ETHNOBOTANICAL STUDY OF PLANTS USED FOR MATERNAL AND CHILD HEALTH CARE BY THARU TRIBE OF DANG DISTRICT, WESTERN NEPAL

A THESIS SUBMITTED FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER'S DEGREE IN BOTANY

BY

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NOVEMBER, 2023

DECLARATION

I, "Sangita Chaudhary", hereby declare that the thesis work entitled "**Ethnobotanical study of plants used for Maternal and Child health care by Tharu tribe of Dang district, Western Nepal"** is entirely my own, except where states otherwise by reference or acknowledgement, and has not been published or submitted elsewhere, in whole, or in part, for the requirement for any other degree or professional qualification. Any literature, data or works done by others and cited within this thesis has been given due acknowledgement and listed in the reference section.

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RECOMMENDATION LETTER

This is to recommend that the Master's thesis entitled "**Ethnobotanical study of plants used for Maternal and Child health care by Tharu tribe of Dang district, Western Nepal"** is carried out by "Sangita Chaudhary" under my supervision. The entire work is based on original scientific investigations and has not been submitted for any other degree in any institutions. I therefore, recommend this thesis work to be accepted for the partial fulfillment of M.Sc. Degree in Botany.

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LETTER OF APPROVAL

This dissertation paper entitled "**Ethnobotanical study of plants used for Maternal and Child health care by Tharu tribe of Dang district, Western Nepal**" submitted at the Department of Botany, Amrit Campus by Sangita Chaudhary, has been accepted for the partial fulfillment of requirements for Master's degree in Botany.

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APPROVAL

The thesis work submitted by "Ms. Sangita Chaudhary" entitled "**Ethnobotanical study of plants used for Maternal and Child health care by Tharu tribe of Dang district, Western Nepal**" to the Department of Botany, Amrit Campus, Tribhuvan University has been accepted as partial fulfillment of the requirements for the final year of the Master's degree in Botany.

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Sangita Chaudhary

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LIST OF ABBREVIATIONS AND ACRONYMS

BP: Blood Pressure

CBS: Central Beaureu of Statistics

DDC: District Development Committee

DHM: Department of Hydrology and Meteorology

ENT: Ear Nose and Throat

FL: Fidelity Level

GoN: Government of Nepal

ICF: Informant Consensus Factor

KATH: National Herbarium and Plant Laboratories

MoFSC: Ministry of Forests and Soil Conservation

PRA: Participatory Rural Appraisal

SKI: Skin tissue cellular disorder

TBAs: Traditional Birth Attendants

UF: Use Frequency

WHO: World Health Organization

ABSTRACT

Nepal is very rich in culture and indigenous knowledge regarding traditional uses of plants. The motive of this research work was to document the medicinal plant species used to treat maternal and child health ailments in different villages of Shantinagar Rural Municipality, Dang District. Ethnobotanical data were collected by using Participatory Rural Appraisal (PRA) method which comprised the focus group discussion and interview of the traditional healers, local people and Guruwas. Altogether 40 informants were interviewed including 25 female and 15 male. The ethnobotanical knowledge were rich among elderly people (above 50). The enumeration of medicinal plant species was done with their scientific name, local name, family, life form, habitat and processing ways. Altogether, 129 medicinal plant species were recorded and fabaceae was the dominant family. The plant species were analysed on the basis of habit category, parts use category, mode of use category, disease use category, multiple uses, number of use report and the most frequently used species to treat different ailments. Of all the species, most of them were of wild occurrence, and herbs were the dominantly used life form. The widely used plant parts were roots and leaves to treat the maternal and child health ailments, respectively. The informant consensus factor (ICF) ranges from 0.40 to 0.74 with an average of 0.64 for maternal health ailments. Likewise, the ICF value ranges from 0.22 to 0.70 with an average of 0.56 in case of child health ailments. Species like *Oxalis corniculata, Amaranthus spinosus, Lagenaria siceraria, Ocimum tenuiflorum* have the highest fidelity level value (100% each) for the treatment of maternal health ailments. Similarly, *Ageratum haustonianum, Phaseolus lunatus, Syzygium cumini* and *Hordeum vulgare* have the highest FL value i.e. 100% each for the treatment of child health ailments. *Euphorbia hirta* and *Zingiber* sp. were the most frequently used species for the treatment of maternal health ailments with the values 0.2 and 0.1 respectively. Likewise, *S. cumini*, *Terminalia chebula* and *A. haustonianum* were the most frequently used species for the treatment of child health ailments with the values 0.30, 0.28 and 0.23 respectively. Present study documented valuable ethnobotanical information which can be useful to develop novel drugs in future.

Keywords: Indigenous Knowledge, Medicinal Plants, Traditional Healers, Traditional Uses

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CHAPTER 1: INTRODUCTION

1.1 Background

Ethnobotany is the study of the plants and their practical uses through the indigenous knowledge of local people and their culture. It can also be defined as a scientific investigation of inter-relationship between plants and people that depends on various approaches like botany, ecology, medicine, religion, culture, economics, anthropology, archeology, etc. (Sharma and Kumar, 2013). Local floras can be used for many important aspects of life (i.e. medicines, foods, intoxicants, and clothing) and ethnobotany plays an important role in documenting indigenous knowledge of nature. The main focus point of ethnobotanical knowledge is the cultivation and protection of those plant species for the development of new sources of plant products and agro-based industries for the upliftment of particular ethnic groups and their primary health care (Bhatta, 1999).

Traditional system of medicine is reported to be the mainstay of 60-85% of the population in developing countries (Sofowora, 1982). According to WHO, herbal and traditional medicines are still used by around 80% of the world's population (Yadav, 2008). Almost half of the medicinal compound in the world are derived from plants and globally 6000 medicinal plants are traditionally used as medicine (Frankel *et al*., 1995). It is predicted that 17% of urban residents have access to antidote and the rest of the population has to depend on traditional medicine systems for their primary health care (Uprety *et al*., 2010).

Medicinal plants play important roles in the Nepalese subsistence and the use of medicinal plants are continual in different Nepalese regions. Nepal is a country adored with the diversity in gene of flora and fauna because of complex topography and diverse climate conditions (Rajbanshi and Thapa, 2019). Nepal covers only 0.1% of the world's land area which harbours approximately 6973 species of flowering plants i.e. 3.2% of the world's flora (MoFSC, 2014a; Shrestha *et al.*, 2018). The number of plant species are more than 2500 which are used in the traditional medicine systems (Bhatt and Kunwar, 2020). About 1792 to 2331 plant species were reported as conceivable medicinal and aromatic plants (Rokaya *et al*., 2010).

Going back in the history, humans are considered to use various parts of the plants for food and medicinal purpose as well (Malla *et al*., 2015). They have been using plants for food,

clothing and medicine by their own systems of knowledge. Rigveda is presumed to be the earliest record of the medicinal use of plants which was written between 4500 BC and 600 BC revealing 67 plants. After Rigveda, Ayurveda was developed between 2500 BC and 500 BC in India identifying 1200 plants (Kunwar *et al*., 2006). Various techniques to use medicinal plants in Ayurveda are Ras (Juice of plant parts), Choorna (Powder form), Quath (Decoction of plant part), Awaleh (Plant parts boiled in milk and purified butter), Asav (Decoction of plant part with jaggery or honey kept in a pot for fermentation). The knowledge of using medicinal plants were achieved by Vaidyas and Kabirajs. Homeopathy, Aamchi and Folklore are other traditional health systems beside Ayurveda which used different plants containing large number of pharmacologically active ingredients (Kunwar *et al*., 2006; Malla *et al*., 2015).

From ancient times, Nepal possesses a great history in case of traditional health practices and home remedies. Home remedies focus in uplifting the health condition of people in traditional way. Although modern medical systems are accessible, some people still prefer to use traditional medicinal system for health care. Maternal and child health care is a major division of Ayurveda. Numerous time tested practices are designed that suit the health problems of the mother and child (Muss *et al*., 1992; Pushpangadan and George, 2010).

Nepal is a country with about 126 ethnic groups speaking 123 different languages and is a multi-ethnic, multi-lingual, and multi-religious country (Bista, 2004). Among all, Tharu people are considered as the main citizenry of the Terai region between Mahabharat ranges and Indian plains. Tharu people are one of the primitive society of Nepal and they mostly live around the forest and rivers since 18th century and marked as the "Sons of Forest" (Chaudhary *et al.*, 2020). Tharu people are considered as the main ethnic groups having specific culture, language, folklore, customs, rituals and lifestyles residing in Terai region over 20 different districts of Nepal. The best known people for using plants to treat various diseases in a traditional way are Guruwas and healers.

According to WHO, maternal health can be defined as the "health of women during pregnancy, childbirth and the postpartum period". The major problems during pregnancy are nausea, vomiting, weakness, tiredness, fever, urinary problems, genital bleeding, gas in the abdomen, edema, and toothache (Dubey and Shukla, 2000). Pregnant women are in need of care at different stages of pregnancy where antenatal care aims to provide healthcare by skilled professionals to women throughout their pregnancy, the prenatal care aims to provide easy

delivery and a physically fit child and postnatal care aims to recoup women's health after delivery. In many parts of the world, medicinal plants are used extensively for pre and postnatal care (Zumsteg and Weckerle, 2007). Medicinal plants play a vital role at the time of pregnancy, birth, and postpartum care in many remote areas of the world. Numerous plants have been documented used by various ethnic groups in women's health associated conditions like female fertility, menorrhea, birth control, pregnancy, birth (parturition), postpartum (puerperium) and lactation including infant care (Singh *et al*., 1984; Bourdy and Walter, 1992; Jain *et al*., 2004; Ticktin and Dalle, 2005; Zumsteg and Weckerle, 2007).

Likewise, infancy is the period in a human's life which is noticeable by the accelerated visible growth and development. Children are prone to various types of viral and communicable diseases because they possess low immune system. The reason for children suffering from immune system diseases are poverty, lack of awareness regarding cleanliness, essential nutrients in diet and carelessness. The common serious diseases in children globally include gastrointestinal, respiratory, urinary, kidney disorders, liver, ear nose throat disease (ENT), eye infection, and dental anomalies. Numerous children in developing countries die each year because of some prevailing ailments like malaria, measles, convulsion, mumps, mouth ulcer, chicken pox, kwashiorkor, small pox, cholera, pertussis (whooping cough), diarrhea, pneumonia. Neonates pass away due to delivery complications, cold, tetanus and infections. Evidences show that diarrhea and malnutrition have the contagious nature in the Indian subcontinent, Asia, Africa, and South America. Many plant species are used for the treatment of diseases like anaemia, malaria and diarrhea among children in various parts of the world. In many countries, it has been found that dehydration is caused due to acute gastroenteritis in various aged children and the main agents include Norovirus and Rotavirus. The most identified agent in infants and young children was norovirus (Biçer *et al*., 2012). The documentation shows that herbal medicine contribute an auspicious source of anti-diarrheal drugs and useful antimicrobial plant compounds (Gram *et al*., 2002). Respiratory diseases are the most common preventable cause of infant deaths (Jones, 1996).

Many ethnobotanical studies have been conducted in different parts of Nepal including the present study area regarding the treatment of various human ailments. The practice of using the medicinal plants are more common in the rural areas and mostly among the indigenous people of Nepal. There was not any previous record of the documentation of the traditional indigenous knowledge in the current study area. Hence, there is a need of documentation of all these

knowledge and processing ways of medicinal plants. So, the main aim of this research work was to document the medicinal plants used to treat the maternal and child health ailments (MCHAs) in the selected area of Dang district, Nepal. It provides an overall information on the scientific name of plants, habit and habitat, plant parts used and processing ways. The study can be an initiator for the further research work regarding medicinal plants used to treat maternal and child health ailments, their chemical analysis for checking the effectiveness and make aware people about their negative impacts if found on curing different ailments in a traditional way.

1.2 Justification of the study

Ethnobotany plays a crucial role in the study and documentation of indigenous knowledge regarding the use of plants. This study will help to protect the knowledge of important medicinal plants to treat MCHAs and aware the people about their importance and might take further steps for their cultivation and conservation. In addition, this may also contribute to uplift the particular ethnic groups. The reason for conducting the research work in the study area was that the documentary work related to ethnobotany were done in the same district previously but the specific documentation of ethnobotanical work related to maternal and child health care were not done yet. The place is densely populated by Tharu people and they belong to one of the indigenous community in Nepal.They reside mainly in rural parts of Nepal because of that they are more familiar to natural resources, have more knowledge about their proper utilization, their advantages and disadvantages as well. Due to modernization, change in living styles, passing away of older generation, lack of proper documentation and lack of interest of youngsters towards traditional medicinal practices, the important ethnobotanical knowledge are being lost. Hence, this study will not only help to document the useful plants but also advantageous to share and preserve the knowledges, beliefs and experiences of traditional healers. Likewise, there will be a positive impact among the people regarding their beliefs, knowledges and practice which may encourage them to conserve their traditional medicinal practices. This research work can be the basis for discovery of new medicines and their chemical study as well used for the treatment of MCHAs.

1.3 Research questions

1. What type of variations are found regarding ethnobotanical knowledge among different age group people to treat MCHAs?
2. How many medicinal plants are used for treating different MCHAs?
3. How the medicinal plants are processed for the treatment of MCHAs?
4. What type of MCHAs are treated by the use of medicinal plant species?

1.4 Objectives of the study

To address the answers related to the developed research questions, following research objectives have been formulated:

General objectives: To enumerate the medicinal plants used for the treatment of different MCHAs.

Specific objectives:

1. To document the variation of knowledge prevalent among various age groups regarding the medicinal plants to treat MCHAs.
2. To determine the ways of using medicinal plants to treat MCHAs with their processing techniques.
3. To identify different MCHAs under various categories treated by the use of medicinal plant species.

1.5 Limitations of the study

1. The study was conducted in a limited area of the village, so the documentary work may not include all the medicinal plant species.
2. People felt difficult to share their knowledge easily so, only some portion of their knowledge were recorded.
3. Limited time was provided by the local people and traditional healers so all the information may not be included.

CHAPTER 2: LITERATURE REVIEW

2.1 Ethnobotany

The part of science that studies the plant and its efficient traditional uses i.e. food, medicine, shelter is Ethnobotany. According to Harshberger (1986), Ethnobotany is the term defining plant and people relationships. It is also considered as an important area of research and development in research management, sustainable utilization, biodiversity conservation and socio-economic development. So, botanists, social scientists, anthropologists, and practitioners of traditional medicines from all around the world are involved in the study of human and plant interactions in the natural environment. The focus of ethnobotanical knowledge is on the plantation and protection of the plant species having medicinal value to develop plant products and agro-based industries for uplifting some ethnic groups and their elementary health care (Bhatta, 1999). Ethnobotany plays a considerable role in the study, documentation and use of the traditional knowledge that are linked with nature. The studies related to ethnobotany are very few in Nepal and activities related to such studies are still in developing stages (Manandhar, 2002). Still there are a number of plants having traditional importance waiting for their relevant documentation (Rijal, 2011). The studies related to ethnobotany provide an input to researcher for diagnosing the unknown medicinal property.

The knowledge related to ethnobotany are obtained through observation, experiences of old people, folklores, trial and error, and many other documents. In many ethnic communities, ethno-medicinal knowledge are normally passed verbally from one generation to other through family members (Nadembega *et al.*, 2011), and formal documentation of these knowledges are still lacking. Ethnobotanical study aims to conserve the disappearing indigenous knowledge and using these informations, help to establish a sustainable resource use program that will benefit the local communities too. Wild plant collections are still normal in many rural communities of the world for medicinal purpose, food, construction materials, fuel and others.

Dependence on wild plants to fulfill the basic needs of indigenous people and local communities in Nepal are also prevalent and they have their own art of knowledge regarding ethnobotany (Bhattarai and Ghimire, 2006; Ghimire and Bastakoti, 2009; Bhattarai *et al.*, 2010; Rokaya *et al.*, 2010; Uprety *et al.*, 2010). For conserving crucial ethnobotanical knowledge, it is necessary to make a communication between the indigenous people and local communities (Ambu *et al.*, 2020). The reason for the accelerated decline of the practice and dependence of ethnic people in folk medicines are the changing lifestyle, secrecy of traditional healers and

lack of interest of the youngsters so, there is a need for the documentation of such ethno-botanical indigenous knowledge (Longuefosse and Nossin, 1996; Behera and Mishra, 2005; Bussmann and Sharon, 2006; Saikia *et al*., 2006; Rajkumar and Shivanna, 2010; Rana *et al*., 2010; Kumar *et al*., 2012). Some of the medicinal plants used by the minor tribal commuinities are limited and not studied yet. The ethnomedicinal study provides a way for the discovery of natural and synthetic drugs (Fabricant and Farnsworth, 2001). Going back in the history, ethno-medicine lead to the origination of about 50% of the pharmaceutical drugs (Van Wyk *et al.*, 1997).

2.2 Ethnobotanical studies of medicinal plants conducted outside Nepal

Giday *et al*. (2003) conducted an ethno-botanical study among Zay people of Ethiopia and reported 33 plant species having medicinal value, among them 10 were reported scarce locally. Out of 33 medicinal plant species, 28 species were used against human ailments and 11 species were used against cattle and equine diseases.

Teklehaymanot and Giday (2007) conducted an ethno-botanical study of medicinal plants in Zegie Peninsula, Northwestern Europe and reported 67 medicinal plants to cure 52 ailments. The highest number of remedies were reported to treat gastrointestinal disorder and parasite infections (22.8%) followed by external injuries (22.1%).

Jeruto *et al.* (2008) identified 40 medicinal plants used by Nandi people in Kenya for the treatment or control of human ailments.

Ignacimuthu *et al.* (2008) documented 101 species of plants having medicinal value used by Paliyar tribals in Theni district of Tamil Nadu, India. The common ailments treated were skin diseases, wounds, rheumatism, headache, earache, menstrual disorders, etc.

Lulekal *et al.* (2008) documented 230 medicinal plant species from Mana Angetu District, southeastern Ethiopia and 78.7% plants were reportedly used to treat human diseases.

Shukla *et al.* (2010) conducted an ethno-botanical study in Rewa district, Madhya Pradesh, India. The number of medicinal plants reported were 166 which were used against different diseases such as cough, cold, dysentery, diarrhea, ulcers, diabetes, male and female weaknesses, snake-bite and skin disorders.

Musa *et al.* (2011) identified 53 plant species from the Blue Nile State, South-eastern Sudan to treat one or more ailments such as digestive system disorders, infections and respiratory disorders. The common method used to administer were decoction and oral intake.

Rajaei and Mohamadi (2012) recorded 92 plant species having medicinal value from Hezar Mountain in South East of Iran. The most common ailments treated by using the plant species were digestive disorders of the gastrointestinal tract (25.4%), renal and genital disorders (13%), respiratory tract system disorders (11.8%) and heart-blood circulatory system disorders (10.2%). The common method of preparation were decoction and infusion.

Abe and Ohtani (2013) described the therapeutic effects of 112 medicinal plant species used against 13 ailments from Batan Island, Phillipines. The highest Informant Consensus Factor (ICF) was 1.00 cited for diseases of the ear and respiratory system and for use during pregnancy, childbirth and the postnatal period.

Ahmad *et al*. (2014) reported a total of 50 plant species used as medicine from Chail Valley, Pakistan. The most frequently treated diseases were urinary disorders, skin infections, digestive disorders, asthma, jaundice, angina, chronic dysentery and diarrhea.

Hong *et al*. (2015) documented 368 medicinal plant species with their uses used by the Maonans in China. The number of human diseases treated were 95.

Hu *et al*. (2020) documented 456 medicinal plant species along with their local name, scientific name, family, habit, habitat, parts used, preparation method, and uses which were used by Mulam people in Guangxi, China. Three hundred twelve human diseases were treated by the medicinal plant species. The highest ICF value was found to be for gynecological problems (0.90) and digestive system diseases (0.89).

Emre *et al*. (2021) carried out an ethno-botanical study in Mersin province, Turkey and identified 93 plant taxa of medicinal usages. Most of the drugs were prepared by using the infusion method (27.6%).

Huang *et al*. (2022) conducted an ethno-botanical study of medicinal plants in Kinmen and reported 83 medicinal plants. The ailments treated were colds, sore throat and allergic rhinitis. These plants were also used to promote urination, blood circulation, removing toxicity and relieving pain.

2.3 Ethnobotanical studies of medicinal plants conducted in Nepal

Manandhar (1989) described 107 plant species with ethnobotanical importance among Chepang community of Makwanpur district.

Manandhar (1990) recorded 74 plant species used to treat about 24 ailments with their dose and mode of application of Chitwan district, Nepal.

Manandhar and Chaudhary (1992) stated 70 plant species used for medicinal purpose with their distribution, uses, mode of preparation and doses in Saptari district, Nepal.

Siwakoti and Verma (1996) studied the medicinal use of plants in the Terai region of Eastern Nepal and have reported 209 species used for different purposes from both wild and cultivated areas.

Dangol and Gurung (2000) considered 181 species of plants having medicinal value used in different forms for different purposes in Darai ethnic group of Chitwan district, and highlights the need of forthcoming programmes for investigating and conserving traditional knowledge.

Rajbhandari (2001) published a book of Ethnobotany including 562 species of wild flowering plants and ferns (538 species of angiosperm, 12 species of gymnosperm and 12 species of pteridophytes) being important in terms of ethnobotany from different parts of Nepal along with their local names and uses.

IUCN (2004) published a book of medicinal plants in which 187 plant species were listed with their full author citation, family, common names in 13 different languages and conservation status.

Kunwar *et al.* (2006) documented 170 plants having medicinal value among which 49 species were used to treat different diseases/disorders, 12 common plants were used to treat 9 common diseases/disorders by all ethnic/caste groups in Benimanipur VDC of Nawalparasi district.

Yadav (2008) conducted an ethno-botanical study in three VDCs of Rasuwa District using consensus methodology and reported 49 species out of which 45 species were in consensus list. This study categorized diseases into 11 usage categories and ICF (Informant Consensus Factor) for each usage category was calculated showing high ICF value for “Skin tissue cellular disorder (SKI)”.

Bhattarai *et al.* (2009) listed 94 plant species from Nawalparasi district and reported an expense of modern medical treatment having poor economic status and the main reasons for the

endurance of traditional healing system are continous faith in traditional medicines and traditional medical practitioners.

Rokaya *et al.* (2010) documented 161 species of plants indicating 73 human and 7 veterinary ailments to be treated in Humla district of Western Nepal.

Joshi (2011) reported 87 species of plants having ethnobotanical use from Macchegaun, Kathmandu district.

Singh and Hamal (2013) recorded 60 medicinal plant species helpful to treat skin diseases from Rupandehi district.

Kumar and Bharati (2014) listed 97 medicinal plant species used to treat 49 ailments of human. Fic values were calculated and the values were high in favour of injuries, respiratory ailments, circulatory, digestive ailments, colds and fever.

Shrestha *et al.* (2016) have listed 48 species of plants from Eastern Nepal to treat 37 human ailments of which 10 species were not documented earlier. The ICF value ranges from 0.38 to 1 which indicated high consensus among the informants on the use of plants for medicinal purpose.

Bhattarai and Khadka (2016) documented 102 medicinal plants used to treat 56 human ailments from Illam district, Eastern Nepal.

2.4 Ethnobotanical studies of Tharu community

Manandhar (1985) recorded 79 traditional medicinal plants used by Tharus of Dang-Deokhuri district, Nepal.

Dangol and Gurung (1991) have conducted their study in Chitwan district, Nepal regarding Ethnobotany of the Tharu tribe. They have found total 71 plant species to be of medicinal use to the Tharus. The plants were used to treat a range of diseases including headache, diarrhoea and problems associated with menstruation and pregnancy.

An ethno-botanical study was carried out among the Tharus of Chitwan district by Muller and Boker (1993). They mentioned 61 plant species used for food (the tubers, leaves and fruit), construction and culture material. Likewise, they reported 62 medicinal plants used to cure different diseases/disorders.

Gachhadar (2007) have reported 136 medicinal plants to cure various human diseases like skin diseases, stomach trouble, gastric, fever, cough and cold, headache, etc. used by Tharu Community in Eastern Nepal.

Acharya and Acharya (2009) have studied about the ethno-medicinal plants used by Tharu Community in Parroha VDC, Rupandehi district, Nepal. They have documented altogether 45 different plant species. These plants are used to treat different ailments ranging from gastro-intestinal to headache and fever, respiratory tract related problems to dermatological problems, snake bite to ophthalmic and cuts and wounds.

Bhattarai *et al*. (2009) have documented 94 plant species to cure different diseases diarrhoea, dysentery and constipation in children between one to five years. Some of the plant species are reported to be used as a tonic in lactating a postpartum mother for two weeks. Plant species like *Mallotus philippensis* are reported to be used for backbone pain or menstrual problems and disorders (pain and irregular flow of blood during the menstrual period) until recovery.

Thatte *et al*. (2009) studied about the knowledge, attitudes, and practices about maternal and newborn health. Researcher found out that (Traditional Birth Attendants) TBAs continue to play an important role in home deliveries in Nepal, also the role of TBAs in managing maternal complications remain uncertain. This research provided unique details about traditional practices of TBAs in rural Nepal.

Singh and Hamal (2013) studied about the medicinal plants used by Tharu and Magar Communities of Western Nepal, against dermatological disorders. They have documented 60 plant species to cure different skin diseases such as cuts and wounds, eczema, boils, abscesses, scabies, dog and insect bite, ringworm, leprosy, burns, blisters, allergy, itching, pimples, leucoderma, prickly heat, warts, septic ulcers, and other skin diseases.

Chaudhary *et al*. (2020) have studied about the ethnic plants of Tharu Community of Eastern Nepal. They have reported 37 plant species, among them 25 were recorded as medicinal plant, used to treat pneumonia, menstrual disorder, stone, piles, skin disease, etc. Other plant species were used for food, fodder, timber, fiber and ceremonial/ religious activities.

Thapa (2020) recorded 74 plant species after conducting an ethno-medicinal research in Tharu Ethnic Community in Rupandehi and Nawalparasi district. It has been reported that 40 types of ailments have been treated. Some of them include gastrointestinal disorders, dermatological troubles, respiratory troubles, gynecological and andrological problems.

2.5 Ethnobotanical studies related to maternal health care

In many rural areas of the world, medicinal plants play a major role during pregnancy, birth and postpartum period. According to Zumsteg and Weckerle (2007), medicinal plants are preferred to be used more for pre and postnatal care.

Studies done by (Singh *et al.,* 1984; Browner, 1985; Bourdy and Walter, 1992; Varga and Veale, 1997; Ticktin and Dalle, 2005; Lamxay *et al.,* 2011; Attah *et al.,* 2012; Nordeng *et al.,* 2013; Borokini *et al.,* 2013; Abdillahi and Van Staden, 2013) showed that a number of medicinal plants were used to treat obstetric and gynecological conditions like birth control, problems related with infertility as well as to treat difficulties during pregnancy and child birth.

Though plants have played a major role in midwifery among many ethnic communities, very few in-depth studies are done on the medicinal plants used by midwives traditionally (Browner, 1985; Bourdy and Walter, 1992; Ososki *et al.,* 2002).

Singh *et al.* (1984), Bourdy and Walter (1992), Jain *et al.* (2004), Ticktin and Dalle (2005), and Zumsteg and Weckerle (2007) documented number of plants in various ethnic groups used for women's health associated conditions like female fertility, birth control, menorrhea, pregnancy, birth (parturition), postpartum (puerperium) and lactation, together with infant care.

It can scare the health of mother and child by the traditional practices applied to women during pregnancy, delivery and postpartum period. As fertility of women and child birth are given importance, at the same time labour pain and postpartum period are bound to numerous traditional beliefs and religious practices. It shows that traditional medicinal practices are still used to cure maternal and infant health in many developed and developing countries (Martinez, 2008; Ozsoy and Katabi, 2008; Geckil *et al.,* 2009; Isik *et al.,* 2010; Holst *et al.,* 2011; Kaingu *et al.,* 2011).

In a rural Kenyan community, Kaingu *et al.* (2011) document herbal treatment together with Traditonal birth attendants (TBAs) to treat pre, intra and post-partum difficulties. Two hundred TBAs and 20 clients were interviewed, 10 pregnancy related complications and recorded symptoms were unsafe abortion, labour difficulties, post-partum haemorrhage and retained placenta after birth. Fifty five plant species were identified for the management of complications, most of them belonging to Euphorbiaceae family. National and international studies show that the traditional practices are prevalent in many rural areas and are adopted before contraception and continued upto the postpartum period.

2.6 Ethnobotanical studies related to child health care

In sub Saharan African countries, maternal and child morbidity and mortality is highest due to shortage of modernized hospitals, improper use of medicinal plants by women (Maliwichi-Nyirenda and Maliwichi, 2010).

It has been found that in a recent study, school children of age 13-16 years actively get involved in health care activities of their own and their families too, curing themselves and the siblings younger than them (Geissler, 1998; Geissler *et al*., 2000; Prince *et al*., 2001; Prince and Geissler, 2001).

Huge pervasiveness of malnutrition, anaemia and infectious diseases has been found in the recent studies among the school children in one of the village of Kenya, Bondo district, Ugingo (Friis *et al.*, 1998; Geissler *et al.*, 1998 a, b).

Infectious nature of diarrhea and malnutrition in children were found as evidence from the research in Indian subcontinent, Asia, Africa, and South America. For example: In rural areas of Bangladesh, the occurrence of illness caused due to diarrhea under the age of 5 years was almost 12.8 days per 100 child-days, indicating each child to spent 46 days per year with diarrhea (Black *et al*., 1982).

According to WHO (World Health Organization), one children among four suffers from undernutrition globally and 63% of all children deaths are the result of that infectious disease (De *et al.*, 2004).

Literature review shows that, the leaves of *Heliotropium indicum* Linn. by the process decoction in Sierra Leone are used to wash new-born babies. The leaf powder is applied to dermatitis and suppurating eczema and impetigo in children of Senegal (Kerharo and Adams, 1974).

Documentation of medicinal herbs show the evidence of drugs which are helpful to treat diarrhea and contain valuable antimicrobial compounds (Gram *et al.*, 2002).

Shaheen *et al.* (2017) have studied about the medicinal plants for Children Diseases in Bannu District, Khyber Pakhtoonkhwa. They have reported a total of 55 species of flowering plants used as ethnomedicines. Most of the species were used to cure gastrointestinal diseases. Other various ailments include respiratory disorders, ear nose throat (ENT), liver disorders, eye infection, kidney problems, dental problem, etc.

CHAPTER 3: MATERIALS AND METHODS

3.1 Study Area

3.1.1 Dang District

Dang is a district in Nepal categorized to tropical region having an altitudinal range below 1000m. Deukhuri Valley is the capital of Lumbini Province situated in Dang district which is also the second largest valley of Asia continent. The headquarter of the district is Ghorahi which is the seventh largest city and the largest sub-metropolitan city of Nepal. The second largest city of Dang is Tulsipur sub-metropolitan city, also the major center for transportation. Dang and Deokhuri are the two large dun valleys of the district located in between 27°37' N to 28°21' N latitudes and 82°02'E to 82°54' longitudes. The total area of the district is 2955km^2 and the altitude ranges from 213m to 2058m above mean sea level (Sharma and Gautam, 1999). The total population of the district is 674,993 (2021 Census).

3.1.2 Site description

The study was carried out in Shantinagar rural municipality of Dang district. The geographical area of the rural municipality is 116.02 sq.km and the population is 27,641 according to 2021 census. There are 7 wards in the rural municipality out of which two wards were selected for the study purpose i.e. 6 and 7. The villages of ward 6 includes Chilariya, Danda Tilwari, Korbaang, Parhipur and Sundavari and that of ward 7 are Dhanaura, Gaira Tilwari and Ghusari. The study area lies between 28°06'31.26''N to 28°08'11.52''N latitude and 82°07'50.86''E to 82°09'33.12''E longitude having an altitudinal range from 533m to 582m above sea level. The map of the study area is presented in Figure 1.

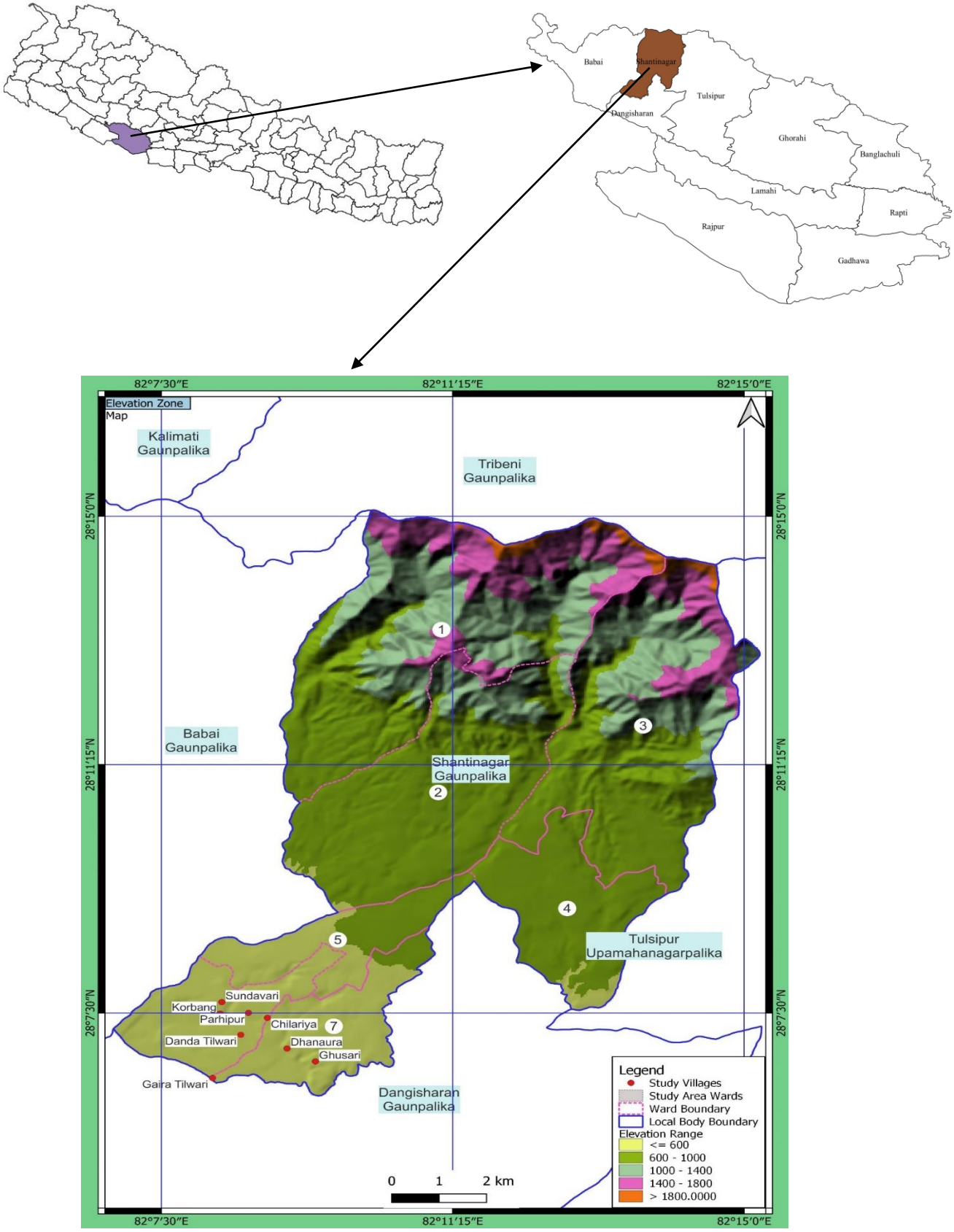
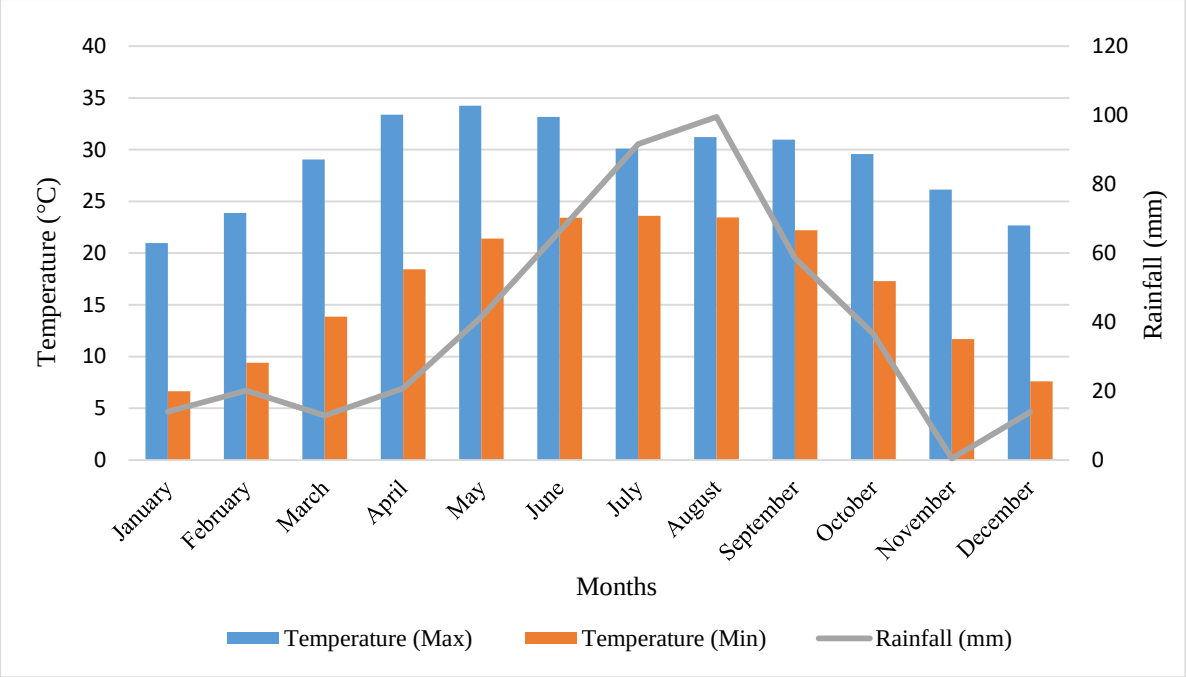


Figure 1: Map of the study area

3.1.3 Climate

The climate differs from place to place due to various factors such as latitude, altitude, land and water distribution, wind direction, mountain barriers, etc. Subtropical monsoon type of climate is found in the study area with four different seasons: summer, monsoon, winter and spring. Due to absence of meteorological station in the study area, the climatological data of the headquarter was taken for the study purpose. The study area is located at the western part of the headquarter. The warmest month (with the highest average high temperature) is May (34.25°C). The month with the lowest average high temperature is January (20.98°C). The month with the highest average low temperature is August (23.44°C). The coldest month (with the lowest average low temperature) is January (6.63°C). The highest average rainfall is in August upto 99.55 mm and the lowest is in November i.e. 0.405 mm and the average total rainfall per year is 476.02 mm (Figure 2). The climate is warm and temperate. In winter, there is much less rainfall than in summer.



Source- DHM (2012-2022)

Figure 2: Ten years average climatological record of Ghorahi (District Headquarter)

3.1.4 Vegetation

The study area is rich in vegetation and the vegetation type is tropical which ranges below 1000m. Sal (*Shorea robusta* Gaertn.) forest is the main vegetation type found here with other mixed species like *Aegle marmelos* (L.) Corrêa, *Syzygium cumini* (L.) Skeels, *Mangifera ind4ica* L., *Phyllanthus emblica* L., *Terminalia chebula* Retz., *Terminalia bellirica* (Gaertn.) Roxb., *Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb., *Pinus roxburghii* Sarg., etc. Shrubs like *Woodfordia fruticosa* (L.) Kurz, *Solanum anguivi* Lam., *Calotropis gigantea* (L.) W. T. Aiton, *Justicia adhatoda* L., etc. are found. *Artemisia indica* Willd., *Mimosa pudica* L., *Achyranthes aspera* L., *Centella asiatica* (L.) Urb., etc. are common herb of the research area. The climbers like *Cuscuta reflexa* Roxb., *Bauhinia vahlii* Wight & Arn., etc. are common in the study area. The crops like Paddy (*Oryza sativa* L.), Wheat (*Triticum aestivum* L.), Maize (*Zea mays* L.), Potato (*Solanum tuberosum* L.), Mustard (*Brassica rapa* L.), Peas (*Pisum sativum* L.), Soyabean (*Glycine max* L. Merr.), etc. are commonly cultivated.

3.1.5 Ethnicity

The major ethnic community in the study area are Tharus mixed with other communities like Brahmin, Chhetri, Magar, Kami, Damai, Sarki, Gaine, etc. Tharus comprise of about 40% of the total population (DDC, 1999). Tharu people prefer to live in a cluster with their closed ones or relatives. They generally build their houses in close vicinity. Tharu people generally earn their livelihood by involving in agriculture.

3.1.6 Way of earning livelihood by the local people

Local people earn their livelihood by involving in agriculture i.e. rearing animals and production of crops. Maximum number of people depend upon agricultural work for the fulfillment of their basic needs and income source. Tharu people are very hardworking and spent most of their time in farm lands. With the development of technologies, ancient way of ploughing fields by using oxen are replaced by tractors. The change in the way of doing farming have made their life easier and helpful in saving their time.

3.2 Methods

3.2.1 Data collection and Enumeration

The purposive and snowball sampling method was used as sampling method in the study. The data were collected by using Participatory Rural Appraisal (PRA) technique. The given information were noted down by having oral and visual communication. PRA comprised the interview of the traditional healers, local people and Guruwas. By using free listing method, medicinal plants used by Tharu tribe were listed with local name. The medicinal plants used by ethnic communities were recorded by direct interview with respondents randomly selected in particular sample area.

3.2.2 Field visit and interviews

The selected areas were visited to collect the data. The field was visited twice for data collection and thrice for plant collection. The collection was done in different time intervals between 2021 and 2022. The semi-structured questionnaires were used to get information on medicinal plants with their local names, habit, habitat, parts used and mode of preparation. The informants selected were of different age groups. The informants were selected based on their knowledge of medicinal plants either for self-medication or for treating others. The informants were asked and requested to come to field and show the plants with local name, the species mentioned by the informants were taxonomically identified. The interviews and discussions were conducted in Nepali as well as Tharu language.

3.2.3 Household survey

The survey was done on a random basis on two wards of the rural municipality. Altogether, the survey was conducted in 40 different households to obtain the ethnobotanical information like local name of medicinal plants, their habit, habitat, and mode of use. The main motive for doing this survey was to collect the maximum knowledge related to ethnobotany.

3.2.4 Focus group discussions

Focus group discussions were conducted among the elderly people, traditional healers, knowledgeable and experienced people as well to gain an in-depth knowledge related to research work and for cross-checking the validity of the given information as well (Martin, 1995).

3.2.5 Key informant interview

Key informant interviewee includes traditional healers, they are Guruwas and Sudenis. Altogether 7 key informants were interviewed and were selected because they had very rich knowledge and experience. They belong to the age groups above 50. The questions regarding the research work such as about the medicinal plants, their local names, used parts, purpose and preparation techniques were asked. The mentioned plant species available in the nearby surrounding were collected. The collected plant species were shown to other local people to confirm their identity and uses (Martin, 1995).

3.3 Plant collection, identification and herbarium preparation

The listed medicinal plants were collected from the forest namely Aamkholi Samudayek Ban as well as surrounding areas. The restricted plant species were not collected, instead the details of their habitat, structure and their forms were noted in a note book and photographs were taken as well. The medicinal plants were collected having flowers and fruits (if present) along with the roots for the preparation of herbarium. Mud and excess water of the plant were removed, excess leaves and branches were trimmed out. The plants were then pressed carefully between newspapers. They were allowed for natural dry with daily change of newspapers until they were dried completely. The dry and well pressed specimens were mounted on herbarium sheets of standard size by following standard technique (Lawrence, 1967). The collected plant specimens were identified with the help of available floras (Flora of Nepal; Flora of China and Flora of Bhutan), books, potential literatures (Hara *et al*., 1978; Hara and Williams 1979; Hara *et al*., 1982; Polunin and Stainton, 1984; Stainton, 1988; Press *et al*., 2000; Rajbhandari and

Rai, 2017; Shrestha *et al*., 2018). The collected specimens were compared with the voucher specimen at National Herbarium (KATH), Godawari as well for identification. The name of identified plants were assigned according to Catalogue of life, World Flora Online and submitted in KATH and Department of Botany, Amrit Campus, Tribhuvan University Nepal for future references.

3.4 Mode of preparation of medicinal plants

The medicinal plants were used in different ways by different people. Some of the common ways of using medicinal plants are as follows:

1. Juice: Prepared by crushing or squeezing the plant part.
2. Paste: Prepared by grinding the plant part with water.
3. Powder: Product prepared by drying the plant part and grinding it.
4. Raw: Fresh plant parts are taken as medication.
5. Decoction: The liquid is prepared by boiling the useful plant parts with water.
6. Infusion: Drinkable liquid prepared by soaking the plant parts in water for one or several nights.
7. Cooking: Local medicine prepared by cooking plant parts with oil and other needed ingredients.
8. Milky latex: An extract prepared by collecting the latex that are beneficial by chopping or cutting plant part.
9. Smoke: A form of medication where smoke is taken by burning the specific plant part.
10. Oil: An extract produced from plant by applying excessive pressure to the seeds of plant like mustard seeds.
11. Resin: An extract collected by giving a cut to the plant.
12. Ash: Some of the specific part of the plant are burned to get the residues which are used as it is or by mixing with oil.
13. Heat: The plant parts are applied by giving slight heat to them.

3.5 Secondary data source

The additional data needed for the research work were collected from the published articles and books, Department of Hydrology and Meteorology, Ward office, Tribhuvan University Central Library and National Herbarium and Plant Laboratories (KATH), etc.

3.6 Data analysis

The ethnobotanical data were analyzed using Microsoft Office Excel spreadsheet (2013). The species were listed in alphabetical order by Local name, Label name, Family, Purpose, Habit, Habitat, Parts used and Processing ways. The data collected from informants were analyzed using different quantitative indices like Informant consensus factor (ICF), Fidelity Level (FL) and Use Frequency (UF).

3.6.1 Informant consensus factor (ICF)

Informant consensus Factor (ICF) was calculated to check the homogeneity of informant's knowledge (Trotter and Logan, 1986; Heinrich *et al*., 1998). Its value lies between 0 - 1. High ICF values indicate that any one plant species or small number of plant species are reported to be used by more number of informants for particular use and it is opposite in case of low ICF. Hence, high ICF value help to find out the most preferred species among the informants. The formula to calculate ICF is as follows:

$$ICF: N_{ur} - N_t / (N_{ur} - 1)$$

where, N_{ur} = Number of informants using specific plant species for specific ailment category

N_t = Total number of plant species used by all the informants for the treatment of particular ailment

3.6.2 Fidelity Level (FL)

By the calculation of Fidelity Level, the most preferred species was determined (Alexiades, 1996; Friedman *et al*., 1986). It clarifies the percentage of informants who claims the use of a

particular plant species for the treatment of a particular ailment. It was calculated by using the following formula:

$$FL\ (\%): (N_p / N) \times 100$$

Where, N_p= Number of informants that prefer the use of particular plant species to treat particular disease

N = Number of informants who use that plant species as a medicine to treat any disease

3.6.3 Use Frequency (UF)

It was calculated in order to determine the frequency of the useful species. Its value is high when many informants cite a specific plant species. The following formula was used to calculate Use Frequency (UF) which was also used by Tardio and Santayana (2008):

$$UF = U/n$$

Where, U= Number of informants who prefer a particular species

n= Total number of informants interviewed in the survey

CHAPTER 4: RESULTS

4.1 Variation of ethnobotanical knowledge among the informants

From this study, a total of 129 medicinal plant species were recorded by the informants interviewed by applying purposive and snowball sampling method. Altogether, 40 informants were interviewed of which 25 were female and 15 were male and the ethnobotanical information were provided more by females in comparision to males (Figure 4). People of different age groups have been categorized into three different classes i.e. below 25, 25-50 and above 50. The female respondents were of all three age groups whereas the male respondents below 25 did not participate at all. The female repondents below 25 were very few i.e. only two. However, the female respondents participated more than male between the age groups 25-50 (female: 10; male: 1). The maximum number of respondents were of age groups above 50 and almost equal number of male and female respondents showed their active participation (female: 13; male: 14) (Figure 3).

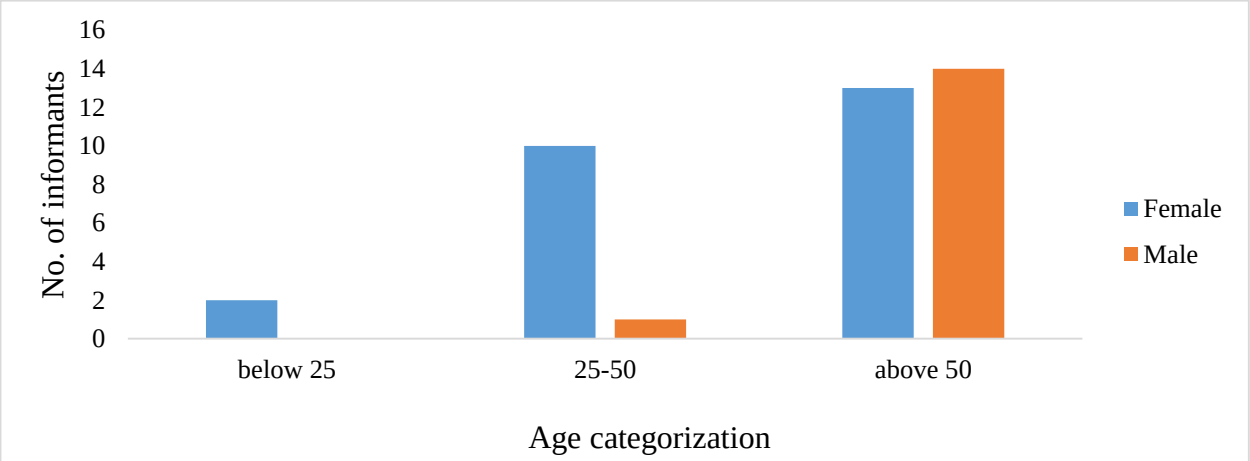


Figure 3: No. of informants on the basis of age categorization

The medicinal plants were reported by each groups of female whereas the male respondents of age 50 to 80 reported the medicinal plants. The data shows that the ethnobotanical information provided by the age groups below 25 female were very few i.e. 26 species. The female respondents provided more information regarding plant species between the age groups 25-50 (female: 83 species; male: 5 species). The ethnobotanical information were rich among the elderly people (above 50). Altogether 292 species were recorded from this age groups and the male respondents have provided more knowledge comparing to female repondents (female: 118; male: 174) (Figure 4).

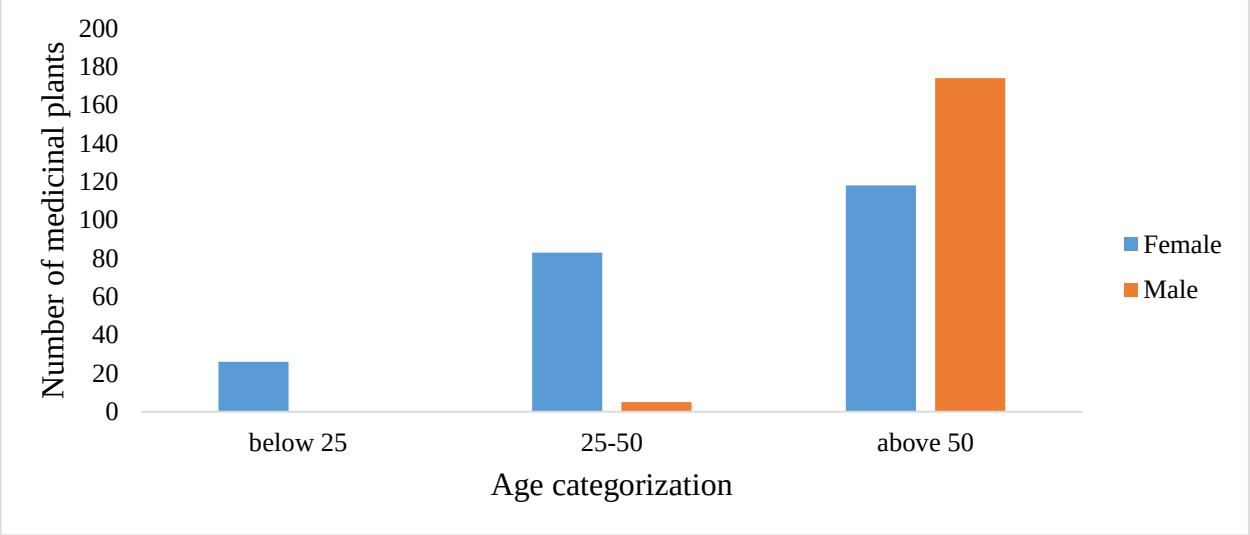


Figure 4: Number of plants reported on the basis of age

4.2 Medicinal plants used to treat MCHAs

The Tharu people in the study area were found to be rich in ethnobotanical knowledge. From the study, it was found that the use of medicinal plants have been reduced as the modern medicines are easily available these days. By interviewing the youngsters as well, it was clear that they had fewer knowledge in comparison to the elderly people. From the study, it had been found that the total number of plant species used for the treatment of maternal and child health ailments were 129 belonging to 113 genera and 60 families. The dominant family among all was Fabaceae (13 species) followed by Zingiberaceae, Poaceae, Lamiaceae, Asteraceae and Amaranthaceae (6 species each). Some of the families with few plant species were Amaryllidaceae (2 species) and Convolvulaceae (1 species) (Table 1).

Table 1: Enumeration of the plants

S.N.	Plant Species	Family	Use	
			Maternal health	Child health
1.	*Abrus precatorius* L.	Fabaceae	+	
2.	*Achyranthes aspera* L.	Amaranthaceae	+	+
3.	*Acorus calamus* L.	Acoraceae	+	+
4.	*Adiantum* sp.	Pteridaceae		+
5.	*Aegle marmelos* (L.) Corrêa	Rutaceae		+
6.	*Aerva sanguinolenta* (L.) Blume	Amaranthaceae		+
7.	*Ageratum conyzoides* L.	Asteraceae		+
8.	*Allium cepa* L.	Amaryllidaceae	+	+
9.	*Allium sativum* L.	Amaryllidaceae	+	+
10.	*Aloe vera* (L.) Burm.f.	Asphodelaceae	+	+
11.	*Alternanthera ficoidea* (L.) R. Br.	Amaranthaceae		+
12.	*Alternanthera sessilis* (L.) R. Br. ex DC.	Amaranthaceae		+
13.	*Amaranthus spinosus* L.	Amaranthaceae	+	+
14.	*Amomum subulatum* Roxb.	Zingiberaceae		+
15.	*Anethum graveolens* L.	Apiaceae	+	+
16.	*Argemone mexicana* L.	Papaveraceae		+
17.	*Artemisia vulgaris* L.	Asteraceae	+	+
18.	*Asparagus racemosus* Willd.	Asparagaceae	+	
19.	*Azadirachta indica* A. Juss.	Meliaceae	+	+
20.	*Bambusa vulgaris* Schrad. ex J.C.Wendl.	Poaceae		+
21.	*Bauhinia vahlii* Wight & Arn.	Fabaceae	+	+
22.	*Bauhinia variegata* L.	Fabaceae		+
23.	*Berberis asiatica* Roxb. ex DC.	Berberidaceae		+
24.	*Boerhavia diffusa* L.	Nyctaginaceae		+
25.	*Bombax ceiba* L.	Malvaceae	+	+
26.	*Brassica nigra* L.	Brassicaceae	+	+
27.	*Bryophyllum pinnatum* (Lam.) Oken	Crassulaceae	+	
28.	*Caesalpinia bonduc* (L.) Roxb.	Fabaceae	+	
29.	*Calotropis gigantea* (L.) W. T. Aiton	Apocynaceae		+
30.	*Cannabis sativa* L.	Cannabaceae	+	
31.	*Catunaregam spinosa* (Thunb.) Tirveng.	Rubiaceae	+	
32.	*Celosia cristata* L.	Amaranthaceae	+	+
33.	*Centella asiatica* (L.) Urb.	Apiaceae	+	+
34.	*Chrysanthemum indicum* L.	Asteraceae	+	+
35.	*Cicer arietinum* L.	Fabaceae	+	
36.	*Cinnamomum tamala* (Buch.-Ham.) T. Nees & Eberm.	Lauraceae		+
37.	*Cissampelos pareira* L.	Menispermaceae		+
38.	*Citrus limon* (L.) Osbeck	Rutaceae		+
39.	*Citrus* sp.	Rutaceae	+	+
40.	*Clerodendrum infortunatum* L.	Lamiaceae	+	+
41.	*Cucumis hardwickii* Royle	Cucurbitaceae	+	+

42.	*Curcuma angustifolia* Roxb.	Zingiberaceae	+	
43.	*Curcuma longa* L.	Zingiberaceae		+
44.	*Cuscuta reflexa* Roxb.	Convolvulaceae	+	+
45.	*Cynodon dactylon* (L.) Pers.	Poaceae	+	+
46.	*Cynoglossum zeylanicum* (Sw. ex Lehm.) Thunb. ex Brand	Boraginaceae		+
47.	*Cyperus compactus* Retz.	Cyperaceae	+	
48.	*Desmodium gangeticum* (L.) DC.	Fabaceae	+	+
49.	*Desmostachya bipinnata* (L.) Stapf	Poaceae		+
50.	*Dolichos biflorus* L.	Fabaceae		+
51.	*Elephantopus scaber* L.	Asteraceae		+
52.	*Elettaria cardamomum* (L.) Maton	Zingiberaceae		+
53.	*Equisetum arvense*	Equisetaceae	+	+
54.	*Euphorbia hirta* L.	Euphorbiaceae	+	+
55.	*Euphorbia pulcherrima* Willd. ex Klotzsch	Euphorbiaceae		+
56.	*Euphorbia royleana* Boiss.	Euphorbiaceae		+
57.	*Ficus benghalensis* L.	Moraceae	+	
58.	*Ficus religiosa* L.	Moraceae	+	
59.	*Firmiana simplex* (L.) W. Wight	Malvaceae	+	
60.	*Flueggea virosa* (Roxb. ex Willd.) Royle	Phyllanthaceae		+
61.	*Glycine max* (L.) Merr.	Fabaceae	+	
62.	*Hellenia speciosa* (J.Koenig) S.R.Dutta	Costaceae	+	+
63.	*Hibiscus rosa sinensis* L.	Malvaceae	+	
64.	*Hordeum vulgare* L.	Poaceae		+
65.	*Imperata cylindrica* (L.) Raeusch.	Poaceae		+
66.	*Jatropha curcas* L.	Euphorbiaceae	+	+
67.	*Justicia adhatoda* L.	Acanthaceae		+
68.	*Lagenaria siceraria* (Molina) Standl.	Cucurbitaceae	+	+
69.	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae		+
70.	*Magnolia champaca* (L.) Baill. ex Pierre	Magnoliaceae	+	
71.	*Mangifera indica* L.	Anacardiaceae	+	+
72.	*Mentha arvensis* L.	Lamiaceae	+	+
73.	*Mimosa pudica* L.	Fabaceae	+	
74.	*Mirabilis jalapa* L.	Nyctaginaceae	+	
75.	*Momordica charantia* L.	Cucurbitaceae		+
76.	*Murraya paniculata* (L.) Jacq.	Rutaceae		+
77.	*Musa paradisiaca* L.	Musaceae		+
78.	*Myrica esculenta* Buch.-Ham. ex D. Don	Myricaceae	+	
79.	*Nigella sativa* L.	Ranunculaceae		+
80.	*Ocimum basilicum* L.	Lamiaceae		+
81.	*Ocimum tenuiflorum* L.	Lamiaceae	+	+
82.	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	+	+
83.	*Oxalis acetosella* L.	Oxalidaceae	+	
84.	*Phaseolus lunatus* L.	Fabaceae		+
85.	*Phyllanthus emblica* L.	Phyllanthaceae	+	+

86.	*Pinus roxburghii* Sarg.	Pinaceae		+
87.	*Piper longum* L.	Piperaceae		+
88.	*Pogostemon benghalensis* (Burm.f.) Kuntze	Lamiaceae		+
89.	*Psidium guajava* L.	Myrtaceae		+
90.	*Pterocarpus santalinus* L.f.	Fabaceae		+
91.	*Punica granatum* L.	Lythraceae		+
92.	*Raphanus sativus* L.	Brassicaceae	+	+
93.	*Rauvolfia serpentina* (L.) Benth. ex Kurz	Apocynaceae	+	
94.	*Rheum australe* D. Don	Polygonaceae	+	+
95.	*Rhododendron arboreum* Sm.	Ericaceae	+	
96.	*Rhus javanica* L.	Simaroubaceae		+
97.	*Ricinus communis* L.	Euphorbiaceae	+	
98.	*Rubus ellipticus* Sm.	Rosaceae		+
99.	*Sagittaria sagittifolia* L.	Alismataceae		+
100.	*Salvia coccinea* Buc'hoz ex Etl.	Lamiaceae	+	
101.	*Sapindus mukorossi* Gaertn.	Sapindaceae		+
102.	*Scoparia dulcis* L.	Plantaginaceae		+
103.	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	Fabaceae	+	+
104.	*Sesamum indicum* L.	Pedaliaceae	+	
105.	*Shorea robusta* Gaertn.	Dipterocarpaceae		+
106.	*Sida cordifolia* L.	Malvaceae		+
107.	*Solanum aethiopicum* L.	Solanaceae	+	
108.	*Solanum linnaeanum*	Solanaceae		+
109.	*Solanum lycopersicum* L.	Solanaceae	+	+
110.	*Solanum melongena* L.	Solanaceae	+	+
111.	*Solanum nigrum* L.	Solanaceae		+
112.	*Spilanthes* sp.	Asteraceae	+	+
113.	*Syzygium cumini* (L.) Skeels	Myrtaceae	+	+
114.	*Tagetes patula* L.	Asteraceae	+	
115.	*Terminalia arjuna* (Roxb.) Wight & Arn.	Combretaceae	+	+
116.	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	+	+
117.	*Terminalia chebula* Retz.	Combretaceae	+	+
118.	*Tinospora cordifolia* (Willd.) Miers	Menispermaceae	+	
119.	*Trachyspermum ammi* (L.) Sprague	Apiaceae	+	+
120.	*Trichosanthes cucumerina* L.	Cucurbitaceae		+
121.	*Trigonella foenum-graecum* L.	Fabaceae	+	+
122.	*Verbena officinalis* L.	Verbenaceae	+	
123.	*Wallichia oblongifolia* Griff.	Arecaceae	+	
124.	*Woodfordia fruticosa* (L.) Kurz	Lythraceae		+
125.	*Zanthoxylum armatum* DC.	Rutaceae	+	+
126.	*Zea mays* L.	Poaceae	+	
127.	*Zingiber* sp.	Zingiberaceae	+	+
128.	*Zingiber officinale* Roscoe	Zingiberaceae		+
129.	*Ziziphus mauritiana* Lam.	Rhamnaceae		+
Total			75	99

Altogether 75 plant species were found to treat the maternal health ailments belonging to 69 genera and 42 families. The dominant family was same as in the case of child health ailments i.e. Fabaceae including 9 plant species followed Asteraceae and Lamiaceae (4 species each) (Figure 5). Altogether 26 families include only one plant species which was the lowest number among all (Table 1).

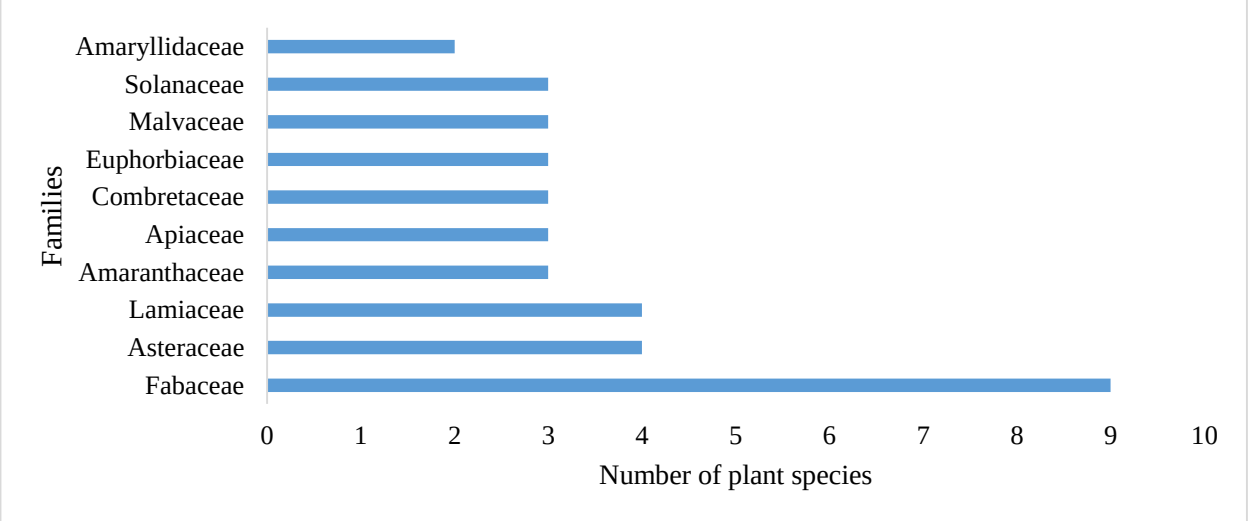


Figure 5: Top ten families having higher number of plant species (maternal health ailments)

In case of child, the total number of plant species used to treat the ailments were 99 belonging to 89 genera and 47 families. The plant species belonging to the family Fabaceae was the highest i.e. 8 species followed by Asteraceae, Lamiaceae, Poaceae, Rutaceae and Zingiberaceae (5 species each) (Figure 6) and there were 27 families which include only one plant species (Table 1). The detail of the plant species found in the study area had been mentioned in the Appendix V and Appendix VI with their scientific name, family, local names, habit, habitat, parts used, purpose, and processing ways.

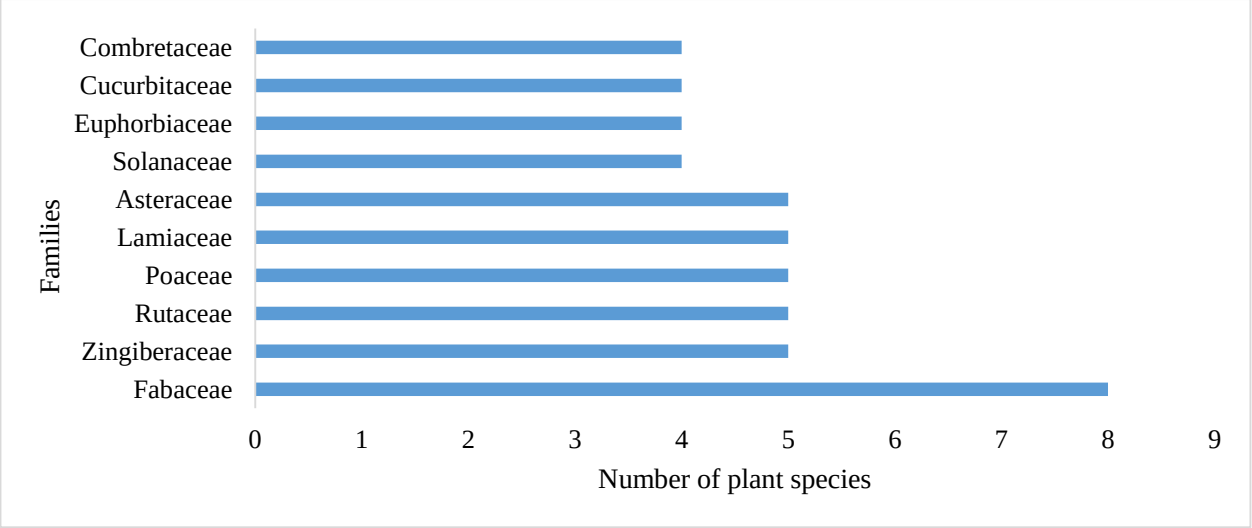


Figure 6: Top ten families having higher number of plant species (child health ailments)

4.3 Multiple uses of the medicinal plants

The medicinal plants reported from the present study had multiple uses and were differentiated into six different use categories i.e. one to more than five for both maternal and child health ailments.

4.3.1 Maternal health ailments

The plants were categorized into six different categories on the basis of their use categories. Overall, only two use categories i.e. single and triple include all the four habits of plant i.e. herbs, shrubs, trees and climbers. However, other use categories except the two lacks one or three different habits of plant.

In all six different categories, herbs were the most dominating habits and were maximum in one use categories followed by shrubs, trees and climbers. The maximum number of species were included in single use categories followed by triple use categories. However, climbers were not included under two use categories.

Comparatively, four, five and more than five use categories include fewer number of species. Among these all, maximum number of species were included under four use categories followed by five use and more than five use. Three different habits of plant i.e. herbs, shrubs and trees were equal in number in four use categories whereas five use categories include only herbs and more than five use include only shrubs (Figure 7).

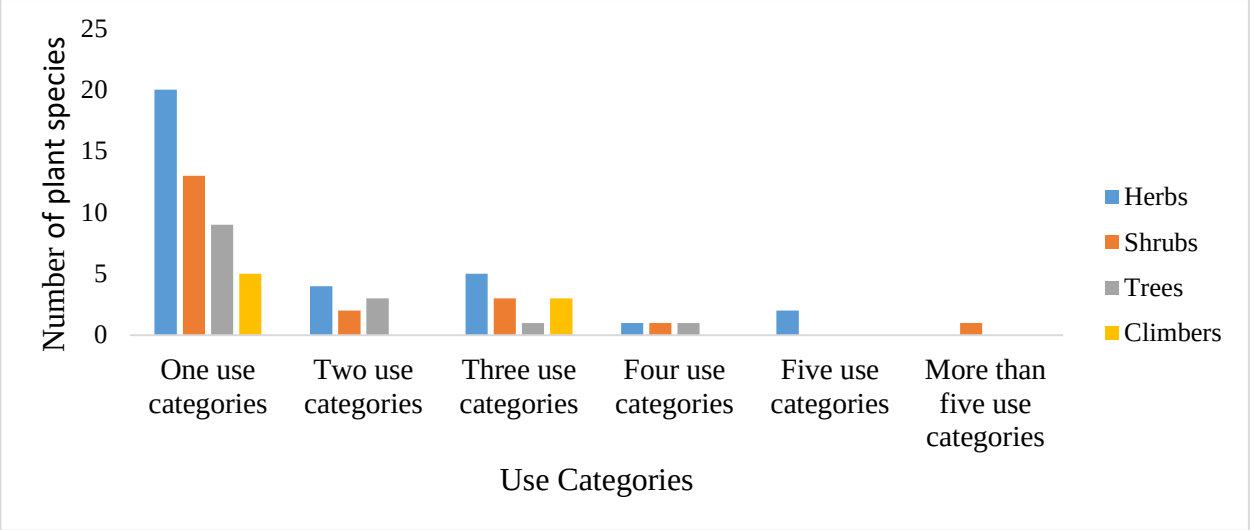


Figure 7: Medicinal plant species in different use categories (Maternal Health Ailments)

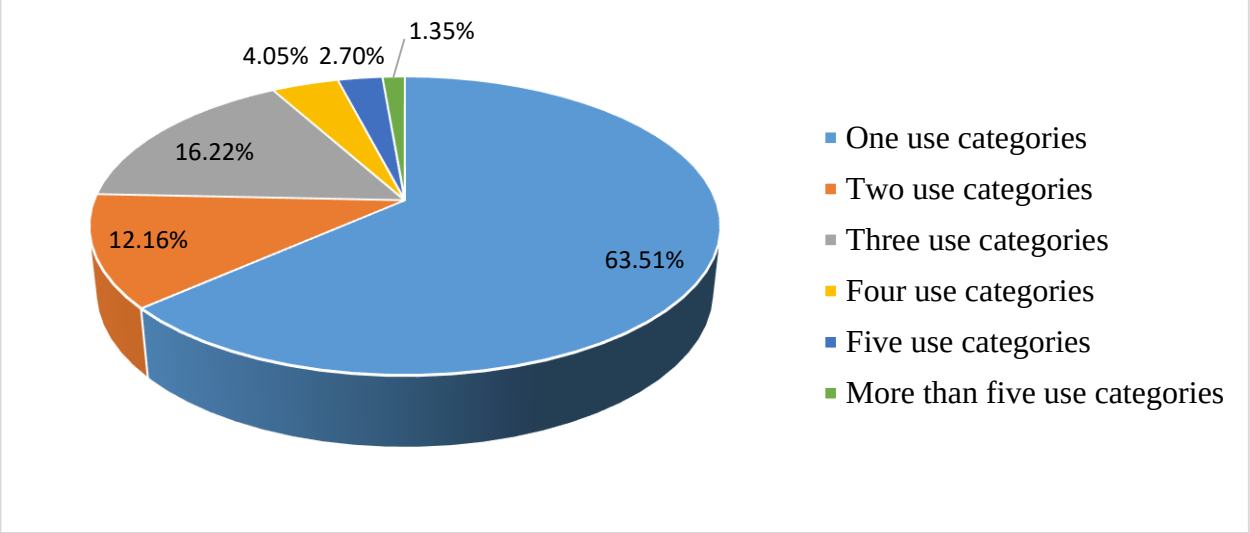


Figure 8: Percentages of different use categories of plants (Maternal health ailments)

The figure 8 shows that 36.48% of plant species were found to treat multiple ailments in case of maternal health which were comparatively fewer than that of child. The highest number of species recorded were under one use categories followed by three, two, four, five and more than five. The number of species under one use categories were 47 (63.51%) comprising of 20 herbs, 13 shrubs, 9 trees and 5 climbers. The highest number of plant species for treating multiple ailments were under three use categories i.e. 12 species (16.22%) and only one species had been reported to be used for the treatment of more than five different ailments. In both the cases, medicinal plants under single use categories were the highest and lowest were under four, five and more than five use categories (Appendix I). Here the same species were used to

;treat different or multiple ailments so the actual number is different than the total number of species.

4.3.2 Child health ailments

Similar to maternal health ailments, the plants to treat child health ailments were categorized into six different categories on the basis of their use categories. Overall, half of the use categories i.e. one, two and three include all the four habits of plant i.e. herbs, shrubs, trees and climbers. However, other halves lack one or two different habits of plant.

In all six different categories, herbs were the most dominating habits and were maximum in one use categories followed by shrubs, trees and climbers. The maximum number of species were included in one use categories followed by two use categories. In three use categories herbs were dominant followed by trees and equal number of shrubs and climbers were included.

In four, five and more than five use categories, maximum number of plant species were included under four use categories followed by more than five use categories. However, four use categories include only shrubs and trees and climbers were not used for more than five use categories (Figure 9).

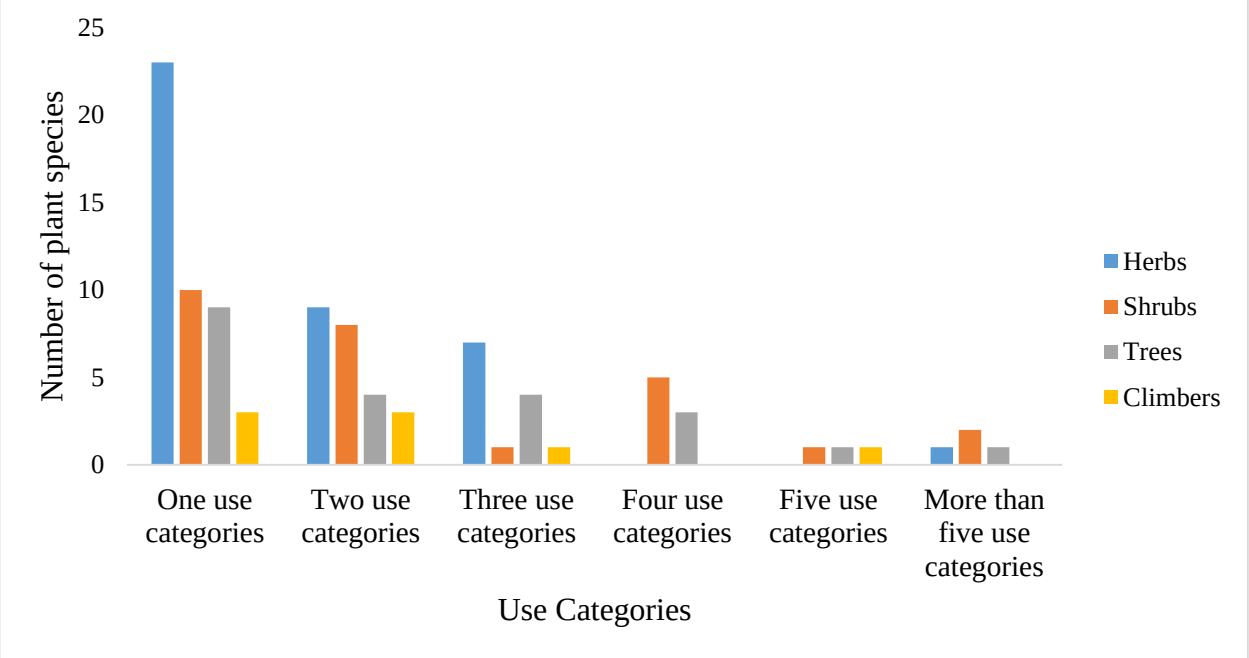


Figure 9: Medicinal plant species in different use categories (Child Health Ailments)

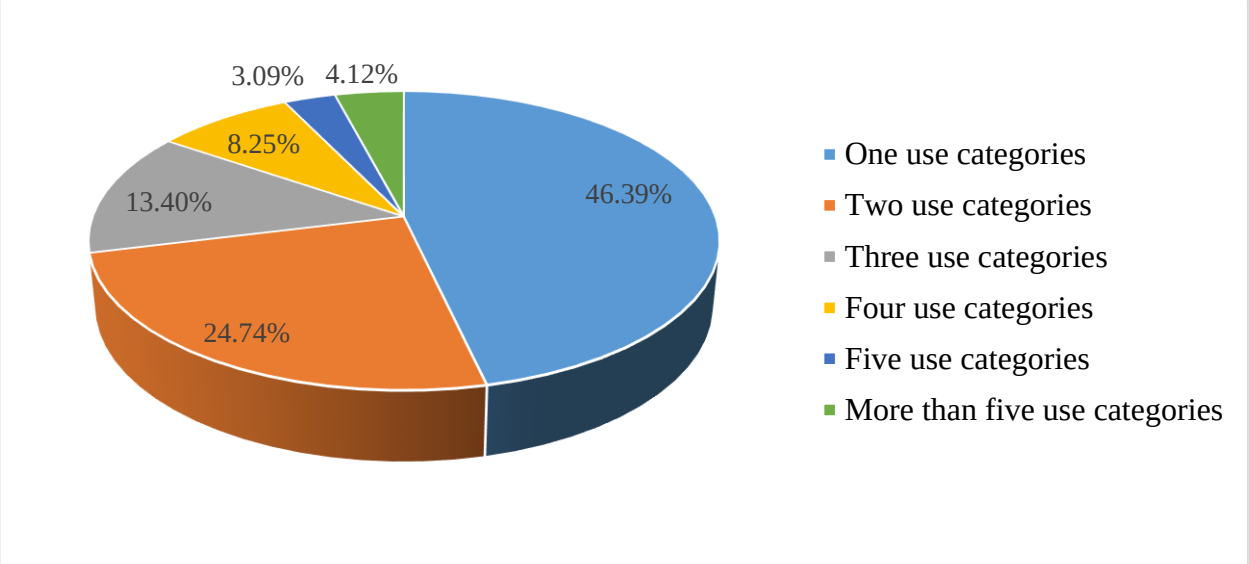


Figure 10: Percentages of different use categories of plants (Child health ailments)

The bar chart and pie-chart (Figure 9 & 10) illustrates the different use categories of plant species for the treatment of child health ailments and there are six different categorization i.e. one to more than five. The plants were divided into different sub-categories on the basis of their habit i.e. herbs, shrubs, trees and climbers. One, two and three use categorization include all the habit of plant i.e. herbs, shrubs, trees and climbers whereas others lack one or two habit. The percentage calculated for different use categories shows that 53.6% of plant species were found to treat more than one ailments (Figure 10). The highest number of plant species were included under one use categories i.e. 45 plant species (46.39%). Comparing the plants used for multiple ailments, the highest number of plant species were included under two use categories i.e. 24 species in total. The lowest species fall under five use categories i.e. 3 species (3.09%) and there were only four plant species (4.12%) to treat more than five different ailments slightly higher than five use categories (Figure 10).

4.4 Plant Parts Used

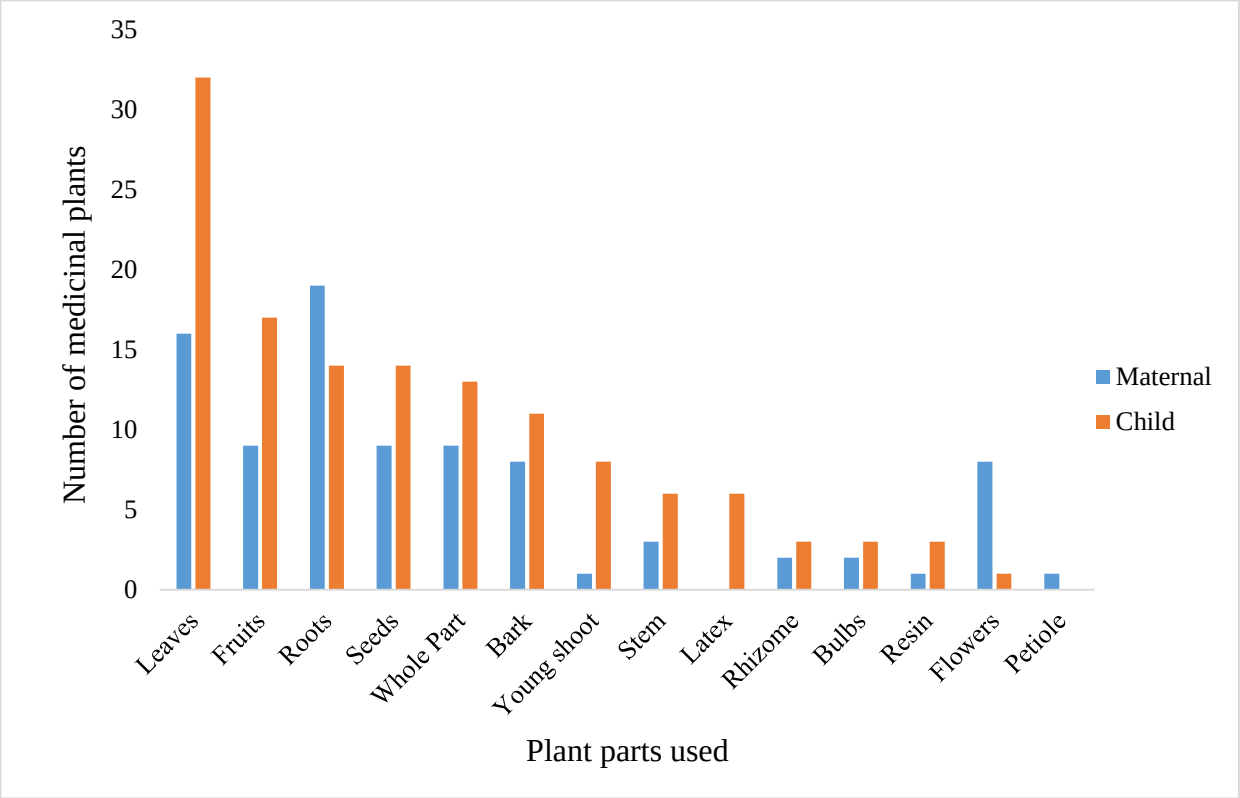


Figure 11: Plant parts used to treat maternal and child health ailments

The survey revealed that the most frequently used plant parts to treat maternal and child heath ailments were roots and leaves with 19 and 32 species respectively. The plant parts that were least used to treat maternal health ailments were young shoots, resin and petiole (1 species each) and for child health ailments were flowers (1 species). The petiole of plant were only used for the treatment of maternal health ailments and the latex of plant species were found to treat only child health ailments (Figure 11). The roots were the most used plant part for maternal health ailments. The continuous use of roots for a longer period of time may lead to the loss of valuable medicinal plants. Similarly, the leaves were the most frequently used plant parts for the treatment of child health ailments probably due to their easy availability and high abundance. The regular harvest of fruits, seeds, whole part and roots may lead to the extinction of valuable medicinal plant species. Likewise, the activities like harvesting carelessly, whole plant uprooting, may lead to decrease in their number.

4.5 Mode of Use

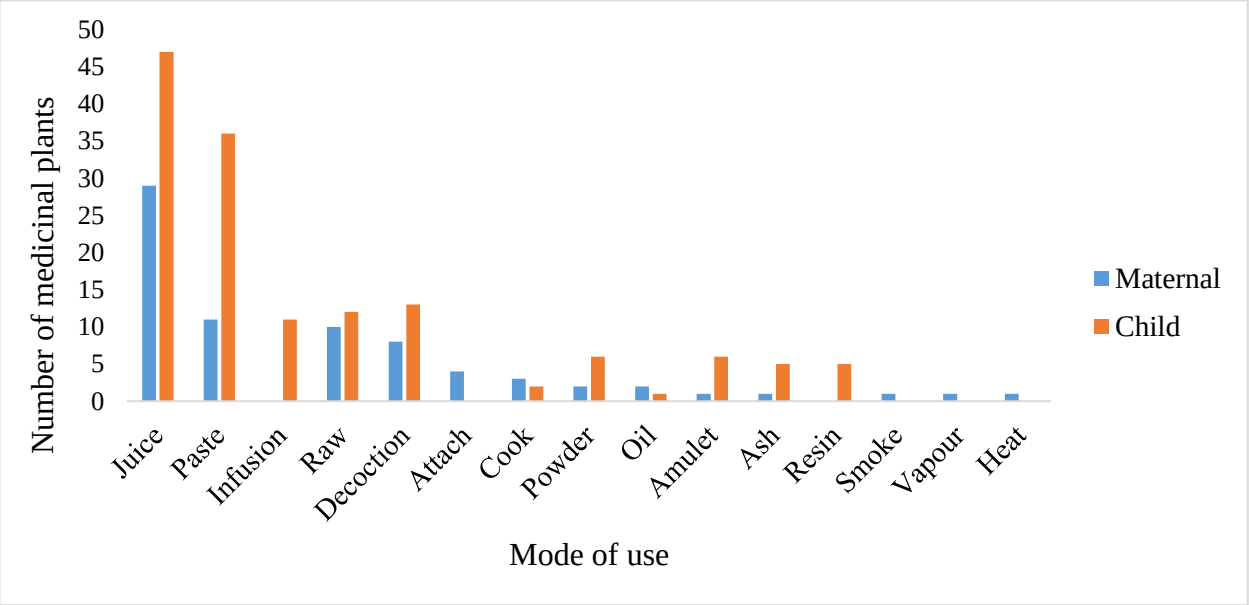


Figure 12: Mode of use of plant parts

The medicinal plant species were used in 15 different ways to treat maternal and child health ailments. The juice was the most used form to treat maternal and child health ailments i.e. 29 and 47 species respectively followed by the use in paste form i.e. 11 and 36 species respectively. The plants were least used as amulet, ash, smoke, vapour and heat to treat maternal health ailments (1 species each) whereas oil was the most least used form to treat child health ailments (Figure 12). The probable reason for the highest use of medicinal plants in juice form may be due to the easy processing ways.

4.6 Habit of medicinal plant species

Table 2: Habit of medicinal plant species used to treat maternal and child health ailments

Habit of plants	**Percentage of plant species (%)**	
	Maternal health	Child health
Herbs	32.0	38.8
Shrubs	40.0	32.7
Trees	17.6	19.4
Climbers	9.3	9.2

The medicinal plant species used to treat maternal and child health ailments were categorized as herbs, shrubs, trees and climbers on the basis of their habits. Among all, shrubs (40%) were

the most used life form to treat maternal health ailments followed by herbs (32%). However, herbs (38.8%) were the most used life form to treat child health ailments followed by shrubs (32.7%). The lowest number of species were included under climbers to treat both maternal (9.3%) and child health ailments (9.2%) (Table 2). The reason for the highest use of herbs and shrubs were may be due to their easy availability in nearby surroundings and easy harvesting techniques.

4.7 Habitat of the medicinal plants

Table 3: Habitat of medicinal plant species used to treat maternal and child health ailments

Habitat of plants	**Percentage of plant species (%)**	
	Maternal	Child
Cultivated	47.3	41.0
Wild	43.2	49.0
Cultivated+Wild	9.5	10.2

The sources of medicinal plants were either cultivation or naturally found in the forests, riverside and farmlands. In case of maternal health ailments, the maximum number of medicinal plants used were found cultivated in home gardens and nearby agricultural fields which was 47.3%. In case of child health ailments, the maximum number of medicinal plant species were obtained from the wild i.e. 48 (48.98%) whereas it was reverse in case of maternal health ailments i.e. maximum number of medicinal plants were obtained from home gardens and nearby agricultural fields which was 35 (47.30%). However, there were few species obtained from wild as well as cultivated for the treatment of both maternal and child health ailments i.e. 10 species (10.20%) and 7 species (9.46%) respectively (Table 3) [Appendix V & VI].

4.8 Categorization of ailments

Table 4: Different ailment categories with their bio-medical terms

I. Maternal health ailments

S.N.	Ailments categories	Bio-medical Terms
1.	Dermatological Disorder	Acne, Pimples, Dandruff
2.	Gastrointestinal Disorder	Indigestion, Vomiting during Pregnancy, Gastritis, Stoamch Pain, Displacement of Gaano
3.	Respiratory diseases and Fever	Common Cold
4.	Ureno-genital disorder	Urine burn, Leucorrhea, Swelling of Private Parts, Uterus Pain
5.	Oral Problems	Dry Mouth, Tongue Blisters
6.	Skeleto-Muscular Pain and Swelling	Swelling of legs, hands/legs pain, body pain, Pain in joints and nerve pain, back pain, headache
7.	Pregnancy Related Problems	Slow Delivery, Excessive bleeding after Delivery, Lactation, Vomiting, Slow falling of placenta, Lack of appetite
8.	Menstruation Related Problems	Irregular Periods, Lower Abdomen Pain, Over Bleeding During Menstruation, Abdominal Cramps
9.	Others	Lower B. P.

The total ailment categories for both maternal and child health ailments were 9 which are presented with their bio-medical terms in Table 4. In case of maternal health, the ailment categories with maximum number of ailments include pregnancy related problems and skeleto-muscular pain and swelling (6 ailments each) followed by gastro-intestinal disorder i.e. 5. The lowest ailments were under others category (only one ailment). The ailments with highest number of biomedical terms in case of child health include respiratory diseases and fever i.e. 10 followed by dermatological i.e. 11. There were only two ailments listed under ear and throat problems, oral and dental problems, skeleto-muscular pain and swelling, eye problems and others category in case of child health ailments.

II. Child health ailments

S.N.	Ailments categories	Bio-medical terms
1.	Dermatological Disorder	Burns, Wounds, Cuts, Scabies, Itching and Allergy, Blisters, Chicken Pox, Ringworm, Measles, Rashes, Warts
2.	Gastrointestinal Disorder	Diarrhea, Dysentery, Stomach Pain, Swelled Stomach, Gastritis, Constipation, Indigestion, Worms
3.	Respiratory disease and fever	Common cold, Cough, Asthma, Fever, Typhoid, Pneumonia, Difficulty in breathing, Nose bleeding, Severe Hot, Jaundice
4.	Ureno-genital disorder	Urine burn, Swelling of Scrotum, Yellow Urine
5.	Ear and Throat Problems	Sore Throat, Ear Infection
6.	Oral and dental Problems	Teeth Infection, Tongue Blisters
7.	Skeleto-Muscular Pain and Swelling	Hands/Legs Sprain, Headache
8.	Eye Problems	Eye Infection, Decreased Eye Power
9.	Others	Blood Clot

4.9 Use of medicinal plants to treat different ailments

The total number of plant species recorded was 129 and among them all 75 plant species were used for the treatment of maternal health ailments and 99 plant species were used for the treatment of child health ailments. There were 43 common species used to treat both the maternal and child health ailments. The maternal health ailments were categorized into 9 different categories and the maximum number of plants were found to treat pregnancy related problems (32 taxa) followed by skeleto-muscular pain (22 taxa). The lowest number of species were reported for the treatment of oral problems i.e. only 2 species (Figure 13). Similarly, the child health ailments were also categorized into 9 different categories and it had been found that the medicinal plants were mostly used for the treatment of gastro-intestinal disorder (42 taxa) followed by dermatological disorder (37 taxa). Very few species had been reported for the treatment of eye problems i.e. only 2 species (Figure 14).

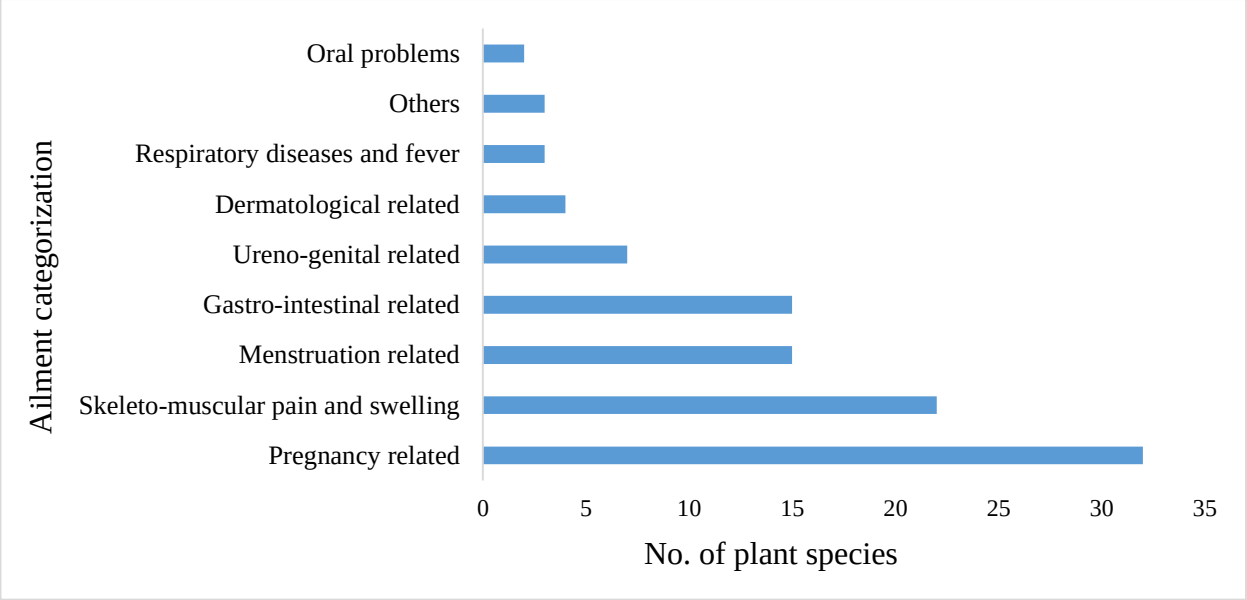


Figure 13: Number of medicinal plants to treat maternal health ailments

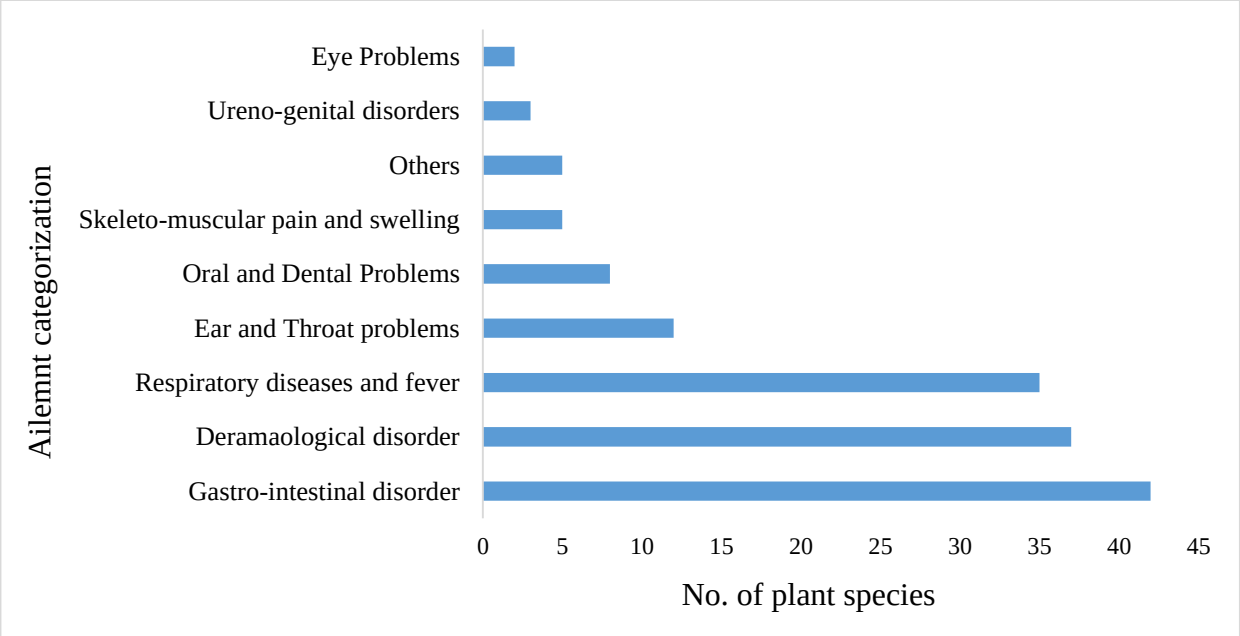


Figure 14: Number of medicinal plants to treat child health ailments

The present study showed that there were 6 common maternal and child health ailments treated by the use of medicinal plants i.e. oral and dental problems, others category, respiratory diseases and fever, dermatological disorder, ureno-genital disorder and gastro-intestinal disorder. The others category had almost same number of plants to treat both ailments. The common ailment in others category treated by the use medicinal plants was high blood pressure. In order to lower the blood pressure, common plant species such as *Tinospora cordifolia* and *Azadirachta indica* were used. However, small amount of doses were given to child and

comparatively higher doses to mothers. The ailments like respiratory diseases and fever, dermatological disorder and gastro-intestinal disorder had a huge difference in the use of medicinal plants to treat maternal and child health ailments. One reason for this difference was very few maternal ailments were found to be treated under the above mentioned three categories.

The number of plant species used to treat ureno-genital disorders and skeleto-muscular pain and swelling were comparatively higher in maternal than in chid. Two common species were used to treat the urine burn problems in both cases i.e. *Equisetum arvense* and *Bauhinia vahlii*. Similarly, there was only one common ailment i.e headache under skeleto-muscular pain and swelling category but the plant species used to treat were different for both. Such as *Pogostemon benghalensis* was used to treat headache in children whereas species like *Artemisia vulgaris, Firmiana simplex* and *Asparagus racemosus* were used for maternal case. The ailments cough and common cold were found to be treated under respiratory diseases and fever category but the plants used to treat them were different in both the cases. Similarly, there were common plant species found to treat dermatological disorder in both maternal and child which were *Aloe vera* and *Brassica nigra* but the ailments treated by the use of these species were different. *A. vera* was found to treat pimples and dandruff to treat maternal ailments whereas burns, wounds, cuts and rashes in child. *Brassica nigra* was used to make clear and clean skin in maternal but were found to treat scabies and dandruff in child. Similarly, there were three common ailments under gastro-intestinal disorder treated by the use of medicinal plant species i.e. indigestion, gastritis and stomach pain. The species recorded to treat indigestion were different but there were two common species i.e. *Terminalia bellirica* and *T. chebula* to treat gastritis. Additionally, there was one common species i.e. *Oroxylum indicum* used to treat stomach burn in both maternal and child. The problems related to eye, ear and throat were only found in child and not in case of maternal. The reason may be the low immune system in children and more prone to suffer from various infectious disease.

4.10 Quantitative analysis

4.10.1 Informant Consensus Factor (ICF)

The highest ICF value of the ailment categories indicate that there is high degree of knowledge sharing among the informants to cure particular ailment by using particular species. The ICF

values in case of maternal health ailments ranges from 0.40 to 0.79. The highest ICF value was for skeleto-muscular pain and swelling (ICF: 0.79; 102 use reports and 22 taxa) which was followed by menstruation related problems (ICF: 0.74; 55 use reports and 15 taxa). The lowest value was calculated for Ureno-genital disorder ((ICF: 0.40; 11 use reports and 7 taxa) (Table 5-I).

Table 5: Informant Consensus Factor (ICF) for each ailment category

I. Maternal health ailments

Ailments Categories	**Number of Use-Reports (N_{ur})**	**Number of Taxa (N_t)**	**Informant Consensus Factor (ICF)**
Pregnancy related	112	32	0.72
Skeleto-muscular pain and swelling	102	22	0.79
Menstruation related	55	15	0.74
Gastro-intestinal disorder	45	15	0.68
Ureno-genital disorder	11	7	0.40
Dermatological disorder	12	4	0.73
Respiratory disease and fever	7	3	0.67
Others	6	3	0.60
Oral Problems	3	2	0.50
Total	353	103	5.83

II. Child health ailments

Ailments Categories	**Number of Use-Reports (N_{ur})**	**Number of Taxa (N_t)**	**Informant Consensus Factor (ICF)**
Dermatological disorder	116	37	0.69
Gastrointestinal disorder	125	42	0.67
Respiratory disorder and fever	135	35	0.75
Ureno-genital disorder	7	3	0.67
Ear and Throat Problems	20	12	0.42
Oral and dental problems	10	8	0.22
Skeleto-muscular pain and swelling	12	5	0.64
Eye Problems	3	2	0.50
Others	8	5	0.43
Total	436	149	4.99

Similarly, the ICF of 9 ailment categories were calculated for child health ailments and the highest ICF value was of ailment category respiratory disorder and fever (ICF: 0.75; 135 use

reports; 35 species followed by dermatological disorder (ICF: 0.69; 116 use reports; 37 species). The oral and dental problems category had the lowest ICF value i.e. 0.22 and 10 use reports; 8 species. The ICF value ranges from 0.22 to 0.75. (Table 5-II). High ICF value for respiratory disease and fever were may be due to cooking of food using firewood and cowdung, lack of personal care, hygiene and balanced diet. The probable reason behind the lower ICF values may be due to lack of knowledge sharing among the informants. The high ICF values of different maternal and child health ailments refers that the knowledge of plant species were homogenous among the respondents and can be considered as the effective plant species to treat different ailments and the results were reverse which have low ICF values.

4.10.2 Fidelity Level

The purpose behind calculating the fidelity level of ethno-medicinal plants used for the treatment of MCHAs were to find out the most frequently used plant species by the local people. The medicinal plants which were generally used by the local people have the fidelity level values higher than the medicinal plants which were being cited by fewer people (Teklehaymanot and Giday, 2007). The species which had the highest fidelity level in the treatment of MCHAs were *Oxalis corniculata, Amaranthus spinosus, Spilanthes* sp., *Lagenaria siceraria, Ocimum tenuiflorum, Euphorbia hirta* (100% each) followed by *Anethum graveolens* (80%) under the ailment categories Dermatological, Ureno-genital, Respiratory Disease, Skeleto-muscular pain and swelling, Oral problems and Pregnancy related problems respectively. The fidelity level of one species was the least i.e. *Aloe vera* (16.67%) under the ailment category others (Table 6-I).

From the fidelity level calculated as shown in Table 6-II, the species which had the highest fidelity level in the treatment of child health ailments were *Phaseolus lunatus, Hordeum vulgare, Terminalia chebula, Argemone maxicana, Rheum australe, Cuscuta reflexa* (100% each) under ailment categories Dermatological, Ear and Throat Problems, Respiratory disease and fever, Eye Problems, Others and Respiratory disease and fever followed by *Syzygium cumini* and *Pogostemon benghalensis* (85.71% each) under ailment categories Gastro-intestinal disorder and Respiratory disease and fever category. The lowest fidelity level was of the species *Oroxylum indicum* i.e. 12.5% under Gastro-intestinal disorder category.

Table 6: Most frequently used species for various ailments

(I) MATERNAL HEALTH AILMENTS

Ailments	Plant Species	FL (%)
Acne on face	*Oxalis corniculata*	100
Pimples; Dandruff	*Aloe vera*	25
Urine Burn	*Amaranthus spinosus*	100
Urine Burn	*Equisetum arvense*	50
Common Cold	*Spilanthes sp.*	100
Cough/Cold	*Cannabis sativa*	50
Swelling hands/legs	*Lagenaria siceraria*	100
Hands/Legs Pain	*Zingiber sp.*	66.67
Tongue Blisters	*Ocimum tenuiflorum*	100
Delivery Fast	*Solanum melongena*	100
Increase Lactation	*Euphorbia hirta*	100
Stop excessive bleeding after delivery	*Anethum graveolens*	80
Gastritis	*Solanum aethiopicum*	75
Stomach Pain	*Tinospora cordifolia*	50
To lower B.P.	*Aloe vera*	50
Lower B.P.	*Tinospora cordifolia*	25
Irregular Menstruation	*Achyranthes aspera*	33.33
Stomach Pain	*Solanum aethiopicum*	25

(II) CHILD HEALTH AILMENTS

Ailments	Plant Species	FL (%)
Cuts	*Ageratum haustonianum*	100
Ringworm	*Phaseolus lunatus*	100
Diarrhea	*Syzygium cumini*	100
Gastro-intestinal disorder	*Oroxylum indicum*	50
Ear Infection	*Hordeum vulgare*	100
Cough/Common Cold	*Terminalia chebula*	88.89
Fever	*Pogostemon benghalensis*	85.71
Toungue Blisters	*Ocimum basillicum*	75
Ureno-genital disorder	*Solanum melongena*	50
Eye Problems	*Argemone maxicana*	50
Tulsi	*Ocimum tenuiflorum*	50
Ear Infection	*Alium sativum*	50
Others	*Rheum australe*	50
Jaundice	*Cuscuta reflexa*	25
Headache	*Pogostemon benghalensis*	14.29

4.10.3 Use frequency

In case of maternal health, the most frequently used medicinal plant species were *Euphorbia hirta* (0.2) followed by *Zingiber* sp. (0.1). Use frequency (UF) values were least for the species *Aloe vera, Spilanthes* sp. and *Ocimum tenuiflorum* (0.025 each). However, the most frequently used species for the treatment of child health ailments were *Syzygium cumini* (0.30) followed by *Terminalia chebula* (0.28) and *Ageratum haustonianum* (0.23). The lowest UF value were found for the species *Bauhinia vahlii, Pogostemon benghalensis, Argemone maxicana* and *Rheum australe* (0.025 each) (Table 7).

Table 7: Use frequency for different ailment categories

(I) MATERNAL HEALTH AILMENTS

Ailments	**Plant Species**	**UF**
Dermatological Disorder	*Aloe vera*	0.025
Gastro-Intestinal Disorder	*Solanum aethiopicum*	0.075
Ureno-genital Disorder	*Bauhinia vahlii*	0.075
Respiratory Disease	*Spilanthes* sp.	0.025
Skeleto-Muscular Pain and Swelling	*Zingiber* sp.	0.1
Oral Problems	*Ocimum tenuiflorum*	0.025
Pregnancy Related Problems	*Euphorbia hirta*	0.2
Menstruation Related Problems	*Azadirachta indica*	0.05

(II) CHILD HEALTH AILMENTS

Ailments	**Plant Species**	**UF**
Dermatological Disorder	*Ageratum haustonianum*	0.23
Gastro-Intestinal Disorder	*Syzygium cumini*	0.30
Respiratory Disease and Fever	*Terminalia chebula*	0.28
Ureno-genital disorder	*Bauhinia vahlii*	0.025
Ear and Throat Problems	*Alium sativum*	0.075
Oral and Dental Problems	*Ocimum basilicum*	0.075
Skeleto-muscular pain and swelling	*Pogostemon benghalensis*	0.025
Eye Problems	*Argemone maxicana*	0.025
Others	*Rheum australe*	0.025

CHAPTER 5: DISCUSSION

3.1 Knowledge variation among informants

The results of the interviews and group discussion suggested that the knowledge on medicinal plants differ from person to person but traditional healers like Guruwas and Sudenis have extensive ethnobotanical knowledge. Similar findings were reported from Amrai village of Dang district (Adhikari, 1997) and Bardia (Shrestha, 1997). The ancient practices regarding health care are rooted in depth and depend upon traditional healers locally known as Gurau who have the only power to conduct the rituals regarding protection, blessing and healing, and also considered as a linking medium between the supernatural and real world.

There was variation of knowledge depending upon the age groups. The elder generation were more knowledgeable than the younger ones which may be due to the lack of allopathic medicines in the past and the people in the ancient time developed different ways to cure different ailments. Similar findings were reported from the Illam district (Bhattarai, 2018) and Gulmi district (Bhandari *et al*., 2023). A study conducted by Ong and Kim (2014) in Philippines, revealed that the maximum number of plants were reported by the people of age groups 53 years old and above which was similar to the findings as in the present study. There are work divisions among the family members. Female members have to take care of household activities, male members have to do the work outside the home and young members have to look after the cattle. Similar findings were reported from the other parts of the Dang district (Paudyal, 2000). The present study showed that the female respondents participated more actively in comparison to male respondents. At the same time, females were found to be more knowledgeable than males. The reason behind this may be due to the caring nature of female as they have to take care of all the family members and also the study was specific regarding maternal and child health care. So, it was obvious for females to have more information than males. Females are of more caring nature and are considered to be homemakers as they have to collect food, fodder and firewood (Torres-Avilez *et al*., 2016). Similar findings were reported from Ethiopia (Giday *et al*., 2009), Brazil (Merétika *et al*., 2010), Mexico (Beltrán - Rodriguez *et al*., 2014), Philippines (Ong and Kim, 2014) and Nepal (Luitel *et al*., 2014). However, study conducted in Morang district (Das *et al*., 2021) showed the participation of male respondents more than female as the study was more generalized regarding ethnobotany.

The practice of keeping the ethnomedicinal knowledge secret is common among people in different parts of the world (Giday *et al*., 2009). The reason behind keeping the knowledge secret is their belief that if the knowledge is shared with others the effectiveness of medicinal plants would decrease (Shrestha *et al*., 2014). The present study also implied that the people have a tendency of keeping the knowledge with themselves. This trend of secrecy had also been reported from Humla District (Rokaya *et al*., 2010), Makwanpur District (Luitel *et al*., 2014) and Ilam District (Bhattarai, 2017) of western, central and eastern Nepal respectively. The poor mindset of people for not sharing their knowledge is one of the big reason in the loss of traditional knowledge (Pradhan and Badola, 2008). While interviewing it had been noticed that some were open to their traditional ethnobotanical knowledge while others were of shy nature too. In the ancient time, the health facilities were really poor, so the people had gained knowledge and developed different practices to overcome their day to day life challenges.

These days' people are neglecting the use of medicinal plants as they are albeit challenging to use in contrast to allopathic medicine. Current modernization are creating the threat to the traditional knowledge of using the medicinal plant species (Gemedo-Dalle *et al*., 2005). These knowledge might get lost soon if not documented, filmed or recorded. Hence, it is crucial to conserve and document the medicinal plants which might get disappear in the coming future (Shrestha *et al*., 2014, Shrestha *et al*., 2016).

5.2 Diversification of medicinal plants

From the present study, altogether 129 medicinal plant species belonging to 113 genera and 60 families were recorded. Among all, 75 plant species were found to treat maternal health ailments belonging to 69 genera and 42 families. The dominating family was Fabaceae including 9 plant species followed by Asteraceae and Lamiaceae. Similarly, 99 medicinal plants were found to treat child health ailments belonging to 82 genera and 45 families. Among all the families, Fabaceae including 8 species dominates all followed by five families i.e. Asteraceae, Lamiaceae, Poaceae, Rutaceae and Zingiberaceae. In Ethiopia, Asmare *et al.* (2018) also mentioned that Fabaceae was the most dominating family and 8 species were included, i.e. 7.77%. Likewise, in Zimbabwe, Maroyi (2011) also found the Fabaceae family to be dominant. Bhatt *et al.* (2023) also reported the Fabaceae family to be dominant including 19 species in an ethnobotanical study conducted in Kanchanpur district, Nepal. The plant species recorded were used to treat different ailments and these ailments were separated under

9 different categories for both maternal and child health ailments. The recorded plant species were analyzed on the basis of plant parts used, mode of use, habit of medicinal plants and habitat. There are other comparable studies which had been conducted in different parts of Nepal such as in Eastern Nepal (Chaudhary and Rai, 2017), Western Nepal (Acharya and Acharya, 2009; Singh *et al*., 2012) and Central Nepal (Bhattarai *et al*., 2009; Luitel *et al*., 2014; Ambu *et al*., 2020;).

5.3 Medicinal plants in multiple use

The recorded plant species were not only used to treat a single ailment or disease rather they were used to treat multiple ailments. Furthermore, the multiple use categories were divided into one, two, three, four, five, and more than five-use categories. In the present study, the plant species *Azadirachta indica* under the tree category was used to treat more than five different maternal and child health ailments which was the highest categorization for multiple use of plants. The maternal health ailments treated include indigestion, lower abdomen pain, leucorrhea, hands/legs pain, abdominal cramps, and high blood pressure. The leaf decoction of the plant was reported to treat malaria during pregnancy which was a single use report (Ogbe *et al*., 2009). Similarly, the leaf decoction were used to bath body in Nigeria to cure fever during pregnancy (Kankara *et al*., 2015). The maternal ailments treated in the present study were different and new compared to above mentioned studies which may be due to lack of awareness of the multiple use of the plant species in other areas. Likewise, the child health ailments treated by the same plant species include wounds, stomach pain, cough, fever, nose bleeding, severe hot, teeth infection and high blood pressure. Shaheen *et al*. (2017) also reported the multiple use of plants to treat wounds, nasal infection, earache, scabies, intestinal worms in child. Multiple uses of the same plant had been found to treat wounds, fever, diabetes, gum disease, liver problems and twigs were found to be used as tooth brush in an ethnobotanical study conducted in India (Singh *et al*., 2022). Chaudhary and Rajbhandary (2021) reported the multiple use of the plant leaves and barks to treat cut, wounds, skin rashes, ecto-parasites, intestinal worms, common cold and cough, asthma, fever, fracture and bone marrow infection. Similar use of the plant species had been reported from other studies as well may be due to the susceptible nature of child to various diseases and the knowledge of plant species were homogenous among the people in different areas.

The second species used to treat multiple maternal and child health ailments was *Aloe vera* under herb category. Different maternal health ailments such as pimples, dandruff, swelling of hands/legs, body pain, swelling body parts and high blood pressure were treated by the use of plant species. Similarly, child health ailments like burns, wounds, cuts, rashes and jaundice were found to be treated by the use of same plant species. Similar uses had been reported by Chaudhary and Rajbhandary (2021) from Nawalparasi district to treat skin rashes, boils, burn, headache, get rid of pimples and act as a cooling agent. The gel of leaves were used to get relief from burning, jaundice, skin allergies and kamalpitta (Karki *et al*., 2023) which were similar in use as in the present study. Bhandari *et al*. (2023) also reported the similar use of the leaves to treat burns and boils. Similar use of the plant had been reported from various studies because the plants were known to have multiple benefits among the people all around the world.

Justicia adhatoda was another species reported to be used for the treatment of multiple child health ailments. The child health ailments include stomach pain, worms, common cold, cough, asthma, fever and severe hot. The use of leaf juice had been reported to treat fever, cough and cold which were similar in use may be due to the ailments being common in most of the areas with some dissimilar use like to treat impotence and jaundice which were less common ailments (Uddin and Hassan, 2014). The leaves and roots of the same plant were reported to cure fever and cough which were similar in use may be due to the ailments were more common among child and also as urinary problems and fertilizers which were different use (Ambu *et al*., 2020).

5.4 Use of plant parts

As Tharu people have rich traditional knowledge, they use almost all parts of the plant as possible. The most used plant parts for the treatment of maternal health ailments were roots. It might be due to their anti-inflammatory and anti-oxidant properties. The continuous use of roots might put some plants to be in danger and make them vulnerable, rare, endangered and extinct. However, Moravec *et al.* (2014) showed the agreement that the continuous use of roots for treating different ailments hamper the plant's existence in negative aspects. Similarly, leaves were the most frequently used plant parts for the treatment of child health ailments. It may be due to their easy availability, simple harvesting techniques. Kala (2005) had also reported the similar use of plant part i.e. leaves from Eastern Himalaya Region of India. The continuous use of leaves have less effects on plants because they are easily available and do

not affect the plants to regenerate but the use of plant roots have negative effect on their use as some plants only propagate with the help of roots.

5.5 Mode of use of plants

The way of using medicinal plants varies among people to people. People have developed their own ways for the use of plants in medicinal perspective. The result (Figure 12) shows that the most used form were juice followed by paste in both cases. The probable reason for using in juice and paste form are may be due to their easy processing ways. Similar kind of techniques were reported to be used from other parts of Nepal (Joshi and Edington, 1990; Shrestha and Dhillion, 2003; Uprety *et al.,* 2010). Likewise, studies conducted by the researchers outside the country (Andrade-Cetto, 2009; Rajkumar and Shivanna, 2010; Srithi *et al.,* 2009) also mentioned the similar ways of using the plant parts. The amount of dose depends upon their age bar. Small child need less doses in comparison to young and adults. The medicinal plant species were least used as amulet, ash, smoke, vapour and heat to treat maternal health ailments whereas oil was the least used form to treat child health ailments. The reason for the above mentioned techniques to be less popular are may be due to less effectiveness of the techniques and difficult processing ways in the latter case. Most of the indigenous people felt difficult to share their knowledge and preferred to transfer it to only their closed ones (Gedif and Hahn, 2002; Uniyal *et al.,* 2005; Teklehaymanot, 2009 and Panghal *et al*., 2010).

5.6 Habitat or sources of medicinal plants

The study revealed that the medicinal plants were obtained either from wild or cultivated in fields and home gardens. The maximum number of plant species to cure maternal health ailments were found to be cultivated species which may be to avoid long walks to collect wild species and effectiveness of the cultivated species to treat different maternal health ailments. Ogbe *et al*. (2009) also reported the maximum number of species to be cultivated from Nigeria. In an ethnobotanical study conducted by Zenede (2012) in Ethiopia, the diversity of plant in home garden includes 6% of medicinal plants. However, to treat the child health ailments maximum number of medicinal plants were obtained from the wild which may due to their potential ability to treat various child health ailments and also may be due to continuation of the practices followed by their ancestors. Frankel *et al*. (1995) reported that the maximum

number of medicinal plant species were obtained from the wild. Similar results were reported by other researchers (Rokaya *et al*., 2010; Yirga, 2010; Kalayu *et al*., 2013; Teklay *et al*., 2013; Moravec *et al*., 2014). To collect the medicinal plants present far away from the residential area, people have to cover long distance (Giday and Ameni, 2003).

5.7 Various ailments medicated in the study area

The total maternal and child health ailments treated by the use of medicinal plant species were 32 and 41 respectively. The ailments were divided into 9 different categories for both maternal and chid health ailments. The maternal health ailments were categorized under different headings which were dermatological disorders; gastro-intestinal disorders; respiratory diseases and fever; ureno-genital disorders; oral problems; skeleto-muscular pain and swelling; pregnancy-related problems; menstruation-related problems and others. Similarly, child health ailments were categorized as dermatological disorders; gastro-intestinal disorders; respiratory diseases and fevers; ureno-genital disorders; ear and throat problems; oral and dental problems; skeleto-muscular pain and swelling; eye problems and others. Similar categorizations have been reported by Ong and Kim (2014). The highest number of plant species for the treatment of maternal health ailments include pregnancy related problems (32 species) followed by skeleto-muscular pain (22 species) as the study was more specific regarding maternal health care. The maximum number of plant species were used for the treatment of gastro-intestinal disorder (42 species) followed by dermatological disorder (37 secies) in case of child health ailments. The reason for the maximum species found to treat gastro-intestinal disorders may be due to the unhygienic nature of child which was followed by dermatological disorder which may be due to child lacking immune powers to fight against the common dermal diseases. Similar uses had been reported from many developing and developed countries (Chaudhary and Rajbhandary, 2021; Susandarini *et al.*, 2021; Singh *et al*., 2022).

5.8 Use of medicinal plants to treat different ailments

People in the study area treat different ailments related to maternal and child health quite similarly if compared with other ethnobotanical studies done in different parts of the country and outside country. For example: The fruits of ***Aegle marmelos*** were used to treat diarrhea and dysentery in the present study. Likewise, the bark of the plant mixing in oil was used to cure boils. Similar studies were done previously by various authors (Uniyal and Shiva, 2005;

Kala *et al*., 2006; Pande *et al*., 2006; Thapa, 2008; Acharya and Acharya, 2009; Bhattarai *et al*., 2009; Sharma *et al*., 2011; Mathur and Joshi, 2013). The use of roots, stem and leaves of same plant had also been reported by Jain (2004) for the treatment of diabetes and leaves to be used for the treatment of liver diseases such as jaundice and hepatitis. Pandey (2021) conducted an ethnobotanical study in Chhattisgarh, India and found out that the fruits of the plant were nutritive and were also used to treat indigestion and constipation. Fruits were mixed along with the leaves of *Dalbergia sissoo* to treat heat stroke. The decoction of leaves were found to treat diabetes.

The whole parts of ***Elephantopus scaber*** mixing with little flour were used to make medicine for the fermentation of alchohol. The same medicine were used in dried and powdered form to treat stomach pain and indigestion in child. The use of plant for fermentation of alcohol had also been reported by Chaudhary *et al*. (2020) and Chaudhary and Rajbhandary (2021). Sharma and Lata (2022) conducted a study in Tharu tirbe of India and documented the use of plant roots to cure paralysis which was a different finding from the present study. The roots were reported to be used for the headache and sinusitis in the study done by Bhattarai *et al*. (2009). Manandhar (1985) also reported that the roots were used to treat aphrodisiac. Ong and Kim (2014) in their study mentioned the use of plant leaves to treat cuts and wounds, abdominal pain and ascariasis. No other previous studies revealed the use of plant for the treatment as mentioned in the present study, so it was a new finding from the study area.

The juice extracted from the wounds of ***Ageratum haustonianum*** were used to treat wounds and stop the bleeding from the cuts. Sharma and Lata (2022) also mentioned the use of plant to cure cut and wounds similar to the use found in the present study. Additionally, the paste of leaves were applied in fractured bones and twigs were used as fodder mixed with other grasses which were different uses than in the recent study.

It had been found that the whole parts of ***Cuscuta reflexa*** were used for the treatment of jaundice, hands/legs sprain and broke in case of child. However, the whole part of the plant were used to treat gastritis in case of maternal health ailments in the study area. Similar data were found in the study done by Dangol and Gurung (1991); Ghimire and Bastakoti (2009) where the plants were used to treat jaundice. In the study of Manandhar (1985), similar use of plants were reported along with joining of the dislocated parts. The findings were new in the study of Jain (2004) such as jaundice including hepatitis and liver diseases. Acharya and

Acharya (2009) documented similar use of plants to treat jaundice, headache, body pain and stomach. In the study conducted by Bhattarai *et al*. (2009) the plants were used to treat jaundice including ringworm. In the study of Sharma and Lata (2022), the twig of a different plant species i.e. ***Acmella calva*** had been found to treat ailment Jaundice in child.

Present study revealed the use of flowers' juice of ***Tagetes patula*** for the treatment of ear infection. The leaf of same genus but different species i.e. *Tagetes erecta* had been found to be used in the study of Sharma and Lata (2022) for the treatment of eczema and earache which was a similar finding whereas flower heads were used for the treatment of boils in nostrils and ringworm. Similarly, the decoction of either leaves or flower heads were used to cure piles which was an additional finding other than in the present findings. Plants were found to be grown for ornamental purpose, as mosquito repellent and flower heads were used to worship god and in ceremonies which were also grown for similar purpose in the present study area. The plant debris were used to prepare compost which was a common finding. Chaudhary and Rajbhandary (2021) reported the use of flowers juice of the plant to treat pimples in female.

In the current study, the young shoots of ***Ziziphus mauritiana*** were used to treat measles in childr. The paste of young shoots was applied in the infected area once a day until recovery. In the study of Chaudhary and Rajbhandry (2021), the root paste of the plant were used to treat diuretic and also the leaf paste of the plant were found to be used to treat the problems of frequent urination. Singh *et al.* (2022) reported the use of plant roots to cure dandruff problems in women.

The root juice of ***Amaranthus spinosus*** was used for the treatment of indigestion in child and used to treat urine burn in case of maternal health ailments. However, in the study done by Susandarini *et al*. (2021) the leaves of same plant were used as uterotonics by women.

The problem of uterus pain in female were treated by using the decoction of barks of ***Terminalia arjuna*** and powder form of barks of the same plant which was a different finding than in the study conducted by Susandarini *et al.* (2021) where the fruits, coconut water and oil of *Cocus nucifera* were used to clean the uterus. Singh *et al.* (2022) mentioned the use of *Terminalia arjuna* to cure hypertension and high blood pressure different than the use in present study.

Susandarini *et al.* (2021), in their study mentioned the use of *Areca catechu, Enhydra fluctuans, Impatiens basalmina, Costus speciosus, Bryophyllum pinnatum, Tacca chantrieri, Musa paradisiaca, Myristica fragrans, Trifolium repens, Piper bettle, Phyllanthus niruri, Uncaria gambir, Citrus aurantiifolia, Boesenbergia pandurata* to facilitate ease labor or child delivery whereas in the present study the root juice of ***Solanum melongena*** was given to the pregnant women during delivery period to make delivery faster and also the leaves of same plant were pressed in the stomach area. In case of child health ailments, the fruit of ***Solanum melongena*** was used to treat asthma and also the amulet of roots were tied around the waist of children to treat swelling scrotum. In the study of Ong and Kim (2014), leaves of same plant were used to cure gas pain and flatulence, abdominal pain and fever. Another finding was the use of oil extracted from the seed of ***Brassica nigra*** in the forehead of pregnant women to ease delivery and to provide her some courage.

In the study conducted by Susandarini *et al.* (2021) plant species such as *Pimpinella anisum, Musa paradisiaca, Sauropus androgynus, Citrus aurantiifolia, Capsicum frutescens* and *Boesenbergia pandurata* were used to induce breast milk in post-natal mother. Different plant species had been recorded from the current study for the same purpose such as ***Euphorbia hirta***, *Mirabilis jalapa, Zea mays, Cicer arietinum, Centella asiatica, Trachyspermum ammi, Lens culinaris, Allium sativum, Zanthoxylum armatum, Trigonella foenum-graecum, Trachyspermum ammi, Zingiber* sp., *Catunaregam spinosa* and *Syzygium cumini*. The whole plant of *Euphorbia hirta* were reported to be used for dengue fever (Ong and Kim, 2014). Additionally, it had been found that the people in the study area provide the soup of crabs and earthworms to increase the breast milk in mother.

In the study conducted by Susandarini *et al.* (2021), plant species such as flowers and fruits of *Myristica fragrans*, leaves of *Syzygium aromaticum* and the seeds of *Oryza sativa* were used to treat fertility whereas different plant species had been found in the present study with different belief to cure the fertility. One/one flowers of each plant species like ***Magnolia champaca***, ***Hibiscus rosa-sinensis, Rhododendron arboreum, Tagetes patula*** **and** ***Salvia coccinea*** were taken with addition of two more flowers of any plant species and puja is done by the help of Guruwas in a belief that it will solve the problems of sterility in female.

The slow falling of placenta during delivery period was treated by giving 2 or 3 spoons of root juice of ***Solanum melongena*** to the mother, also one or two leaves of the same plant were

pressed in the stomach area and some people also tied the amulet of roots around the waist of mother. However, the stem of *Dendrocalamus asper* and rhizome of *Curcuma longa* were used to cut placenta in the study done by Susandarini *et al*. (2021).

Susandarini *et al*. (2021) documented the use of fruit of ***Lagenaria siceraria*** to increase stamina and general wellbeing whereas the leaves of same plant were used to treat burns in child and in case of maternal health ailments leaves were used to treat swelling of hands/legs and also the ashes of leaves were applied in the swelled area in the current study. Ong and Kim (2014) reported the use of fruits to treat high blood pressure and difficulty in urination.

In present study, it had been found that the paste of whole parts of ***Centella asiatica*** were used to treat wounds in child. Similarly, juice of whole parts of the plant were used to treat the problems of urine burn in mother and also the juice of the plants were given to the mothers to increase breast milk. The plant juice were taken by mixing little amount of mishri and jaggery to cure lower abdomen pain. The paste was prepared mixing with mint and onion roots and given to girls and women to treat abdominal cramps during menstruation. Similar use of plants to treat wounds had been reported by Bhattarai (2018) in addition to treat pneumonia in infants, gastritis, rashes on tongue and in mouth, throat pain, fever and cuts. Ong and Kim (2014) reported use of the plants leaves to treat problem in urination, burns and sore eyes.

The leaves of ***Cannabis sativa*** had been found to treat the swelling private parts in female and treat the swelling hands or legs of pregnant women. However, the findings were different in the study conducted by Bhattarai (2018) where the plants were reported to be used to cure diarrhea in cattle.

Present findings revealed that the thorns of ***Bombax ceiba*** were used to treat measles whereas the previous study done by Sharma *et al*. (2011) showed that the plant roots were used to treat burns. Likewise, Acharya and Acharya (2009) reported that the bark and fruits of plants were used to treat urinary discord, excessive vaginal bleeding and intestinal bleeding. Similarly, it had been found that the dry latex of the plant was mixed with dry seed of mango to treat diarrhea in a study conducted by Bhattarai *et al*. (2009). Chaudhary and Rajbhandary (2021) also reported the use of barks and latex of plants to treat wounds.

From the present study, it had been found that the milky latex of ***Calotropis gigantea*** was used for the treatment of hands and legs sprain. Other studies from different parts of Nepal also revealed that the plant had been used for treating sprain (Kunwar *et al*., 2006). Manandhar (1985) concluded from his study that the same plant was used to cure swelling of the body. Muller-Boker (1993) documented that the same plant was used for the treatment of wound. The leaves, milky latex and fruits of plant had been reported to be used for the treatment of body pain, boils and pimples according to Acharya and Acharya (2009) and Dangol and Gurung (1991). Chaudhary and Rajbhandary (2021) also reported the use of powder form of flowers to cure asthma and decoction of roots were used to treat joint pain.

The juice of leaves of plant species ***Phaseolus lunatus*** were used to treat ringworm in children. The juice of the plant was applied in the affected part before going to bed. Similar use of the plants had been reported to treat ascariasis in the study of Ong and Kim (2014) in addition to treat mumps, gas pain and flatulence. Chaudhary and Rajbhandary (2021) also reported the use of leaves of the same plants to treat cuts, wounds, skin rashes, ringworm and scabies.

It had been recorded that the fruits of ***Piper longum*** were used to treat diarrhoea, cough, fever and teeth infection in the present study. The use of stem and leaves for the treatment of cough had been reported by Dangol and Gurung (1991). The use of plants for similar use i.e. for cough had been documented by Muller-Boker (1993). Thapa (2008) mentioned that the use of stems, fruits and roots were used to treat cough, gastritis and asthma. Likewise, Acharya and Acharya (2009) documented the use of plants for treating cough and indigestion. In the study conducted by Ghimire and Bastakoti (2009), fruits had been used to treat cough. Similar use had been reported by Chaudhary and Rajbhandary (2021) to cure cough by the use of plants' fruits.

The powder of fruits of ***Terminalia chebula*** were mixed with powder of *Terminalia bellirica*, *Zingiber officinale*, *Elettaria cardamomum*, *Amomum subulatum* and *Cinnamomum tamala* to treat Gastritis. Similar ailment including indigestion had been treated by using the fruit powder of *Terminalia chebula* and *Terminalia bellirica* mixing with little salt in the study of Chaudhary and Rajbhandary (2021). Additionally in the present study the raw fruits of *Terminilia chebula* and *Terminalia bellirica* were chewed to treat common cold and cough.

There were many maternal and child health ailments being treated by the use of ***Aloe vera*** in the present study area. The latex extracted from the leaves of ***Aloe vera*** was used to treat

pimples, dandruff, swelling hands/legs, swelling body parts, to lower B. P. and body pain in case of maternal health ailments. The latex of leaves was used to cure burns, wounds, cuts and rashes in children. Similar kind of findings had been reported by Chaudhary and Rajbhandary (2021) such as pimples, skin rashes, cough, headache and cooling agent. Ong and Kim (2014) reported the use plant leaves to treat alopecia and burns.

The roots of ***Achyranthes aspera*** were found to treat stomach pain, indigestion and fever in children and roots juice were given to pregnant women to abort child in the present study. However, different kind of findings had been reported in the study of Chaudhary and Rajbhandary (2021) i.e. leaves, juice and paste were reported to be used for constipation and muscular pain respectively and also the stem of the plant was used to treat jaundice.

In the present study, the leaves of ***Azadirachta indica*** were used to treat wounds, stomach pain, cough, fever, nosebleeding, severe hot, teeth infection and low blood pressure in child. Similarly, the plant was used to treat indigestion, leucorrhea, hands/legs pain, lower abdomen pain, abdominal cramps and lower B.P in case of maternal health ailments. However, in the study conducted by Chaudhary and Rajbhandary (2021) the plants were found to cure cuts, wounds, skin rashes, ectoparasites, intestinal worms, common cold, cough, asthma, fever, fracture and bone marrow infection. Similar use of the plants to cure fever and healing wound were reported in addition to cure diabetes, gum disease and liver problems in the study of Singh *et al*. (2022)

The bark juice and fruits of ***Syzygium cumini*** were used to cure diarrhea, dysentery, ear infection in case of maternal health ailments and lactation purpose for mothers. Similar use of the plant to treat diarrhea had been reported in the study of Chaudhary and Rajbhandary (2021). Ong and Kim (2014) also reported the bark, fruits and seeds of the plants to treat diarrhea, mouth sore, infant diarrhea and high blood pressure.

The paste prepared from the seeds of ***Oroxylum indicum*** was used to cure burns in the present study. The bark, leaves and flowers of the same plant were used to treat Jaundice (Uddin and Hassan, 2014).

Different and some new uses of the plant species such as *Elephantopus scaber*, *Terminalia arjuna, Aegle marmelos*, *Solanum melongena, Lagenaria siceraria, Cannabis sativa,* and *Oroxylum indicum* had also been documented.

5.9 Informant consensus Factor, Fidelity Level and Use Frequency

In the present study, the ICF values of 9 different ailment categories were calculated for both maternal and child health ailments ranging from 0.40 to 0.79 and 0.22 to 0.75 respectively. In case of maternal health ailments, the highest ICF values were found for skeleto-muscular pain and swelling i.e. 0.79 and lowest for ureno-genital disorder i.e. 0.40. In case of child health ailments, the ICF values were highest for respiratory disease and fever i.e. 0.75 followed by dermatological disorder (0.69). The high ICF value indicates the medicinal plants to be more effective and have the highest number of use reports and also the knowledge shared were more homogenous. The high ICF value (near to 1) specifies that less number of species were used by a large number of people (Heinrich *et al*., 1998). Similar result was obtained by Treyvaud *et al*. (2005) from Q'eqchi Maya of Southern Belize and reported 7 ailment categories among 17 to have ICF value greater and equal to 0.70. However, Yadav (2008) recorded ICF value for 7 ailment categories among 11 greater and equal to 0.75 from three VDCs of Langtang district. Scientifically, the plant species having high ICF value are considered as good species which can be used in the future to be used for further research regarding phytochemistry and phytomedicine (Treyvaud *et al*., 2005). The lowest ICF value was found for ear and throat problems (0.47) and can be considered as less effective plants as the use reports for the species to treat the ailments were less.

The fidelity level value of widely used medicinal plants were higher than other common plants (Teklehaymanot and Giday, 2007). In the present study the highest fidelity level value to treat maternal health ailments were found for *Oxalis corniculata*, *Amaranthus spinosus*, *Spilanthes* sp., *Lagenaria siceraria*, *Ocimum tenuilorum* and *Solanum melongena* (100% each) and *Ageratum haustonianum*, *Syzygium cumini*, *Hordeum vulgare* (100% each) to treat the child health ailments. The species having 100% FL value were the most frequently used species by the local people. Mainasara and Khadijah (2019) reported the highest fidelity value for *Acacia nilotica*, *Guiera senegalensis*, *Tamarindus indica*, *Parkiabiglobosa*, and *Euphorbia*

convolvuloides to treat maternal health ailments in Nigeria and the reported plant species were different than in the present study.

Bhattarai (2018) also reported the highest fidelity level value for *Begonia picta* and *Aconitum palmatum* (FL=100% each) for gastro-intestinal ailments, *Clematis buchananiana* (FL= 91.6%) in ENT problems, *Astilbe rivularis* and *Bergenia ciliata* (FL=100% each) in skeleto-muscular problems. However, the mentioned plant species were different than in the present study.

The use frequency value was highest for the species *Euphorbia hirta* (0.2) for pregnancy related problems and also has the fidelity level value 100% so, it can be considered as an effective plant species to treat pregnancy related health problems. The high UF value indicates the high number of informants who cite the particular plant species for treating particular ailment (Tardio and Santayana, 2008). Another species was *Zingiber* sp. which have the second highest UF value (0.1) and 66.67% FL value, so this species was comparatively less effective than the previous one. The highest UF value in case of child health ailments was found for *Syzygium cumini* (0.3) under gastro-intestinal disorder category to treat diarrhea and dysentery. The species also had the high FL value (100%) and can be considered as an effective plant species to treat gastro-intestinal related ailments as it had been cited by most of the informants in the study area. Similar analysis had been found in the study conducted by Budha Magar *et al.* (2020) in Rolpa district but the species reported having the high UF value was different i.e. *Tsuga dumosa*.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The people of the study area have rich traditional knowledge along with their practices and experiences about the use of medicinal plants for different purposes. Altogether 129 medicinal plant species were recorded from the present study area and 75 plant species were used to treat maternal health ailments while 99 species to treat child health ailments.

The level of knowledge varied depending upon the gender (female and male) and different age group people. The female respondents were found to be more knowledgeable. However, the traditional healers such as Guruwas, Sudenis and elderly people reported more number of plant species. Present study revealed altogether seven plant species to have different and new use. The maximum number of plant species to treat MCHAs were included under Fabaceae family. Quantitative analysis (ICF, FL, and UF value) shows that the most preferred species to treat maternal health ailments are *Euphorbia hirta*, *Amaranthus spinosus*, *Bauhinia vahlii*, *Aloe vera*, *Solanum melongena*, and to treat child health ailments are *Ageratum haustonianum*, *Syzygium cumini*, *Terminalia chebula*, and *Ocimum basilicum*. Plant species such as *Azadirachta indica*, *Aloe vera*, and *Justicia adhatoda* are found to treat the maximum number of ailments. The maximum number of plants used to treat maternal health ailments are cultivated and the opposite is for child health ailments i.e. wild. Herbs are the most used life form due to their easy availability. Likewise, roots are the most preferred plant part for the treatment of maternal health ailments and leaves for the child health ailments.

The older generation have valuable information, practices and experiences to treat different ailments which is lacking in younger generation. One of the reasons behind the less attentive nature of young generation may be the practice of keeping the knowledge secret by old generation. Another reason may be the easy availability of modern medicines. Present study at least attempted to document precious traditional knowledge that can be useful in the invention of new drugs.

6.2 Recommendations

- The indigenous knowledge of local healers (Guruwas, Sudenis) and elderly people should be filmed, documented or taped for the coming generations.
- Younger generation should be encouraged for having concern over the medicinal plant species and their beneficial aspects.
- Local people should be trained for the cultivation of medicinal plant species and conservation.
- Health posts or health care system should include one or two local healers for the treatment of different ailments traditionally.

CHAPTER 7: REFERENCES

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Appendices

Appendix I: Lists of species to treat different ailments

Maternal Health Ailments

Categories	**Species**
One use category	*Oxalis acetosella, Curcuma angustifolia, Glycine max, Cicer arietinum, Cynodon dactylon, Euphorbia hirta, Mirabilis jalapa, Chrysanthemum indicum, Spilanthes sp., Cyperus compactus, Tagetes erecta, Trachyspermum ammi, Amaranthus spinosus, Asparagus racemosus, Mimosa pudica, Trigonella foenum-graecum, Raphanus sativus, Verbena officinalis, Allium cepa, Rheum australe, Citrus* sp., *Ricinus communis, Solanum lycopersicum, Myrica esculenta, Rhododendrum arboreum, Catunaregam spinosa, Zea mays, Wallichia oblongifolia, Artemisia indica, Ocimum tenuiflorum, Desmodium gangeticum, Sesamum indicum, Cuscuta reflexa, Abrus precatorius, Cucumis hardwickii, Lagenaria siceraria, Bauhinia vahlii, Phyllanthus emblica, Terminalia arjuna, Ficus benghalensis, Terminalia bellirica, Syzygium cumini, Terminalia chebula, Senegalia catechu, Bombax ceiba, Caesalpinia bonduc, Clerodendrum infortunatum*
Two	*Allium sativum, Mentha arvensis, Anethum graveolens, Salvia coccinea, Hibiscus rosa- sinensis, Solanum melongena, Ficus religiosa, Oroxylum indicum, Azadirachta indica*
Three	*Equisetum arvense, Zingiber* sp, *Bryophyllum pinnatum, Brassica nigra, Achyranthes aspera, Solanum aethiopicum, Firmiana simplex, Rauvolfia serpentine, Tinospora cordifolia, Magnolia champaca*
Four	*Centella asiatica, Zanthoxylum armatum, Azadirachta indica*
Five	*Cannabis sativa, Aloe vera, Celosia argentea*
More than five	*Zanthoxylum armatum*

Child Health Ailments

Categories	Species
One use category	*Psidium guajava, Terminalia arjuna, Murraya paniculata, Lannea coromandelica, Woodfordia fruticosa, Bauhinia variegata, Sapindus saponaria, Bombax ceiba, Calotropis gigantea, Punica granatum, Ziziphus mauritiana, Berberis asiatica, Aerva sanguinolenta, Desmodium gangeticum, Solanum lycopersicum, Solanum linnaeanum, Euphorbia pulcherrima, Euphorbia royleana, Equisetum arvense, Sida rhombifolia, Cynoglossum zeylanicum, Sagittaria sagittifolia, Euphorbia hirta, Macrotyloma uniflorum, Boerhavia diffusa, Centella asiatica, Spilanthes* sp., *Hordeum vulgare, Alternanthera ficoidea, Amaranthus spinosus, Trigonella foenum –graecum, Raphanus sativus, Solanum nigrum, Rheum austral, Mentha arvensis,, Adiantum* sp., *Impereta cylindrical, Argemone mexicana, Phaseolus lunatus, Momordica charantia, Lagenaria siceraria, Asparagus racemosus, Pterocarpus santalinus, Bryophyllum pinnatum, Amomum subulatum, Anethum graveolens*
Two	*Phyllanthus emblica, Cinnamomum tamala, Syzygium cumini, Pinus roxburghi, Bambusa vulgaris, Ocimum basilicum, Flueggea virosa, Chrysanthemum indicum, Musa paradisiaca, Jatropha curcas, Pogostemon benghalensis, Solanum melongena, Zingiber officinale, Cyanodon dactylon, Centratherum anthelminticum, Desmostachya bipinnata, Alternanthera sessilis, Cuscuta reflexa, Trichosanthes cucumerina, Cissampelos pareira, Brassica rapa, Allium cepa, Oroxylum indicum*
Three	*Rhus javanica, Rubus ellipticus, Ageratum conyzoides, Curcuma longa, Acorus calamus, Elephantopus scaber, Trachyspermum ammi, Scoparia dulcis, Achyranthes aspera, Bauhinia vahlii, Senegalia catechu, Shorea robusta*
Four	*Mangifera indica, Terminalia bellirica, Terminalia chebula, Citrus* sp., *Citrus limon, Ocimum tenuiflorum, Allium sativum, Clerodendrum infortunatum*
Five	*Aegle marmelos, Artemisia vulgaris, Piper longum, Zanthoxylum armatum*
More than five	*Azadirachta indica, Justicia adhatoda, Aloe vera*

Appendix II: Values used to calculate fidelity level

Maternal Health Ailments

S.N.	Ailments & Plant Species	N_p	N	FL (%)
1.	Acne on face (*Oxalis corniculata*)	1	1	100
2.	Pimples; Dandruff (*Aloe vera*)	1	4	25
3.	Urine Burn (*Amaranthus spinosus*)	2	2	100
4.	Urine Burn (*Equisetum arvense*)	1	3	33.33
5.	Common cold (*Spilanthes* sp.)	1	1	100
6.	Cough; Cold (*Cannabis sativa*)	1	3	33.33
7.	Swelling hands/legs (*Lagenaria siceraria*)	3	3	100
8.	Hands/Legs Pain (*Zingiber* sp.)	3	5	60
9.	Tongue Blisters (*Ocimum tenuiflorum*)	1	1	100
10.	Delivery Fast (*Solanum melongena*)	5	6	83.33
11.	Increase Lactation (*Euphorbia hirta*)	10	10	100
12.	Stop excessive bleeding after delivery (*Anethum graveolens*)	4	5	80
13.	Gastritis (*Solanum aethiopicum*)	1	4	25
14.	Stomach pain (*Tinospora cordifolia*)	2	3	66.67
15.	To lower B.P. (*Aloe vera*)	1	6	16.67
16.	Lower B.P (*Tinospora cordifolia*)	1	3	33.33
17.	Irregular menstruation (*Achyranthes aspera*)	1	3	33.33
18.	Stomach pain (*Solanum aethiopicum*)	2	4	50

Child Health Ailments

S.N.	Ailments & Plant Species	N_p	N	FL (%)
1.	Cuts (*Ageratum haustonianum*)	9	11	81.82
2.	Ringworm (*Phaseolus lunatus*)	6	6	100
3.	Diarrhea (*Syzygium cumini*)	12	14	85.71
4.	Diarrhea (*Oroxylum indicum*)	1	8	12.5
5.	Ear infection (*Hordeum vulgare*)	2	2	100
6.	Cough; Common Cold (*Terminalia chebula*)	9	9	100
7.	Fever (*Pogostemon benghalensis*)	6	7	85.71
8.	Tongue blisters (*Ocimum basilicum*)	3	4	75
9.	Swelling of scrotum (*Solanum melongena*)	1	2	50
10.	Eye infection (*Argemone maxicana*)	1	1	100
11.	Tongue blisters (*Ocimum tenuiflorum*)	2	6	33.33
12.	Ear infection (*Alium sativum*)	2	4	50
13.	Blood clot (*Rheum australe*)	1	1	100
14.	Jaundice (*Cuscuta reflexa*)	3	3	100
15.	Headache (*Pogostemon banghalensis*)	1	7	14.29

N_p: No. of informants that prefer the use of particular plant species to treat particular disease

N: No. of informants who use that plant species as a medicine to treat any disease

Appendix III: Values used to calculate use frequency

Maternal Health Ailments

S.N.	Ailments & Plant Species	U	n
1.	Dermatological Disorder (*Aloe vera*)	1	40
2.	Gastro-intestinal Disorder (*Solanum aethiopicum*)	3	40
3.	Ureno-genital Disorder (*Bauhinia vahlii*)	3	40
4.	Respiratory Disease (*Spilanthes* sp.)	1	40
5.	Skeleto-muscular pain and swelling (*Zingiber* sp.)	4	40
6.	Oral Problems (*Ocimum tenuiflorum*)	1	40
7.	Pregnancy Related Problems (*Euphorbia hirta*)	8	40
8.	Menstruation Related Problems (*Azadirachta indica*)	2	40

Child Health Ailments

S.N.	Ailments & Plant Species	U	n
1.	Dermatological Disorder (*Ageratum haustonianum*)	1	40
2.	Gastro-intestinal Disorder (*Syzygium cumini*)	3	40
3.	Respiratory Disease and Fever (*Terminalia chebula*)	1	40
4.	Ureno-genital disorder (*Bauhinia vahlii*)	4	40
5.	Ear and Throat Problems (*Alium sativum*)	1	40
6.	Oral and Dental Problems (*Ocimum basilicum*)	8	40
7.	Skeleto-muscular pain and swelling (*Pogostemon benghalensis*)	2	40
8.	Eye problems (*Argemone maxicana*)	1	40
9.	Others (*Rheum australe*)	1	40

Appendix IV: List of informants with the number of ethno-plants reported

S.N.	Name of Respondents	Sex	Age	Ward No.	Plants reported		Occupation
					Maternal	Child	
1	Baburam Chaudhary	M	50	6	1	2	Farmer
2	Bal Bahadur Chaudhary	M	75	6	1	7	Government Officer
3	Basanta Chaudhary	M	60	6	4	7	Guruwa
4	Belauti Chaudhary	F	60	6	1	3	Housewife
5	Bhagwati Chaudhary	F	55	6	2	10	Housewife
6	Bhikhu Chaudhary	M	63	6	2	2	Farmer
7	Chadak Bahadur Chaudhary	M	58	7	4	5	Farmer
8	Chadani Chaudhary	F	40	6	1	5	Housewife
9	Chainamati Chaudhary	F	55	7	9	10	Housewife
10	Chulhya Chaudhary	F	70	6	6	6	Sudini
11	Dilli Chaudhary	F	77	6	-	4	Housewife
12	Gauthali Chaudhary	F	78	6	1	8	Housewife
13	Gehendra Chaudhary	M	61	7	3	-	Farmer (Retired school guard)
14	Gobardhani Chaudhary	F	57	7	7	3	Housewife
15	Jaguram Chaudhary	M	65	6	4	5	Farmer
16	Janaki Chaudhary	F	36	6	1	4	Housewife
17	Kalapati Chaudhary	F	45	7	1	7	Housewife
18	Khadka Kumari Chaudhary	F	82	6	1	10	Housewife
19	Khusi Ram Chaudhary	M	70	6	9	6	Guruwa
20	Kucha Chaudhary	M	68	6	8	20	Guruwa

21	Lahani Chaudhary	F	45	7	3	7	Housewife
22	Laxi Pyari Chaudhary	F	89	7	-	12	Housewife
23	Maan Bahadur Chaudhary	M	62	6	10	5	Farmer
24	Manju Chaudhary	F	20	7	8	12	Housewife
25	Mankumari Chaudhary	F	45	7	2	4	Housewife
26	Manrakhu Chaudhary	M	79	7	11	15	Guruwa
27	Mayalu Chaudhary	F	58	7	-	6	Housewife
28	Min Bahadur Chaudhary	M	70	7	5	22	Guruwa
29	Min Bahadur Chaudhary	M	65	6	8	4	Farmer
30	Nima Chaudhary	F	29	7	2	1	Housewife
31	Pataya Chaudhary	F	75	7	2	9	Housewife
32	Ramita Chaudhary	F	27	7	2	4	Housewife
33	Ramkanya Chaudhary	F	50	7	-	3	Housewife
34	Rampyari Chaudhary	F	48	7	9	24	Housewife
35	Sugani Chaudhary	F	55	7	6	5	Housewife
36	Sumitra Chaudhary	F	50	6	1	4	Housewife
37	Sunita Chaudhary	F	24	7	2	12	Housewife
38	Suntali Chaudhary	F	60	6	-	2	Housewife
39	Tikaram Chaudhary	M	67	6	-	3	Farmer
40	Tularam Chaudhary	M	69	6	3	15	Guruwa

Appendix V: Maternal Health Ailments (List of ailments categories, Label Name, Local Name, Parts Used, Habit, Habitat, Processing ways and Voucher No.) (*: Voucher specimen not collected)

Ailments Categories	Label Name	Local Name (Tharu)	Parts Used	Habit	Habitat	Processing ways	Voucher No.
Dermatological Disorder							
Acne	*Oxalis acetosella*	Aamchwacha	W	H	W	H	*
	Raphanus sativus	Mula	S	H	C	P	*
Pimples	*Aloe vera*	Ghiukumari	L	H	C	L	*
Dandruff	*Aloe vera*	Ghiukumari	L	H	C	L	*
Clean and Clear Skin	*Brassica nigra*	Lahi	Rem	S	C	P	*
Gastro-intestinal Disorder							
Indigestion	*Azadirachta indica*	Neem	L	T	W	Ju	*
	Cannabis sativa	Ganja	L	S	W,C	S	SCOL 72
Vomiting During Pregnancy	*Zanthoxylum armatum*	Timur	Fr	S	W	R	*
Gastritis	*Allium sativum*	Nasun	B	H	C	R	*
	Terminalia chebula	Harra	Fr	T	W	R	SCOL 71
	Terminalia bellirica	Barra	Fr	T	W	R	*
	Solanum aethiopicum	Bihi	Fr	S	W	R/Pi	SCOL 64
	Rauvolfia serpentina	Dhamlaguruwa	R	H	W	Ju	*
	Cuscuta reflexa	Aakashbeli	W	Cl	W	Ju	*
	Clerodendrum infortunatum	Vaada/Vaat	L/St	S	W	De	SCOL 76

Stomach Pain	*Tinospora cordifolia*	Gurjo	St	Cl	W	De	*
	Desmodium gangeticum	Ghauley Jaro	R	S	W	Ju	SCOL 58
	Oroxylum indicum	Swantata	B	T	W	Ju	SCOL 7
	Rauvolfia serpentina	Dhamlaguruwa	R	H	W	Ju	*
	Zanthoxylum armatum	Tipur	R	S	C	Ju	*
	Cissampelos pareira	Batoley	R/S	Cl	W	R/Ju	*
	Solanum aethiopicum	Bihi	Fr	S	W	R	SCOL 64
	Caesalpinia bonduc	Karenji	S	S	W	De	*
To clean stomach	*Solanum aethiopicum*	Bihi	Fr	S	C	R/De/ Pi	SCOL 64
Dsiplacement of Gaano	*Zanthoxylum armatum*	Tipur	R	S	C	Ju	*
Respiratory Disease and Fever							
Cough and Cold	*Spilanthes* sp.	Gorakhpaan	W	H	W	Ju	SCOL 66
	Firmiana simplex	Odal	Br	S	W	Ju	SCOL 73
	Cannabis sativa	Ganja	L	S	W,C	S	SCOL 72
Ureno-Genital Disorder							
Urine Burn	*Amaranthus spinosus*	Matya	R	S	W	Ju	SCOL 38
	Centella asiatica	Ghodtapre	W	H	W	Ju	SCOL 31
	Bauhinia vahlii	Namhenik Patya	L/Pe	T	W	Ju	SCOL 2
	Equisetum arvense	Aakhchimni	W	H	W	Ju/Am	SCOL 16
Leucorrhea	*Azadirachta indica*	Neem	L	T	C	V	*
Swelling of Private Parts	*Cannabis sativa*	Ganja	L	S	W,C	B/H	SCOL 72
Uterus Pain	*Terminalia arjuna*	Arjun Kath	Br	T	W	Pd/De	*
Urination Problems	*Equisetum arvense*	Aakhchimni	W	H	W	Am	SCOL 16
Oral Problems							
Dry Mouth	*Myrica esculenta*	Kafal	Br	S	W	R	*
Tongue Blisters	*Ocimum tenuiflorum*	Tulsi	S	H	C	R	SCOL 67
Skeleto-Muscular Pain and Swelling							
Swelling of Hands/Legs	*Ficus religiosa*	Pipra	B/L	T	W	A/H/P	SCOL 61
	Ficus benghalensis	Bargadhwa	B/L	T	W	A	SCOL 57
	Lagenaria siceraria	Lauka	L	S	C	H/A	*
	Rheum australe	Padamchaal	R	S	W	P	*
	Cannabis sativa	Ganja	L	S	W,C	A	SCOL 72
	Ricinus communis	Sullyar	L	S	W	A	SCOL 47
	Aloe vera	Ghiukuwari	L	H	C	L	*

Hands/Legs Pain	*Zingiber* sp.	Bai Aduwa	Rh	H	W	De	SCOL 10
	Curcuma angustifolia	Bai Besar	Rh	H	W	De	SCOL 48
	Tinospora cordifolia	Gurjo	St	Cl	W	De	*
	Azadirachta indica	Neem	Fr	T	W	O	*
	Brassica nigra	Lahi	S	S	C	O	*
	Bombax ceiba	Simal	Br	T	C/W	Pd	SCOL 19
Body Pain	*Wallichia oblongifolia*	Rangan	L/St	S	W	De	SCOL 12
	Aloe vera	Ghiukumari	L	H	C	De/B	*
Pain In Joints And Nerve Pain	*Equisetum arvense*	Aakhchimni	W	H	W	Am	SCOL 16
	Bryophyllum pinnatum	Padjamri	L	H	C/W	H	SCOL 13
Back Pain	*Senegalia catechu*	Khayar	Re	T	W	De	SCOL 36
	Anethum graveolens	Samphu	S	H	C	Pd	SCOL 59
Headache	*Artemisia vulgaris*	Titepati	L	S	W	Ju	SCOL 51
	Firminia simplex	Odal	Br	S	W	Ju	SCOL 73
Hands/Legs Pain	*Asparagus racemosus*	Kurla	R	H	W	Ju	SCOL 5
Navel Swelling	*Cucumis sativus* var. *hardwickii*	Airelu	R	Cl	W	P	*
Swelling Body Parts	*Ficus religiosa*	Pipra	Br	T	W,C	A	SCOL 61
	Zingiber sp..	Bai Aduwa	Rh	H	W	P	SCOL 10
	Aloe vera	Ghiukumari	L	H	C	L	*
Pregnancy related problems							
Slow Delivery	*Solanum melongena*	Vaata	R/L	S	C	Ju/Am	SCOL 25
	Brassica nigra	Lahi	S	S	C	O	*
To make eat food	*Abrus precatorius*	Raatigedi	R	Cl	W	Ju	*
Excessive Bleeding After delivery	*Anethum graveolens*	Samphu	Fr	H	C	R/De/C/I	SCOL 59
	Rauvolfia serpentina	Dhamalguruwa	R	H	W	Ju	*
	Celosia argentea	Chaiyafuul/Kyashar Fula	Fl	S	C	Ju	SCOL 034
	Magnolia champaca	Champha	Fl	S	C	P	*
	Oroxylum indicum	Swantata	S	T	W	Ju	SCOL 7
Lactation	*Euphorbia hirta*	Dudhey Jhar	W	H	C	Ju/De/R	SCOL 29
	Mirabilis jalapa	Ghunesra	R	S	C	Ju	SCOL 39
	Zea mays	Kokni	S	S	C	C	*
	Glycine max	Bhattar	S	S	C		*
	Cicer arietinum	Chana	S	S	C	C	*
	Centella asiatica	Ghodtapre	W	H	W	Ju	SCOL 31
	Trachyspermum ammi	Jwano	S	S	C	C/De	*

	Lens culinaris	Masri	S	H	C	C	*
	Sesamum indicum	Til	S	S	C	C	*
	Allium sativum	Nasun	B	H	C	C	*
	Zanthoxylum armatum	Tipur	R	S	C	P	*
	Trigonella foenum-graecum	Methi	S	S	C		*
	Trachyspermum ammi	Jwano	Fr	H	C		*
	Zingiber sp.	Bai Aduwa	Rh	H	W		*
	Catunaregam spinosa	Maiin	Br	S	W		SCOL 77
	Syzygium cumini	Faleto(Jamun)	Br	T	C		*
Vomiting	*Mentha arvensis*	Padna	L	H	C	P	SCOL 54
	Allium cepa	Pyaj	B	H	C	P	*
	Zanthoxylum armatum	Timur	Fr	S	W	R	*
Slow Falling of Placenta	*Solanum melongena*	Vaata	R/L	S	C	Ju/Am	SCOL 25
Lack of Appetite	*Abrus precatorius*	Raatigedi	R	S	W	Ju	*
To Abort Child	*Citrus* sp.	Amla	R	S	C	Ju	SCOL 21
	Achyranthes aspera	Ultakuur	R	S	W	Ju	SCOL 3
To Prevent Conception	*Celosia argentea*	Chaiyafuul	Fl	S	C	Ju	SCOL 34
To Treat Sterility	*Magnolia champaca*	Champha	Fl	T	C	Pu	*
	Hibiscus rosa-sinensis	Baarmsey fula	Fl	S	C		*
	Rhododendron arboreum	Laliguras	Fl	S	W		*
	Tagetes patula	Hajari	Fl	H	C		SCOL 37
	Salvia coccinea	Raani	Fl	H	C		*
To Lower B.P.	*Bryophyllum pinnatum*	Bhuipatta	L	H	C/W	R	SCOL 13
To Prevent Abortion	*Celosia argentea*	Chaiyafuul/Kyashar Fula	Fl	S	C	Pu	SCOL 34
Menstruation Related Problems							
Irregular Periods	*Magnolia champaca*	Champha	Fl	S	C		*
	Achyranthes aspera	Ultakuur	R	H	W	Ju	SCOL 3
	Cynodon dactylon	Duub	W	H	W	Ju	SCOL 56
	Hibiscus rosa-sinensis	Barmasey Fula	Fl	S	C	Pu	*
	Rhododendron arboreum	Laliguras	Fl	S	W		*
	Magnolia champaca	Champa	Fl	S	C		*
	Tagetes patula	Hajari	Fl	S	C		SCOL 37
Lower Abdomen Pain	*Azadirachta indica*	Neem	L/T	T	W	V	*
	Centella asiatica	Ghodtapre	W	H	W	Ju	SCOL 31
Overbleeding During Menstruation	*Celosia argentea*	Chaiyafuul/Kyashar Fula	Fl	S	C	Ju	SCOL 34
	Oroxylum indicum	Swantata	S	T	W	Ju	SCOL 7

Abdominal Cramps	*Azadirachta indica*	Neem	L	T	W	V	*
	Mentha arvensis	Padna	L	H	C	P	SCOL 54
	Allium cepa	Pyaj	R	H	C		*
	Centella asiatica	Ghortapre	W	H	C		SCOL 31
	Solanum aethiopicum	Bihi	Fr	S	W	R	SCOL 64
	Verbena officinalis	Petmaari	R	H	C	De	SCOL 28
	Mimosa pudica	Lajjawoti/Lato	R	H	W	Ju	*
Others							
High B.P.	*Aloe vera*	Ghiukumari	L	H	C	L	*
	Tinospora cordifolia	Gurjo	St	Cl	W	De	*
	Azadirachta indica	Neem	L	T	W	Ju	*

Appendix VI: Child Health Ailments (List of ailments categories, Label Name, Local Name, Parts Used, Habit, Habitat, Processing ways and Voucher No.) (*: Voucher specimen not collected)

Ailment Categories	Label Name	Local Name (Tharu)	Parts Used	Habit	Habitat	Processing ways	Voucher No.
Dermatological Disorder							
Burns	*Jatropha curcas*	Ratanjot	St	S	W	Ju/P/L	SCOL 45
	Alternanthera sessilis	Bhiringiraj	R	H	W	Ju	*
	Lagenaria siceraria	Lauka	L	Cl	C	Ju/P	*
	Aloe vera	Ghiukuwari	L	H	C	L	*
	Solanum lycopersicum	Golvera	Fr	S	C	Ju	SCOL 26
	Alternanthera sessilis	Bhiringiraj	R	H	W	Ju	*
	Lagenaria siceraria	Lauka	L	Cl	C	Ju/P	*
	Aloe vera	Ghiukuwari	L	H	C	L	*
	Solanum lycopersicum	Golvera	Fr	S	C	Ju	SCOL 26
	Bambusa vulgaris	Baas	L	S	W, C	A/P	SCOL 74
	Woodfordia fruticosa	Dhaira	Br	S	W	P	SCOL 65

	Flueggea virosa subsp. *virosa*	Dahigola	L	S	W	P	SCOL 46
	Allium sativum	Nasun	B	H	C	P	*
Burns	*Oroxylum indicum*	Tatelo(N)/Suntata	S	T	W	P	SCOL 7
Wounds	*Ocimum basilicum*	Bebri	S	S	C	P	SCOL 60
	Azadirachta indica	Neem	L	T	W	P	*
	Ageratum houstonianum	Bokejhar	L	H	W	Ju	SCOL 42
	Shorea robusta	Saal	Re	T	W	Re	SCOL 63
	Centella asiatica	Ghortapre	W	H	W	P	SCOL 31
	Cynodon dactylon	Dubo	W	H	W	P	SCOL 56
	Artemisia vulgaris	Paati/ Titepaati	L	H	W,C	P	SCOL 51
	Cynoglossum zeylanicum	Chakchaira	L	H	W	P	SCOL 69
	Oroxylum indicum	Tatila/Tatelo	L	T	W	P	SCOL 7
	Aloe vera	Ghiukumari	L	H	C	L	*
	Sida rhombifolia	Bishkhapra	W	H	W	Ju	*
Cuts	*Lannea coromandelica*	Dabdabey	Br	T	W	P	*
	Ageratum haustonianum	Raune/Bokejhar/Kasalighas	L/Y	H	W	Ju	SCOL 42
	Euphorbia pulcherrima	Lalupatey	L	S	C	Ju	*
	Senegalia catechu	Khayer	Re	T	W	Re	SCOL 36
	Euphorbia hirta	Dudhejhar	L	H	W	L	SCOL 29
	Pinus roxburghii	Salla	Re	T	W	P	*
	Aloe vera	Ghuikumari	L	H	C	L	*
Scabies	*Artemisia vulgaris*	Paati/Titepaati	L	S	W,C	In	SCOL 51
	Ocimum tenuiflorum	Tulsi	L	S	C	In	SCOL 67
	Brassica nigra	Lahi	S	H	C	P	*

	Ageratum haustonianum	Bokejhar	L/Y	H	W	Ju/P	SCOL 42
Itching and Allergy	*Spilanthes* sp.	Gorakhpaan	W	H	W	P	SCOL 66
	Pinus roxburghii	Salla	Re	T	W	P	*
Boils	*Aegle marmelos*	Byal	Br	T	W	P	SCOL 15
	Boerhavia diffusa	Gaspuna	W	H	W	De/P	SCOL 8
	Alternanthera ficoidea	Laalpatya	W	H	W	Ju	SCOL 70
	Oroxylum indicum	Swantata	S	T	W	P	SCOL 7
	Boerhavia diffusa	Gaspuna (Th)	W	H	W	P	SCOL 8
Blisters	*Artemisia vulgaris*	Pati/titepati	L	S	W,C	P	SCOL 51
Chicken Pox	*Acorus calamus*	Bojo	Rh	S	W,C	De	SCOL 24
Ringworm	*Phaseolus lunatus*	Hiudya Sem	L	S	C	Ju	SCOL 23
	Bauhinia vahlii	Taata	S	T	W	P	SCOL 2
	Oroxylum indicum	Swantata	S	T	W	P	SCOL 7
	Allium sativum	Lasun	B	H	C	P	*
Rashes	*Aloe vera*	Ghiukumari	L	H	C	L	*
Wart	*Scoparia dulcis*	Mittha	Fr	H	W	R	SCOL 27
Measles	*Bombax ceiba*	Simal	Th	T	W	P	SCOL 19
	Desmostachya bipinnata	Kush	R	H	W	P	*
	Ziziphus mauritiana	Bayar	Y	S	W		SCOL 32
	Senegalia catechu	Khayar	Y	T	W		SCOL 36
Dandruff	*Brassica nigra*	Mustard (Pina)	S	H	C	P	*

Gastrointestinal Disorder							
Diarrhoea	*Psidium guajava*	Aamrut	Br	T	C	Ju	SCOL 14
	Syzygium cumini	Jaam	Br/Fr	T	C	Ju/De/R	*
	Rhus javanica	Vakya Chuuk	Fr	T	C	Pd	*
	Trichosanthes cucumerina	Kaitha	Fr	S	C	Ju	*
	Musa paradisiaca	Kyara	Fr	S	C	R	*
	Oroxylum indicum	Swantata	S	T	W	P	SCOL 7
	Punica granatum	Anar	Br/Fl	S	C	Ju/R	*
	Chrysanthemum indicum	Godauri Fula	L	S	C	L/Ju	*
	Clerodendrum infortunatum	Tita/Vaada	L/St	S	W	De	SCOL 76
	Curcuma longa	Besar	Rh	S	C	De	*
	Jatropha curcas	Ratanjot	L	S	W	In	SCOL 45
	Piper longum	Murajar	Fr	H	C	R	SCOL 30
	Scoparia dulcis	Mittha	L	H	W	P/De	SCOL 27
	Mangifera indica	Aam	Br	T	C	Ju/De	*
	Aegle marmelos	Byal	Fr	T	W	Ju	SCOL 15
	Bauhinia variegata	Koiraal	Br	T	C	Ju	SCOL 50
	Shorea robusta	Sakhwa	Br	T	W	De	SCOL 63
	Zanthoxylum armatum	Timur	St	S	W	Ju	*
	Anethum graveolens	Samphu	S	H	C	De	SCOL 59
	Catunaregam spinosa	Maiin	Br	S	W	Pd	SCOL 77
Dysentery	*Trichosanthes cucumerina*	Kaitha	Fr	S	C	In	*

	Syzygium cumini	Jaam	Br	T	C	Ju/De	*
	Aegle marmelos	Byal	Fr	T	W	Ju	SCOL 15
	Oroxylum indicum	Swantata	Br	T	W	De	SCOL 7
	Rhus javanica	Vakya Chuuk+	Fr	T	W	P	*
	Allium cepa	Pyaj	B	H	C		*
	Raphanus sativus	Morai	B	H	C	P	*
Vomit	*Mangifera indica*	Aap	Br	T	C		*
Stomach Pain	*Elephantopus scaber*	Dadari	W	H	W	Pd	SCOL 78
	Azadirachta indica	Neem	St/ L	T	W	Ju	*
	Oroxylum indicum	Swantata	S	T	W	In	SCOL 7
	Rubus ellipticus	Ainselu	R	S	W	Ju	*
	Acorus calamus	Bojo	Rh	H	C/W	Ju	SCOL 24
	Justicia adhatoda	Asuro	Ti	S	W	Ju	SCOL 4
	Achyranthes aspera	Ultakur	R	H	W	De	SCOL 3
Stomach Burn	*Cissampelos pareira*	Batoley	L	C	W	Ju	*
Gastritis	*Phyllanthus emblica*	Aura	Fr	S	W	Pd/ P	*
	Amomum subulatum	Badka illaichi	S	H	C		*
	Elettaria cardamomum	Sukmel	S	H	C		*
	Cinnamomum tamala	Dalchini	L	T	C/W		*
	Zingiber officinale	Aduwa	Rh	H	C		*
	Terminalia chebula	Harro	Fr	T	W		SCOL 71
	Terminalia bellirica	Barro	Fr	T	W		*
Constipation	*Bauhinia vahlii*	Maalu/Taata	S	T	W	P	SCOL 2

	Cissampelos pareira	Batoley	L	C	W	Ju	*
Indigestion	*Amaranthus spinosus*	Matya/Karey matey	R	S	W	Ju	SCOL 38
	Elephantopus scaber	Dadari	W	H	W	Pd	SCOL 78
	Allium cepa	Pyaj	B	H	C	P	*
	Achyranthes aspera	Ultakuur	R	H	W	Ju	SCOL 3
	Acorus calamus	Bojo	Rh	H	C/W	Ju	SCOL 24
Worms	*Citrus* sp.	Aamla	R/L/Br	S	C	Ju/R/De	SCOL 21
	Phyllanthus emblica	Aura	Fr	S	W	Pd	*
	Rhus javanica	Vakya Chuuk	Fr	T	W		*
	Flueggea virosa	Dahigwala	S	S	W	R	SCOL 46
	Justicia adhatoda	Asuro	Y	H	C	In	SCOL 4
	Citrus limon	Kagati	R	S	C	In	SCOL 22
	Citrus sp.	Aamla	R	S	C		SCOL 21
	Imperata cylindrica	Siru	R	H	W	P	*
Respiratory disease and fever							
Common Cold	*Terminalia chebula*	Harra	Fr	T	W	R	SCOL 71
	Terminalia bellirica	Barra	Fr	T	W	R	*
	Trachyspermum ammi	Jwano	Fr	H	C	De	*
	Rubus ellipticus	Ainselu	R	S	W	Ju	*
	Ocimum tenuiflorum	Tulsi	L/Y	H	C	De	SCOL 67
	Cynodon dactylon	Duub	W	H	W,C	Ju	SCOL 56
	Piper longum	Murajar	Fr	H	C	R	SCOL 30
	Acorus calamus	Bojo	Rh	H	C	De	SCOL 24

	Clerodendrum infortunatum	Tita (Vaada)	L/St	S	W	De/R	*
	Justicia adhatoda	Asuro	Y	H	C	Ju	SCOL 4
	Citrus sp.	Aamla	L	S	C	De/R	SCOL 21
	Aegle marmelos	Byal	L	T	W		SCOL 15
	Mangifera indica	Aam	L	T	C		*
	Curcuma longa	Hardi	Rh	H	C		*
	Citrus limon	Kakti	L	S	C	Ju/R	SCOL 22
	Cuminum cyminum	Kari jeeri	S	H	W	De	*
	Senegalia catechu	Khayar	Br	T	W	De	SCOL 36
	Pogostemon benghalensis	Udaira	L	S	C/W	Ju	SCOL 2
Cough	*Terminalia chebula*	Harra	Fr	T	W	R	SCOL 71
	Terminalia bellirica	Barra	Fr	T	W	R	*
	Rubus ellipticus .	Ainselu	R	S	W	Ju	*
	Ocimum tenuiflorum	Tulsi	L/Y	H	C	De	SCOL 67
	Zanthoxylum armatum	Tipur	Fr	S	C	R	*
	Acorus calamus	Bojo	Rh	H	C	R	SCOL 24
	Clerodendrum infortunatum	Tita(Vaada)	Wh	S	W	De	SCOL 76
	Justicia adhatoda	Asuro	Y	H	C	De	SCOL 4
	Azadirachta indica	Neem	L	T	C	Ju	*
	Piper longum	Murajar	Fr	S	C	R	SCOL 30
	Curcuma longa	Besar	Rh	H		Pd	*
	Pogostemon benghalensis	Udaira	L	S	C/W	Ju	SCOL 2
	Citrus sp.	Amla	L	S	C	De	SCOL 21

	Aegle marmelos	Byal	L	T	W		SCOL 15
	Mangifera indica	Aam	L	T	C		*
	Curcuma longa	Hardi	Rh	H	C		*
	Citrus limon	Kakti	L	S	C	R	SCOL 22
	Cuminum cyminum	Kari Jeeri	S	H	W	De	*
	Senegalia catechu	Khayar	Br	T	W	De	SCOL 36
	Clerodendrum infortunatum	Vaada/Vaat	W	S	W	De/R	SCOL 76
Asthma	*Solanum melongena*	Vaata	Fr	S	C	Touch in chest and hang somewhere as amulet.	SCOL 25
	Justicia adhatoda	Asuro	L/Ti	H	C	De	SCOL 4
Fever	*Citrus limon*	Kakti	Fr	S	C	Ju	SCOL 22
	Artemisia vulgaris	Titepati	L/Y	S	W	Ju	SCOL 51
	Achyranthes aspera	Ultakuur	R	H	W	Ju	SCOL 3
	Pogostemon benghalensis	Udaira	L	H	W	Ju	SCOL 2
	Azadirachta indica	Neem	L	T	W	In	*
	Piper longum	Murajar	Fr	H	C	R	SCOL 30
	Berberis asiatica	Chothra	Br	S	W	Ju	*
	Justicia adhatoda	Asuro	L/ Ti	H	C	De	SCOL 4
	Adiantum sp.	Raatmol	W	H	W	Am	*
Typhoid	*Sapindus mukorossi*	Rittha	S	T	W	Ju	*
Pneumonia	*Momordica charantia*	Kareli	W	S	C	Am	SCOL 20
	Allium sativum	Nasun	B	H	C		*

	Trachyspermum ammi	Jwano	S	H	C		*
	Zanthoxylum armatum	Tipur	Fr	S	C		*.
Difficulty in breathing	*Chrysanthemum indicum*	Godauri fula (Th)	L	S	C	L/Ju	*
Nose Bleeding	*Celosia cristata*	Kyashar Fula	Fl	S	C	Ju	SCOL 034
	Azadirachta indica	Neem	L	T	W	In	*
Severe Hot	*Azadirachta indica*	Neem	L	T	W	In	*
	Mentha arvensis	Pudina	L	H	C	P	SCOL 54
	Musa paradisiaca	Kera	R	S	C		*
	Justicia adhatoda	Asuro	L/Ti	H	C		SCOL 4
	Artemisia vulgaris	Titepati	L	S	C	Ju	SCOL 51
Jaundice	*Cuscuta reflexa*	Akashbeli	W	C	W	Ju	*
	Clerodendrum infortunatum	Vaada	R	S	C	In	SCOL 76
	Oroxylum indicum	Swantata	Br	T	W	Ju	SCOL 7
	Aloe vera	Ghiukumari	L	H	C	L	*
Ureno-genital disorder							
Urine Burn	*Equisetum arvense*	Aankhchimni	W	H	W	Am	SCOL 16
Swelling of Scrotum	*Solanum melongena*	Vaata	R	S	C	Am	SCOL 25
Yellow Urine	*Bauhinia vahlii*	Namhini	Br	T	W	Ju/R	SCOL 62
Ear and Throat Problems							
Sore Throat	*Terminalia arjuna*	Arjun Kath	Br	T	W	Pd	*
	Trachyspermum ammi	Jwano	S	H	C	Am	*
	Zanthoxylum armatum	Tipur	Fr	S	C		*
	Trigonella foenum-graecum	Methi	S	H	C		*
Ear Infection	*Citrus* sp.	Aamla	L	S	C	Ju	SCOL 21
	Hordeum vulgare	Jau	L	S	C	Ju	*

	Allium sativum	Nasun	B	H	C	Cook	*
	Sagittaria sagittifolia	Dabli	L	S	W	Ju	SCOL 68
	Solanum nigrum	Ninhuwa Ghumra	L	S	W	Ju	SCOL 40
	Syzygium cumini	Jamun/ Jaam	Br	T	C	Ju	*
	Tagetes patula	Hajari	Fl	H	C	Ju	SCOL 37
	Erythrina stricta	Fared	St	T	W	Ju	*
Oral and Dental Problems							
Teeth Infection	*Azadirachta indica*	Neem	L	T	W	Ju	*
	Murraya paniculata	Bajradanti	St	S	W	R	SCOL 1
	Piper longum	Murajar	Fr	H	C	R	SCOL 30
	Zanthoxylum armatum	Tipur	Fr	S	C	R	*
	Desmostachya bipinnata	Kusho	R	H	W	P	*
	Solanum linnaeanum	Karchyata	Fr	S	W	P	SCOL 55
Tounge Blisters	*Ocimum basilicum*	Bebri	S	H	W,C	R	SCOL 60
	Ocimum tenuiflorum	Tulsi/Lahunga	S	H	C	R	SCOL 67
Skeleto-Muscular Pain And Swelling							
Hands/Legs Sprain	*Cuscuta reflexa*	Aakashbeli	W	Cl	C	P	*
	Rheum australe	Padamchaal	R	H	W	Ju	*
	Calotropis gigantea	Aankh	L	S	W	L	SCOL 17
	Euphorbia royleana	Siudi	L	S	W	L	*
Hands/Legs Broken	*Cuscuta reflexa*	Aakashbeli	W	Cl	C	P	*
Headache	*Pogostemon benghalensis*	Udaira	L	S	W	P	SCOL 2
Eye Problems							
Eye Infection	*Argemone mexicana*	Varvanda	Fl	S	W	Ju	SCOL 52
Decreased Eye Power	*Alternanthera sessilis*	Viringiraaj	R	H	W	Ju	*
Others							
Marasmus	*Shorea robusta*	Jinaitha/Saal	Br	T	W	De	SCOL 63

Blood Clot	*Rheum australe*	Padamchaal	R	H	W	Ju	*
Separate clotted blood	*Pterocarpus santalinus*	Raktachandan	St	T	W	Ju	*
Low Blood Pressure	*Tinospora cordifolia*	Gurjo	St	Cl	W	De	*
	Azadirachta indica	Neem	L	T	W	Ju	*

In the Parts Used Column: W- Whole parts; S-Seeds; L- Leaves; Re-Remnants; Fr-Fruits; B-Bulbs; R-Roots; St-Stem; Br-Bark; Pe- Petiole; Rh-Rhizome; Re-Resins; Fl- Flowers; T-Twigs; Y-Young Shoots; Th-Thorns; Ti- Tips of Young Shoots
In the Habit Column: H-Herbs; S-Shrubs; T- Trees; C-Climbers
In the Habitat Column: W-Wild; C-Cultivated
In the Processing ways column: H- Heat; P-Paste; L-Latex; Ju-Juice; S-Smoke by Adult; R-Raw; Pi-Pickle; A-Ash; O-Oil; B-Burn; Am-Amulet; De-Decoction; Pd-Powder; V-Vapour; I-Inserted; C-Cook; Pu-Puja; In- Infusion
In the Voucher no. column: SCOL- Sangita's Collection

Appendix VII: Questionnaire used for data collection

Name:

Address:

Gender:

Age:

Education:

Occupation:

Questions:

1) Do you use forest products from nearby forests?

Yes No

2) What kinds of material do you bring from forests?

Fodder Logs Litters Leaves Flowers Fruits Others (specify)

3) For what purpose do you use forest products?

Timber Medicinal Aromatic use Ornamental Fiber Dye Edible Trade Religious

4) How often do you use forest products for daily use?

More dependent Less dependent Moderate

5) How people over here treat the diseases they suffer from?

Traditional way Modern way

6) (If traditional) What are the different medicinal plants that you use?

…….

7) Which kind of diseases can be treated by using medicinal plants?

……

8) What are the most frequently used medicinal plants?

…….

9) Are the medicinal plants effective to treat the diseases?

…….

10) Are there any medicinal plants being used to treat maternal illnesses? (If yes) What are they?

…….

11) What are the maternal illnesses being treated by these medicinal plants?

……..

12) Are there any medicinal plants being used to treat child illnesses? (If yes) What are they?

……..

13) What are the child illnesses being treated by these medicinal plants?

…….

Appendix VIII: Data Sheet used for data collection

Title: Participatory Survey to document resource utilization patterns

Date:

Site:

Name:

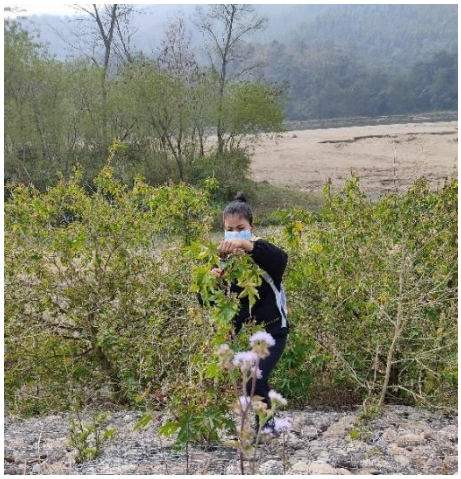
Age:

Education:

S. N.	Local Name	Habit	Habitat	Part(s) used	Collection season	Mode of use	Doses

Photographs

A- Interviewing a Traditional Healer (Guruwa)



B- Plant collection (*Ricinus communis*)

C- Plant collection (*Senegalia catechu*)

D- Having group discussion with local people

E- Interviewing some local people

F- Plant collection (*Ziziphus mauritiana*)

G- Group discussion with some local people

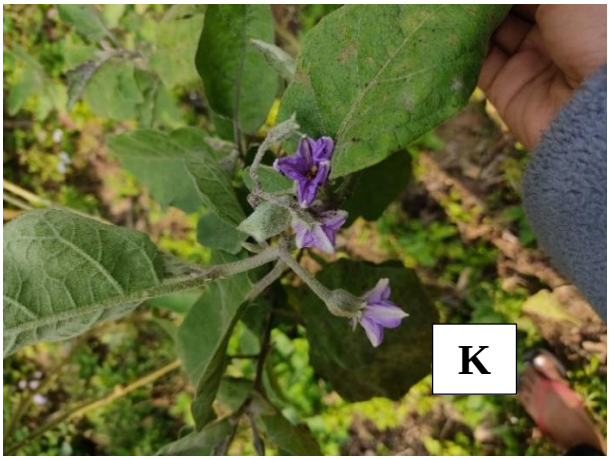
H- Interviewing local people

I- *Argemone mexicana*

J- *Solanum linnaeanum*

K- *Anethum graveolens*

L- *Oroxylum indicum*



M- *Solanum melongena*

N- *Euphorbia hirta*

L

O- *Terminalia chebula*

P- *Boehmaria* sp

Q- *Piper longum*

R- *Centella asiatica*

S- *Acorus calamus* (Rhizome)

T- *Acorus calamus*