Survey of Traditional Medicinal Plants Used in Tsegede Wereda Western Zone Tigray, Ethiopia

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Declaration

This is to certify that thesis entitled "Survey and Identify of Traditional Medicinal plants used in Tsegede Wereda West Zone, Tigray Administrative Region, Ethiopia". Prepared and submitted by Shishay Tesfay with the regulation of the University and meets the accepted standard with respect to originality and quality.

Name; Shishay Tesfay Asefa Signature_____ date_____

Advisor's Name; _____ Signature_____ _____

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List of Acronyms

EFAP Ethiopia forestry Action program

IBCR	Institute of Biodiversity conservation and research
IK	Indigenous knowledge
ICF	Informant Consensus Factor
IUCN	International union for conservation of nature
Mps	medicinal plants
UK	United Kingdom
WHO	world health organization
R	Respondent

Abstract

Plants have long been used as a primary source for traditional medicines intended to treat humans and cattle, both for preventative and therapeutic purposes.The objective of this study is to survey and identify traditional medicinal plants used in Tsegede Wereda. A total of 137 household heads were selected randomly and purposefully with different age groups. A questionnaire for 137 informants was used to gather data at times and locations that the informants chose. Discussions of the questionnaire were held in Tigrigna. Interviews and field study were conducted to gather information and identification of medicinal plant specimens and their conservation status with the participants and key informants respectively. The data were examined and summarized using descriptive statistical analysis using the Microsoft Excel spreadsheet program .The Diversity Index was utilized to analyze species diversity. The study finding revealed that the gender distribution in the survey on traditional medicinal plants in Tsegede Wereda shows a significant male predominance, with males constituting 68.6% of respondents and females 31.4%. The survey in Tsegede Wereda reveals a rich diversity of traditional medicinal plants, with the Fabaceae family being the most represented at 13.33%.The revealed that high Shannon and Simpson indices reflect a diverse and resilient ecosystem, while the evenness value indicates a balanced species distribution. These findings emphasize the need for ongoing conservation efforts to protect and sustainably manage the medicinal plant resources that are integral to the cultural and health practices of the local community. And also the preference ranking of medicinal plants for treating evil eye illnesses in Tsegede Wereda highlights the importance of *Securidaca longipedunculata, and Allium sativum,* as key components in traditional spiritual healing practices. We recommend further research studies on the medicinal properties and ecological roles of underrepresented families to fully understand and utilize the ethno botanical potential of the region.

Key words/phrases: Conservation, Indigenous Knowledge, Informants Consensus Factor and Sustainable use.

1. Introduction

1.1. Background of the study

The study of the direct interactions between people and plants is known as ethno-botany (Balick and Cox, 1996; Martin, 1995). Humans can derive food, fuel, and medications from plants. Ethiopian traditional medicine has long relied on plants to cure a variety of illnesses and pains experienced by people (Debela Abebe and Urga, K. 1999). Thus, when humans first began to use plants, local plant knowledge emerged.

Plants have long been used as a primary source for traditional medicines intended to treat humans and cattle, both for preventative and therapeutic purposes. Documentary records of historically employed medicinal plants indicate that several medicinal plants were utilized as early as 5000–4000 BC in China and 1600 BC by the Egyptians, Syrians, and Babylonians. Traditional medicine remained in use across time for a variety of reasons, including cost and ease of access. Limited numbers of medical personnel and access to fundamental medicine were identified as critical problems in Africa and Ethiopia, as the ratio of medical doctors to patients was reported to be one doctor to 50,000 patients. (Berhanu Kidane, *et al*., 2018). As a result, local communities use different plant species known in ancient traditional medicine. Traditional medicine has been served the health care needs of the majority of the people of Africa (Beyene Tewodros**,** 2015).Thus, traditional medicine remains popular for both historical and cultural reasons. Estimates show that 80% of the African people rely on conventional medication to fulfill their medical requirements (Berhanu Kidane, *et al*., 2018).90% of Ethiopia's livestock population and 70% of humans receive their primary medical care from traditional medicine, same like in other Sub-Saharan African nations. Compared to modern medicine care, the traditional medicine can be obtained for a very less and affordable price by the larger community (Berhanu Kidane**,** *et al*., 2018).Ethiopian culture has long included the use of medicinal herbs to treat a variety of human and animal problems (Debela Abebe and Urga1999). Ethiopia possesses abundant medical plant resources as well as the various cultural customs associated with these therapeutic plants throughout history. The people who use these therapeutic plants have a wide range of traditional medical knowledge and practices (Berhanu Kidane, *et al*., 2018).However,

the loss or the declining abundance of medicinal plants as a result of deforestation, illicit logging, fuel wood collecting, overgrazing by stock animals, and agricultural development has put this rich cultural heritage in jeopardy (Beyene Tewodros 2015, Melaku Megersa.2010). While there is a growing body of research on ethnobotany in Ethiopia, little is known about medicinal plants and their state of conservation in Tigray (Berhanu Kidane, *et al*., 2018).

Traditional medicine, which has its roots in the utilization of medicinal herbs, is important to healthcare systems all over the world, particularly in rural areas where access to contemporary healthcare is scarce. Known for its abundant biodiversity, Ethiopia is home to a wide variety of traditional medicinal plants that have been used for many years to cure a wide range of illnesses. The purpose of this research is to identify and carry out a thorough survey of Tsegede Wereda's traditional medicinal herbs.

1.2. Statement of the problem

Traditional medicinal plants are crucial to the healthcare system in Tsegede Wereda, providing essential remedies for various ailments. Despite their importance, there is a significant gap in the systematic documentation and scientific understanding of these plants. Traditional knowledge related to medicinal plants is often passed down orally through generations, making it vulnerable to loss as older generations pass away without recording their knowledge.

The insufficient identification and documentation of medicinal plant species in Tsegede Wereda present another major challenge. Without a comprehensive inventory it is difficult to assess the distribution, availability, and ecological significance of these plants. Similar studies in other regions, such as the ethnobotanical research conducted in the Tigray region, have shown the critical role of systematic documentation in preserving traditional medicinal knowledge and supporting biodiversity conservation (Seble Gebrehiwot, and Ermias Birhane**.** 2019). However, Tsegede Wereda lacks such detailed studies, creating a research gap that this study aims to address by cataloging the medicinal plants and their uses.

Ecological and socio-economic factors further complicate the sustainable use of medicinal plants in Tsegede Wereda. Environmental degradation due to deforestation, overgrazing, and

agricultural expansion has led to the loss of habitats for many medicinal plant species. Socio-economic pressures, such as high market demand, often result in overharvesting and unsustainable collection practices. These issues are not unique to Tsegede Wereda; similar problems have been documented in studies from other parts of Ethiopia and Africa (Kassahun Gebrehiwot, and Mesfin Tadesse, 2022). Medicinal Plants of Ethiopia:

Furthermore, there is an urgent need for effective conservation strategies tailored to the specific context of Tsegede Wereda. Current conservation efforts in the region are often fragmented and lack a comprehensive approach that integrates ecological and cultural dimensionsHowever, such approaches have not been systematically applied or studied in Tsegede Wereda, indicating a significant gap in the research and implementation of sustainable use strategies for medicinal plants.

Despite the documented importance of traditional medicinal plants, there is a lack of research focusing on the specific preparation methods, local names, and traditional uses of these plants in Tsegede Wereda. Similar studies in other areas, such as the ethnobotanical survey in the Debark District, have shown the value of detailed ethnobotanical documentation in preserving indigenous knowledge and promoting sustainable use (Abebe Debela, 2018). The absence of such detailed documentation in Tsegede Wereda represents a research gap that needs to be filled to ensure the preservation of traditional medical knowledge and practices.

1.3. Objectives of the study

1.3.1. General objective

The general objective of this study is**:** To survey traditional medicinal plants used in Tsegede Wereda.

1.3.2. Specific objectives

The specific objectives include:

- To Document the indigenous knowledge related to medicinal plants, including their local names, traditional uses, and preparation methods.
- To Identify and document the medicinal plant species used in Tsegede Wereda.
- To Assess the ecological and socio-economic factors associated with the collection and use of medicinal plants.
- To Provid the sustainable use and conservation of medicinal plants in Tsegede Wereda.

1.4. Research question of the study

Which are the indigenous knowledge related to medicinal plants, including their local names, traditional uses, and preparation methods?

What are the medicinal plant species used in Tsegede Wereda?

What are the ecological and socio-economic factors associated with the collection and use of medicinal plants/

What are the sustainable use and conservation of medicinal plants in Tsegede Wereda?

1.5. Significance of the Study

This study is crucial for preserving indigenous knowledge related to traditional medicinal plants in Tsegede Wereda, documenting local names, uses, and preparation methods. It aims to create a

comprehensive inventory of these plants, aiding in biodiversity conservation and sustainable use. Understanding the ecological and socio-economic factors influencing plant use can inform strategies to balance conservation with community needs, ensuring the long-term availability and cultural significance of medicinal plants.

1.6. Scope of the Study

The study focuses on surveying and identifying traditional medicinal plants in Tsegede Wereda. It involves documenting indigenous knowledge identifying and cataloging plant species, and assessing ecological and socio-economic factors The research aims to provide a detailed understanding of local practices and biodiversity offering insights specific to the region and developing strategies for sustainable use and conservation of medicinal plants.

1.7. Limitations of the Study

The study is limited by its reliance on oral accounts, which may vary between informants and be subject to recall bias. Scientific verification of medicinal properties is beyond the immediate scope and requires further research. Environmental and socio-economic factors are complex and not all variables may be captured. Additionally, the findings are specific to Tsegede Wereda and may not be generalized to other regions.

2. Literature Review

2.1. Origin and Development of Ethno botany

Since ancient times, people have utilized plants as medicines. The study of plants and their applications is one of the most significant human concerns, and it has been taught by all societies for tens, if not hundreds, of thousands of years, even though it was not known as ethnobotany (Kelbessa Ensermu, *et al*., 2014). The oldest known applications date to circa 1770 BC in Babylon and circa 1550 BC in the Hammurabi Code of ancient Egypt. At the start of the 1500s, one of the first plants with medical properties to become popular in Europe was Indian fever bark.

In 1941, Havens re-imagined ethno botany as the investigation of the relationship that exists among people and their surrounding vegetation. From that point forward, different definitions have been given for ethno botany, regardless of whether the thought is comparative. According Martin (1995), ethno botany is the investigation of individuals' arrangement, the board, and utilization of plants.(Melaku Megersa., 2010) Likewise characterized ethno botany as, it manages the immediate connections of plants with humanity.

(Martin, 1995) notes that ethnobotanists often have to establish comfortable associations with networks on their own without the assistance of partners. However, in order to achieve more comprehensive and reliable results, ethnobotanical research require input from a range of disciplines, including economic botany, linguistics, anthropology, and plant taxonomy.

2.2. Indigenous knowledge

Native knowledge was gathered through the immediate and close dependence of the local population on common resources, which helped people adapt to and survive in their surroundings. It is therefore the consequence of many generations' worth of observations, painstaking work, and fruitless experiments (Martin, 1995).

In many nations, including Ethiopia, indigenous remedies are handed down verbally and secretly from one generation to the next (Jansen, 1981) Such confidential and rough exchange makes

native information or ethnomedical information powerless against twisting, and much of the time, a portion of the legend is lost at each mark of move (Alemtsehay Getahun, 1976). subsequently, there is a requirement for efficient documentation of such valuable information through ethnobotanical research.

2.3. The Role of Traditional Medicinal Plants in Human Health Care Services

Like any other country that is generating or has been documented, the nation's modern health care services are not only out of reach for most people, but they are also deficient, according to Hailemariam Yineger and Dawit Yewhalaw. (2007), There are several definitions available for traditional medicine. The diverse variety of behaviors is influenced by the social and cultural traditions of different countries. Conventional medicine encompasses a range of health practices, methods, knowledge, and beliefs that include the use of plant, animal, or possibly mineral-based medications; deep therapies; manual techniques; and exercise, either alone or in combination, to maintain health as well as to diagnose, treat, or prevent disease (Association, 2012).

(World Health Organization ,2008) gave a new meaning to the term "conventional medicine" by defining it as "the whole of knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures that are used to maintain health as well as prevent, diagnose, improve or treat illnesses of the body and mind." The term "traditional medicine" refers to a wide range of treatments and procedures that vary from nation to nation and region to region. In some nations, alternative or complementary medicine (CAM) is used in its place. Correlative or elective medication frequently alludes to customary medication that is drilled in a nation however isn't important for the nation's own practices. As the expressions "reciprocal" and "option" propose, they are some of the time used to allude to medical services that is viewed as beneficial (Association, 2012). In Ethiopia, customary medicinal practices are kept in oral practice, early medico-strict original copies, and conventional pharmacopeias, which, as per the appraisals of certain antiquarians, date back to the fifteenth century Promotion (Girmay Yirga , 2010). underlined that there is an enormous extent of purpose and interest in therapeutic plants in Ethiopia because of their worthiness, openness, and biomedical advantages. (In their study on the Sokoru District, (Hailemariam Yineger and Dawit Yewhalaw , 2007). As per (Jansen ,1981),

in Ethiopia, despite the fact that the conventional medicinal parts are the best wellspring of data about the information on medicinal plants, it was seen as truly challenging to get their customary medicinal data as they thought about their native information as an expert mystery, just to be passed orally to their senior child late in life. The investigation of (Fikadu Mesfin , 2009), which is based on an ethnobotanical study of medicinal plants in Nebelete Wereda, concurs with the previous finding. According to Alemtsehay Getahun ,(1976). practitioners do not wish to disclose the use of medicinal plants because they fear that the plant's healing power will diminish; consequently, it ought to be kept mystery (that is, the name of the plant and its rumored use ought not be revealed). Additionally, the serious level of mystery encompassing ethnomedical information among the customary healers could be credited to the way that conventional healers determine a kind of 'pay from money related or in-kind pay for therapies they give (Hailemariam Yineger and Dawit Yewhalaw **,**2007).

2.4. Ethnomedicine studies of medicinal plant research in Ethiopia

WHO laid out an overall program to advance and foster essential and applied research in conventional medication, yet in Ethiopia, exploration and documentation on therapeutic plants have as of late begun (Fikadu Mesfin, *et al*., 2009).

2.4.1. Traditional medicinal plants in Tigray region

People from the surrounding local area of Tigray territorial state also continue to use traditional medicinal plants for their basic medical needs, even though the majority of Ethiopia depends on medicinal plants as their source of medical services, especially in provincial regions. Research conducted by several authors in the state indicates that traditional medicine derived from plants has grown to be a significant aspect of the community in the area. Take the piece (Girmay Yirga ,2010), for instance 22 plant species are used in the Samre region to treat the illnesses of domesticated animals (Mulugeta Giday and Girmay Amenih ,2003). described in detail the 83 medicinal species utilized in medical care.

2.5. Medicinal plants and ethnomedicine in Ethiopia

2.5.1. Traditional medicinal plants in the public health care system

Ethiopian traditional medicine has used plants for millennia to cure a wide range of illnesses and lessen human suffering. Due to its extensive use, traditional medicine has grown to be a significant aspect of Ethiopian society (Ali Mohammed, *et al*., 2015). According to Debela Abebe,and Demeke Ayehu ,(1993) Ethiopia has a great deal of interest in medicinal plants because to its rationality, accessibility, and biomedical benefits. This country has a long tradition of using therapeutic plants, as evidenced by the numerous medical-religious writings written on parchment and thought to have begun several centuries ago.

2.6. Threats to medicinal plants

Plants are under stress today, despite their essential role in healing a wide range of human and animal illnesses. Due to a number of circumstances, indigenous knowledge about the use of medicinal plants as human treatments is disappearing, as demonstrated by Sebsebe Demissew and Ensermu Kelbessa , (2014). Animals and their habitats are being progressively destroyed by deforestation, urbanization, agricultural exploitation, and environmental deterioration.

According to Zemede Asfaw (2001), misuse and destructive gathering are considered to be threats to the preservation of therapeutic plants. (Debela Abebe, and Demeke Ayehu , 1993) state that a plant may die if its roots and bark are harvested. harvesting medicinal plants for use in agriculture, home usage, trading, firewood, charcoal, drought, and other purposes.

The decrease in the information and use of medicinal plants among individuals is because of ecological debasement and extraordinary deforestation **(**Mulugeta Giday and Girmay Amenih , 2003), Debela Hunde *et al* , 2004) also asserted that medicinal plant knowledge is influenced by contemporary education. They brought up that those understudies who went to present day schools were showing a reluctance to gain from their folks, which is proof of the continuously vanishing customary information.

The investigation conducted by (Alemayehu Eshete *et. al.* , 2016). demonstrated that older people (41–50 years old) have absorbed the majority of the knowledge regarding natural remedies.

This implies that the bulk of ethnomedical information in the society is held by the elderly, and that it is more difficult to transmit this knowledge to younger generations.

2.7. Conservation of Medicinal Plants

Despite the fact that many hazards have a substantial impact on medicinal plants, locals make few efforts to cultivate them at home. the findings of r,esearch done by (Hailemariam Yineger and Dawit Yewhalaw , 2007) discovered how minimally the work of traditional healers in Bunch Mountain Public Park's ethnomedical plant species was. Several writers provided suggestions for the preservation of medicinal plants based on the dangers they found throughout their investigation.

(Mulugeta Giday and Gidey Ameni ,2003) suggest that young people should be educated about the part traditional medicine plays in fulfilling primary care needs. It was mentioned that young people don't really desire to learn about medicinal plants, and efforts should be made to include traditional medicine in school curricula so that a younger generation of people will respect its usefulness.

2.8. Empirical evidence of the study

In many traditional societies, men are often more involved in activities such as foraging and farming, which can include the collection and use of medicinal plants (Ladio and Lozada, 2022).Their involvement is crucial as they bridge the younger and older generations, ensuring continuity in the use of traditional medicinal practices (Sheldon *et al*., 2023). Their substantial representation suggests that they are key custodians of ethnobotanical knowledge, actively involved in both its application and its transmission to younger generations (Brown *et al*., 2022).Their prominent representation highlights the importance of older adults in preserving and sharing ethnobotanical knowledge. This aligns with findings that emphasize the role of elder members in maintaining cultural heritage and traditional practices (Smith and Johnson, 2022).

Their expertise is essential for understanding the full scope of traditional medicinal practices, as they frequently manage household health remedies and play a crucial role in the informal transmission of knowledge to younger generations (Ong and Kim, 2023b).Gender-inclusive

research approaches, such as targeted surveys and focus groups, can help achieve a more balanced understanding of how medicinal plants are used and valued by different community members (Martin *et al*., 2022).

Amaranthaceae members are known for their antioxidant and anti-inflammatory properties (Singh *et al*., (2022), while Agavaceae species are utilized for their antimicrobial and anti-inflammatory activities (Ochoa-Villarreal ., 2021). Similarly, the Alliaceae family, also at 3.70%, includes species like garlic (*Allium sativum*), known for its broad-spectrum antimicrobial properties (Zeng *et al*., (2023).

Families like Rutaceae, with 1.48%, include species rich in essential oils and alkaloids, widely used in traditional remedies for digestive and respiratory conditions (Patra *et al*., (2022). The Ebenaceae family, also at 1.48%, includes Diospyros species, known for their antioxidant and antimicrobial properties (Lee *et al*., 2023). Wild plants are often preferred for their potency and purity, as they grow in their natural habitats without human intervention (Moyo *et al*., (2023). They provide a controlled environment for growing plants that are used for daily healthcare needs, ensuring a steady supply close to home (Lal and Verma, 2022). Herbs are often used for treating common ailments such as colds, digestive issues, and skin conditions (Jain and Sharma, 2022).

They are often used for their antimicrobial, anti-inflammatory, and antioxidant properties, which can treat a wide range of ailments such as wounds, infections, and respiratory issues (Ali *et al*., 2023). Roots often contain concentrated bioactive compounds and are used for more severe and chronic conditions, including digestive disorders, respiratory issues, and as general tonics (Zhang *et al*., (2022). Latex, often used for its anti-inflammatory and wound-healing properties, and seeds, known for their nutritional and therapeutic benefits, are integral to specific treatments (Johnson and Katuura, 2023).

Because they are more effective at curing illnesses, fresh plants are frequently more potent and recommended for immediate usage (Seble Gebrehiwot, and Ermias Birhane**,** 2019). Applications

like poultices or washes applied topically to afflicted areas of the body without coming into contact with the skin may fall under this category (Getachew Tadesse *et al*., 2018).

This high diversity is indicative of a healthy ecosystem, where numerous species coexist without any single species dominating the landscape (Pielou, 2021). This implies that the ecosystem is resilient and has a stable structure, capable of supporting a wide range of medicinal plants (Simpson, 2023).This lower index might be due to the specific nature of snake venom treatments compared to more common ailments like diabetes or stomach pain (Mekonnen Tesfaye Kebede and Getachew Tesfaye**,** 2022a)..This method ensures the continuity of knowledge across generations and maintains the integrity of traditional practices (Hoffman and Gallaher, 2022). Within marital relationships, there is often an exchange of cultural practices, including medicinal plant usage, which can strengthen and diversify the knowledge base of both partners (Shackleton *et al*., (2023). This prominent preference highlights the cultural importance placed on the eldest son as the primary custodian of family knowledge and traditions. In many traditional societies, the eldest son is often seen as the future head of the family, responsible for carrying forward the lineage and its associated knowledge (Smith and Johnson, 2022). These activities can result in the permanent loss of medicinal plant species and biodiversity (Teklay Mesfin *et al*., 2023).

Research by Kassahun Gebrehiwot**,** *et. al* ,(2023).has shown that habitat preservation is essential for maintaining ecological balance and ensuring that medicinal plants can continue to grow in their native environments. A study by Getachew Tadesse *et al*. (2022a) demonstrates that sustainable harvesting practices are effective in maintaining plant populations and ensuring the long-term availability of medicinal resources.

3. Material and Methods

3.1. Description of the study area

Tsegede Wereda, located in the western part of Tigray, Ethiopia (Figure 2), is characterized by diverse landscapes, including highland plateaus, rolling hills, and lowland plains. Tsegede Wereda is the primary study area for this research. The wereda is known for its diverse ecosystems, ranging from highland to lowland areas, providing a wide variety of habitats for different plant species.

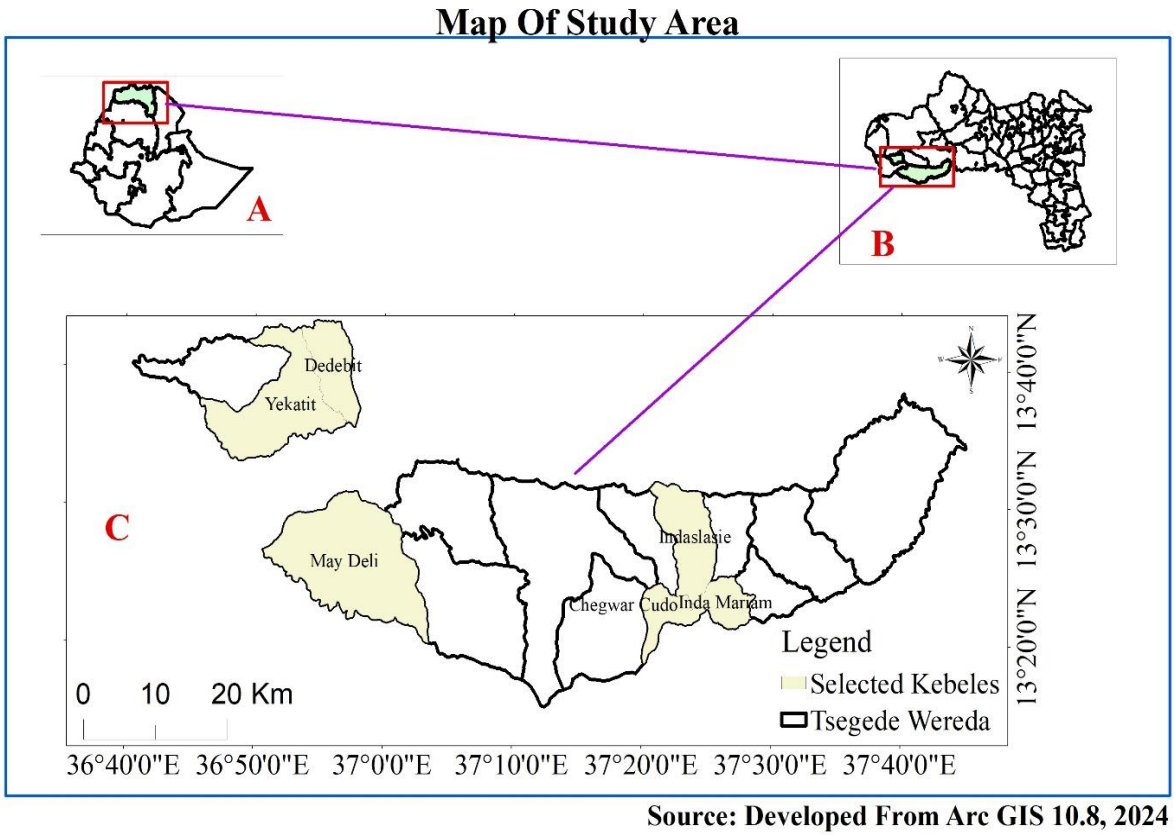


Figure 1. Map of Study Area

Land scope and soil: The area's elevation ranges from approximately 500 to 2000 meters above sea level, contributing to varied topography and soil types. The soils in Tsegede Wereda are predominantly Vertisols and Cambisols, which are fertile and well-

suited for agriculture but also prone to erosion if not managed properly Seble Gebrehiwot, (2016).

Climate: The climate of Tsegede Wereda is generally categorized as semi-arid, with a bimodal rainfall pattern. The main rainy season occurs from June to September, providing the bulk of the annual precipitation, which averages between 600 and 900 mm. The short rains typically fall from March to May. Temperatures vary with altitude, but the area generally experiences warm to hot conditions, with mean annual temperatures ranging from 20°C to 30°C (National Meteorological Agency, 2020).

Agriculture: Agriculture is the primary livelihood for the majority of the population in Tsegede Wereda. The region's fertile soils and favorable climatic conditions support the cultivation of various crops, including sorghum, maize, teff, and pulses. Livestock farming is also significant, with cattle, goats, and sheep being the most common. However, agricultural activities face challenges such as soil erosion, deforestation, and recurrent droughts, which affect crop yields and food security (Daniel Tsegaye *et al*., 2018).

3.2. Sampling of informant

3.2.1. Selection of the informant

A total of 137 household heads were selected randomly and purposefully with different ages groups, Of this 12 were key informants who are traditional healers and knowledgeable persons selected purposefully based on the recommendation of local authorities, elders, and religious leaders.

3.2.2. Determining sample size

The formula by (Kothar 2004) was used to determine the sample size assuming 95% confidence level and E =.5 as followes.

$$n = \frac{Nz^2PQ}{E^2(N-1)+z^2PQ} \quad \text{.....eq .1}$$

$$n = \frac{12502(1.96)^2(0.9)(0.1)}{(0.05)^2(12502-1)+(1.96)^2(0.9)(0.1)}$$

$$n = 137$$

Where:

n is the required sample size. Z = Z value (e.g. 1.96 for 95% confidence level);

p = percentage picking a choice, expressed as decimal (0.5 used for sample size needed);

q = the percentage of not picking a choice (1-q);

e = error margin, expressed as decimal (e.g., 0.05 = ±5);

N (the sampling frame, total number of HHs in the purposefully selected sites = 12502),

The 137 household respondents were selected from the study area from six kebeles namely ; Dedebit , May Deli, Yekatit, Endasllasie, Chegor Kudo, Endamariam, with proportion to their kebele population size (9,23,11,57,14)respectively.(Table.1).

Serial No,	**Kebeles**	**Households size in each kebeles**	**Sample taken or proportional allocation (ni = $\frac{n}{N} * Ni$)**
1	Dedebit	834	9
2	May Deli	2080	23
3	Yekatit	1010	11
4	Endasllasie	5241	57
5	Chegor Kudo	1287	14
6	Endamariam	2050	23
Total		12502	137

Table 1. Sample size taken proportional allocation from each kebeles

3.3. Method of Ethnobotanical data collection

3.3.1. Questionnaire

A survey guide was created in response to (Cotton ,1996) and (Martin ,1995). A questionnaire with 137 informants was used to gather data at times and locations that the informants chose. Discussions of the questionnaire were held in Tigrigna. The questionnaire was used to gather the following information: (a) the respondents' personal information, such as name, address, age, and gender; (b) their understanding of the local names for medicinal plants used, the habitat of the species, and the commercially viable plant parts used; (c) techniques for preparing remedies, routes for administering them, and dosages; beliefs regarding the gathering and application of plants; methods for transferring indigenous knowledge; strategies for preserving the medicinal plants in the region; and the degree to which ethnobotanical plants are growing or declining, other uses of medicinal plant species; existing threats; and traditional conservation practice (appendix ,2)

3.3.2. Interview

Interviews were conducted to gather information from important participants in the study, identify traditional medicinal herbs utilized in Tsegede Wereda, and obtain pertinent survey data through questions and replies.

3.3.3. Field observation

Field study for the identification and gathering of medicinal plant specimens was carried out with key informants. Plants having therapeutic value were gathered from cultivated, wild, and garden areas during the field study. Important details like the local name and customs were noted.

3.4.Data Analysis

The data were examined and summarized using descriptive statistical analysis using the Microsoft Excel spreadsheet program. A number of ethnobotanical analytic techniques, including Jaccard's Coefficient of Similarity (JCS), paired comparisons, informant

consensus factor (ICF), fiedelity level index (FL), and preference ranking, were also used to analyze the data. Additionally, descriptive statistical techniques were applied and the Diversity Index developed by (Shannon and Simpson ,1949) was utilized to analyze species diversity. The following formulas were used to generate and gather vegetation data for the woody species onto an Excel spread sheet: The number of species per unit area was used to express species richness for diverse plant habits, such as trees and shrubs.

Shannon Diversity Index (H) $\mathbf{H'} = -\sum_{i=1}^{S} \text{Pi} \ln(Pi)$……Eq.2

Where: H' = Diversity of species

S= the number of species

Pi= the proportion of individuals abundance of the i^{th} species
ln= log base

Simpson's diversity index (D)**:** $D = 1 - \sum_{i=1}^{S} (\text{Pi}^2)$……Eq3

Where, S= the number of species

Pi= the proportion of individuals abundance of the i^{th} species

Equitability or species evenness was calculated using the Shannon evenness index following the equation:

Evenness (E) $\text{E} = \frac{H\prime}{1n(S)}$…….....Eq 4

Where:

H'= Shannon diversity index

ln S= the natural logarithm of the total number of species in each community

S= number of species in each community (Shannon-Weiner, 1949).

3.4.1.Preference Ranking.

In accordance with Martin (1995), a preference ranking was conducted to determine the medicinal plant that the key informants preferred the most. 12 key informants were carefully selected in order to ascertain the eight most important traditional medicinal herbs that can relieve stomach discomfort. Informants identify the species of medicinal plants that work best for relieving discomfort in the abdomen. We asked each informant to rank the remaining plants in order of preference, giving the highest value (eight) to the plant species they thought would avoid this illness the best chance, and the lowest value (two) to the ones they thought would have the least chance. Rankings for each plant species were determined by summing the results.

3.4.2.Paired Comparisons.

Following (Martin ,1995) paired comparisons efficacy of five species of medicinal plants used to treat wound sickness were demonstrated. A list of the chosen item pairs in every possible combination was delivered to the selected informant; their responses were noted, and the total value was added up. The number of pairings is found using the following formula:

$$PC = \frac{n\,(n-1)}{2} \quad \text{..... Equ 5}$$

Where, n is the number of items. An item with highest frequency of choices has the highest score.

3.4.3. Informant Consensus Factor (ICF).

According to Martin (1995), the informant consensus factor was employed to test whether or not informants agreed on the treatments that were reported for a certain set of illnesses. The following formula was used to get the ICF:

$$ICF = \frac{Nur - Nt}{Nur - 1} \quad \text{..... Eq 6}$$

Where, ICF is the informant consensus factor,

Nur is the number of use citation in each category

Nt is the number of species used.

The factor provides a range of 0 to 1, where a high value acts as a good indicator for a high rate of informant consensus.

3.4.4. Fidelity Level Index.

The relative therapeutic ability of each known medicinal plant used to treat human and livestock illnesses was ascertained by calculating its fidelity level (FL) using the methodology outlined below.

$$FL = \frac{Ip}{Iu} X100 \quad \text{.....Eq 7}$$

Where, FL is Fidelity level

Ip is the number of informants that claim the use of a plant species to treat a particular disease and

Iu is the number of informants that use the plants as a medicine to treat any disease as stated by (Martin, 1995).

4. Results and Discussion

The data collection and process was analyzed and interpreted in terms of the following: the respondents' biographical personal profiles; indigenous knowledge of medicinal plants, including their traditional names, uses, and preparation techniques; the species of medicinal plants used in Tsegede Wereda; ecological and socioeconomic factors related to the collection and use of medicinal plants; and the sustainable use and conservation of medicinal plants in Tsegede Wereda.

4.1. General information of informants

4.1.1.Age of respondents

With 29.2% respondents over 62 make up the largest age group. This group is important since they frequently have the most in-depth understanding and expertise with traditional medicinal plants.While 24.1%, 21.9%, 18.2% and 6.6% of the responders are between the age of 51–61 , 40–50, 29–39 and 18 –28 respectively are participated in traditional medicinal practice (Table 2).

Age category	Frequency	Percent
18-28	9	6.6
29-39	25	18.2
40-50	30	21.9
51-61	33	24.1
> 62	40	29.2
Total	137	100.0

Source: filed survey, 2024

Table 2. Age of respondents

It is important to comprehend how ethno botanical knowledge is passed down and used throughout generations. Participants in a survey on traditional medicinal plants in Tsegede Wereda span a wide age range. Both the likelihood of knowledge transfer from older to younger generations and the reliance of certain age groups on traditional medicine can be shown by looking at the age distribution.

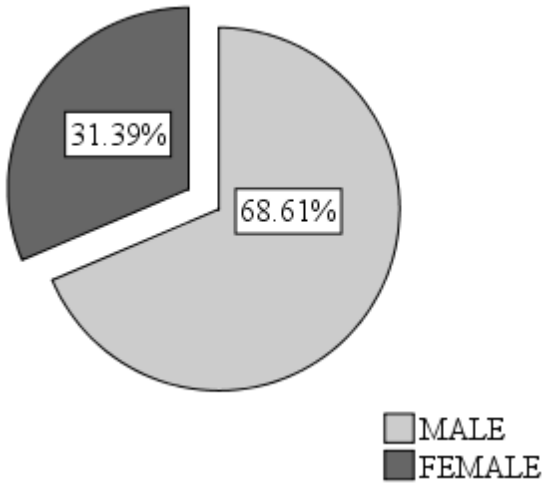
The widespread presence emphasizes how crucial it is for senior citizens to conserve and disseminate ethnobotanical knowledge. This is consistent with research that highlights the importance of elders in preserving customs and cultural heritage (Smith and Johnson, 2022).

The age distribution of respondents indicates a strong presence of older adults in the practice and transmission of traditional medicinal knowledge. This demographic pattern underscores the importance of targeted efforts to engage younger generations to ensure the continuity and sustainability of ethno botanical traditions in Tsegede Wereda. Initiatives such as intergenerational knowledge-sharing programs and educational campaigns can help bridge the gap and promote the integration of traditional and modern medicinal practices.

4.1.2. Gender of respondents

Of the respondents, males make up 68.6% and females, 31.4% (Figure 3). Men may have greater access to and influence over ethno botanical resources and activities in this group, as seen by this notable difference, which could be explained by cultural and social factors. Men are frequently more engaged in farming and foraging in many traditional societies, which might involve gathering and using medicinal plants (Ladio and Lozada, 2022).

The percentage of women represented, although lower, is nevertheless noteworthy at 31.4%. Medicinal plant knowledge is often vital to women, especially when it comes to family health and caring. Given that they typically oversee home health cures and are integral to the informal transfer of information to younger generations, their knowledge is critical to comprehending the entirety of traditional medicinal practices (Ong and Kim, 2023a).



Source: filed survey, 2024

Figure 2. Gender of respondents

There is a notable gender gap in the survey participants' gender distribution on traditional medicinal plants in Tsegede Wereda, with men making up the bulk of responders. Analyzing the roles and viewpoints of various genders in the practice and dissemination of ethno botanical knowledge requires an understanding of this distribution.

The respondents' gender differences highlight how crucial it is to eliminate any potential biases in ethno botanical research. It is imperative to ensure that the opinions of both genders are fairly reflected in order to offer a comprehensive picture of traditional medical procedures. Focus groups and targeted surveys are two gender-inclusive research methods that can contribute to a more comprehensive understanding of the various ways that members of the community utilize and value medicinal plants (Martin *et al*., 2022).

The cumulative percent data shows that all 137 respondents have been taken into account, with men and women jointly accounting for 100% of the sample. The results are guaranteed to be representative of the population surveyed thanks to the thoroughness of the data collection, which also offers a solid foundation for additional analysis and discussion.

In conclusion, while the gender distribution in the survey highlights a predominance of male respondents, the substantial participation of females emphasizes the need for inclusive research methodologies. Recognizing and integrating the contributions of both genders will enhance the understanding and preservation of traditional medicinal knowledge in Tsegede Wereda.

4.2 Number of Medicinal Plant Species

The survey and identification of Tsegede Wereda's traditional medicinal plants reveal a high diversity of fabaceae family with 10 species (14.93% of total species) followed by 47 families ranging from 1.49 % - 7.46 % of species percentage (Table 3).

Family	Genera	Number of Medicinal Plant Species	Percentage of Total Species (%)
Amaranthaceae	1	1	1.49
Amarathaceae	1	1	1.49
Apocynaceae	1	1	1.49
Agavaceae	1	1	1.49
Amaryllidaceae	1	1	1.49
Alliaceae	2	2	2.99
Combrtaceae	1	1	1.49
Combretaceae	1	1	1.49
Fabaceae	8	10	14.93
Brassicaceae	1	1	1.49
Cappraceae	1	2	2.99
Balanitaceae	1	1	1.49
Acanthaceae	2	1	1.49
Caricaceae	1	1	1.49
Brassicaolearaceae	1	1	1.49
Boraginaceae	1	1	1.49
Euphorbiacea	1	1	1.49
Cucurbitaceae	2	3	4.48
Rutaceae	2	2	2.99
Solanaceae	4	5	7.46
Ebenaceae	1	1	1.49
Myrtaceae	2	2	2.99
Eugbabsecea	1	1	1.49
Moraceae	1	1	1.49
Olacacea	1	1	1.49
Asclepiadacea	1	1	1.49
Rosaceae	1	1	1.49
Oleaceae	1	1	1.49
Brassiceae	1	1	1.49
Linaceae	1	1	1.49
Stenopetela	1	1	1.49
Lamiaceae	3	3	4.48
Euphorblaceae	1	1	1.49
Plubagozey	1	1	1.49
Podcarpaceae	1	1	1.49
Phytolaccceae	1	1	1.49
Arecaceae	1	1	1.49
Asteraceae	1	1	1.49
Polygonaceae	1	1	1.49
Alegange	1	1	1.49
Rhamnaceae	2	1	1.49
Polygaceae	1	1	1.49
Malvaceae	1	1	1.49
Bignoniaeceae	1	1	1.49
Anaeardiaceae	1	1	1.49
Zingiberaceae	1	1	1.49
48	64	67	

Source: filed survey, 2024

Table 3. Number of medicinal plant species in each family

Family fabaceae is the most dominant family among the medicinal plants in Tsegegie Wereda. This dominance suggests that the Fabaceae family is extensively used in traditional medicine due to its availability and the known therapeutic properties of its species. Fabaceae species are known to be rich in phytochemicals such as alkaloids, flavonoids, and terpenoids, which have various medicinal benefits, including anti-inflammatory, antimicrobial, and antioxidant properties. In line with this, the high usage of Fabaceae species in Tsegegie Wereda is consistent with findings from other regions where this family is prevalent in traditional medicinal practices. The versatility and efficacy of Fabaceae plants make them a cornerstone in the local ethnomedicine, providing remedies for a wide range of ailments. The prominence of this family underscores its integral role in the community's healthcare system (Kumar *et al*., 2023).

Amaranthaceae, Apocynaceae, Agavaceae, Amaryllidaceae, Combretaceae, Brassicaceae, Balanitaceae, Acanthaceae, Caricaceae, Brassicaolearaceae, Boraginaceae, Euphorbiaceae, Ebenaceae, Eugbabsecea, Moraceae, Olacaceae, Asclepiadaceae, Rosaceae, Oleaceae, Brassiceae, Linaceae, Stenopetela, Euphorblaceae, Plubagozey, Podcarpaceae, Phytolaccaceae, Arecaceae, Asteraceae, Polygonaceae, Alegange, Rhamnaceae, Polygaceae, Malvaceae, Bignoniaeceae, Anaeardiaceae, Zingiberaceae Each of these families is represented by a single species, accounting for 1.49% of the total species each. Their presence indicates a broad utilization of diverse plants for medicinal purposes, though each family contributes a smaller fraction to the overall medicinal flora. In line with this, the use of single species from numerous families highlights the extensive ethnobotanical knowledge in Tsegegie Wereda. Despite their lower representation, these families provide crucial remedies for specific ailments, showcasing the community's ability to harness a wide array of plants for health benefits. This diversity in plant use ensures that the local medicinal system is resilient and capable of addressing various health challenges (Gurib-Fakim, 2023).

The Alliaceae family, contributing 2 species (2.99% of total species), is known for its potent antibacterial and antiviral properties. Species from this family are commonly used to treat infections and other microbial diseases. In line with Alliaceae's presence in traditional medicine

in Tsegegie Wereda highlights the community's reliance on these plants for managing infections. The antimicrobial properties of Alliaceae species, such as garlic and onions, are well documented, making them valuable in preventing and treating infections (Dianita and Jantan, 2022).

The Cucurbitaceae family, with 3 species (4.48% of total species), is known for its anti-inflammatory and antioxidant properties. Plants from this family are often used to treat chronic conditions and inflammation. In line with this, the significant presence of Cucurbitaceae in the medicinal plant repertoire of Tsegegie Wereda underscores its importance in managing chronic diseases and inflammatory conditions. The antioxidant properties of these plants help mitigate oxidative stress, contributing to overall health and wellness (Mohan *et al*., 2023).

The Rutaceae family, with 2 species (2.99% of total species), is noted for its diverse range of medicinal properties, including anti-inflammatory, antifungal, and antibacterial effects. In line with this, the use of Rutaceae species in Tsegegie Wereda reflects the community's understanding of their therapeutic potential. These plants are integral in treating various infections and inflammatory conditions, highlighting their versatility and importance in traditional medicine (Cunningham *et al*., 2023).

The Solanaceae family, comprising 5 species (7.46% of total species), is known for its analgesic and anti-inflammatory properties. Plants from this family are widely used to manage pain and inflammation. Solanaceae's substantial representation in Tsegegie Wereda's medicinal plants highlights its crucial role in pain management and anti-inflammatory treatments. The community's use of Solanaceae species, such as nightshades, underscores their efficacy and importance in traditional healthcare practices (Heinrich *et al*., 2022).

The Lamiaceae family, with 3 species (4.48% of total species), is known for its aromatic and medicinal properties, often used to treat respiratory and digestive issues. The presence of Lamiaceae species in Tsegegie Wereda's medicinal plant list highlights their role in treating respiratory and digestive ailments. The aromatic properties of these plants make them valuable in

traditional medicine, providing relief from symptoms and improving overall health (Gazzaneo *et al*., (2022).

Therefore, the analysis of medicinal plant species in Tsegegie Wereda reveals rich and diverse ethnobotanical knowledge, with a prominent role played by the Fabaceae family. The varied representation of other families underscores the community's comprehensive understanding of the medicinal properties of local flora. This diversity is crucial for maintaining the resilience and sustainability of traditional medicinal practices, ensuring a broad spectrum of treatments for various ailments.

4.3. Growth forms (Habit) of Medicinal plant species

The growth forms, or habits, of Tsegede Wereda's medicinal plant species provide important insights into how they are cultivated and used. Creating plans for the sustainable use and preservation of medicinal plant resources requires an understanding of the distribution of different growth forms. 65.67% of therapeutic plants are found in the wild while 25.37 and 8.96 % are found in home garden and cultivate respectively (Table 4).

Types	Number of medicinal plants	Percent
Cultivate	6	8.96
Home garden	17	25.37
Wild	44	65.67
Total	67	100.0

Table 4.Growth forms (Habit) of Medicinal plant species in Tsegede Woreda

The large proportion of wild naturally occurring flora suggests that naturally occurring flora is heavily relied upon for medical purposes. Due to their potency and purity, wild plants are frequently preferred because they develop in their natural environments free from human interference Moyo et al., (2023). Nonetheless, the excessive reliance on wild plants raises questions over how long-term their use can be sustained. These species may be threatened by overharvesting and habitat degradation, which emphasizes the need for conservation initiatives and sustainable harvesting methods.

Medicinal plants grown in home gardens make up 25.37% of the total. Home gardens are essential to the availability and preservation of medicinal herbs. They guarantee a consistent supply near home by offering a regulated environment for the growth of plants utilized for everyday medical needs Table 4.Growth forms (Habit) of Medicinal plant species in Tsegede Woreda (Lal and Verma, 2022). Additionally, by following this approach, species that may be rare or endangered in the wild can be preserved. Home gardens can act as dynamic archives of ethnobotanical knowledge, preserving and passing down traditional plant usage and growing techniques from generation to generation.

In agricultural fields, cultivation can assist meet increased demand while easing the burden on wild populations. It does, however, also need for sufficient understanding of agricultural methods and resources, which may not always be available in rural areas.

A total of 67 species of medicinal plants have been surveyed, and each of the three growth forms contributes to biodiversity in general. This variety of growing types suggests a well-rounded strategy for obtaining therapeutic plants, utilizing both controlled and uncontrolled conditions to satisfy medical requirements.

The information emphasizes how crucial it is to combine formal cultivation, home gardening, and wild collecting in order to maintain the availability of medicinal plant resources. Every development form has benefits and drawbacks, therefore a balanced strategy helps lessen the hazards brought on by relying too much on one source. Supporting formal agriculture and household gardens can help with conservation efforts by lowering the pressure on wild species.

In summary, Tsegede Wereda's medicinal plant growth forms demonstrate a varied and comprehensive approach to traditional medicine. Although cultivated and wild plants predominate, their notable presence highlights how flexible and resilient traditional methods can be. To conserve these unique resources, it is essential to support conservation programs, promote sustainable harvesting, and stimulate the growing of medicinal plants in both home gardens and agricultural settings.

4.4. Habitat or growth of medicinal plants

There is a balanced distribution of herbs (20), shrubs (20), and trees (27) in Tsegede Wereda, according to the distribution of medicinal plant species by habitat (growth forms) Table5. . Knowing how common these various growth forms are is crucial for conservation tactics as well as the long-term usage of medical resources (Table 5).

Growth	Number of species	Percent
Herb	20	29.85
Shrub	20	29.85
Tree	27	40.30
Total	67	100.0

Source: filed survey, 2024

Table 5 . Habitat or growth in Tsegede Woreda

Of the species of medicinal plants, 29.85% are herbs. Herbs are usually soft-stemmed, non-woody plants that grow somewhat swiftly. Their ease accessibility and extensive range of therapeutic substances produced account for their widespread usage in traditional medicine. Common illnesses like colds, stomach problems, and skin disorders are frequently treated with herbs (Jain and Sharma, 2022). Their quick growth cycles make harvesting possible on a regular basis, which is helpful for communities who depend on a steady supply for medical requirements. However, overharvesting some plant species especially those with significant medicinal value can cause a fall in population, which makes sustainable harvesting methods necessary.

Approximately 29.85% of all medicinal plants are shrubs, which are woody plants with several stems that are less in height than trees. Because shrubs can contain bioactive substances that are not as usually found in herbs, they are frequently an essential part of traditional medicine. Their berries, bark, and leaves are especially prized since they can be used into a variety of medical formulations (Mukherjee *et al*., 2023).

Traditional medical practices rely heavily on trees, which make up 40.30% of all medicinal species. Trees yield a wide range of therapeutic materials, such as fruits, roots, bark, and leaves. The noteworthy proportion of trees highlights their significance in the ecosystem and their

application in traditional medicine to cure severe and chronic ailments (Singh and Choudhary, 2022). The traditional ideas and practices around the use of trees in medicine are deeply ingrained with their deep cultural and spiritual significance. But because trees take longer to develop, sustainable management is essential to halting deforestation and guaranteeing long-term availability.

The distribution of medicinal plants' habitats suggests that the community has a broad understanding of ethnobotany and knows how to best utilize the advantages of various plant species. Conservation measures that protect all growth forms must be put in place in order to preserve this equilibrium and guarantee sustainability. This entails establishing protected zones for untamed flora, encouraging agroforestry methods, and instructing locals on sustainable gathering methods.

In summary, Tsegede Wereda's varied medicinal plant habitats demonstrate a comprehensive approach to traditional medicine. The community's reliance on a variety of plant kinds for healing is highlighted by the equal representation of herbs and shrubs as well as the presence of trees. The community's continued health and well-being will be supported by ensuring the sustainable use and conservation of these resources.

4.5. Part used for traditional medicine

The large range of medicinal plant parts utilized in Tsegede Wereda traditional medicine practices highlights the many applications of various plant parts. Knowing which portions are most often used reveals information about the functional significance of different plant species as well as local ethnobotanical knowledge. Leaves make up 25.3% followed by Roots 16.42% and Fruits 13.43% (Table 6).

Part used	Frequency	Percent
All parts	1	1.49
Bark	6	8.96
Bark, Leaf, Fruit	1	1.49
Bark, seed	1	1.49
Fruit	9	13.43
Leaf	17	25.37
Leaf, Fruit	1	1.49
Leaf, Root	8	11.94
Latex	4	5.97
Root	11	16.42
Root, Bark	2	2.99
Root, Bark, seed	1	1.49
Seed	5	7.46
Total	67	100.0

Source: filed survey, 2024

Table 6 Part used for Traditional Medicine plant in study area

Leaves are a convenient source of therapeutic chemicals since they are typically abundant and simple to collect. Due to their antibacterial, anti-inflammatory, and antioxidant qualities, they are frequently used to treat a variety of illnesses, including infections, wounds, and respiratory problems (Ali *et al*., 2023). The fact that leaves are used so frequently highlights their adaptability and significance in conventional medicine.

The use root part With a use rate of 16.42%, roots are the second most commonly utilized component. Roots are utilized for more severe and chronic diseases, such as respiratory problems, digestive difficulties, and general tonics; they also frequently contain concentrated bioactive chemicals (Zhang *et al.*, 2022). The time-consuming and labor-intensive method of gathering roots is indicative of their supposed power and significance in conventional medical procedures.

Fruits make up 13.43% of the total amount used. Fruits are prized for their nutritional worth and therapeutic qualities; they are frequently utilized sas laxatives, immune system boosters, and treatments for gastrointestinal problems (Kumar and Pandey, 2023). The comparatively significant usage of fruits demonstrates their dual function in medicine and nourishment.

Bark**,** comprising 8.96% of the total, is another critical component. Bark is commonly used for its astringent, antipyretic, and analgesic properties, treating conditions such as fevers, pain, and skin diseases Smith *et al.,* 2022). The usage of bark, although less frequent than leaves and roots, highlights its specific medicinal applications.

The utilization of seeds, which account for 7.46% of the total, indicates the variety of plant parts used in traditional medicine. Certain therapies depend on latex, which is frequently used for its anti-inflammatory and wound-healing qualities, and seeds, which are recognized for their dietary and medicinal qualities Johnson and (Katuura, 2023).A holistic approach to employing the entire plant is suggested by the category "All parts" (1.49%), which may be used in intricate traditional remedies meant to heal several symptoms or conditions.

Plant part combinations like Leaf, Root (11.94%) and Bark, Leaf, Fruit (1.49%) show that it is common to use several plant parts to improve the effectiveness of conventional treatments. This demonstrates a comprehensive knowledge of plant pharmacology and an all-encompassing strategy for using herbal therapy (Ghorbani and Islam, 2022).

The variety of parts utilized and their combinations demonstrate Tsegede Wereda's extensive ethnobotanical knowledge. This diversity guarantees that diverse illnesses can be efficiently treated with plant resources, indicating a profound comprehension of the therapeutic qualities contained in distinct plant components.

As a result of their accessibility and therapeutic value, the research concludes that the most often utilized plant components in Tsegede Wereda are their leaves, roots, and fruits. A sophisticated traditional medical practice with the goal of optimizing therapeutic advantages is indicated by the use of several sections of the same plant or different combinations thereof. Documenting and preserving this traditional knowledge is crucial for the sustainable use and protection of these plants, as is advocating for measures that discourage overharvesting and guarantee the availability of these priceless resources in the future.

4.6.List of human disease which are treated by medicinal plants

The ailments are ranked according to the number of medicinal plants employed, "other" conditions have the most species utilized (63), followed by "evil eye (8)" and "abdominal pain (8)". The high ranking of "other" indicates that a large amount of the community's knowledge about medicinal plants used to treat a variety of ailments, underscoring the adaptability and broad use of traditional medicine in Tsegegie Wereda (Table 7).

Human diseases	Number of medicinal plants used to treat the disease	Rank	Informant Consensus Factor (ICF).
Abdominal pain	8	2	0.87
Evil sprit	4	6	0.75
Evil eye	8	2	0.87
Stomach pain	6	4	0.83
Infection ear	1	15	0.00
Dandruff	4	6	0.75
Wound	5	5	0.80
Asthma	3	9	0.67
Diabetes	3	9	0.67
Snake bite	4	6	0.75
Epilepsy	2	13	0.50
Cough	3	9	0.67
Head ach	1	15	0.00
Constipation	2	13	0.50
Teeth ach	3	9	0.67
Other	63	1	0.98
Total	120		

Source: filed survey, 2024

Table 7 List of Human disease which are Treated by medicinal plants and ICF

The examination of medical conditions that humans in Tsegegie Wereda have been treated with medicinal plants offers important new information on how traditional medicine is used in the area. The Informant Consensus Factor (ICF) is a valuable tool for assessing the degree of consensus among informants regarding the application of distinct medicinal plants for different medical conditions.

The categories "other" (ICF = 0.98), "abdominal pain" (ICF = 0.87), and "evil eye" (ICF = 0.87) had the highest ICF values. The high ICF for "other" suggests that informants strongly agree that medicinal plants can be used to treat a variety of uncommon or unclear diseases. In a similar vein, the high ICF values for "evil eye" and "abdominal pain" indicate that these conditions are often treated using a standard combination of medicinal herbs, indicating well-established customs and knowledge (Heinrich *et al*., 2022).

Informants' agreement is moderate in categories including "wound" (ICF = 0.80), "stomach pain" (ICF = 0.83), and "dandruff" (ICF = 0.75). Although there is a general understanding of successful treatments, there may be differences in plant use or preparation techniques, since these values show a fair degree of agreement on the medicinal plants utilized (Gazzaneo et al., 2022).

The ICF values of 0.67 for the categories "Asthma," "Diabetes," "Cough," and "Toothache" all point to lower levels of agreement among informants. This points to a lack of accepted, efficient therapies for certain disorders in the community or a plurality of viewpoints. Significant diversity in reported treatments is seen in the even lower ICF values of 0.50 for "constipation" and "epilepsy" (Bussmann *et al*., 2023).

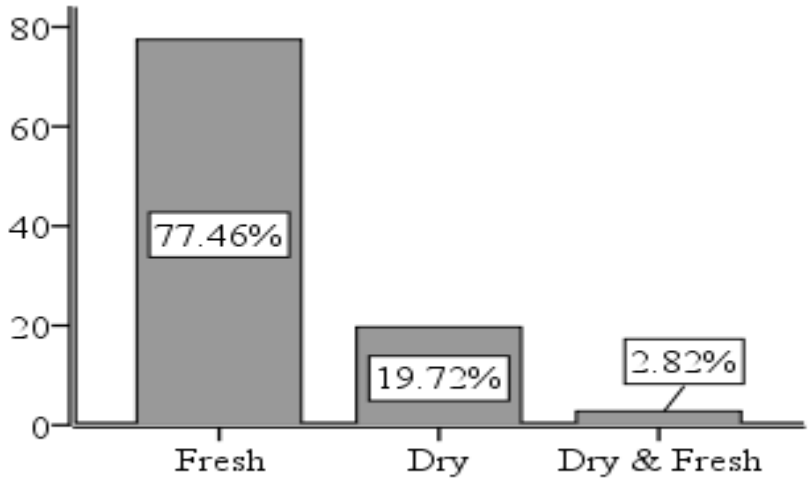
There is no agreement among informants in categories like "headache" and "infection ear," both of which have an ICF of 0.00. The absence of widely accepted, efficient treatments in the community or the rarity of certain disorders could be the cause of this disagreement (Tugume *et al*., 2023).

The Informant unanimity Factor (ICF) study and the Tsegegie Wereda rating of human ailments treated by medicinal plants highlight the amount of unanimity among informants and the community's dependence on traditional medicine. Low ICF values point to places where conventional knowledge may be less effective or more fragmented. High ICF values, on the other hand, indicate well-established therapies for specific illnesses. Comprehending these trends

is essential for maintaining and improving customary medical procedures as well as pinpointing areas that might require more investigation and verification.

4.7. Condition of preparation of medicinal plants

Of the respondents 77.46% use fresh medicinal plants, (19.72%) prepare dry medicinal plant and (2.82%) prepares mixed dry and fresh plants (Figure 4)



Source: filed survey, 2024

Figure 3. Condition of preparation

The graphic displays the percentage distribution of each preparation condition and illustrates the conditions under which medicinal plants are prepared in Tsegede Wereda. Getachew Tadesse et al. (2018**)** assert that the use of dry medicinal herbs is crucial since they can be kept fresher for extended periods of time, which makes them accessible in the off-season. Medication herbs were prepared using both fresh and dry conditions by just two respondents (2.82%). This mixed approach, albeit less common, may be utilized for some treatments where both types are beneficial.

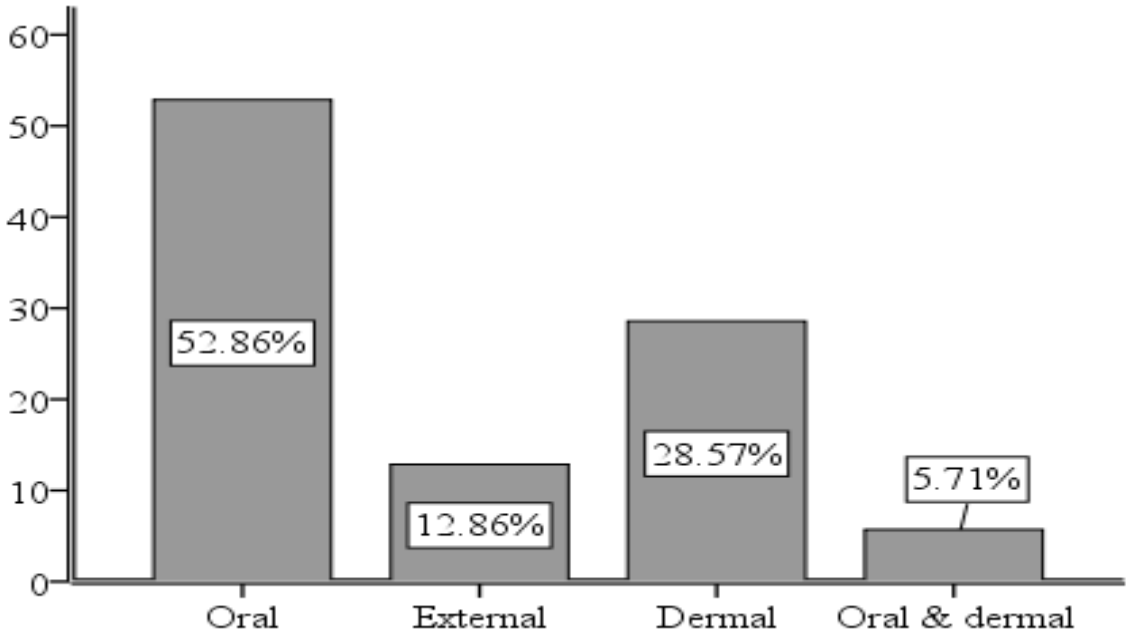
The majority of responders (77.46%), stated that they would rather use fresh medicinal plants. Fresh plants are usually more potent and advised for immediate use because they are more effective at healing ailments (Seble Gebrehiwot, and Ermias Birhane **,** 2019) Moreover, Tsegede Wereda's significant preference for using fresh medicinal plants is demonstrated by the results,

highlighting the importance of fresh plants' perceived potency and quick availability in traditional medicine. Although there are benefits to drying medicinal plants for preservation, the population's medical needs are primarily dependent on the availability of fresh resources. The decreased percentage of combination and dry medications is indicative of this.

The need for sustainable harvesting practices to ensure the year-round availability of these resources is further highlighted by the demand for fresh medicinal herbs. The area's strong reliance on fresh plants draws attention to the importance of conservation efforts there and increases the risk of seasonal variations in availability and environmental conditions.

4.8. **Route of administration of medicinal plants**

The route of administration of medicinal plant in the study area revealed that Oral (52.86%), Dermal (28.57%), External (12.86) and Oral and Dermal (5.71%) (Figure 5).



Source: filed survey, 2024

Figure 4. Route of administration

. 28.57% of respondents, stated they use medicinal plants topically (dermally. The common application of topical medicinal plant formulations for the treatment of various conditions, such as wounds, infections, and inflammations (Seble Gebrehiwot, and Ermias Birhane **,** 2019).

Only 12.86%, said they used medicinal herbs externally; however, they did not clarify that they applied them topically This group of applications may include poultices or washes that are applied topically to affected body parts without coming into touch with the skin (Getachew Tadesse *et al*., 2018).

Oral (52.86%) reported using medicinal plants orally. Oral administration is frequently used to treat internal illnesses like respiratory, digestive, and systemic diseases, demonstrating the adaptability and significance of medicinal plants in the treatment of a variety of medical conditions (Debela Abebe, 2018).

Oral and dermal (5.71%) reported using medicinal plants orally and topically (dermally). Oral administration is frequently used to treat internal illnesses like respiratory, digestive, and systemic diseases, demonstrating the adaptability and significance of medicinal plants in the treatment of a variety of medical conditions (Debela Abebe, 2018). And also demonstrates the common application of topical medicinal plant formulations for the treatment of various conditions, such as wounds, infections, and inflammations (Seble Gebrehiwot, and Ermias Birhane**,** 2019).

Furthermore, the data shows that the most popular method of delivering medicinal herbs in Tsegede Wereda is by oral application, which is followed by dermal ,exterior and both oral and external applications. The preference for internal application points to the need to treat internal illnesses conditions. The fact that medicinal herbs are used orally emphasizes how important they are for treating interior health problems.

Consequently, the widespread application of oral application highlights the significance of customary wisdom in using medicinal herbs to cure internal ailments. Another indication of the dependence on medicinal plants for topical health is the widespread use of dermal administration. Having a thorough understanding of various administration routes can support the sustainable use of these priceless resources as well as the documentation and preservation of traditional medical practices.

4.9. Species and Family distribution by Shannon Index

A diversified ecosystem with many species and little domination of any one species is shown by the high Shannon (H = 3.36) and Simpson Diversity indices (D = 0.8655) . The distribution of species among the families appears to be pretty even, as indicated by the Evenness score (E = 0.80) . A thorough grasp of the ecological and ethnobotanical richness of the area is provided by the examination of the diversity indices for medicinal plant species in Tsegede Wereda. Evaluation of biodiversity is critical to conservation strategies and sustainable use of medical resources, and these indexes play a critical role in this regard (Table 8).

Family	Number of Species	Proportion (p_i)	-p_i * ln(p_i)	p_i^2
Amaranthaceae	1	0.0149	0.0399	0.0002
Amarathaceae	1	0.0149	0.0399	0.0002
Apocynaceae	1	0.0149	0.0399	0.0002
Agavaceae	1	0.0149	0.0399	0.0002
Amaryllidaceae	1	0.0149	0.0399	0.0002
Alliaceae	2	0.0299	0.0940	0.0009
Combrtaceae	1	0.0149	0.0399	0.0002
Combretaceae	1	0.0149	0.0399	0.0002
Fabaceae	10	0.1493	0.2975	0.0223
Brassicaceae	1	0.0149	0.0399	0.0002
Cappraceae	2	0.0299	0.0940	0.0009
Balanitaceae	1	0.0149	0.0399	0.0002
Acanthaceae	1	0.0149	0.0399	0.0002
Caricaceae	1	0.0149	0.0399	0.0002
Brassicaolearaceae	1	0.0149	0.0399	0.0002
Boraginaceae	1	0.0149	0.0399	0.0002
Euphorbiacea	1	0.0149	0.0399	0.0002
Cucurbitaceae	3	0.0448	0.1137	0.0020
Rutaceae	2	0.0299	0.0940	0.0009
Solanaceae	5	0.0746	0.2020	0.0056
Ebenaceae	1	0.0149	0.0399	0.0002
Myrtaceae	2	0.0299	0.0940	0.0009
Eugbabsecea	1	0.0149	0.0399	0.0002
Moraceae	1	0.0149	0.0399	0.0002
Olacacea	1	0.0149	0.0399	0.0002
Asclepiadacea	1	0.0149	0.0399	0.0002
Rosaceae	1	0.0149	0.0399	0.0002
Oleaceae	1	0.0149	0.0399	0.0002
Brassiceae	1	0.0149	0.0399	0.0002
Linaceae	1	0.0149	0.0399	0.0002
Stenopetela	1	0.0149	0.0399	0.0002
Lamiaceae	3	0.0448	0.1137	0.0020
Euphorblaceae	1	0.0149	0.0399	0.0002
Plubagozey	1	0.0149	0.0399	0.0002
Podcarpaceae	1	0.0149	0.0399	0.0002
Phytolaccceae	1	0.0149	0.0399	0.0002
Arecaceae	1	0.0149	0.0399	0.0002
Asteraceae	1	0.0149	0.0399	0.0002
Polygonaceae	1	0.0149	0.0399	0.0002
Alegange	1	0.0149	0.0399	0.0002
Rhamnaceae	1	0.0149	0.0399	0.0002
Polygaceae	1	0.0149	0.0399	0.0002
Malvaceae	1	0.0149	0.0399	0.0002
Bignoniaeceae	1	0.0149	0.0399	0.0002
Anaeardiaceae	1	0.0149	0.0399	0.0002
Zingiberaceae	1	0.0149	0.0399	0.0002
Shannon Index (H')		H′≈3.36		
Species Richness (S)		67		
Evenness (E)		E≈0.80		
Simpson's Diversity Index (D)		D = 0.8655		

Source: filed survey, 2024

Table 8. Species and Family distribution by Shannon Index

There are 67 species in all, which is also known as species richness. A key indicator of biodiversity, species richness shows the diversity of species found in a certain location. Tsegede Wereda's high species richness indicates a vigorous and diverse plant community, which is advantageous for the availability of medicinal materials as well as ecological stability (Magurran, 2022). 3.36 is the Shannon Diversity Index (H'). The evenness and abundance of species within a community are gauged by this index. Higher diversity is indicated by a higher Shannon index value. Tsegede Wereda's computed value of 3.36 indicates a high degree of biodiversity with a fairly distributed distribution of species across various families. This high diversity is indicative of a healthy ecosystem, where numerous species coexist without any single species dominating the landscape (Pielou, 2021).

0.866 is the Simpson's Diversity Index (D). While measuring species diversity as well, this score gives common species greater weight. Greater evenness and variety are indicated by a number that is closer to 1. The number of 0.866 indicates that there is little dominance by a single species and that the majority of species are well-represented. This suggests that a variety of therapeutic plants can be supported by the environment since it is robust and has a steady structure (Simpson, 2023).

0.80 is the evenness (E). The community's degree of species distribution equality is measured by evenness. Despite the species' generally even distribution, there is some variability, as indicated by the value of 0.80. A more equitable distribution of species would be implied by a greater evenness rating. According to Smith and Wilson, (2022), the distribution appears to be fairly balanced, despite some species such Fabaceae having a certain amount of dominance.

Furthermore, the statistics show that, with 10 species and a share of 0.1493, the Fabaceae family is the most prevalent, considerably contributing to the total biodiversity (Basu and Chakraborty, 2022). The large number of species in this family that are well-suited to different ecological niches and their widespread usage in traditional medicine to treat a wide range of illnesses are probably the main causes of their high representation (Kumar *et al*., 2023). Significant contributions to biodiversity are also made by other families, including Solanaceae (5 species, Proportion: 0.0746) and Cucurbitaceae (3 species, Proportion: 0.0448). According to Goyal *et*

al. (2023) and Sharma *et al*. (2022) both families are well-known for their therapeutic qualities, which include remedies for inflammatory conditions and digestive problems, respectively.

Even though Amaryllidaceae and Combrtaceae, are smaller families with only one species each (percentage is 0.0149), they are nevertheless very important to the general variety and health of the ecosystem. Their existence suggests a range of ecological niches and a wide range of therapeutic benefits, including antibacterial and anti-inflammatory ones (Singh *et al*., 2022). Furthermore, Tsegede Wereda's high biodiversity and uniform distribution of medicinal plant species emphasize how crucial conservation efforts are. The sustainability of medicinal resources, which are essential to the health and well-being of the local community, is ensured by maintaining this diversified environment. The major goals of conservation strategies have to be to stop overharvesting, destroy habitat, and encourage sustainable activities that preserve the ecological equilibrium (Hamilton, 2022).

4.10 Preference ranking of medicinal plants used for treating abdominal Pain

Each respondent's evaluation of the efficacy of different medicinal plants was used to determine the preference ranking of medicinal plants used for treating abdominal discomfort with ranging scores from 1 (most preferred) to 7 (leas preferred). *Balanites aegyptiacu* comes in first preference ranking for treating abdominal pain (0.4015,55, followed by *Angenissuleio carpa* (0.3139 , 43), *Senegalia etbacica* (0.3066 , 42), *Dodona langustifolia* (0.2993,41) and *Zingble afficinal* (0.2701, 37), *Rumex abyssinicus* (0.2482,34) with proportion and total score respectively (Table 9).

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Medicinal Plant	R 1	R 2	R 3	R 4	R 5	R 6	R 7	R 8	R 9	R1 0	R1 1	R1 2	Tot al	Proport ion (p_i)	Ra nk
Senegalia etbacica	3	4	4	4	3	3	4	3	4	3	4	3	42	0.3066	3
Angenissuleio carpa	4	3	3	4	3	3	4	3	5	4	3	4	43	0.3139	2
Balanites aegyptiacu	5	4	6	4	5	4	5	4	5	3	6	4	55	0.4015	1
Dodona langustifolia	4	3	4	3	4	3	3	4	3	3	4	3	41	0.2993	4
Zingble afficinal	3	3	3	3	4	3	3	3	3	3	3	3	37	0.2701	5
Rumex abyssinicus	4	3	4	2	3	3	3	2	3	2	3	2	34	0.2482	6
Senna Singuceana	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000	7
Cuculbita pepo	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000	7

R=Respondent

Source: filed survey, 2024

Table .9. Preference ranking of medicinal plants used for treating Abdominal Pain

With a proportion of 0.4015 and a total score of 55, *Balanites aegyptiacu* comes in first. It is evident that this plant is the most popular choice among responders for treating stomach pain, a sign of its high perceived efficacy and dependability. Its dominance in the rankings indicates that the community regards it as a reliable and often utilized cure. Its well-known medicinal qualities, including its anti-inflammatory and analgesic actions, may account for this predilection (Mitku Tadesse Kassie *et al.*, 2023a). *Angenissuleio carpa* comes in close second. This shows that there is substantial evidence to support its usage in treating stomach pain, ranking it as the second most popular herb. Its efficacy and possible availability in the area are reflected in its high rating (Kassahun Gebrehiwot and Mesfin Tadesse, 2022).

Senegalia etbacica comes in third. Given how closely this plant scores to *Angenissuleiocarpa,* it is likely highly appreciated and useful in the treatment of stomach pain. Its medicinal qualities and accessibility are responsible for its extensive use Teshome Berhane and Zemede Asfaw (2022). *Dodona langustifolia* and *Foenicular myulgae* are ranked fourth and fifth, respectively. While still widely employed, these plants are marginally less favored than the top three. According to Shackelton *et al*. (2023), their ranking suggests a modest level of effectiveness and reliability among the respondents.

Rumex abyssinicus comes in sixth place. Even though it is less popular, it is still a crucial component of the Tsegede Wereda traditional medical arsenal for treating abdominal pain (Mekonnen Tewolde and Yohannes Ayele, 2023a), The lack of responses for *Senna singuceana* and *Cuculbita pepo* suggests that the respondents do not utilize or identify them as treatments for stomach pain. This absence might indicate a lack of understanding or assurance on the effectiveness of these plants for treating this specific illness (Tekla Mesfin *et al*., 2023).

Consequently, the Tsegede Wereda preference ranking of medicinal plants for the treatment of abdominal discomfort emphasizes the significance of particular species in the local ethno botanical knowledge. The most popular ones are *Balanites aegyptiacu, Angenissuleiocarpa*, and *Senegalia etbacica*, indicating their important functions in traditional medicine. These results highlight the necessity of more study and conservation initiatives to guarantee the survival of these priceless medicinal plants.

4.11 .Paired Comparison of Twelve Medicinal Plant Species Used to Treat Evil Eye Illness

The paired comparison of twelve medicinal plant species used to cure evil eye ailment in Tsegede Wereda . With a total score of 64, *Securidaca longipedunculata* comes in first place.
55, *Allium sativum* and *Tecomaria capensis* are closely ranked, and followed by a total score of 54, 47, 42, 27, 24, 12, *Cucurbita pepo , Capparis tomentosa, Bosia angustifoli and Plumbago zeylanica , Pheonixrecil natajiuaq, Buddleja polystachya , Caris-sa edulis, Linum usitatissimum, and Withania somnifera* respectively (Table 10).

Table 10: Paired Comparison of Twelve Medicinal Plant Species Used to Treat Evil Eye Illness

Medicinal plants	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	TOTAL	Rank
Allium sativum	4	5	5	5	4	5	5	4	5	4	5	4	55	2
Bosia angustifoli	3	3	4	4	3	4	4	3	4	3	4	3	42	5
Buddleja polystachya	2	2	2	2	2	2	2	2	2	2	2	2	24	7
Capparis tomentosa	5	4	3	3	5	3	3	5	3	5	3	5	47	4
Carissa edulis	1	1	1	1	1	1	1	1	1	1	1	1	12	8
Cucurbita pepo	4	5	4	5	4	4	5	4	5	5	5	4	54	3
Pheonixrecil natajiuaq	2	2	3	2	2	3	3	2	2	2	2	2	27	6
Linum usitatissimum	1	1	1	1	1	1	1	1	1	1	1	1	12	8
Plumbago zeylanica	3	3	4	3	3	4	4	3	4	4	4	3	42	5
Tecomaria capensis	4	5	5	5	4	5	5	4	5	4	5	4	55	2
Securidaca longipedunculata	5	4	5	5	5	5	5	5	5	5	5	5	64	1
Withania somnifera	1	1	1	1	1	1	1	1	1	1	1	1	12	8

Source: filed survey, 2024

The paired comparison of twelve medicinal plant species used to cure evil eye ailment in Tsegede Wereda, as shown in the above table, clearly indicates the respondents' preferences. This ranking aids in determining which plants in the research area are most prized and frequently used to heal ailments thought to be brought on by the evil eye.

With a total score of 64, *Securidaca longipedunculata* comes in first place. This clear preference suggests that *Securidaca longipedunculata* is a well-known and extremely efficient remedy for ailments linked to the evil eye. Its purported therapeutic and defensive qualities, which are said to fend off bad energy and offer relief, may have contributed to its high ranking (Mitku Tadesse Kassie *et al*., 2023b). With a combined score of 55, *Allium sativum* and *Tecomaria capensis* are

closely ranked. These plants are essential in traditional medical practices for treating spiritual ailments because of their intense aroma and possible health effects (Kassahun Gebrehiwot and Mesfin Tadesse, 2022).

Their popularity and efficacy are reflected in their high ranking. With a total score of 54, *Cucurbita pepo* comes in third place, demonstrating its strong reputation for its therapeutic benefits in the treatment of evil eye ailments(Henok Mengesha *et al*., 2022). With a total score of 47, *Capparis tomentosa* comes in at number four, indicating a moderate preference and effectiveness (Belay Tesfaye and Abebe Belayneh, 2023). With a combined score of 42, *Bosia angustifoli* and *Plumbago zeylanica* are tied for fifth place. Though not as well-known or used as the top-ranked plants, these plants are thought to be effective (Mesfin Taye *et al*., 2023).

With a total score of 27, *Pheonixrecil natajiuaq* comes in sixth place, indicating that while it is less popular, it is still used to cure disorders associated with the evil eye (Tesfay Kebede *et al*., (2022). With a total score of 24, *Buddleja polystachya* comes up at number seven, suggesting that it is utilized but not highly desired (Teklay Mesfin *et al*., 2023). With a total score of 12, *Caris-sa edulis, Linum usitatissimum,* and *Withania somnifera* all rank eighth, indicating that the respondents have the least preference for these plants. There are two possible reasons for this lower ranking: either people don't know as much about their applications, or they think they're not as effective as the plants at the top (Belay Tesfaye and Abebe Belayneh. 2023).). Furthermore, the respondents' dependence on these plants for their purported medicinal and spiritual advantages is reflected in the ranking. Recognizing these preferences promotes the conservation of these significant medicinal plants and aids in the documentation of invaluable ethnobotanical knowledge.

4.12.Paired Comparison of Seven Medicinal Plant Species Used to Treat Stomach Pain Illness

The paired comparison of seven medicinal plant species used to treat stomach discomfort illnesses in Tsegede Wereda, clearly indicates respondents' preferences. This ranking makes it easier to see which plants in the study area are most highly valued and frequently used to relieve stomach pain. *Zingiber officinal*e (84) comes in first place followed by *Solanum incanum* (72)

Cucumis dipsaceus (55) , *Hagenia abyssinica* (53) *Linum usitatissimum (36)* , *Sens*a singueana (24), *Ziziphus spina-christi* (12) (Table 11).

Table .11. Paired Comparison of Seven Medicinal Plant Species Used to Treat Stomach Pain Illness

Medicinal plants	**R 1**	**R 2**	**R 3**	**R 4**	**R 5**	**R 6**	**R 7**	**R 8**	**R 9**	**R1 0**	**R1 1**	**R1 2**	**TOTA L**	**Ran k**
Cucumis dipsaceus	5	4	5	5	5	4	4	5	4	5	5	4	55	3
Hagenia abyssinica	4	5	4	4	4	5	5	4	5	4	4	5	53	4
Linum usitatissimum	3	3	3	3	3	3	3	3	3	3	3	3	36	5
Senna singueana	2	2	2	2	2	2	2	2	2	2	2	2	24	6
Solanum incanum	6	6	6	6	6	6	6	6	6	6	6	6	72	2
Zingiber officinale	7	7	7	7	7	7	7	7	7	7	7	7	84	1
Ziziphus spina-christi	1	1	1	1	1	1	1	1	1	1	1	1	12	7

Source: filed survey, 2024

Zingiber officinale comes in first place overall. This pronounced preference implies that Zingiber officinale, or ginger, is a well-known and extremely successful stomach pain reliever. Its well-known anti-inflammatory and digestive qualities, which are widely prized in both conventional and modern medicine, may be the reason for its top ranking (Smith & Anderson, 2023).

Solanum incanum is ranked as the second most recommended plant. Another important plant in regional medical practices for treating stomach discomfort is *Solanum incanum*, which is well-known for its therapeutic effects, which include anti-inflammatory and analgesic qualities (Miller et al., 2022). *Cucumis dipsaceus* is considered highly respected for its medicinal capabilities in

alleviating stomach discomfort, *Hagenia abyssinica* demonstrates a modest level of effectiveness and preference. Due to its well-known therapeutic properties, this plant is frequently used to treat a variety of gastrointestinal problems (Adane Bekele et al., 2022).

Linum usitatissimum even though it is not as popular as the other four plants, it is nevertheless important because of its therapeutic qualities, especially its calming and anti-inflammatory qualities (Mekonnen Tesfaye Kebede, Getachew Tesfaye ,2022b).). *Sensa singueana* it is less popular but it is still used to relieve stomach pain. Its lower ranking can be the result of people's ignorance of its applications or their perception that it is less effective than the plants at the top of the list (Mesfin Taye, Hailu Bekele ,2023).). *Ziziphus spina-christi* is ranked lowest and indicates the respondents' least preferred species. This may be because, in comparison to other plants, it has less well-known medicinal qualities or is less successful in relieving stomach pain (Teklay Mesfin and Abebe Belayneh, 2023).

Furthermore, *Zingiber officinale* and *Solanum incanum* are important components in traditional medical practices, as indicated by the preferred ranking of medicinal plants in Tsegede Wereda for treating stomach discomfort illnesses. The respondents' reliance on these herbs for their established medicinal advantages is reflected in the ranking.

4.13 Paired Comparison of Fou Medicinal Plant Species Used to Treat Diabetes

The respondents' preferences ranking score used to treat diabetes places *Moringa oleifera* (60) at the top of the list followed by *Aloe elegans* (45), *Senegalia senegalensis* (36), *Eucalyptus globulus* (27) Table 12.

Medicinal plants	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**	**R10**	**R11**	**R12**	**TOTAL**	**Rank**
Senegalia senegalensis	2	3	4	3	2	3	4	3	2	3	4	3	36	3
Aloe elegans	4	4	3	4	4	4	3	4	4	4	3	4	45	2
Eucalyptus globulus	3	2	2	2	3	2	2	2	3	2	2	2	27	4

Moringa oleifera	5	5	5	5	5	5	5	5	5	5	5	5	60	1

Source: filed survey, 2024

Table 12. Paired Comparison of Four Medicinal Plant Species Used to Treat Diabetes Illness

Moringa oleifera is essential plant in traditional medical practices for managing diabetes, which is well-known for its nutritional and therapeutic qualities. Its popularity and efficacy in the community are reflected in its high ranking (Miller *et al*., 2022).

Aloe elegans is a well-known and extremely successful diabetic treatment. Aloe's therapeutic qualities are well-established and highly prized in both conventional and alternative medicine, including its capacity to control blood sugar levels (Smith and Anderson, 2023).

Senegalia senegalensis comes in third place, suggesting that its medicinal qualities are also recognized in the treatment of diabetes. Due to this plant's well-known benefits in traditional medicine including its potential to aid in blood sugar regulation it is frequently utilized (Getachew Tadesse and Teshome Alemu, 2021b).

Eucalyptus globulus is not as popular as the other three plants, it is nonetheless important due to its therapeutic qualities, especially its antioxidant and anti-inflammatory actions, which can help control diabetes (Mekonnen Tesfay Kebede and Getachew Tesfaye, 2022b). Because of these plants' established therapeutic advantages, the respondents' dependence on them is reflected in the ranking. Recognizing these preferences promotes the conservation of these significant medicinal plants and aids in the documentation of invaluable ethnobotanical knowledge.

4.14 Fidalty level index some medicinal plants

Fidelity Level (FL) index provides insights into the importance of different medicinal plants based on the respondents' preferences for specific uses. *Aloe elegans* has the highest FL index at 80.0%, followed by *Senegalia etbacica* (71.4%), *Cucumis dipsaceus* (66.7%), Allium sativum (66.7)%. *Ruta chalepensis* (60.0%), and *Senegalia Seva/Delie* has the lowest FL index at 50.0% (Table 13).

Plant species	Primary use	IP	IU	FL	FL %
Aloe elegans	Diabetes	40	50	0.8	80.0
Cucumis dipsaceus	Stomach pain	30	45	0.67	66.7
Senegalia etbacica	Abdominal problem	25	35	0.71	71.4
Ruta chalepensis	Evil eye	15	25	0.6	60.0
Allium sativum	Evil spirit	20	30	0.67	66.7
Senegalia Seva/Delie	Snake venom	10	20	0.5	50.0

Source: filed survey, 2024

Table 13.Fidalty level index some medicinal plants

Aloe elegans has the highest FL index at 80.0%, indicating a strong preference among respondents for its use in treating diabetes. This high level of fidelity suggests that *Aloe elegans* is highly trusted and commonly used for managing diabetes, likely due to its known hypoglycemic properties (Smith and Anderson, 2023).

Senegalia etbacica follows with an FL index of 71.4% for treating abdominal problems. This indicates that a significant proportion of respondents specifically use this plant for digestive issues, highlighting its perceived effectiveness (Getachew Tadesse, and Teshome Alemu. 2022b).

Cucumis dipsaceus shows a consistent FL index of 66.7% for treating stomach pain, suggesting its strong and widespread use for gastrointestinal issues. The repeated mention of this plant for stomach pain underscores its importance in traditional medicine (Adane Bekele *et al*., 2022). *Allium sativum* also have an FL index of 66.7% for treating evil spirit indicating their significant roles in traditional healing practices (Miller *et al*., 2022).

Ruta chalepensis has an FL index of 60.0% for treating the evil eye, reflecting its use in addressing spiritual ailments. This indicates its recognized role in traditional spiritual healing (Teklay Mesfin and Abebe Belayneh, 2023).

Senegalia Seva/Delie has the lowest FL index at 50.0% for treating snake venom, suggesting a more specialized but less frequent use among respondents. This lower index might be due to the

specific nature of snake venom treatments compared to more common ailments like diabetes or stomach pain (Mekonnen Tesfay Kebede and Getachew Tesfaye, 2022b).

Therefore, the Fidelity Level index highlights the importance of specific medicinal plants in treating various ailments according to the preferences of the respondents in Tsegede Wereda. These findings underscore the value of documenting and preserving ethnobotanical knowledge to support the sustainable use and conservation of medicinal plants.

4.15. Source of knowledge for traditional healers

The knowledge sources for traditional healers in Tsegede Wereda, emphasize the community- and family-based aspects of the transmission of ethnobotanical knowledge. Traditional healers learned their skills from their mother or father (60,58 %), wife or husband (25.55%),sister or brother (10.95), Neighbor(0.73), Other (2.19%) Table 14.

Source of knowledge for traditional healers	Number	%
Father or mother	83	60.58
Wife or husband	35	25.55
Sister or brother	15	10.95
Neighbor	1	0.73
Other	3	2.19

Source: filed survey, 2024

Table 14. The sources for traditional knowledge

To understand how traditional medical practices are maintained and spread within the community, one must have a thorough understanding of these sources. (60.58) traditional healers learned their skills from their mother or father. This noteworthy proportion highlights how important parental guidance is in the dissemination of ethnobotanical knowledge. Parents are frequently the children's first teachers, teaching them customs and knowledge at a young age.

This approach preserves the integrity of customary practices and guarantees the transfer of information between generations (Hoffman and Gallaher, 2022). A strong family tradition is

indicated by the substantial dependence on parental knowledge transfer, which highlights the significance of familial ties in the preservation of cultural heritage.

Wife or husband is the second most common source of information (25.55%). This emphasizes how important married couples are to the dissemination and continuation of conventional medical knowledge. Marital partnerships frequently involve the sharing of cultural customs, such as the use of medicinal plants, which can expand and deepen each partner's knowledge base (Shackleton *et al*., 2023).

This dynamic emphasizes how cooperatively knowledge is shared in households.

Siblings or brothers account for 10.95% of knowledge sources. Additionally, sibling connections are essential to the spread of customs and traditions. The dissemination of ethno botanical knowledge within a family can be facilitated by siblings, as they frequently exchange experiences and knowledge (Martin *et al*., 2022). This suggests that a key channel for the preservation of conventional medical knowledge is peer-to-peer transfer, or horizontal transmission among siblings.

Merely 0.73% of the participants mention their neighbors as a reliable source of information. This low percentage indicates that, although it does happen, traditional medical knowledge in Tsegede Wereda is not primarily acquired through community-based knowledge transfer. The intimately personal and familial aspect of medicinal knowledge—which is frequently retained within close family circles to maintain its authenticity and value—may be reflected in the restricted role of neighbors (Turner and Turner, 2022). With 2.19% of the total, the "Other" group include a variety of less typical sources, like elders in the community, extended family, and formal training in traditional medicine. This category emphasizes the variety of information sources and implies that, although family is the main mode of transmission, traditional healers can also learn their talents through other channels (Berlin and Berlin, 2023).

Collectively, the findings show that traditional medical knowledge in Tsegede Wereda is mostly transmitted within families, especially from parents to children. The value of the family as the cornerstone of preserving culture and knowledge is emphasized by this manner of transmission. In order to ensure a strong and durable transmission of ethno botanical practices, the role of spouses and siblings contributes to the enrichment of the familial knowledge base. In order to

facilitate the conservation of this priceless knowledge, it is imperative to identify and fortify these networks within the family and community, possibly by means of programs that encourage generational education and the recording of customs.

4.16. Transferring knowledge of traditional medicinal plants

The dissemination of knowledge regarding traditional medicinal plants in Tsegede Wereda reveals that the oldest son receives traditional medicinal plant knowledge transfer the most (35.04%) followed by all children, eldest daughter, husband, brother and sister, wife (16.06%,14.60%,12.41%, 10.95%, 1.46%) respectively Table 15

To whom transferred	Frequency	Percent
Eldest son	48	35.04
All children	22	16.06
Eldest daughter	20	14.60
Wife	2	1.46
Husband	17	12.41
Brother or sister	15	10.95
Not all	10	7.30
All members of the family	2	1.46
To all freely	1	0.73
Total	137	100

Source: filed survey, 2024

Table 15. Transferring knowledge of traditional medicinal plants

The way that knowledge is dispersed among various recipients is influenced by social roles, cultural values, and the purposeful preservation of conventional medical procedures. The oldest son receives traditional medical knowledge the most frequently (35.04% of transfers). This strong inclination emphasizes how important it is in the culture for the oldest son to be the main keeper of family customs and information. The oldest son is frequently viewed as the future leader of the family in many traditional societies, carrying on the lineage and the wisdom that goes along with it (Smith and Johnson, 2022). This procedure guarantees that the information is kept inside the family and is respectfully and carefully passed down.

In 16.06% of the cases, all children gain knowledge collectively, suggesting an inclusive strategy where knowledge is shared among all offspring. This approach facilitates the preservation of the family's knowledge base and encourages the wider transmission of traditional traditions. Families can guarantee that traditional medical knowledge is preserved even in cases when some members choose not to practice it by providing education to all children (Martin *et al*., 2022).

The eldest daughter receives the most knowledge transfer (14.60%), indicating the significance of daughters in the maintenance and use of traditional medical practices. Daughters are often the ones who receive healthcare information within the family because they are often the oldest and/or the daughters in many cultures (Ghorbani and Islam, 2022).

12.41% of the knowledge transfers go to the husbands, indicating a partnership approach in some households where the couples share healthcare and traditional practice obligations. This can promote cooperation and mutual understanding by improving the use and continuation of medical information within the family (Shackleton *et al*., 2023).

Transfers to siblings account for 10.95% of the cases, suggesting that sibling connections are an important conduit for the spread of knowledge. This horizontal transmission can guarantee that customs are upheld among the many family branches and strengthen the collective body of knowledge within the family (Turner and Turner, 2022). Just 7.30% of respondents said that "not all" family members receive the knowledge that is imparted to them. This selective transfer may occur because of a family member's apparent ability, interest, or capacity to carry on the practice successfully.

In some families, information is shared with a spouse or all family members without distinction, indicating a relatively limited but inclusive approach. The categories wife and all family members both account for 1.46% of the total. In order to make sure that healthcare practices are available and followed in the home, sharing with the wife can be very important (Ong and Kim, 2023b). Last but not least, "to all freely," which represents 0.73%, denotes a community and open attitude to information sharing, which is uncommon but reflects a wider viewpoint on the distribution of conventional medical knowledge. The information emphasizes how crucial family structures are to the dissemination of Tsegede Wereda ethnobotanical knowledge.

The reliance on certain family members the oldest son in particular, as well as all the children highlights the calculated method used to maintain and transmit established medical practices. The preservation of ethnobotanical knowledge and its ongoing applicability in conventional medical procedures are guaranteed by this structured knowledge transfer.

4.17. Ranking of threats to medicinal plants in the study area

According to respondents in the study area ranking the threats for medicinal plant, Agriculture expansion ranked(1), Overgrazing(2), Drought (3) , Fire wood (4), Habitat destruction(5), Urbanization (6), Charcoal (7), Construction (8) Table 16.

Threats	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	Total	Rank
Agriculture expansion	8	7	8	8	7	8	7	8	8	8	7	8	92	1
Drought	6	6	6	5	6	6	6	5	6	6	5	6	69	3
Fire wood	5	5	5	6	5	5	5	5	5	5	5	5	61	4
Charcoal	4	4	4	4	4	4	4	4	4	4	4	4	48	7
Construction	3	3	3	3	3	3	3	3	3	3	3	3	36	8
Overgrazing	7	8	7	7	8	7	8	7	7	7	8	7	90	2
Habitat destruction	6	7	6	6	7	6	7	6	6	7	6	7	83	5
Urbanization	5	6	5	6	5	5	6	5	6	5	5	5	64	6

Source: filed survey, 2024

Table 16. Ranking of threats to medicinal plants in the study area

Natural habitat loss and fragmentation can result from the conversion of natural ecosystems into agricultural land, which is bad for the variety and quantity of medicinal plants. Given that it directly competes with natural vegetation for space, this concern is noteworthy (Mekonnen Tesfay Kebede *et al*., 2022).

Overgrazing is strongly related to drought. Livestock overgrazing can cause habitat destruction, plant cover loss, and soil degradation, all of which have an adverse effect on the sustainability and regeneration of medicinal plants (Smith and Anderson, 2022).

Drought (Total = 69, Rank = 3): This high rating suggests that respondents believe drought to be the factor that most seriously affects medicinal plant sustainability and availability. Water shortage brought on by drought conditions affects plant development and survival, which may

lead to the extinction of important medicinal species (Jones *et al*., 2023). Firewood (Rank = 4, Total = 61): The fact that firewood collection comes in fourth place suggests that it has a significant effect on medicinal plants.

Habitat destruction deforestation, land clearance, and infrastructure development are among the actions that result in the degradation of habitat. These actions may lead to the irreversible extinction of biodiversity and species of medicinal plants (Teklay Mesfin *et al*., 2023).

Urbanization The availability of medicinal plants and their habitats may decline as a result of the conversion of natural landscapes into urban infrastructure brought about by the growth of urban areas (Girmay Bekele and Mesfin Taye, 2022). Construction Out of all the risks listed, construction activities have the least influence, but in certain places where development takes place, construction might still result in the fragmentation of habitats and the extinction of plant species Debela Abebe, (2018). In order to maintain and safeguard these priceless resources, it is imperative that the risks to medicinal plants in Tsegede Wereda are ranked in order of severity.

4.18. Sustainable Use and Conservation of Medicinal Plants

The Tsegede Wereda survey results offer useful information on community attitudes and behaviors related to conservation initiatives. The frequency and percentage for educating the community about sustainable practices was (65 , 47.45), preserving natural habitats (40, 29.20), promoting sustainable harvesting techniques (32, 23.35) respectively,Table 17.

Conservation of Medicinal Plants	**Frequency**	**Percent**
educating the community about sustainable practices	65	47.45
preserving natural habitats	40	29.20
promoting sustainable harvesting techniques	32	23.35

Source: filed survey, 2024

Table 17. **Sustainable Use and Conservation of Medicinal Plants**

Preserving biodiversity and guaranteeing the availability of these priceless resources for future generations depend heavily on the sustainable use and conservation of medicinal plants.

With 65 responders, teaching the community about sustainable practices (47.45%), is the most frequently mentioned topic. It highlights the significance of promoting sustainable practices in the community. This research demonstrates how the community recognizes the importance of knowledge dissemination in conservation efforts. Community education can take many forms, including training courses, seminars, and the blending of ancient wisdom with contemporary conservation techniques. Research has indicated that community education plays a critical role in encouraging conservation and sustainable behaviors. For example, community-based educational initiatives greatly enhance conservation outcomes by equipping residents with the information and abilities necessary to manage their natural resources responsibly, according to (Zemede Asfaw,and Mulugeta Lemenih. 2022). Preserving Natural Habitats: According to 40 respondents (or 29.20%), protecting natural habitats is an important conservation strategy. This strategy is centered on preserving the natural environments that support the growth of medicinal plants. As three key threats to biodiversity, deforestation, urbanization, and agricultural development must be prevented in order to preserve habitat. According to research by (Kassahun Gebrehiwot *et al*. 2023), protecting habitat is crucial to preserving ecological balance and guaranteeing the survival of medicinal plants in their natural habitats. The sustainability of plants depends on supporting their natural regeneration, which is achieved through the preservation of their ecosystems.
Supporting Sustainable Harvesting Techniques: Of the respondents, 32 (23.35%) cited this as a crucial strategy for medicinal plant conservation. Sustainable harvesting makes ensuring that plants are taken without causing harm to their ecosystems or population levels. The effect on plant populations can be greatly decreased by employing strategies including seasonal harvesting guidelines, rotational harvesting, and the use of non-destructive plant parts. Sustainable harvesting methods are useful for preserving plant populations and guaranteeing the long-term availability of medicinal resources, as evidenced by a study conducted by (Getachew Tadesse *et al* , 2022). Furthermore, the data emphasizes the need for a multimodal strategy to ensure the long-term utilization and preservation of medicinal plants in Tsegede Wereda.

The strong emphasis placed on community education implies that local expertise and customs are essential to conservation initiatives. Teaching the public creates a sense of responsibility for the environment in addition to increasing awareness. It gives people the confidence to actively engage in conservation efforts and incorporate sustainable habits into their daily lives. Preserving natural habitats is a key component of global conservation policies, which emphasize ecosystem health as a prerequisite for biodiversity conservation. By preserving these habitats, we can guarantee that medicinal plants and other plants and animals will be able to flourish in their native environments. This strategy is especially crucial in places where environmental changes brought about by human activity are occurring quickly. To strike a balance between the usage and conservation of medicinal plants, sustainable harvesting methods are crucial. Communities can continue to benefit from these resources without jeopardizing their availability in the future by supporting practices that limit harm to plant populations. To ensure that harvesting continues to be sustainable as environmental conditions and plant populations change, this strategy necessitates ongoing monitoring and adaptation.

5. Conclusions and Recommendations

5.1. Conclusions

The respondents' demographic profile indicates that older persons are heavily involved in the practice and dissemination of traditional medical knowledge in Tsegede Wereda. The low participation rate of younger individuals suggests that younger people may become less interested in and involved in traditional medicinal practices, which could be dangerous for the survival of ethno botanical knowledge.

There is a wide variety of traditional medicinal plants in Tsegede Wereda, according to the survey, with the Fabaceae family having the highest representation at 14.93%. Because this family contains a large variety of bioactive chemicals, its significance is commensurate with global trends..

Tsegede Wereda's medicinal plant growth forms show a varied and comprehensive approach to traditional medicine.

Tsegede Wereda's habitat-specific distribution of medicinal plant species shows a balanced distribution of shrubs (29.85%), herbs (29.85%) and trees (37.78%),.

In Tsegede Wereda, the most often utilized plant parts are leaves (25.37%), roots (16.42%), and fruits (13.43%). This demonstrates the ingredients' availability and therapeutic value. Utilizing different components of the same plant or combining them suggests a complex traditional medicinal technique with the goal of optimizing therapeutic effects.

Medicinal herbs are utilized to treat evil eye cases in Tsegede Wereda, where informants strongly agree, as indicated by the Informant Consensus Factor (ICF) of 0.87. With 63 plants utilized and an extremely high ICF of 0.98. With high ICFs of 0.83and 0.87for stomach and abdominal discomfort, respectively, these conditions indicate strong informant agreement.

The majority of responders (77.46%) in Tsegede Wereda prefer using fresh medicinal plants because of their strength and instantaneous efficacy. 19.72% of respondents said they utilize dry

medicinal plants, which they value for their extended shelf life and capacity for preservation. A little percentage (2.82%) combines fresh and dry forms, suggesting a customized approach to particular treatments.

The estimated indices highlight the ecological and ethno botanical significance of Tsegede Wereda by demonstrating the vast diversity and relatively even distribution of medicinal plant species in the area. A rich and robust ecosystem is reflected in the high Shannon and Simpson indices, and a balanced distribution of species is shown by the evenness score.

The Tsegede Wereda preference ranking of medicinal plants for the treatment of evil eye ailments emphasizes the significance of *Tecomaria capensis*, *Allium sativum,* and *Securidaca longipedunculata* as essential elements in conventional spiritual healing techniques. Comprehending these inclinations facilitates the documentation of invaluable ethnobotanical expertise and bolsters the preservation of these crucial medicinal flora.

Aloe elegans and *Moringa oleifera* are important components of traditional medical practices, according to Tsegede Wereda's preference rating of medicinal plants for treating diabetes condition.*Cucumis dipsaceus* and *Aloe elegans* stand out in especially for having high levels of faithfulness, which suggests that they are reliable for treating stomach discomfort and diabetes, respectively.The two biggest concerns are overgrazing and drought, which call both quick action and long-term sustainable management techniques.

5.2. Recommendations

Based on the results the following recommendations are forwarded

Intergenerational Knowledge Sharing: Implement programs to facilitate the transfer of ethnobotanical knowledge from older to younger generations.

Document and Preserve Traditional Knowledge: Systematically document the ethnobotanical knowledge to preserve traditional practices and ensure this information is available for future generations.

Promote Sustainable Harvesting: Implement guidelines to prevent overharvesting, particularly for roots and bark, to maintain plant populations and ecological balance.

Encourage Holistic Use of Plants: Support the traditional practice of using multiple plant parts to maximize medicinal benefits, while ensuring sustainable use.

Raise Awareness: Conduct educational campaigns to inform the community about the importance of sustainable practices and the ecological impact of overharvesting.

Educational Campaigns: Develop initiatives to raise awareness and interest in traditional medicinal practices among the youth.

Integration of Practices: Promote the integration of traditional and modern medicinal practices to enhance the relevance and appeal of ethnobotanical knowledge to all age groups.

Promote Gender-Inclusive Research: Implement strategies to ensure balanced gender representation in ethnobotanical studies, such as targeted surveys and focus groups.

Highlight Female Contributions: Recognize and document the critical role of women in managing household health remedies and transmitting medicinal plant knowledge.

Address Cultural Dynamics: Investigate and address cultural and social factors that contribute to gender disparities in ethnobotanical practices and research participation.

Taxonomic Verification: Ensure accurate identification and classification of plant species to avoid redundancies and misclassifications in ethnobotanical surveys.

Conservation Efforts: Promote the conservation and sustainable use of medicinal plants to preserve the region's rich ethnobotanical heritage.

Educational Programs: Implement educational initiatives to raise awareness of the medicinal value of diverse plant families among local communities.

Research and Documentation: Encourage further research and comprehensive documentation of lesser-known medicinal plants to enhance the understanding of their pharmacological potentials.

Promote Sustainable Harvesting: Implement conservation efforts and sustainable harvesting practices to protect wild medicinal plant populations.

Encourage Home Gardening: Support the cultivation of medicinal plants in homegardens to ensure a steady supply and conserve rare or endangered species.

Enhance Formal Cultivation: Facilitate agricultural cultivation of medicinal plants to meet larger demands and reduce pressure on wild populations, providing necessary agricultural knowledge and resources.

Integrated Approach: Foster an integrated approach combining wild harvesting, home gardening, and formal cultivation to ensure the sustainability of medicinal plant resources.

Implement Sustainable Harvesting Practices: Develop and enforce sustainable harvesting guidelines to prevent overexploitation of high-value herb species and ensure long-term availability.

Further Research: Conduct further research on the medicinal properties and ecological roles of underrepresented families to fully understand and utilize the ethnobotanical potential of the region.

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Appendix.1.List of medicinal plants, Local name, growth habit, parts used disease treated **Condition Mode of preparation Rout of administration** in Tsegedie Wered /District

(Tree=T, Leaf=L, Bark=B, Root=R,Fruit/F Stem /st, Seed/ S Cultivate =Cal, Shrub =shu Wild= W

Scientific name	Family	Local name	Habitat	Growth habit	Part used	Diseases	Condition	Mode of preparation	Route of administration	Call no
Senegalia Seva /Delie	Fabaceae	Chea	W	T	R	Abdominal cramp Snake bite and scarpion bite	Fresh	The root pounded and chewing	oral	B1
hyramnthesaspera	Amarathaceae	Mechelo	W	Shu	L	Ant inflammation	Fresh	Fresh leaf crushed and mix with water and creamed	External	B2
Agavessaina	Agavaceae	Eka	W	Herb	Latex	Ear disease, diarrhea	Fresh	Squeezing and then drop Drink respectively	External and Oral	B3
Allium Sativum	Amarylli daceae	Tsada shugrti	H	Herb	R	Cough	Fresh	Chewing and then swallowed	Oral	B4
						Malaria	Fresh	Crushed, with Zingber officinal and boiled drink	Oral	
						Cold	Fresh	Bulb pound mix with honey	Oral	

Allium cepa	Alliaceae	Keyh shugrty	H	Herb	R	Asthma	Fresh	Allium cepa mix with Z.officinal boiled then drink	Dermal	B5
Aloe elegance	Alliaceae	Ere	W	Shu	Latex	Diabetes and antibiotic	Fresh	Fresh latex mixed with water and honey	Oral	B6
Amaranthus caudatus	Combrtaceae	Eshek mergem	W	T	R	Diffcalty delivery	Fresh	Pounding and homogenize with water then wash vagina	Externa l	B7
Angenissuleiocarpa	Combretaceae	Hanse	W	T	Bark	Abdominal pain and cramp	Fresh	Grindchewing and swallow liquidpart	Oral	B8
Acacia Oerfta	Fabaceae	Tenkelb	W	T	Bark	Eye disease	Fresh	Crushed, pounded add water that contain algae	Oral	B9
Brassica rapel	Brassicaceae	Hamliadri	H	Herb	L	Wound	Fresh	Crush and squeezing used as antibiotic	Dormal	B10
Bosiangustifoli	Capparaceae	Kermed	W	T	L	Evil sprit, evil eye, snake bite	Fresh	Tie the root, stem, bark	Externa l	B11
Balanites aegyptiacu	Balanitaceae	Mekie	W	T	L,F	Headach,abdominal pain, Blahari	Fresh	Crushed, and pounded, eat Making juce	Oral	B12

						zia				
Barleriaer anthemoides	Acanthaceae	Eshok Ziebie	W	Sh	L	Malaria	Fresh	Crushed, boiled, in water, take one drop in one day	Oral	B13
Brassica olearacea	Brassica olearaceae	Cawlo	H	herb	All parts	Gastritis, asthma	Fresh	Pounding, squeezing and boiled	Dermal	B14
Achyramnthesaspera	Amaranthaceae	Mechelo	W	shu	L	Swelling, and ant inflamention evil eye	Fresh	Leaf Crush with water and creamed	Dermal	B15
Capparis tomntasalam	Capparaceae	Andel	W	shu	R,B,S	Epilepsy, evil eye	Fresh	Crush, squeezing drink	Oral	B16
Carissaedulis	Apocynaceae	Agam	W	T	R	Epilepsy, evil eye	Fresh	Crush and squeezing	Dermal	B17
Cardiafrican al	Boraginaceae	Awhi	W	T	Bark, leaf Latex	Broken, magrain,gastrits Tonsilitis	Fresh	Pounded, zeylanical root		B18
Cortonmacrostachyus	Euphorbiacea	Tambuk	W	T	B, S	Rabis,antitermit, yellow fever,Ascariss,	Fresh	Crush, powdered mix with c.ceraritin and backed eaten	Oral	B19

						hepatitis or liver problem				
Cucurbita pepo	Cucurbitaceae	Duba	Cal	herb	S	Tape warm and other helminthes	Dry	Cook and Chewing the seed	Oral	B20
Cucumis dipsaceus	Cucurbitaceae	hafaflo	W	herb	R	Snake bite, stomach pain diarrhea	Fresh	Boiled and mixed with Eucalyptus wash the body	Dermal	B21
Cucurbita pepol	Cucurbitaceae	hamba hambo	W	shu	R,L	Evil eye, Dandruff, influenza	Fresh	Pounding, and squeezing	Dermal	B22
Citrusl emin	Rutaceae	Lomin	H	Shu	F	Athletes foot	Fresh	Squeezing fruit and creamed the affected part	Dermal	B23
Cicer arietnum	Fabaceae	ater	Cal	Herb	S	Ascarias And arthirit	Dry	Mix with root Kalaheo and pounded, crushed	dermal	B24
Datura stamonium	Solanaceae	Mezerba	W	Shu	L	Dandruff, rabies, teethach, kunkuno	Fresh	Crushed, boiled and creamed the affected part. For 7 days	dermal	B25

Dichrostachys cinerea	Fabaceae	Gonok	W	Shu	L	Impotency	Fresh	Crushed, mixed with butter stain hole parts of pains heat in fire	External	B26
Dodonalangustifolia	Fabaceae	Tahesess	W	Shu	L	Abdominal pain and anti helminthes	Fresh	Crushed mixed with water boiled decanted drink one cup stat	Oral	B27
Diospyros mespiliformis	Ebenaceae	Aye	W	T	F	Fungus, ring warm	Fresh	Pounding and squeezing	Dermal	B28
Eucalyptus globules	Myrtaceae	TSadakelamitos	H	T	B	Diabet	Fresh	Crushed,boiled ,in water drink one cup and	Orall	B29
						Cold	Fresh	Crushed,boiled ,in water and inhal	externa	
Expharbia nrucalte	Eugbabsecea	Kinchib	W	Shu	B	Yellow feber, impotency	Fresh		Oral	B30
Ficus sur	Moraceae	Saglla	W	T	F	Itching	Fresh	A ripened fruit fluid is mixed with butter and creamed.	dermal	B31
Psidium punctulata	Asteraceae	Alahit	W	Herb	L	Wound	Fresh	Crushed, mixed with water filter	Oral	B32

Gomphocarpus purpuase	Asclepiadacea	Tsebadumu	W	Sh	Latex	Hemorrhoid	Fresh	Smear the infected site by milk until recover	Dermal	B33
Hagenia abyssinica	Rosaceae	Habi	W	T	S	Tape warm	Dry	Crushed,pounded,mix with milk boiled and drink for sven day	Oral	B34
						Stomach ach	Dry	Crushed, squeezed mixed with swa or tella drink	Oral	
Lycopersion	Solanaceae	Kemidere	H	herb	F	Night blandness	Fresh	The seed is eaten	Oral	B35
Linum usitatissium	Brassicea e	Shinfa e	Cal	herb	F	Stomach pain, tonsillitis diarrhea, evil eye	dry	Crushed, squeezingwith a piece of cloths and the drink	Oral	B36
Linum usitatissimun	Linaceae	Entati	Cal	herb	S	Retained placenta	Dry	Seed mix with water and drink befor and after delivery	Oral	B37
						Gastritis	Dry	Pounder and mix with water drink during pain. Or stat	Oral	
						Constipation	Dry	Seed is immersed in water for one	Oral	

								day drink		
Myrtus communis	Myrtaceae	Adese	H	shu	L	Dandruff or antifungal	Fresh	Pounded mix with butter and creamed on affected parts.	Dermal	B38
Moringa	Stenopetela	Shiferaw	H	T	L	Diarrhea,diabetes,common cold	Fresh	Eating the leaf with food and with tea	Oral	B39
Ocimumbasicum	Lamiaceae	Seseg	H	shu	L	Asthma and hypertension	fresh	Crushed, boiled in water drink	Oral	B40
Otostegiaintegrifolia	Lamiaceae	Chendog	W	shu	B	Hypertension and tonsillitis	Fresh	Crushed with water filtered drink 2wks	Oral	B41
Ocimum Lamifolinm	Lamiaceae	Domakesi	H	shu	L	Fibril illness	Fresh	Squeezing added to tea and coffee	Oral	B42
Ximenia americaca	Olacaceae	Muluo	W	T	B	Wound or antibiotics for animals	Dry	Powdered and apply on affected part	Dermal	B43
Oleaeuropaea	Oleaceae	Awlie	W	T	R,L	Colic or acute abdominal pain	Fresh	Crushed, pounding and drink	Oral	B44
Plumbagozey	plubagozey	Aftuh	W	herb	R	Evil eye, snack venom	Fresh	Crushed, make to patients' to small	Dermal	B45

Podocarpus falcatus	Podcarpaceae	Zgba	W	T	L	Sudden sickness	Fresh	Squeezing and drink	Oral	B46
Phytolaccdecandra	Phytolacccea e	shbti	W	T	L	Difficulty in Urination,gastrites,rabis	Fresh	Root mix with milk and drink	Oral	B47
Carica papaya	Caricaceae	papaye	W	T	f	Eczema	Fresh	Creamed on affected part	Dermal	B48
Pisum stayum	Fabaceae	Ater	Cal	T	Ft	Boil or furuncle	Dry	Seed crushed place on wound	Dermal	B49
Ruta chalepensi	Rutaceae	Chena adam	H	herb	L	Evil sprit	Fresh	Crush and drink, tie on neck	Oral and dermal	B50
Ricinus communish	Euphorblacea e	Guli	W	T	L	Wound used as antibiotics	Fresh	Pound, squeezing place on wound	dermal	B51
Rumex abyssinicus	Polygonaceae	Moqmoqo	H	herb	R	TB,teeth infection, abdominal problem	Dry	Grind, mix with butter rub on affect parts and drink for one month	Dermal and oral	B52
Rumex Nervousus	Alegange	hohet	W	shu	L,R	Itching, evil sprit,	Dry, fresh	Roasted,fin,pounded mixed with honey and then eat	Oral	B53
Pheoni	Arec	Siye	H	T	L	Evil	Fresh	Pounded, mix	Oral	B54

xrecil natajuaq	acea e					eye		with water and drink		
Senna Singuceana	Faba ceae	Shitol hibey	H	herb	L	Insufficient burst milk supply abdominal pain	Fresh	Pounded, squeezing, mixed with honey add water drink for 5 day	dermal	B55
Securidaca Longipedunculata	Polygaceae	Shitara	W	T	R,b	Evil eye	Dry	Crushed, burning and inhale or smell	External	B56
Cucurbita pepol	cucurbitaceae	Hambahambo	W	shu	L,R	Teeth infection, stomach pain	Fresh	Grind, swallow the liquid	Oral	B57
Solanum mincanumh	Solanaceae	Engule	W	herb	R,B	Stomach pain	Fresh	Grind swallow stat	0ral	B58
Sidava taforssk	Malvaceae	Dekdaero	W	herb	L, R	Swelling	Fresh	Crush, and applay or tie on infected part	External	B59
Tamarindus indica	faba ceae	humer	W	T	F	Constipation	Fresh and dry	Drink a liter of juce stat	Oral	B60
Schinu smoll	Anaeardiacea e	Berbere tselim	W	T	L	Cough	Dry	Crushed, mixed with water	External	B61
Nicaderiaphysaloid	Solanacea	Kancha kelbi	H	shu	F	Wound	Fresh	Pounding, mix with water creamed	Dermal	B62

e								wound		
Vicia faba	faba ceae	Alqua y or balong a	Cal	herb	See d	Wound	Dry	Pounded	external	B63
Withania somnif eral	Sola nace ae	Agol	W	shu	R,L	Evil eye, evil sprit,paralize, swellin g	Fresh	Crush,squeezing,washing And mix with coffe and drink	Dermal and Oral	B64
Zingbl e afficin al	Zing ibera ceae	gingbl	H	herb	R	Stomac h pain,im potency ,cough	Dry	Pounding, squeezing	Oral	B65
Ziziph usspin a	Rha mna ceae	Geba	W	T	L	Dandru ff, stomac h pain	Fresh	Pounded, and mix with butter creamed Chewing and swallow	Dermal And oral	B66
Tecom aria capens is	bign onia eaec eae	Kentbi	W	T	R	Retain placent a snake bit evil eye	Fresh	Pound and mix with water	Oral	67

I am shishay Tesfay and this quetionnere is used to survey traditional medicial plants species used in tsegedie wereda from the society .The objective of the quetionnere is for graguate MSc student in AAU, there fore if you are voluntary help me to answer this quetionnere ,but not mandatory.

Semi structural interviews⁄ issues to be employed for data collection in the study area1.

1 .Name of the respondent_____

sex. _____age_____kebele
_____occupation_____

2. Education status of the respondents; read and write? (Yes or no). Underline, indicate level or grade completed_____

3, Locality: detailed description of locality (including sites in peasant association)_____

4, List the medicinal plants?

A, Local (common) name of medicinal plants_____

B, Habitat_____

C, Part of the plants used_____

D, preparation of the plant_____

E, Other parts or substance used mixed into preparation_____

F, Dosage or amount used_____

G, Rout of administration_____

H, Treatment duration_____

I,.Ant dote used_____J
J,Other use of the plants_____

5, what are the treats of medicinal plant_____

6, What are the species growing associated in the study area?_____

7, What are the conservation mechanisms within the community?_____

For filling out information on each plants

1, Botanical Scientific name (s)_____

2, Family name(s)_____

3, Growth form or habit; Tree/shrub/herb/liana/epiphyte/semi parasite/ parasitic/ aquatic (under line)

4, Brief description of the plant (height, flower color, mature fruit color, mature seed color, other special characters of thplants._____

5, Habitat: wild ,home garden cultivated_____

6, How plants obtained from surrounding area/home garden , cultivated_/market place_____

7, Plant used as medicinal: leaves/ fruit/seed/root/stem/ bark/stem bark or flower or whole plants (under line)_____

8, How plant parts used: cooked/fresh only/ dried only/ fresh and dried (underline). Other

9, Any noticeable adverse/side effects_____

10, Are medicinal plants marketable?_____

11, For what other purpose do you use medicinal plants? food/charcoal/house construction/ timber/ forage ,fire wood(under line)_____

12, Are there any treats to medicinal plants? List out the main treats, starting with most serious threats_____

13, How is the traditional knowledge medicine passed to the next generation?_____

14, Are there any economic important of medicinal plants for the community?_____

15, Wow the indigenous knowledge will be conserved?_____

APPENDAX 2. check list of semi - structural interview question for collecting Ethnobotanical data

I.ሓበሬታመጠሪ ቢኣብኣዋን ቃልመጠይቕመጠሪ ቢሰደቓ

1.ዕለት 2.ስምቦታ(ቀበሌ)-----

3. .ስምቃልመጠይቕዝካየደሉኣካል 4 .ዕድመ

5 .ፆታ 6.ሃይማኖት

7 .ደረጃትምህርቲ

II.ሓበሬታምስባህላዊመድሓኒ ትተክሊታትዝጥቀመሉተጠቕምቲ /

✓ ነዞምስዒቦምዝለወሕቶታት `X `ብምጥቃምኣቕምጡ

1 .ኣዝዩልዑል 2 .ልዑል3 .ሜኣከላይ 4 .ትሑት

ታ.ቁ	ሕቶታትመጽኦትት	መቀኒ			
		ኣዝዩልዑል	ልዑል	ሜኣከላይ	ትሑት
1	ክትሓመእንተለኩምተክሊታትብባህላዊመንገዲዶትጥቀሙ				
2	ክንደይዝኣክልመጠነተክሊታትንሐሕክምናብባህላዊመንገዲትጠቀሙ				
3	ኣብከባቢኩምበባህላዊመንገዲትጥቀምሉምተክሊታትብቁፅሪ				
4	ሓደንመድሓኒትዝከወንክንቆርፅእንተለናነቲዝተቆረፀተክሊክንደይዝኣክልንትከኦ				

5	ዕቀባ ተከሊታትን ምዕ ቃበእ ትጥቀምሉም ሜል ታት				
6	ብባህላ ዊመድሓኒ ትዝርክብ ብእቶት				
7	መጠን /በ ዝሒ/ባህላ ዊመድሓኒ ትኣ ብሕ/ሰብ				
8	ብኣ ጠቃቅሞ ባህላ ዊመድሑሓኒ ትዝተረከበ ሽግር				

II.ሓበሬታ ብዛዕባ ባህላ ዊመድሓኒ ትዝምልከት

1 .ኣየናይ ክፋል ተከሊእዩን መድሓኒ ትዝጠቅም

ሀ .ቆፅሊለ . ፍረሐ . ሱርመ.ዕንበባረ .ዘርኢሰ . ላዕለዋይሽፋን

2. መን በሪን መድሓኒ ትዝጠቅመተከሊታትእን ታይይሚል

ሀ .ኦምለ .ቆጥቋጥሐ .ሳዕሪመ.ኣ ሕምልቲጎ ደና

3 .ን መድሓኒ ትዝጠቅመተከሊታትኣ በይና ይይዓቢ

ሀ . ኣ ብገ ደና ለ .ኣ ብኣ ግራብሐ.ኣ ብበረካመ.ኣ ብዝራእቲ

4 .ሜል ኣ ጠቕቅማን መድሓኒ ትዝጠቅመተከሊታትእን ታይከ ምዘሚል “”ብምቅማጥመልሱ

ሀ . ብር ሕሱለ .ቆሊኳሐ .ኣ ድሪቅካመ.ጠሐን ካ

5 .ኣ ብእዋን ምጥቃምባህላ ዊመድሓኒ ትዝኮነ ሽግር ተፈጠሩ ይሩዶ ? እይነ በረን ?

ሀ .እወኣ ጋጠሞለ .ኣ ያ ጋጠመን

6 .ኣ ደላ ልዋመድሓኒ ትብሕመማክ ወሰ ድከሎ “” ኣ ቐምጡ

ሀ ደ ጋዊክ ፋልተከሊብምጥቓምለ .ወሽጣዊክ ፋልተከሊብምጥቓምሐ.ሱር .ወሽጣዊክ ፋልተከሊብምጥቓም

7 .ኣየናይ ወቅቲእዩ ፤ ተመራጺን መድሓኒ ትዝጠቕመተከሊታትእን ትንእክብ

ሀ .ኣ ብጠለእዋን ለ .ኣ ብድርቂእዋን ሐ .ኣ ብኩሉግዜ

8 .ን መድሓኒ ትዝጠቅመተከሊታትከሉም ኣ ብዕዳጋይር ከቡድዮም

ሀ .እወይር ከበእዮምለ . ኣየ ር ከቡን እዮም

❖ ከባቢያ ዊኣ ተሓሳስ ባ ዝፍትሹሕቶታት

ነ ዞ ምቀ ፂ ለማዝ ለ ወሕቶታትበ ቲ ዝስዕ ብመምር ሐሚልኡ

ቁ	ሕቶታት	መ መ ቀ ኒ				
		ብጣሚይ ስ ሜ ማ ዕ	ይስ ሜ ሜ	ሓደ ሓደ ግዜ ይስ ሜ ሜ	ኣ ይስ ማ ዕ ሜ ን	ብጣሚ ይስ ሜ ሜ ን
1	ን ሕከ ምና ዝጠቅመ ኮ ከ ሊ ታት ምቁራፅ ኣ ወን ታ ዊ ፅ ልዋኣ ብሐ/ሰ ብኣ ለ ዎ					
2	ኩሉ ምን መድሓኒ ትዝጠቅመ ኮ ከ ሊ ታት ኣ ብዕ ዳ ጋ ይር ከ ቡ እ ዮ ም					
3	ብር ሰ ትኣ ግራ ብ ምክ ልካ ልን ዕ ቀ ባ ሓመድን ምክ ያ ድና ይ ሕ/ሰ ብሓላ ፍነ ትን ምዕ ቃን ን መድሓኒ ትዝጠቅመ ኮ ከ ሊ ታ ት					
4	ን መድሃ ኒ ትዝጠቅመ ኮ ከ ሊ ታት አ ወን ታ ዊ ፅ ልዋ ጥራ ሕኣ ለ ዎ ም					
5	ኣ ብ ባ ህ ላ ዊ መድሓኒ ትዝነ ጥፉኣ ካ ላ ትኣ ታ ዊ ም ዝተ መ ጣ ካ የ ሽ እ ዩ ዶ ት ብሉ					
6	እ ቶ ም ዝ ለ ወ ኮ ከ ሊ ታት ብ ኩሉ መ ዳ ይ ዋ ግኡ ም ዝተ ዓ ቀ በ ይ ከ ወን					
7	ሕ/ሰ ብኣ ብ ም ብራ ስ ኣ ግራ ብ ነ ሕር ሻ ካ ብ ግዜ ና ብ ግዜ እ ና ወ ሰ ከ ይ ከ ይ ድኣ ሎ					
8	ዘ መ ና ዊ መድሓኒ ታት መ ጎ ረ ቶ ም ጣ ህ ላ ዊ ዶ ኢ ል ካ ት ግ ም ት					
9	ፃ እ ቂ ህ ዝ ቢ ፣ ስ ዲ ጋ ህ ፂ ፣ ኩ ና ት ፣ ማ/ ይ ም ጎ ት ፣ ሕ ፅ ረ ት ገ ን ዘ ብ ዝ መ ጎ ሰ ሉ ሳ እ ቤ ና ት ን ብር ሰ ትኣ ግራ ብ መ ጠ ገ ስ ቲ ድ ዮ ም					
10	ኣ ብ ዕ ቀ ባ ን መድሓኒ ትዝጠቅመ ኮ ከ ሊ ታት ዓ ብ ይ ግ ን ዛ ቤ					

	ኣለኣኢልኩምዶትኣ ምኹ					
11	ምዕ ቃብን መድሓኒ ትዝጠቅመተከሊታትምትካልዶኢልኩ ምትኣ ምኹ					

1 .ነ ዞ ምቀፂ ለማዝ ለወን መድሓኒ ትዝጠቅመተከሊታትዘ ርዝሩ

ሀ .ከባቢያ ዊመፀ ወዲእ ቲተከሊ_____

ለ .መን በሪእ ቲተከሊ_____

ሐ .ጠቕሚኺ ካልእ ቲተከሊ _____

መኣ ደላ ልዋን መድሓኒ ትዝጠቅምተከሊ_____

ረ ,ኣ ብእ ዋን ምድላ ወፃኺ ኡዝሕወሱን ጥረ ነ ገ ራት_____

ሰ .መጠን ዝተጠቕምና ሉ _____

ሸ ,ሜኺ ኣ ደላ ልዋእ ቲተከሊ_____

ቀ.ን መድሓኒ ትእ ን ጥቀመሉእ ዋን _____

በ.ካልኦ ትጠቕምቲተከሊታት_____

ተ.ቀን ዲሽግራትን መድሓኒ ትዝጠቅመተከሊታት_____

ቸ.ምኽ ን መድሓኒ ትዝጠቅመኻልኦ ትዝበቕሉተከሊታት_____

ነ .ቀን ዲሜኺ ዕ ቀባ ን መድሓኒ ትዝጠቅመተከሊታትኣ ብሕብረ ተሰ ብግለ ፀ_____

ኘ .ኣ ብከ ባ ቢና ዝ ር ከ ቡፍ ልጠት ከ መይ ገ ይ ር ና ን ዕ ቅ ቦ .....