Arifa, 2021 ; Mabel <i>et al.</i> , 2016 ; Rupilu & Watuguly, 2018 ; Wahidah & Husain, 2018
2	Meliaceae	Ginger	<i>Zingiber officinale</i>	Rhizome; stem	Muna tribe; Donggo tribe	Kasmawati <i>et al.</i> , 2019 Suryani <i>et al.</i> , 2024
3	Melastomataceae	Kapa kapa	<i>Lantana camara</i>	Leaves	Mamasa	Alang <i>et al.</i> , 2022
4	Sapindaceae	Turmeric	<i>Curcuma longa</i>	rhizome	Buton tribe	Arniawati <i>et al.</i> , 2022
5	Anacardiaceae	Mango	<i>Mangifera indica</i>	Stem bark	Marind tribe	Ibo & Arifa, 2021
6	Apocynaceae	Windmill shrub	<i>Tabernaemontana divaricata</i>	Roots	Marind tribe	Ibo & Arifa, 2021
7	Zingiberaceae	Galangal	<i>Alpinia galanga</i>	Rhizome	Tolaki tribe	Syamsuri & Alang, 2021
8	Apocynaceae	Milk Wood	<i>Tabernaemontana pandacaqui Lam</i>	Stem	Marind tribe	Ibo & Arifa, 2021
9	Fabaceae	Princess Shame	<i>Mimosa pudica</i>	Leaves and Seeds	Tolaki tribe	Haris, 2023
10	Melastomataceae	Orodu	<i>Melastoma candidum</i>	Leaves	Tolaki tribe	Haris, 2023
11	Myrtaceae	Jamblang	<i>Syzygium cumini</i>	Fruit and Seed	Kaili tribe, Bugis tribe	Ifandi & Sulistiyaningsih, 2022 ; Fadhil <i>et al.</i> , 2024
12	Euphorbiaceae	Mantalalu, Patikan Kebo, Dutch Sarri	<i>Euphorbia hirta L</i>	All parts, Leaf	Kaili tribe, Bugis tribe, Kupang tribe	Ifandi & Sulistiyaningsih, 2022 ; Fadhil <i>et al.</i> , 2024 ; Seran <i>et al.</i> , 2023
13	Anacardiaceae	Monkey Guava	<i>Anacardium occidentale L.</i>	Leaf	Oirata	Rupilu & Watuguly, 2018
14	Poaceae	Reeds	<i>Imperata cylindrical L.</i>	Roots	Oirata	Rupilu & Watuguly, 2018
15	Rubiaceae	Dandelion	<i>Timonius Timon (Spreng.)</i>	Leaves	Kanume	Widya <i>et al.</i> , 2015

Based on the results that have been identified, there are 15 plant species from 12 families that are traditionally used in the treatment of diarrhea by various ethnicities in Eastern Indonesia. This reflects the wide spread of local knowledge related to plant-based medicine. Plant species such as *Psidium guajava* are used by at least six ethnic groups for their leaves. These plants indicate a high level of trust in their use in traditional medicine. These findings further strengthen the evidence on the importance of these plants as potential sources of medicinal materials, especially in the context of traditional medicine that is still widely practiced by local communities. The existence of these plants not only reflects the rich biodiversity of the region, but also shows their high functional

value as natural alternative medicine in the face of limited access to modern health services. Therefore, these plants have a strategic position in the traditional health care system and have the potential to be further developed as basic ingredients in the manufacture of medicines.

3.4 Types of Plants Used by Various Ethnicities in the Eastern Region of Indonesia

Based on data collected and analyzed from various literatures, the most widely used plants in various eastern Indonesian communities as antidiarrheal can be seen in **Figure 1**. Based on the data that has been obtained, the percentage of plants used is guava, turmeric, patikan kebo, and ginger is much higher indicating the effectiveness and high level of confidence. This is influenced by empirics that are better known by the community and plants are easily available. While the types of plants that are very rarely used are alang-alang, ketimunan, kumkari, mango, galangal, milk wood, monkey guava, and orodu. Some of these plants are rarely used because people in some tribes do not know the effectiveness of plants in different areas, some plants such as putri malu can cause certain side effects if used inappropriately.

Based on the results obtained from various locations in Eastern Indonesia, the *guava* plant (*Psidium guajava*) is a medicinal plant whose use is most widely used by the community traditionally and passed down from generation to generation either through experience or lisam. This plant is very often found in the yard or neighborhood. Guava contains rubberinoid compounds that act as antibacterials by preventing growth and killing bacteria that cause diarrhea. In addition, guava contains tannins, flavonoids, essential oils and alkaloids that can overcome diarrhea (Widyanti *et al.*, 2024).

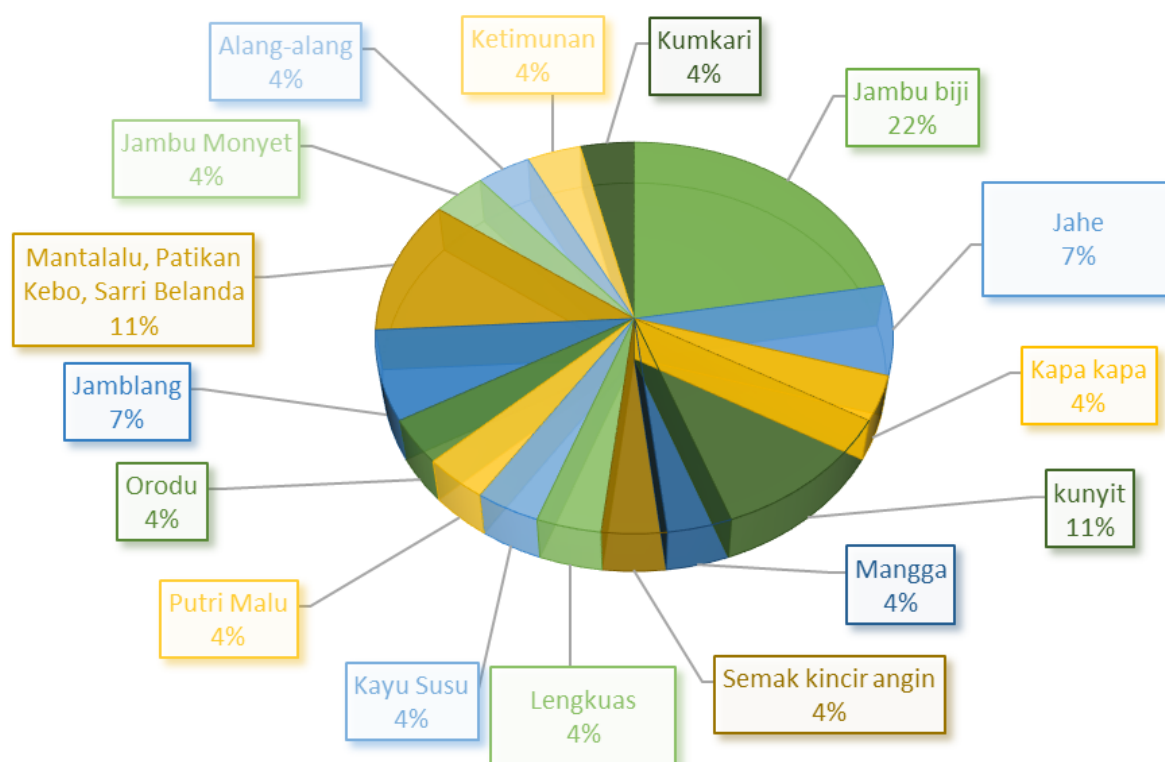


Figure 1 Plants used for the treatment of diarrhea from different ethnicities in the Eastern Indonesia Region

3.5 Classification of Plant Families Used

Based on the results of data from various literatures, as many as 15 plant species from 12 different plant families are used to overcome diarrhea in various communities in Eastern Indonesia as antidiarrheal can be seen in **Figure 2**. This shows a good result of traditional knowledge related to treatment using plants. *Guava* (*Psidium guajava*) from the *Myrtaceae* family is one of the species used by 6 ethnicities on the leaves. This is because there are chemical compounds, namely tannins, flavonoids, essential oils and alkaloids that can overcome diarrhea (Widyanti *et al.*, 2024). There are also several families that are widely used besides *Myrtaceae*, namely *Zingiberaceae*, *Euphorbiaceae*, and *Asteraceae* are the most commonly found species in traditional antidiarrheal treatment in Eastern Indonesia.

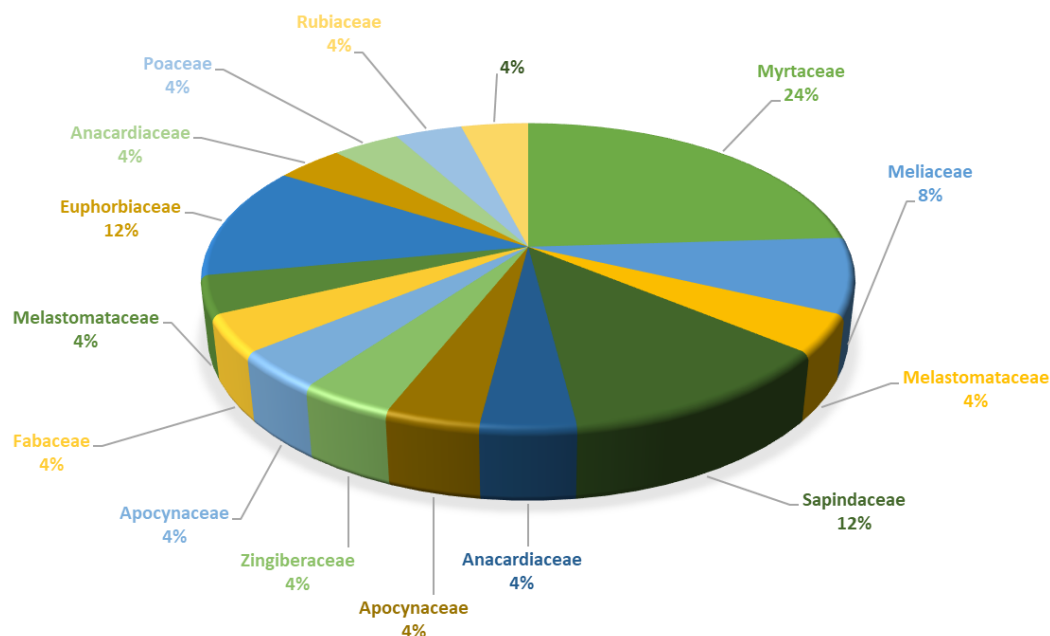


Figure 2 Classification of plants families used for the treatment of diarrhea from different ethnicities in the Eastern Indonesia Region

3.5.1 Part of the Plant Used

Plants used as medicinal plants in various communities. There are various parts used such as roots, stems, leaves, rhizomes, seeds, fruits, flowers, bark, tubers, fruit peels, sap, or herbs. Generally, the use of plant parts is based on therapeutic and empirical effects that have been inherited.

Based on the results of literature data collection, various parts of plants used in overcoming diarrhea in communities in Eastern Indonesia can be seen in Figure 3 that are used are leaves, rhizomes, stems, fruits, and seeds with a value of 40%, 15%, 10%, 10%, respectively. So, it is concluded that the most use of plant parts is the leaves by 40% (Alang *et al.*, 2022; Fadhil *et al.*, 2024; Haris, 2023; Ibo & Arifa, 2021; Rupilu & Watuguly, 2018; Seran *et al.*, 2023; Widya *et al.*, 2015). This is because people have knowledge about medicinal plants that are scientifically proven. According to Henri *et al.*, 2020, Leaves are parts of plants that carry out photosynthesis which produces complex compounds or known as the content of secondary metabolite compounds, namely tannins, alkaloids, and leaves store high water content. If there is no active compound content in the plant, especially the leaves, the plant cannot be used as a medicinal plant. Its abundant availability, ease of processing, healing properties, and its use do not damage the plant as a whole.

Some previous studies also show that leaves are the part of the plant that is most often utilized. abundant availability, ease of processing, healing properties, and its use that does not damage the plant as a whole (Syarifuddin, 2021).

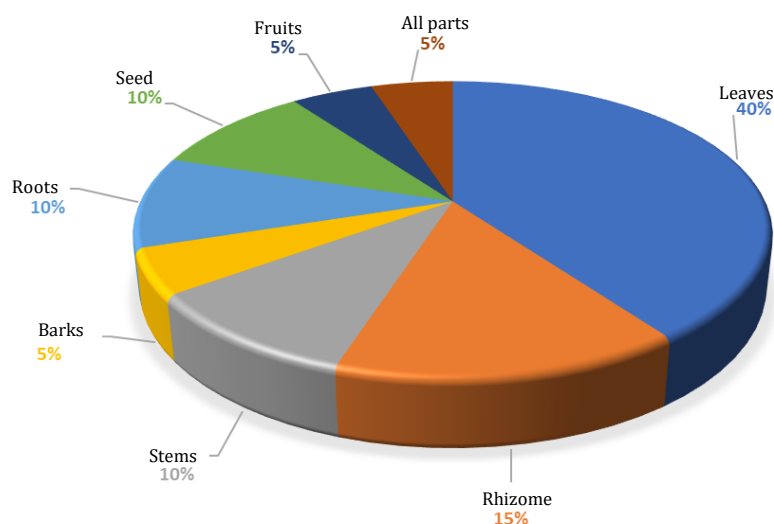


Figure 3 Parts of the plant used

3.5.2 How to Process and How to Use Plants Used by Various Ethnicities in Eastern Indonesia

Traditional societies in various parts of Indonesia have diversity in processing plants and how to use them for traditional medicine. This knowledge is passed down from generation to generation through direct practice or through oral stories in families or communities (Jumhafni *et al.*, 2024). Ethnic diversity in this region also creates variations in the way of processing and using medicinal plants to overcome various diseases, one of which is diarrhea.

Each region has a different way of processing and using plants as treatment. The processing of medicinal plants in Eastern Indonesia generally includes several simple but effective traditional techniques. One of the most commonly used methods is boiling, where plant parts such as leaves, roots, or bark are boiled in water until it boils (Hati *et al.*, 2023). This boiled water is then cooled and drunk as a medicinal herb. Another common method is pounding, especially for hard plant parts such as rhizomes or seeds. The finely ground material is usually mixed with water or applied directly to the affected part of the body, depending on the type of plant and the symptoms to be treated (Rupilu & Watuguly, 2018). In addition, there is also the direct chewing method, in which the leaves or parts of certain plants are chewed without going through further processing. This is usually done when the patient needs immediate treatment or when the ingredients used are known to contain active compounds that work quickly (Hati *et al.*, 2023; Syarifuddin, 2021). In some ethnic groups, such as people in the interior of Papua and Sulawesi, the leftover pulp from processing medicinal plants is sometimes used as an external dressing, for example rubbed on the stomach area to help relieve pain or speed up the healing process from diarrhea. This method is carried out on materials such as leaves that are squeezed for water / juice only or rubbed the leaves and then attached to the part (Hati *et al.*, 2023; Purnama, 2022).

The way it is used also varies greatly. Generally, processed plant products are consumed orally by drinking or swallowing directly (Darlian *et al.*, 2023). However, in some tribes, such as the Tolaki tribe in Southeast Sulawesi, the practice of smearing or compressing is also known, where the processed herb is applied or affixed to the abdomen to reduce symptoms of bloating or pain due to diarrhea (Suryani *et al.*, 2024). This variation shows the community's deep understanding of the pharmacological properties of the plants they use, both through systemic (oral) and topical (external) routes. These differences in processing and use are also influenced by the type of plant used.

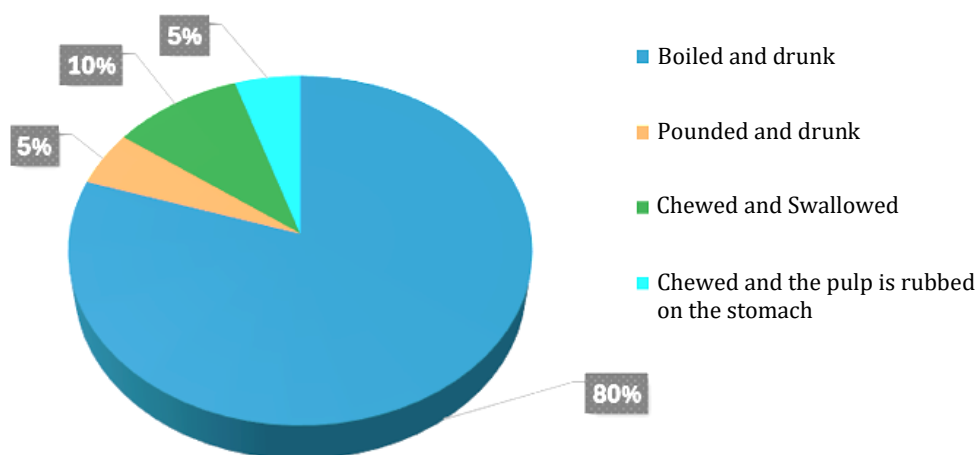


Figure 4 Processing and Usage of the Plants Used

Based on the results of literature data collection, there are several ways of using plants used for the treatment of diarrhea from various Eastern Indonesian communities can be seen in **Figure 4**. Based on data on how to use medicinal plants for the treatment of diarrhea, it can be concluded that the way of use by drinking directly, swallowing directly and rubbing the pulp on the stomach is the most widely used way of use. Plants with the use of direct drinking there are 17 types of plants, namely Alang-alang (*Imperata cylindrical* L.), Mantalu (*Euphorbia hirta* L.), Jamblang (*Syzygium cumini*), Patikan kebo (*Euphorbia hirta* L.), Orodu (*Melasturia hirta* L.), and Orodu (*Melastoma candidum*), Putri malu (*Mimosa pudica*), Kapa-kapa (*Lantana camara*), Ginger (*Zingiber officinale*), Turmeric (*Curcuma longa*), Mango (*Mangifera indica*), Windmill shrub (*Tabernaemontana divaricata*), Galangal (*Alpinia galanga*), Guava glawas or jampu (*Psidium guajava*), Kayu susu (*Tabernaemontana pandacacui* Lar), Kumkari (*Ipomea triloba* L.) and Sarri belanda (*Euphorbia hirta* L.) (Alang *et al.*, 2022; Arniawati *et al.*, 2022; Darlian *et al.*, 2023; Fadhil *et al.*, 2024; Haris, 2023; Ibo & Arifa, 2021; Ifandi & Sulistiyaningsih, 2022; Kasmawati *et al.*, 2019; Rupilu & Watuguly, 2018; Seran *et al.*, 2023; Syamsuri & Alang, 2021). Plants with the use of direct swallowing there are 2 types of plants, namely Jambu monkey (*Anacardium*

occidentale L.) and *Guava* (*Psidium guajava*) (Rupilu & Watuguly, 2018; Suek *et al.*, 2023). While the plant by using the pulp rubbed on the abdomen there is 1 type of plant, namely Ketimunan (*Timonius timon* (spreng).) (Widyanti, Saputra, *et al.*, 2024). Of the various ways of using medicinal plants above, the most widely used way of use is drinking directly because taking drugs directly by drinking is considered more effective because it contains a combination of active compounds from various types of plants (Indrayani & Adinda, 2025). According to Fauziah *et al* 2021 that many medicinal plants are used to treat internal diseases through the direct drinking method, because people believe this method produces a stronger effect than other methods.

4. CONCLUSION

This study shows that people from various ethnicities in the Eastern Indonesia Region still actively utilize medicinal plants in traditional medicine practices to overcome diarrhea, especially due to limited access to modern health services. The study recorded the use of medicinal plants by 14 tribes/ethnic groups spread across Sulawesi, Nusa Tenggara, Maluku and Papua, and identified 15 different plant species. Papua and Southeast Sulawesi are the provinces with the most ethnicities that often use plants as diarrhea medicine. *Psidium guajava* is the most commonly used species due to its phytochemical content and easy to find. The most dominant plant family used as a diarrhea treatment is Myrtaceae. Leaves are the most commonly used part of the plant because they contain high concentrations of active compounds and are easy to process. The common processing technique is boiling, because it is considered simpler, reliable by killing bacteria and can reduce toxic levels. This finding shows the importance of traditional knowledge that has been passed down from generation to generation as a basis for the development of antidiarrheal drugs based on natural ingredients. However, further scientific studies are needed to test the effectiveness and safety of its pharmacological use.

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