MEDICAL ETHNOBIOLOGY AND INDIGENOUS KNOWLEDGE SYSTEM FOUND IN DARAI ETHNIC GROUP IN CHITWAN DISTRICT, NEPAL

(A Case Study of Mangalpur Village Development Committee)

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DECLARATION

I hereby declare that the work presented in this thesis has been done by myself, and has not been submitted elsewhere for the award of any degree. All the sources of information have been specifically acknowledged by reference to the author(s) or institution(s).

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RECOMMENDATIONS

This is to recommend that the thesis entitled "**Medical Ethnobiology and Indigenous Knowledge System Found in Darai Ethnic Group in Chitwan District, Nepal (A Case Study of Mangalpur Village Development Committee)**" has been carried out by **Ms. Manisha Poudel** for the partial fulfillment of Master's Degree of Science in Zoology with special paper Ecology. This is her original work and has been carried out under my supervision. To the best of my knowledge, this thesis work has not been submitted for any other degree in any institutions.

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LETTER OF APPROVAL

On the recommendation of supervisor Dr. Nanda Bahadur Singh this thesis submitted by Ms. Manisha Poudel entitled "**Medical Ethnobiology and Indigenous Knowledge System Found in Darai Ethnic Group in Chitwan District, Nepal (A Case Study of Mangalpur Village Development Committee)**" is approved for the examination and submitted to the Tribhuvan University in partial fulfillment of the requirements for Master's Degree of Science in Zoology with special paper Ecology.

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CERTIFICATE OF ACCEPTANCE

This thesis work submitted by Ms. Manisha Poudel entitled "**Medical Ethnobiology and Indigenous Knowledge System Found in Darai Ethnic Group in Chitwan District, Nepal (A Case Study of Mangalpur Village Development Committee)**" has been accepted as partial fulfillment for the requirements of Master's Degree of Science in Zoology with special paper Ecology.

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LIST OF ABBREVIATIONS

CBS	Central Bureau of Statistics
CNP	Chitwan National Park
IUCN	International Union for Conseravtion of Nature
IK	Indigenous Knowledge
Sq. Km	Square Kilometer
Spp	Species
NEFDIN	Natinal Foundation for Develeopment of Indigenous Nationalities.
NEFIN	Nepal Federation of Indigenous Nationalities.
VDC	Village Development Committee
WIPO	World Intellectual Property Organization

ABSTRACT

The present research has been undertaken in the Mangalpur VDC of Chitwan District in Western Nepal to explore and document the general ethnography, practices on the use of animal and plant species for medicinal purpose indigenous knowledge and among the Darai ethnic group. Studies have been conducted in two diferent seasons i.e. summer and winter from March 15-26, 2014 and August 10-18, 2015. The ethnomedicinal data were collected through key informant interview, group interview, group discussion, participatory observation and informal interview with all groups of people viz. local healers (*Dhami/Jhankri*), knowledgeable elder people, community leader, plant collectors, teachers as well as youth and local people during the field work. Analysis of data revealed that Darai people used 28 animal species for the treatment of 22 different diseases and 76 species of plants to treat 36 different diseases. Various parts and products like meat, skin, bone, blood, carapace, urine, whole organism, hoof egg, tooth, feather and fats of animal parts were used as traditional medicine. Similarly, plant parts such as root, fruit, leaf, whole plant, flower, latex, resin, shoot stem hair, bark, rhizome, seed and young shoot were found to be used by the Darai people. They worship nature and own unique indigenous knowledges regarding biodiversity conservation, agricultural practice, medicinal practices, yeast making practices and art, craft and technology. However, indigenous knowledge and skills of medication are given less attention these days especially by youngsters due to inclination towards modern medicine and hospital facilities. It is necessary to provide education and encouragement to younger generations to pay attention to such knowledges as they make a part of global knowledge and important part of lives of ethnic people. Also proper documentation is necessary to prevent loss of traditional knowledges. Hence, analysis and documentation of traditional medicinal practices and indigenous knowledge of Darai ethnic group is the ultimate objective of this thesis paper.

Keywords: Mangalpur, Medicinal animals, Medicinal plants, Darai, Local healers, Indigenous knowledge.

1. INTRODUCTION

1.1 General Introduction

Nepal is a small country with immense cultural and natural richness. There is a diverse climatic variation from tropical to alpine as a result of altitudinal variation from 60m to 8848m. Nepal with the area of 1,47,181 km^2 lies between latitude 26 & 31 N and longitude between 80 &89 E. Dramatic differences in elevation and varied ecological belts running from east to west, vertically intersected by major north to south flowing river system along with different cultures support diverse forms of livelihood of people.in Nepal.

There are about 250 million indigenous people scattered over global territories of 70 countries. Approximately 60% of the total indigenous people lived in Asia and 66.66% of them are particularly found in china and Asia (Singh 1995). The indigenous people are those whose ancestors were the original inhabitants to their lands and include hunter shifting, cultivation practitioner, fisherman, no maids, pastorals and settled formers who have little participation in the market economy. Indigenous knowledge is an important aspect of society's culture of technology. The rural people, in the course of centuries, have traditionally utilized the knowledge skills and technologies to run their life effectively. Indigenous knowledge is the sum of the experience and knowledge of a given group that forms the basis for decision-making in the face of familiar and unfamiliar problems and challenges (Warren and Cashman 1992). It is also called local knowledge. Their myths and rituals, as well as their traditional environmental practices, depicts a close relation between human beings and nature. These local people of different ethnic group traditionally acquired diversity of knowledge regarding the utilization of plant and animal resources, for various purposes like food, medicine, clothing, construction, dyes, ritual performances, energy etc.

About 80-90% people living in rural areas of Nepal depend, directly or indirectly, on the formal and informal system of traditional medicines for health care (Bhattarai 1992). Various ethnic groups enriched with unique traditions, languages and practices live in harmony. Hence, Nepal has become repository of traditional knowledge and it has rich folk practices of animals and plants, especially for medicinal purpose (Sitaula 2009). So,

the traditional healing practices differ from one ethnic group to another, since it highly depends upon its culture, myths, rituals, economic and social costs, distance, convenience, time, traditional beliefs, fame of specific treats and like, and on knowledge regarding the utilization and availability of the plant resources of the surrounding areas. Even within the same ethnic group, the healing system differs from one district to another due to geographical, cultural, religious, and social differences in the alpine and sub-alpine region, the traditional practice is highly influenced by Tibetan medicine because of common social, cultural, religion, language and ethnicity in Tibet and the northern religion of Nepal, and the healers are known as Amchis. While in the temperate region, the task is performed by Shamans (Traditional healers) known as Dhami-Jhankri, Guni-Ojha, or Janne in general, and in tropical region by healers known as Guruwa, Bharra and Gurau (Rajbhandari 2001).

Darai is one of marginalized the ethnic groups of Nepal. They are mainly found in Chitwan, Tanahu, Gorkha, Palpa, Nawalparasi, Dhading and Makwanpur districts of Nepal. The population of Darai group is 16,789 and occupies 0.07 % of inner Terai (CBS 2012). They are honest docile and hardworking people. Bista (1972) mentioned in his book "People of Nepal" that Darai people live in hot wet and malarial area are reported to have grown immune to malaria. Well known for display of great health; Darai people have traditional way of life and has a close relationship with their local animals and plants. They utilize local plants from ancient time for domestic purposes ranging from timber, fiber, medicine & ritual object, wild fruits & vegetables etc. These people also have traditionally acquired diversity of knowledge regarding the utilization of animal resources of the surrounding area.

Ethnobiology is the scientific and humanistic study of complex set of relationship of biota to present and past human societies (Stepp 2005). It is the scientific study of dynamic relationships among peoples, biota, and environments. As a multidisciplinary field, ethnobiology integrates archaeology, geography, systematics, population biology, ecology, mathematical biology, cultural anthropology, ethnography, pharmacology, nutrition, conservation, and sustainable development." Ethnomedicine is the study of traditional medicines (TM) that have relevant written sources, e.g. Traditional Chinese Medicine (TCM), Siddha, Unani, Ayurveda, but also those whose knowledge and

practices have been transmitted orally. Ethnobiology has two disciplines: Ethnozoology and Ethnobotany. Ethnozoology is the study of relationships between the human societies and the animal resources around them whereas Ethnobotany is the study of relationship between plants and humans whereas. Zootherapy is an important area of ethnozoology, i.e. the healing of human ailments by using therapeutics based on medicines obtained from the animal body, from products of its metabolism (corporal secretions and excrements) or from non-animal materials (nests and cocoons).

1.2 Traditional Medicine

Traditional medicine consists of those beliefs and practices relating to diseases which are products of indigenous cultural development and are not explicitly derived from the conceptual framework of the modern medicine (Mishra et al. 2006).The traditional medical knowledge of indigenous people across the globe has played an important role in identifying living organisms which are important for treating human health problems and livestock. The investigation for new pharmaceuticals from naturally occurring biological material has been guided by ethnobiological data (Blakeney 1999). Ingredients sourced from wild plants and animals are used in traditional medicines and as raw materials in the preparation of modern medicines and herbal preparations (Kang 2003). According to the World Health Organization (1993) about 80% of the world people rely primarily on animal and plant-based medicines. Since ancient times, animals and their products have been used in the preparation of traditional remedies in various cultures (Lev 2003).Traditional medicines have been found to be an invaluable guide in present day to the screening ofimportant modern drugs. Of the 252 essential chemicals selected by the World Health Organization, 8.7% came from animals (Dedeke et al. 2006). Rural people preferred traditional medicine because of easy accessibility, low cost and cultural acceptability, elaborate patient-healer relationship, long term family association and friendly attitude of healers.

1.3 Indigenous Knowledge (IK)

IK is the local knowledge – knowledge that is unique to a given culture or society. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural

communities. IK refers to the empirical knowledge of a group of longtime inhabitants of specific local and principles underlying its generation, organization, meaning and diffusion. It consists of dynamic insight and technique gained through trial and error in responses to the changing environmental and in responses to the changing environmental and socio-economic circumstances and opportunities (Gurung 1993). It is developed and adapted continuously to gradually changing environment and passed from generation to generation being closely interwoven with people's cultural value. Indigenous knowledge may be diffusedly known by many or may be gathered and applied by those in specific role of healers such as Shaman or Midwife. IK encompasses skills, experiences and insights of people applied to maintain or improve livelihood. IK forms a part of global knowledge in this context it has a value and relevance itself. Significant contributions to global knowledge have originated from indigenous people, for instance in medicine and veterinary medicine with their intimate understanding of their environments. IK has become recognized worldwide not only because of its intrinsic value but also because it has a potential instrumental value to science and conservation (Kunwar and Bussmann 2008). IK are at the risk of extinction of rapidly changing environment and fast pacing economic, political and cultural changes on global scale. Practices may vanish as they may be unable or slow to adapt to changing circumstances, intrusion of technologies and development. The tragedy of impending disappearance of IK is most obvious to those who make living out of it.

1.4 Objectives

The general objective of the research work is to investigate the practices on the use of medicinal animals and plants as well as indigenous knowledge found in the Darai ethnic group of Mangalpur VDC, Chitwan. The specific objectives are as follow:

- To provide general information and ethnography of Darai ethnic group.
- To document the animals and their parts having medicinal values used by Darai people in Mangalpur.
- To document the medicinal plants and their medicinal values used by Darai people in Mangalpur.
- To explore and document the indigenous knowledge system found in Darai ethnic group.

1.5 Rationale

Darai ethnic group is one of the marginalized ethnic group among 125 legally recognized ethnic groups in Nepal (CBS 2012). They are one of the early settlers of Terai. Being close to nature they are enrinched with immense knowledges about utilization of plant and animal species in traditional ways. However, Darai people are shy in nature and do not like to share their feelings and knowledges. The reason not only being cause of backwardness of these people but also for the gradual loss of their indigenous knowledge. This study has been designed to explore the ethnozoological and ethnobotanical uses of animals and plants to treat common diseases on the basis of field surveys and taxonomic identification of animals and plants. Documentation on zootherapeutical practices can assist in protecting traditional knowledge, and in ensuring that future users recognize the contributions made by traditional communities, the current custodians of traditional knowledge. Darai ethnic groups is using biological resource from the time immemorial. But such knowledge, skill and practices are vanishing day by day because such knowledge and skill holders are few in numbers and new generation are not taking interest to learn. Also due to loss of their native language these knowledges are on verge of being lost as they are passed down orally. A few works has been done in Darai group on the medicinal plants & plant products and documented too, but there is a definite scarcity of such knowledge when it comes to animal products. So this study was carried out. The study focused on Traditional medicinal usage of animals and plants and documentation of indigenous knowledge prevalent in the Darai ethnic group of Mangalpur.

2. LITERATURE REVIEW

There is a growing appreciation by scientific community to explore medicine based on traditional knowledge. There exist several works being carried out on the ethnomedicinal knowledge on plants and animals around the globe including Nepal. A brief review of such relevant Literature is presented below.

Medicinal plants discovered by the traditional societies are proving to be an important source of potentially therapeutic drugs (Cox and Ballick 1994). Worldwide, at least 122 prescribed drugs are based on substances found in plants (Rijal 1997). Around 21,000 species of plants are reported to have medicinal uses around the world (Shrestha et al. 2000). In Nepal, more than 700 species of medicinal plants used in traditional medicine practices were recorded in the past, and now 1403 species have been reported which represents about 20% of the total estimated flowering plants of Nepal (Tiwari 1994). Most of the species are wild, while few are exotic, naturalized or cultivated since long.

Ethnobiology is the combination of ethnozoological and ethnobotanical study. In the context of Nepal, the ethnobiological study or research is more or less in the stage of void; whereas ethnobotanical research is accounted more in Nepal. The first study of a particular community was conducted by Toba (1975) on study on ethnobotany and village economy followed by Sacherer (1979) on plants used by the Sherpa community of Rolwaling near the northern border with Tibet. Thereafter after, Ratna Pustak Bhandar published a pioneer book regarding medicinal plants of Nepal (Manandhar 1980), which mentioned for the first time 50 species of medicinal plants that were export commodities from Nepal.

Coburn (1984) reported about 100 species of herbal drugs from Gurung community, of which about 50% were named scientifically and the rest in Nepali or Gurung. Since then, documentation of plant uses as medicinal and food values of different ethnic groups are continuously being carried out.

Manandhar (1990) studied the folklore medicine practiced among Chepang, Magar, Tamang and Hayu Community from 7 villages of Chitwan District. Based on the key informant interview with local healers from each village and 6 tribal chiefs around 40-60

years of age, he recorded 74 medicinal plant species used by the local people for treating 24 ailments, where 23 species have been used for the external application, 45 species for internal use and 6 species for veterinary medicine.

Rijal (1994) conducted his ethnobotanical study in 23 villages within Padampur VDC and the surrounding north-east forest of Chitwan National Park and documented the indigenous knowledge of people inhabiting those areas on the use of plants for medicine, fuelwood, fodder, handicrafts, oil extracts and ceremonial and cultural uses. He reported 185 plant species having medicinal value used to treat 126 different combinations of diseases by the local people of Padampur, where 3 species have been used in veterinary medicine.

Bhattarai (1994) also enumerated 54 plant species, used to prepare 60 widely accepted folk prescriptions to treat gynecological complaints, from central Nepal along with description of dose and administration.

Manandhar (1995) documented medicinal plants used by the local people in 10 villages of Jajarkot District, and reported 60 species of plants used for treating 25 types of diseases. The information was collected through verbal interview with 10 herbalists from each village and 50 knowledgeable adults that included shepherds, wood-cutters, fodder collector, medicinal plants collector and others.

Basnet (1998) conducted a study in 13 VDCs of Sindhuli district where different ethnic groups like Nepali, Tamang, Magar, Danuwar, Newar, Sunwar etc. inhabits. He conducted in depth interview within a total area of 101 household using an open-ended questionnaire and 81key informant interviews to explore the indigenous health care practice among these ethnic people. and documented 102 medicinal plant species belonging to 59 family and 92 genera used in traditional medicine by this local people for treating different diseases like respiratory disease, trauma, jaundice, skin disease etc.

Bohara (1998) documented 25 medicinal plant species from 5 VDCs of Bajhang district used by selected 50 local Dhami, Jhankris and Vaidyas for treating different ailments like asthma, bronchitis, body pains, blood purification, dysentery etc.

Manandhar (1998) documented a total of 47 species of plants including 1 species of pteridophytes, 4 monocotyledons and 42 dicotyledons used for the treatment of 17 types

of diseases among the Raute community of Aampani and Rajaura villages of Dadeldhura District. He even reported that medicinal uses of 15 species were unrecorded from other parts of the country.

Similarly, in an ethnobotanical study among the people living in the area of Chitwan National Park, Paudyal (2000) found the indigenous people choosier on the use of plants for various purposes and reported 162 plant species being used by the locals for medicine, food, fodder, firewood, etc

Joshi (2000) reported 48 medicinal plants belonging to 31 families used locally from the villages of Ramdi, Malunga, Bulam, Bettari, Mirmi, Burga and Ridhi in the Kali Gandaki Watershed area. The study indicated that the inhabitant of the Kali Gandaki Watershed area rely on traditional medicine for their primary health care needs.

Nakarmi (2000) reported altogether 50 medicinal plants species belonging to 50 genera and 37 families used for treating 24 different diseases like malaria, diarrhea, jaundice, toothache, internal fever etc. among the Lama community of Ichangue VDC of Kathmandu through their indigenous knowledge system.

Shrestha et al. (2000) published a database of medicinal and aromatic plants of Nepal. in which documented 1624 species of medicinal and aromatic plants of Nepal were documented, in wild or cultivated state, belonging to 938 genera and 218 families along with their ethnobotanical information, pharmacological action, mode of application and its chemical constituents.

Chaudhary (2001) investigated the indigenous knowledge on the use of medicinal plants among the Tharu community of Bachhauli VDC of Chitwan District. He selected 25 households from Dorangi (Ward no. 5) by stratified random sampling. By using different techniques like key informant interview (esp. with Gurau), schedule, observation, PRA, he documented 183 species of medicinal plants used by the local Tharu in the study area along with their mode of preparation by using indigenous knowledge system.

Karki (2001) descriped plants used in traditional medicine among the people inhabiting Ugrachandi and Tukucha VDCs of Kavrepalanchok district and reported 75 species of medicinal plants belonging to 45 families and 68 genera used for treating 51 diseases/disorders by the local people using indigenous knowledge techniques.

Lama et al. (2001) published a book on medicinal plants of Dolpa that gave emphasis on Amchis' knowledge and conservation. The amchis indigenous knowledge on the classification of medicinal plants according to their morphological features, taste and potency has been documented in the book. Among the 407 species recorded so far from Sheyphoksundo National Park and its buffer zone, a total of 100 medicinal plants have been listed along with their life cycle, biology and ecology including distribution, size and vigour of population, and the harvesting practices and rational behind choice of different practices.

Ghimire et al. (2002) recorded 529 species of medicinal plant species from Shey-Poksundo National Plrk of Dolpo. They reported that about 94.3% of the total medicinal plants recorded have been used in traditional medicine by the amchis for treating more than 50 ailments like cough and cold, dysentry, typhoid, rheumatism etc.

Gurung (2002) studied Chitre VDC (Parbat) and Bhadaure/Tamagi VDC (Kaski) where different ethnic groups like Gurung, Kami, Sarki, Pariyar, Chhetri, Bhujel etc.inhabits and documented 83 medicinal plant species belonging to 51 families and 77 genera used by them for treating 52 different ailments like fever, constipation, menstrual disorder, sore throat, heart diseases, typhoid, infertility etc. along with their mode of preparation, parts used, quantity and route of administration etc.

Shrestha et al. (2002) studied traditional methods much prevalent among the local people of Langtang National Park in Central Nepal of Rasuwa District. Some 200 species of medicinal plants were recorded to be used in traditional medicine practices for treating more than 35 types of diseases in the form of juice, paste, decoction, oil and powder, and the maximum numbers of plants were reported to be used in treating wounds and fever.

Gurung (2003) carried out his study in three VDCs of Tinjure area of Tehrathum district and documented the IK on the use of plant resources for different purposes like medicine, fodder, food and other miscellaneous uses among the local people. The study revealed that Dami/Lama/Purohit played crucial role for the indigenous practices with magical and religious practices. Based on the key informant interview and group discussion, he reported a total of 32 species of medicinal plants belonging to 25 families, along with their local name, part used and purpose and mode of preparation.

Oli (2003) studied IK on the use of medicinal plants among the Limbu community of Tapethok VDC, Taplejung. Rapid Rural Appraisal technique, ethnobotinacal observation/survey and transect walk technique was employed by the researcher and documented information on 40 widely used medicinal plants species belonging to 38 genera and 33 families along with their parts used, purpose of use, way of medication and administration, dosage etc. which is relevant to the present research.

Shrestha et al. (2003) carried out the ethnomedicinal uses of wild plant species among 9 rural communities managing local forest resources in the Bonch VDC of Dolakkha District, and reported 113 medicinal remedies derived from 58 plant species belonging to 40 families to treat a wide range of ailments like cardiovascular and circulatory diseases, cuts and wounds, ENT problems, genito-urinery ailments, opthamological uses etc. The information was collected through interviewing 62 informants from different communities.

Dhakal (2004) studied the indigenous knowledge on the use of plants and animals for different purpose like food, medicine, ceremonies, manure, broom, timber, music etc. among the major people of Tnimure VDC of Palpa district.and listed 43 medicinal plant species that were used to treat 10 different diseases like fracture, bronchitis, burn, peptic ulcer, fever, asthma, headache, toothache, cut wounds and eye problem among the local people of study area.

Panta et al. (2004) documented the IK on the use of medicinal plants by the ethnic groups comprising Dhami, Lohar, Tamata, Rawat, Damai and Bohara of Bhageati VDC of Darchula. The local people used 78 species of medicinal plants belonging to 50 families to treat for the remedy of 39 different types of human disorder.

Rai et al. (2004) carried out the study in Thumpathar VDC of Sindhupalchok district on the indigenous utilization pattern of plants as medicine by the local people. They investigate ethno-medicinal practices of plants on 6 communities namely Brahmin, Chhetri, Damai, Kami, Tamang and Sarki.. Based on the key informant interview, at least from one community, documentation of 42 species of plants belonging to 34 families for treating 45 different types of ailments along with the doses and mode of use was done..

Shrestha et al. (2004) carried out study in the ethnic Kumal community of Chirtungdhara VDC of Palpa and documented the information about traditional uses of medicinal plants. Based on the semi structured interview with traditional healers and local people, altogether 50 different species of plants belonging to 45 families were found in the practices of medicinal use for the remedy of different human disorder like measles, antihelminthic, sinusitis, bone fracture, ear infection etc. from the study site.

Kunwar (2006) published a book on non timber forest products of Nepal which aims at providing detailed description, inventory, harvest and management approach of 25 selected NTFPs representing important medicinal plants of Nepal along with their scientific name, family name, vernacular name, distribution and habitat, store and value addition, part used, indigenous use, chemical constituent and marketing information.

Pokhrel (2006) studied ethnobotany of Bankariya of Makwanpur district and documented the indigenous knowledge on the use of plants and animals for different purposes like food, ceremonies, medicine, fiber, broom, music etc. He reported some 82 species of medicinal plants belonging to 45families and 74 genera used for the treatment of various ailments varying from simple cuts and burns to internal bodily disorder like urinary problem, diabetics etc. by those people using their own IK and techniques.

Rajbhandary et al. (2006) gave an account of pharmacognostic tools for the authentication of the herbal drugs along with historical development of pharmacognosy in their book. It also presents the monographs on 30 commercially important and highly traded herbal drugs of Nepal.

An ethnobotanical research carried out in Manang documented 91 ethnomedicinal plant species, belonging to 40 families under 73 genera, and 45 new ethnomedicinal plant species were added. These 91 locally used medicinal plants were found to treat 93 ailments. The study provided information on 45 plant species previously unknown for their medicinal uses in Manang (Bhattrai et al. 2006).

Study of "Ethnobotany of Tharu: Incorporation of Culture and Biodiversity Conservation" documented189 species of plants from the Jayanagar VDC of Kapilvastu study area, out of which 103 were cultivated and 68 were wild, including 71 species of medicinal plants (Aryal 2009).

An ethnobotanical survey was conducted to record the various plant families, species, and plant parts used to manage different HIV/AIDS-related opportunistic infections in Katima Mulilo, Caprivi region, Namibia. The results showed that a total of 71 plant species from 28 families, mostly the Combretaceae (14%), Anacardiaceae (8%), Mimosaceae (8%), and Ebanaceae (7%), were used to treat conditions such as herpes zoster, diarrhoea, coughing, malaria, meningitis, and tuberculosis (Kazhila et al. 2010).

Ethnopharmacological data was collected in the Rasuwa district of Central Nepal by conductinginterviews and focus group discussions with local people. A total of 60 medicinal formulations from 56 plant species were documented. Medicinal plants were used to treat various diseases and disorders, with the highest number of species being used for gastro-intestinal problems, followed by fever and headache (Uprety et al. 2010).

Dangol (2010) observed 231 weeds having traditonal importance in Tharu and Darai community of Chitwan district. Out of these, 91 weeds were used to treat human aliments of human.

A review was carried out to discusses some related aspects of the use of animal-based remedies in Latin America, which identified those species used as folk remedies, and discussed the implications of zootherapy for public health and biological conservation. The review of literature revealed that at least 584 animal species, distributed in 13 taxonomic categories, have been used in traditional medicine in region (Alves and Alves 2011).

A study carried out in Madhmeshwar area of Kedarnath Wildlife Sanctuary for the ecological status of medicinal plants with further focus on the ethnomedicinal uses of plants in the study area documented a total of 152 medicinally important plant species , in which 103 were found herbs, 32 shrubs and 17 were tree species which represented 123 genera of 61 families. A total of 18 plant species fell into the rare, endangered (critically endangered) and vulnerable status categories (Bhat et al. 2013).

A study carried out in Raji tribe of western Nepal concluded that a total of 67 wild edible plant species included in 56 genera and 38 families used by Raji people. The results of study show that Rajis have their traditional way to use different parts of wild plants such

as seeds, fruits, leaves, shoots, roots and tubers in the forms of vegetables, pickles, juice, and raw or as fruits.(Thapa et al. 2014).

A study was carried out to document medicinal plants used in Frontier Region (FR) Bannu, an war affected region of northwest Pakistan. The study reported 107 species of ethnomedicinal plants majority of which were wild (55%) but a substantial proportion also cultivated (29%) (Adnan et al. 2014).

Ethnobotanical surveys at the Naxi homegardens found that 13% of households rely exclusively on traditional Naxi medicine, 26% exclusively use Western medicine and 61% use a combination of traditional Naxi and Western medicine. A total of 106 medicinal plants were inventoried in Naxi homegardens representing 50 botanical families (Yang et al. 2014).

A study mainly focused on the study of Indigenous Herbal Remedies used for treating poison of scorpion sting and snake bite by tribal communities of Rahatgaon of District Harda, in Madhya Pradesh was carried out. The study was based upon the ethno botanical studies on two tribal communities of Gond and Korku. Tribal healers were found to utilize several local available plants in ethno-medicinal practices. The paper reported the use of 23 species of plants used by the tribal communities remedy for animal poison (Kutty 2015).

At the beginning, there were significant works in sector of medico ethnobotany in Nepal. However, Singh (1995) initiated the ethnobiological investigation in Nepal, including both animals and plants. He studied the ethnobiology of Raute tribe and reported 188 plant species used among which only 5 species were used for medicinal purpose. Among animals he depicted 48 wild and domesticated fauna. After Singh many researchers carried out ethnobiological studies. The ethnobiological study carried out on Lohars by Khatri (1999), Bhotes by Upahadaya (1991), Kumals by Dhakal (1997) and Tharus by Pokhrel (2005) are noteworthy.

The use of animals for medicinal purposes is part of a body of traditional knowledge which is increasingly becoming more relevant to discussions on conservation biology, public health policies, sustainable management of natural resources, biological prospection, and patents Research interest and activities in the areas of ethnobiology and

ethnomedicine have increased tremendously in the last decade. Since the inception of the disciplines, scientific research in ethnobiology and ethnomedicine has made important contributions to understanding traditional subsistence and medical knowledge and practice

An Ethnobiological investigation of Tamang people of Gorsyang Village Development Committee of Nuwakot district reported use of different 12 animal names as calendar and a total of 11 animal species and 44 plant species were found to be used in medicinal purpose (Tamang 2003).

An ethnozoological study described the traditional knowledge related to the use of different animals and animal-derived products as medicines by the inhabitants of villages surrounding the Ranthambhore National Park of India (Bawaria, Mogya, Meena), which is well known for its very rich biodiversity. The field survey was conducted from May to July 2005 by performing interviews through structured questionnaires with 24 informants (16 men and 8 women), who provided information regarding therapeutic uses of animals. A total of 15 animals and animal products were recorded and they are used for different ethnomedical purposes, including tuberculosis, asthma, paralysis, jaundice, earache, constipation, weakness and snake poisoning (Mahawar and Jaroli 2006).

A study aimed to review the zootherapeutic practices of the different ethnic communities of India was carried out. The work also attempted to present a list of animals' use for medicinal purposes by different communities of India. Data were gathered from 15 published research papers of various authors on zootherapeutic studies in India from 2000 to 2007. Approximately 109 animals and their 270 uses were reported in traditional medicine in different parts of India (Mahawar and Jaroli 2008).

Rebari people including both sexes provided valuable information regarding uses of domestic animals and their products in local medicinal system and information was obtained, about their conservation too. The results showed 15 domestic animals and 2 plant species used in 30 ailments like headache, tuberculosis, paralysis and anal infection (Vyas 2009).

Lohani in one of her study documented the knowledge treasured by Tamang community on various uses of 41 genera of animals belonging to 28 families. Of the total uses 58%

fall in the food and medicinal use category, 16% in the magico-religious use category, 18% in the category of omen indication, and 2% each in the categories such as weather forecasting, trophy, ethnomusical and taboos (Lohani 2010).

Magars of Central Nepal were reported to use 39 genera of animals with 50 different uses among which 62% of animals had medicinal values (Lohani 2011).

A study assessed the medicinal use of animals by Mestizo communities living near San Guillermo MaB Reserve. Animals were used to treat 22 ailments, with respiratory and nervous system disorders being the most frequently treated diseases with a high degree of consensus (Alves et al. 2012).

During the course of medico-ethnozoological survey of Madhya Pradesh covering 6 districts namely, Rewa, Sidhi, Satna, Panna, Tikamgarh and Chhattarpur, available information with regard to native use of medicinal fishers by the Gond tribals in the treatment of human disease have been recorded. The study has revealed the use of 4 amphibians in the treatment (Tiwari et al. 2013).

A total of 65 plants, 7 animals and 14 other ingredients were described as being used in the preparations of traditional remedies for the treatment of various diseases related to the human circulatory and nervous systems in Oyo State (Borokin et al. 2013).

In a study carried out in Chhattisgarh of India informations regarding the medicinal application of fat of 4 avian and 8 mammalian species were obtained through the interview of 8 types of tribes.The information presented in this paper revealed curious and fascinating information regarding the medicinal applications of different animals species (Azami and Singh 2014).

A total of 48 different animals were recorded to be used for different ethno-medical purposes against various diseases, including tuberculosis, asthma, cancer, paralysis, jaundice, leprosy, toothache, rabies, dysentery, baldness, rheumatism, arthritis, weakness, piles etc by the ethnic groups in Karbi Anglong district of Assam.The highest percentage of animals used for traditional treatment is mammals (about 40%) followed by insects (about 21%) and birds (about 19%) (Verma et al. 2015).

A study was conducted on the beaches of Tamandaré and Batoque, both located in Northeast Brazil. Fishermen from Tamandaré mentioned 339 popular fish names, representing 222 taxa, while Batoque fishermen mentioned 305 popular fish names, representing 215 taxa. Six types of uses of fish were characterized: food, commercial, medicinal, handicrafts, spiritual-religious purposes and aquarium (Pinto et al. 2015).

3. MATERIALS AND METHODS

3.1 Study area

3.1.1 Location

Chitwan district lies in Narayani zone and is located in southwestern corner of Central Development region. It lies in betwwen $27^0$21’45"&$27^0$52’30" N and $83^0$54’45"&$84^0$48’ 15"E at an elevation of 244-1945m. The total area of chitwan district is 2218 sq km which makes 1.5 % of total area of Nepal. District boundary is marked by Nawalaparasi district along with Narayani river in west; Makwanpur district in east; Parsa district and Bihar, India in south; Tanahu, Gorkha and Dhading district in north. Headquater of the district is Bharatpur which is 5th largest city of Nepal. Most part lies in Siwalik region (86.5%) followed by Mid-Mountain (12.7%) and Terai (0.8%). Chitwan district comprises two municipalities, 36 VDC and 13 Ilaka.

Mangalpur VDC lies 7 km west from Bharatpur with Narayani river flowing on northern part. The location map of the study area is shown in **Figure. 1**.

3.1.2 Climate

Chitwan has a subtropical climate. The months of April, May and June are the hottest of the year. During this period, average minimum temperature is around 26 degree Celsius while the maximum reaches usually 35 degree Celcius. However, due to the humidity, the perceived temperature is higher. The annual precipitation is 1995.8 mm/yr (Environment statistics, 2013).

3.1.3 Fauna and Flora

Chitwan is one of the richest districts in terms of flora and fauna. Among total land of Chitwan 59.7% of land is occupied by forest and 34.7% land is used for agriculture and grassland. Similary, only 2.8% of land is shrubland, 17% of total land is barren and 1.1% water bodies (Environment statistic 2008). The Chitwan valley is characterized by tropical to subtropical forest.Most of the vegetation is predominantly Sal (Shorea robusta) forest, a moist deciduous climax vegetation type of the Terai region. The remaining vegetation types include grassland, riverine forest and Sal with Chirpine (Pinus roxburgii) the latter occurring at the top of the Churia range. The riverine forests mainly consists of khair, sissoo and simal. The grasslands form a diverse and complex community .Chitwan

district renowned for one-horned rhinoceros, tiger, gharial crocodile, gaur, wild elephant, four horned antelope, striped hyena, pangolin, gangetic dolphin, monitor lizard and python, etc. Among birds are Bengal florican, giant hornbill, lesser florican, black stork and white stork etc.

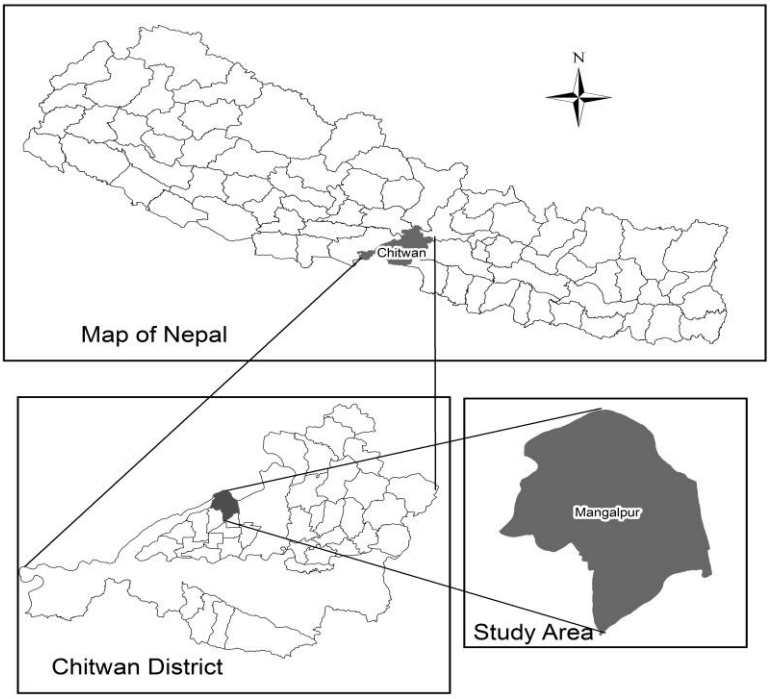

Figure 1. Location of the study area

3.1.4 Demography

The total population of Chitwan district is 579,984 among which the population of Darai is 8,011. Within this population of Darai 3,781 belong to male and 4230 to Female. The country wide population of Darai ethnic group is 16,789 of which 5,431 live in urban and 11,376 live in rular areas. Only 591 Darai live in Mangalpur VDC (CBS 2011). Most of the Darai people have migrated from Mangalpur to areas near to district headquaters.

3.2 Field visit and observation

For the purpose of data collection, Mangalpur VDC was visited March 15-26, 2014 and August 10-18, 2015 in order to document ethnography, medical ethnobiology and indigenous knowledge system prevelant in the area. Various medicinal animals and plants were observed directly.

3.3 Sampling Method and Sample Size

By using purposive or judgement (non-probability) sampling method, Sample of 28 resource persons that included local healers (*Dhami/Jhankri*), knowledgeable elder people, community leader, medicinal plant collectors, school teacher as well as youth and local people from the study area were selected in order to fulfill the intended objectives of the present research work as well as to get the research questions answered.

3.4 Data collection method

The present research work was based on both the primary and secondary data. Primary data has been collected from the field study, and the secondary data from the relevant textbooks, research paper and publications, journals etc.

3.4.1 Primary data collection

3.4.1.1 Key Informant Interview

This method was used in order to obtain the detailed information about the animals and plants used in herbal medicine as well as to explore the local illness, and indigenous knowledge system and techniques on the utilization of medicinal animals and plants for various diseases among the Darai of study area. So, the interview was taken with local healers and knowledgeable elder people (men/women) and former member of the organization; Darai Indigenous Society.

3.4.1.2 Group Discussion

Group discussion with 6-8 respondents was conducted during the research period that included local healers, elder people, community leader, school teacher and other knowledgeable people of the community.

3.4.1.3 Jungle Walk

Jungle walk was frequently carried out with the key informants, who were rich in indigenous or traditional knowledge of use of animals and plants in different ailments and livelihood purposes. The information gathering and specimens collection were also done from adjoining areas of the research sites.

3.4.1.4 Photography and Specimen collection

Local name of plants and animals were collected. Some plants were identified on site whereas unidentified were compressed to made herbarium which later were identified with help of museum specimen and books. Photographs of medicinal plants and animals were also taken for identification. Smaller animals were captured and released after identification. Only few animal species were seen during field visit and photographed.

3.4.2 Secondary data collection

The secondary data were collected by the review of different journals, research papers, theses, published literatures related to the ethnobiological and traditional knowledge studies. Similary, Natural history museum, NEFDIN and NEFIN were also visited to gather further information.

3.5 Limitations

- The present research was conducted for the partial fulfillment of Masters degree in Zoology at T.U., Kirtipur, Kathmandu, Nepal. It has been accomplished in one academic year. So, the time has been one of the most important limiting factors for the present study, and thus, the comprehensive study was not possible.
- Darai people of the village were quite reluctant in sharing their knowledge because of their cultural norms and beliefs. So the detailed required information on ethnomedicine couldn't be generated.
- The present study has been focused on the Darai ethnic group inhabiting the Mangalpur VDC, Chitwan. So, the outcome from this study area may not be generalizable to other areas of Nepal.

4. RESULTS

4.1 Ethnography of Darai

4.1.1 Origin

There isn't any precise proof concerning origin of Darai people. Diverse historian present their wide range of view regarding origin of Darai. In accordance with folklore prevalent in Darai community earlier Darai people had small kingdom located at Darbhanga, now a state of India. It was the migration from Darbhanga that caused spread of these people to Tanahu, Chitwan and other hilly districts. Some believe Tanahu as the place of origin of Darai ethnic group. Most of the Darai people in Chitwan have migrated from Tanahu.

4.1.2 Physical features

Darai people seem to have more or less pronounced Mongolian feature. Mostly, they have brown to black skin colour with beautiful robust body. They have depressed nasal root, oblique eyes, stubby nose and short stature. They are well known for display of great health and strength meaning '*Dharro*'in Nepali which is also considered as origin of name Darai. Darai men have very thin moustaches and beards.

4.1.3 Language

Darai people communicate in their own dialect. Darai language is known as '*Darai Kura'.* But they lack separate script of their language. Darai language is mainly spoken in plains of Chitwan district and western hill area of Tanahu district. The census 2001 reported 10,210 speakers. However, the speakers seemed to decrease with changing time and now only 6,625 speak their mother tongue (CBS 2012). At present Nepali language is becoming more common. Some Darai words are given below. (**Table 1**)

Table 1. Some nepali names in Darai language.

English Word	**Nepali Name**	**Darai Name**
Brinjal	Bhenta	Bhota
Lettuce	Saag	Bhaji
Head	Tauko	Mud
Jackal	Syal	Syar
Bird	Chara	Charai
Son	Chora	Chawak

4.1.4 Dress and Ornaments

Darai men wear homemade Daura, *Bhoto (Vest), Kodrass Aascoat* , *Kachhad* and Nepali cap. Likewise, women wear red, black *Cholo* (Blouse) fastened across chest, petticoat, black tubular skirt and white *Pacchyaura* (Shawl). Women wear beautiful ornaments of silver like *Kalki*, *Chapa*, *Pote* etc. Likewise *Lahurefuli* on nose, *Dhyamna* on ears, *Ghete* (A silver chain attached with many coins) on neck, rings on fingers and Silver Bangles on wrist, *Kada* on feet are traditional ornaments. Some women also make traditional tattoos in their hands and legs. However western clothes are more preferred by young generation. Traditional clothes can be seen only during festivals, dance shows and fairs.

4.1.5 Education

In Mangalpur, young people learn traditional knowledge from parents and elders. For better education they attend various schools and colleges.

Table 2. Number of Darai students in different school/colleges

Name of school/college	**Total number of student**	**Total number of Darai students**	**No of Male students**	**No of Female student**
Gautam Secondary School	465	22	10	12
Janapraksh Secondary School	560	16	9	7

4.1.6 Economy

Traditionally, Darai people are fishermen and boatsmen. They also make various products using bamboo like *Doko* (Bamboo baskets); *Dhakiya* (Fishing basket); *Topi* (Hat). Likewise, *Gundri*, *Muda* (Mats) using straw of paddy. Some people also make fishing nets. These days they are mainly engaged in agriculture and rear cow buffalo, chicken duck, goats and sheep. A few family in Mangalpur are still fisherman while others are teachers, businessmen and some are even abroad to earn.

4.1.7 Religion and Festivals

Most of the Darai in Mangalpur are Hindu. Basically, they are worshipper of nature and believe in invisible forces. Hence they worship various elements of nature like wind, water sun, moon etc. They celebrate various Hindu festivals like Dashain Tihar Teej, Fagupurnima, Sawunesankranti; Maghesankranti etc. Tihar is very important festival .No matter, at what time of the year a member of family dies, the family becomes pure in Tihar even if a year is not completed. In dark moon day during Tihar cow is worshipped in morning and all people go to *Mukhiya's* house to collect flowers and blessings. Children are taught to write their first letter same day.

They celebrate Buddha Jayanti as Chandipurnima. They perform various other puja like Satenaran, Siddhajhakri, Sansaramai, Ansabali, Mohori, Bhakal, Aytabar, Bayu, Chandipuja, Kuldevipuja, Gaudipuja etc. They perform different dance forms like *Chudka, Ghatu, Sorahi.*

4.1.8 Association

The head of the society is called *Mukhiya* who is elder male and only his descented can become head after his death. He plays important role to maintain peace and prosperity in society. Disputed issues are solved by Mukhiya with the help of other elder male of society. After *Mukhiya* the faith healers (*Gurau/Jhakri*) are second important person in Darai community who perform various rituals and treat different ailments of the people. Any religious and cultural practices are performed in presence of him. After *Gurau* elder males of society are considered important. Men and women are considered equal in Darai community so they enjoy free life. Children are also members of society but do not play significant roles.

4.1.9 Lifecycle rituals

4.1.9.1 Birth

Birth of a child is taken as blessing in Darai community. Pregnant mother is given lots of care. After the birth of child mother is considered as impure and no one touches her till naming day of baby.0n 6^{th} day (*Chaiti*), whole house is decorated with lots of lights family pray and worship for bright future of baby. Naming ritual (*Sutouthaune*) is done on 9^{th} day for girl and 11^{th} day for the boy. Priest performs various rites and mother is made pure by giving cows urine (*Gahut*). White male sheep /goat is sacrified and meat is

enjoyed with homemade alcohol. After naming child god of wind is worshiped to spread googd news. After the navel of Darai child falls it is divided into three parts; one is buried near Kuldevi temple, second under the main door of house and last part is made amulet and tied on neck of child.Rice feeding ceremony (Pasni) is done at 5th months for girl and 6th month for boy. *Chebar* is also equally important ritual done for socialization of child.

4.1.9.2 Marriage

Various traditions can be seen on Darai community regarding marriage. There are different types of marriage system observed. In Maghibihah (arrange marriage) family of girl.demands money, meat, alcohol rice etc. If boy and his family can fulfill the demands then, boy and girl can get married. In Choribibah (love marriage) girl and boy elope from house and come home after few days with meat, alcohol, rice and gifts. Both family give them blessing and welcome them. If a married women elopes with other man and get married it is called Jaribibah. However, they should give compensation to former husband of women. This kind of marriage is rare these days. In Darai community marriages are not done within 7 generations of same family.

4.1.9.3 Death

Darai people perform unique death rituals. If a person dies then his body is kept outside the house in a place which is made pure by using cow dung. Family and relatives worship for peace of the departed soul. A small carrier is made using Bamboo in which dead body covered with white clothes is carried to river bank and burnt. Son or the brother of dead person start fire on the body. For 13 days family member eat pure food without salt and wear only white clothes. On 13th day whole house and family members are made pure with special worshipping. Then they can have salt and wear normal clothes.

4.2 Medico-ethnobiology

Human beings have been using various animals and plants since long time. All the ethnic group have their own practices of using them. The same thing was found in the case of Medico-ethnobiology is divided into medico-ethnozoology and medico-ethnobotany.

4.2.1 Medico-ethnozoology

Human beings have very close relationship with nature. They use various products and enjoy beauty of nature. Animals and plants are widely used by human being since their origin. Various parts of animals were used by Darai peple to treat different kinds of ailments. The animals used as medicine by Darai people of Mangalpur are listed in **Table 3 (Appendix 2).**

4.2.1.1 Diversity of Animal species

The result showed Darai people used 28 species of animals belonging to 22 families. Among 28 species of animals used in traditional medicine by Darai people of Mangalpur VDC, 11 species were Mammals, eight were Aves, four were Insects, two were reptiles and Mollusca each, and one fish. 16 species were wild whereas remaining were domesticated. **(Figure 2).**

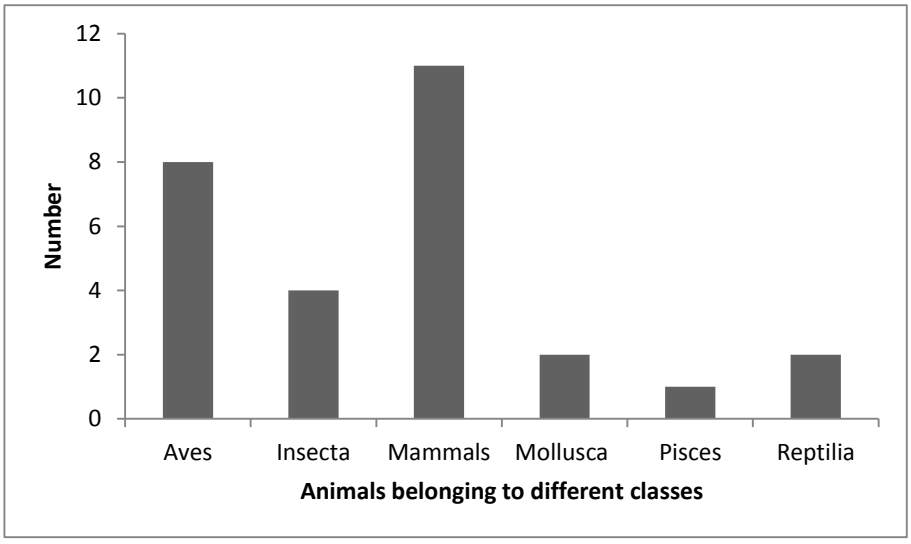

Figure 2. Number of animals belonging to different classes.

4.2.1.2 Diseases/ Ailments treated

Darai people used 28 different types of animals to treat 22 different types of ailments as shown in **Table 4 (Appendix 2).**

Ailments were categorized on the basis of affected parts. Among 22 different ailments five were musculoskeletal, four were integumentory, three were gastrointestinal and otorhinolaryngo each; two were respiratory and reproductive each, and cardiovascular, haematological and nervous each were one **(Figure. 3).**

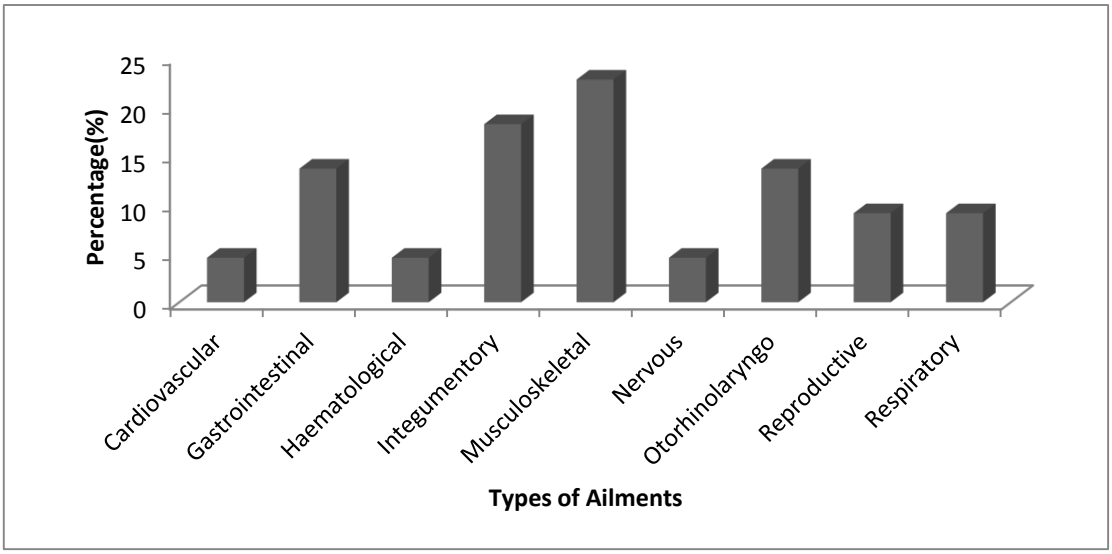

Figure 3. Different types of Ailments treated

4.2.1.3 Parts/products of animals used for medication

Various parts and products of animals were used by Darai people. The result revealed most of the species were used in form of meat (25.64%), followed by egg, fat , bone, body fluid and whole organism (7.72%) each, brain, and milk (5.13%) each. Likewise, Wax, shelter, carapace, blood, skin and antlers were used least (2.56%) **(Figure. 4).**

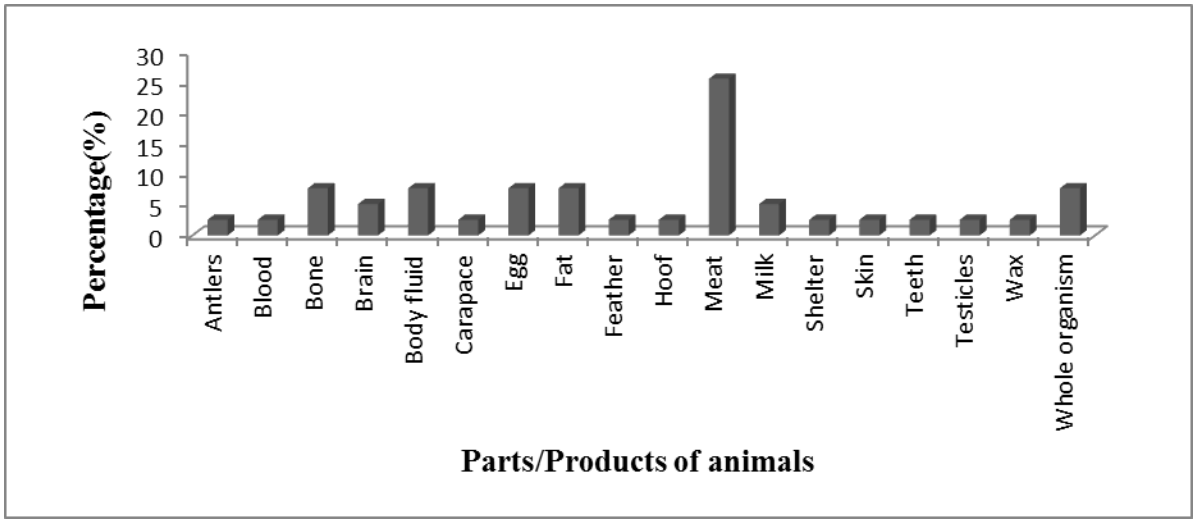

Figure 4. Parts/products of animals used for medication.

4.2.1.4 Forms of Medication**.**

Darai people used animal parts and products in various forms. Among them mostly used form was raw (42.1%), followed by paste (28.94%), cooked (21.05%), Dried, liquor and powder (2.63%) each **(Figure. 5).**

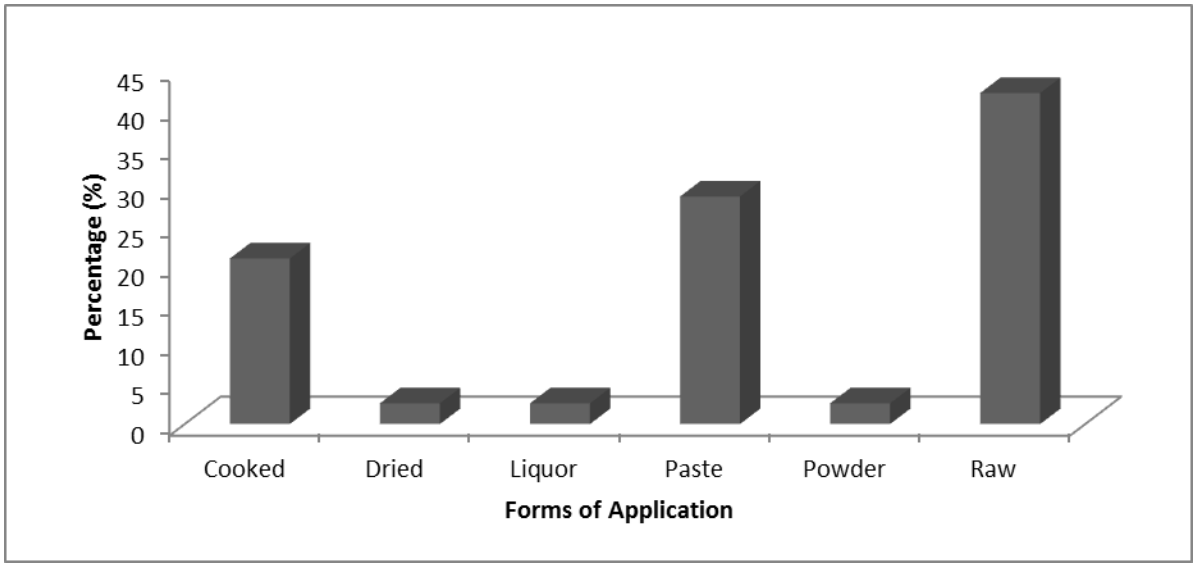

Figure 5. Different forms of application

4.2.1.5 Administration routes

Both external and internal administration routes of treatments were observed. The internal medication included Oral absorption (43.9%) whereas external medication included apply

(17.07%), massage (14.63%), paste (14.64%), amulet (4.88%) and drops (4.88%) **(Figure. 6).**

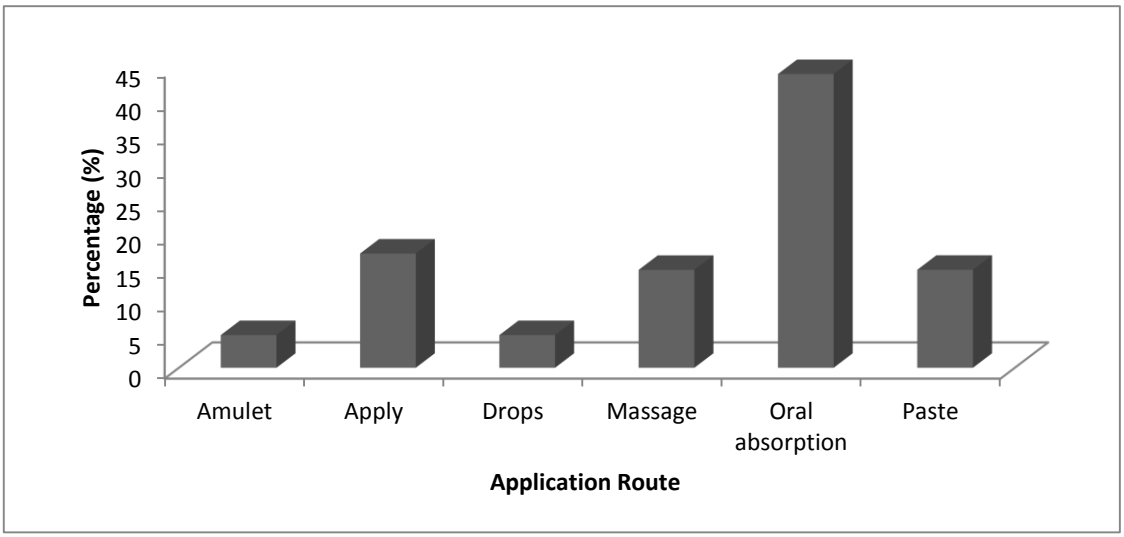

Figure 6. Different types of application routes

4.2.1.6 Description of animals used in medication

Family : Accipitridae

1. *Gypus Spp* (Vulture) Local Name: Giddha

Products used: Bones Forms: Paste, Amulet

Preparation and application: Paste of bone is made by rubbing on stone and applied for severe pain in bones and heal fracture. Amulet is made for children to protect from evil eyes.

Family : Anatidae

2. *Anas Spp* (Duck) Local Name: Haans

Products used: Egg Forms: Raw, Cooked

Preparation and application: Paste made from shell of egg is applied under eyes at night to treat eczema.

Family : Apidae

3. *Apis cerana* (Bee) Local Name: Mauri

Products used: Honey, Wax, Larva Forms: Raw, Cooked

Preparation and application: 1 teaspoon of ginger juice is warmed and mixed with equal amount of Honey is taken two times a day to treat cough. Likewise, Wax is used to treat cracked skin and heels along with fat of other animals.

Honey Bee larva are taken out of the hive and fried in Ghee of *Bos indicus* is given to person with complaint of weakness. It is considered as good source of protein.

Family : Bovidae

4. *Bos indicus* (Cow) Local Name: Gai

Products used: Milk, Ghee Forms: Raw, Cooked

Preparation and application: 50-100 ml milk along powder of dried Anadenus spp is taken orally to heal fractures . Ghee is directly massaged for treating body ache and sprains.

5. *Bos taurus* (Ox) Local Name: Goru

Products used: Teeth Forms: Paste

Preparation and application: Tooth is rubbed against the stone to make paste and applied on either sides of neck below ears to treat tonsillitis**.**

6. *Bubalus bubalis* (Buffalo) Local Name: Bhaisi

Products used: Skin Forms: Amulet

Preparation and application: Skin of neck is worn as amulet to ward off evil eyes and prevent diseases. Also, it is believed to bring good fortune in poker game.

7. *Capra Spp* (Goat) Local Name: Bakhra

Products used: Meat, Milk,Testicles,Brain Forms: Raw, Cooked, Paste

Preparation and application: Testicles of male goat are eaten raw as aphrodisiac. Brain is also swallowed raw to treat nervous disorder. Meat are considered as source of protein and eaten cooked. Likewise paste is made with milk of goat, honey and crystal sugar (*Mishr*i) and applied on anus for anal infection.

8. *Ovis aries* (Sheep) Local Name: Bheda

Products used: Milk, Meat Forms: Raw, Cooked

Preparation and application: Milk is massaged directly over fracture 3 times a day for speedy recovery. Meat are considered as source of protein and eaten cooked. Urine is dropped inside ears during earache.

Family : Canidae

9. *Canis aureus* (Golden jackal) Local Name: Syal

Products used: Meat, Bone Forms: Paste, Liquor

Preparation and application: A special liquor is made using meat of Golden Jackal using yeast (*marcha*).10-15 each day is take to treat Rheumatism. Fat is also massaged for speedy recovery. Dried meat and bones are rubbed against stone to make paste and appied joints to relieve pain and to heal fracture of bones.

Family : Cervidae

10. *Axis axis* (Spotted Deer) Local Name: Harid, Mirga

Products used: Antlers, Meat Forms: Cooked, Paste, Powder

Preparation and application: Antlers are rubbed against stone to make paste and applied topically for treating boils and skin ulcers. Likewise 1teaspoon of powdered antlers are taken orally along with milk/water to prevent osteoporosis. This is one of the traditional bone strengthening measure taken by Darai people.It is also believed to treat impotence and blurred vision. Meat are taken as source of protein.

Family : Cercopidae

11. *Philaenus spumarius* (Spittle bug) Local Name: Thuke Kira

Products used: Whole organism Forms: Raw

Preparation and application: 2-3 Bugs are eaten alive once a day to treat milk defiecency and enhance lactation in mother.

Family : Channidae

12. *Channa Spp* (Walking Snakehead) Local name: Bhoti Macha

Products used: Fat Forms: Raw

Preparation and application: Fat of any species of fish is applied in burns and massaged on muscular pain. Intestine is fried in oil and made paste which is applied on severe burns.

Family : Charadriidae

13. *Venellus indicus* (Red wattled Lapwing) Local Name: Huttityau

Products used: Egg Forms: Raw

Preparation and application: Egg along with shelter of Ichneumon wasp or normal soil (if wasp shelter not available) is made paste and applied on elbow. It is allowed to dry .Water is dropped from elbow and drunk three times a day to treat Typhoid. Also the egg is mixed with Juglans regia and wheat flour to make paste and mixed with water and drunk to treat typhoid.

Family : Columbidae

14. *Columbia livia* (Pigeon) Local Name: Parewa

Products used: Meat Forms: Cooked

Preparation and application: Meat cooked with various spices like ginger, garlic, corriander etc is used to treat cold in children and Menstural disorder in woman. Also meat is given to newly delivered mother for energy.

Family : Coraciidae

15. *Coracias benghalensis* (Indian Roller) Local Name: Theuwa

Products used: Feather Forms: Paste

Preparation and application: Feathers (2-3) are crushed along with *Leucas Spp* and *Cannabis Spp* and given to cattles to treat cough and abdominal disorders.

Family : Equidae

16. *Equus Spp* (Horse) Local Name: Ghoda

Products used: Urine, Sweat, Hoof Forms: Raw, Paste

Preparation and application: Sweat or urine mixed with alcohol given to alcohol addicts is believed to grow repulsion towards alcohol. Also Hoof is rubbed against stone to make paste and given orally to treat Typhoid.

Family : Helicidae

17. *Anadenus spp* (Snail) Local Name: Chiplekira

Products used: Wholebody Forms: Paste

Preparation and application: Whole organism is either swallowed orally by keeping inside fruit of *Musa Spp* to treat fractures and broken bones.

Family : Hominidae

18. *Homo sapiens* (Human) Local Name: Manche

Products used: Milk Forms: Raw

Preparation and application: 2-3 drops of fresh milk from lactating mother is dropped on eyes during irritation and redness**.**

Family : Ichhneumonidae

19. *Ichhneumonida Spp* (Ichneumon waSpp) Local Name: Kamalkutti

Products used: Shelter (Mud) Forms: Paste

Preparation and application: Shelter is mixed with egg of *Vanellus indicus* to treat Typhoid.

Family : Leporidae

20. *Orygodactylus Spp* (Rabbit) Local Name: Kharayo

Products used: Meat, Brain Forms: Raw, Cooked

Preparation and application: Brain is either cooked or eaten raw to treat intestinal pain. Meat is considered as good source of protein.

Family: Muscidae

21. *Musca Spp* (Flies) Local Name: Makha

Products used: Maggots Forms: Powdered

Preparation and application: Maggots collected from skull of human corpse are dried and made powder. This powder is kept on blessed with crocodile's skull bone and special mantras and given to patient suffering from Typhoid (Bigreko).

Family : Passeridae

22. *Passer domesticus* (House sparrow) Local Name: Bhagero

Products used: Meat Forms: Cooked

Preparation and application: Meat is fried along with various spices in ghee of Bos indicus. It is considered as aphrodisiac.

Family : Phasanidae

23. *Gallus gallus domesticus* (Chicken) Local Name: Kukhura

Products used: Meat, Blood Forms: Raw, Cooked, Paste

Preparation and application: Gurau performs special worshipping. Fresh Blood is given to girl suffering with Menstural disorder. Also a part of blood is shared by Gurau .Head is cooked for gurau as well. Likewise Meat is cooked with spices like cinnamon,coriander, Jwano etc and given to pregnant woman for strength and prevention of cold. Egg shell is made paste and applied under eyes for eczema. Small chick is killed and crushed with *Viscum album* which is applied thickly in broken hands or legs and supported with bamboo sticks to treat fracture.

24. *Pavo cristatus* (Peacock) Local Name: Majur

Products used: Bone Forms: Paste

Preparation and application: Bone is rubbed against stone to make paste and taken orally to treat pain in heart.

Family : Suidae

25. *Sus scrofa domesticus* (Pig) Local Name: Sungur

Products used: Fat Forms: Raw

Preparation and application: Fat is rubbed directly to treat cracked heels.

Family : Testudinadae

26. *Testudo spp* (Turtle) Local Name: Kachuwa

Products used: Carapace Forms: Paste

Preparation and application: Shell is rubbed and made paste with mustard oil and applied on wounds of domestic animals.

Family : Varanidae

27. *Varanus Spp* (Golden Monitor Lizard) Local Name: Sungohora

Products used: Meat Forms: Cooked

Preparation and application: Meat of Varanus is cooked and eaten. It is considered to prevent malaria.

Family : Viviparidae

28. *Bellamya Spp* (Freshwater Snail) Local Name: Ghogi

Products used: Meat Forms: Cooked

Preparation and application: These mollusks are washed and kept in a vessel with water to clean mud and other dirt. Next day they are thoroughly washed and cooked along with shell in water with various spices and taken to treat cold and body ache. It is also beleieved to build strong bone and treat malaria.

4.2.2 Medico-ethnobotany

In Mangalpur VDC, along with various animals several plant species were found to be used as medicine to treat different ailments. The result showed 76 plant species used by Darai people to treat different types of diseases **Table 3 (Appendix 2).**

Among 76 plants 23 were trees, 13 were shrubs, 32 were herbs, four were climber, two were grass and parasitic herb and creeper each were one **(Figure. 7).**

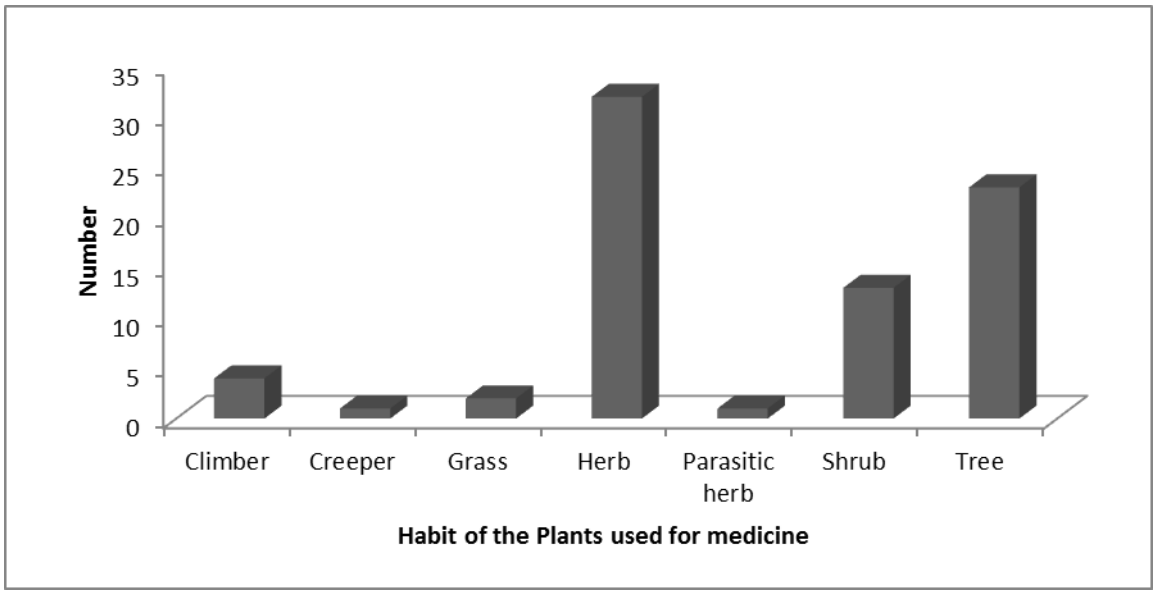

Figure 7. Habit of plants used for medication

Table 3. Plants having medicinal value in Darai community

4.2.2.1 Types of diseases treated

Darai people were found to use 76 species of plants to treat 36 different kinds of ailments. The details about diseases and plants used to treat them are given in **Table 4 (Appendix 2)**. Diferent ailments were categorized based on affected parts. Among them highest was gastrointestinal (nine) followed by integumentory and musculoskeletal, otorhinolaryngo (three) each, respiratory (two), reproductive, cardiovascular, dental, haematological and genitourinary (one) each **(Figure. 8).** Remaining ailments could not be classified**.**

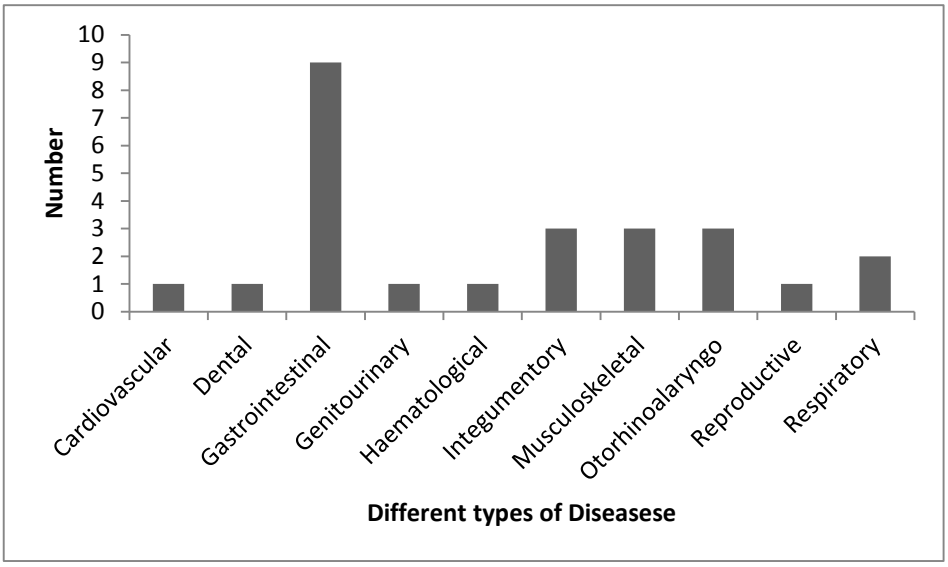

Figure 8. Different types of ailments treated.

4.2.2.2 Plants parts/ products used in treatment

Various parts and products of different plant species were reported to be used by Darai people. Among them mostly used part was leaves (34.78%) followed by root and fruit (15.94%) each, flower and whole plant (7.25%) each; bark; seed and rhizome (4.43%); Stem and tuber (2.89%) each (**Figure. 9**)

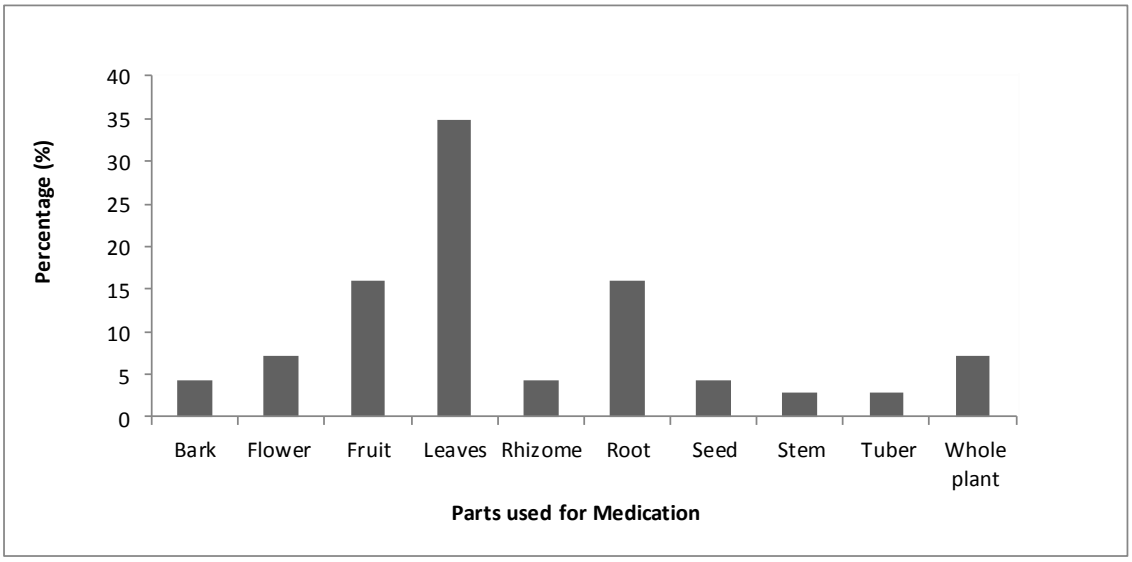

Figure 9. Parts/products of plants used for medication.

4.2.2.3 Forms of medication

Different forms of medication of medicinal plants were revealed during the study. Medicinal plants were mostly used in form of juice (38.46%) followed by decotion and raw (12.82%) each, powder (10.25%) each, cooked and paste (8.97%) each, dried (3.84%) and steam (1.28%) (**Figure. 10)**

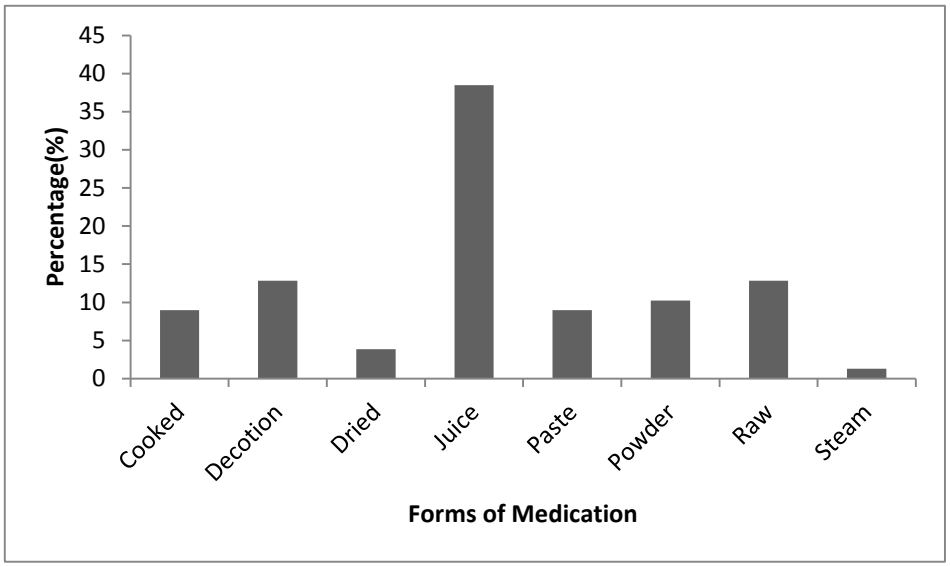

Figure 10. Different forms of Application

4.2.2.4 Routes of Administration

Medicinal plants were administered either externally or internally. External routes of administration included apply (25.64%), massage (3.84%) and drops (2.56) whereas internal routes included oral absorption (64.10%), chewed (2.56%) and inhale (1.28%) **(Figure. 11).**

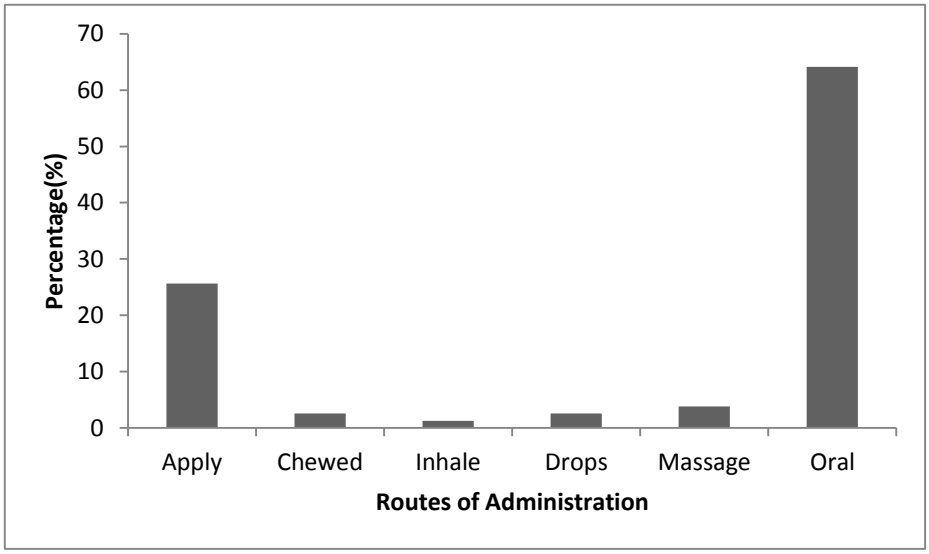

Figure 11. Different routes of Application

4.2.2.5 Description of animal species used for for medicinal purpose

Family : Acanthaceae

1. *Adhato vasica* Local Name: Asuro

Parts used: Leaves Forms: Juice

Preparation and application: Leaf juice mixed with honey in equal amount and taken to treat cough.

2. *Rungia parviflora* Local Name: Runche jhar

Parts used: Whole plant Forms: Juice

Preparation and application: Plant juice is used in cuts and wounds.

3. *Barleria cristata* Local Name: Bhede kuro

Partsused: Root Forms: Decotion

Preparation and application: Root decotion is given in anemia.

Family : Amaranthaceae

4. *Achryranthes bidentata* Local Name: Datiwan

Parts used: Stem Forms: Raw

Preparation and application: Fresh twigs are chewed to treat toothache.

5. Amaranthus spinosus Local Name: Lunde

Parts used: Seeds Forms: Cooked

Preparation and application: Seeds are beaten and fried in ghee and given along with milk to newly delivered women to lessen the pain.

Family : Amaryllidaceae

6. *Allium sativum* Local Name: Lasun

Parts used: Tuber Forms: Decotion

Preparation and application: The tuber is boiled along with turmeric and salt and taken hot to treat sore throat and tonsillitis.

Family : Apiaceae

7. *Carum copticum* Local Name: Jwano

Parts used: Seeds Forms: Cooked

Preparation and application: Seeds are fried in ghee along *Anethum sowa* (swoup) with grinded rice grains to make a dish called '*puwa'* and given to new mother to enhance lactation. Likewise the seeds are boiled in water with salt and taken orally when hot to treat menstrual cramps.

Family : Apocynaceae

8. *Calotropis Spp* Local Name: Aak

Parts used: Latex Forms: Raw

Preparation and application: Latex is applied directly over fractured area and sprains to minimise pain and speedy recovery.

9. *Plumeria Spp* Local Name: Gulaichi

Parts used: Flower Forms: Juice

Preparation and application: Flowers are crushed to extract juice and taken orally to treat fever.

10. *Holarrhea pubescens* Local Name: Dudhkhirra

Parts used: Bark Forms: Juice

Preparation and application: Bark is crushed to extract juice and mixed with equal amount of juice of root of *Ananas comosus* and whole plant of *Scorparia dulcis* to treat excess heat in body during summer.

Family : Araceae

11. *Colocasia esculenta* Local Name: Pidalu

Parts used: Tuber Forms: Cooked

Preparation and application: The tubers (bulbs) are cooked and fed to cows amd buffaloes to stimulate lactation.

12. *Acorus calamus* Local Name: Bojho

Parts used: Rhizome Forms: Raw, Juice

Preparation and application: Juice extracted from rhizome is taken to treat chronic diarrhea. Also the rhizome is chewed in sore throats and tonsillitis. Decotion of roots is given during fever.

Family : Arecaceae

13. *Areca catechu* Local Name: Supari

Parts used: Fruit (Nut) Forms: Paste

Preparation and application: Nut is rubbed against the stone and paste is made which is applied to mimimize scars in skin.

Family : Anacardiaceae

14. *Magnifera indica* Local Name: Aanp

Parts used: Bark Forms: Juice

Preparation and application: Bark is beaten with water and juice is taken orally 2 teaspoon two times a day to treat blood/mucous in stool and abdominal pain.

Family : Annonaceae

15. *Annona squamosa* Local Name: Sarifa

Parts used: Fruit, Leaf Forms: Raw, Juice

Preparation and application: Ripe fruit is rich in nutrients and eaten to increase muscular power. Likewise; young leaves are grinded along with water to make juice and taken orally to treat diabetes and worms.

Family : Apocynaceae

16. *Rauvofolia serpentine* Local Name: Sarpagandha

Parts used: Leaf Forms: Juice

Preparation and application: Leaves are crushed to extract juice and applied on snakebites.

Family : Asteraceae

17. *Mikenia micarantha* Local Name: Banmara

Parts used: Leaf Forms: Juice

Preparation and application: Leaves are crushed to extract juice and applied on fresh cuts and wounds and to stop minor bleeding.

18. *Vernonia cinera* Local Name: Marchajhra

Parts used: Root Forms: Decotion

Preparation and application: Root decotion is taken to treat diarrhoea and stomach pain.

19. *Ageratum conyzoides* Local Name: Gandhe

Parts used: Leaves Form: Paste

Preparation and application: Paste of leaves is applied for cuts and wounds between toes caused by muddy soil during rainy season.

Family : Bixaceae

20. *Bixa orellana* Local Name: Sindure/simrik

Parts used: Fruit Forms: Raw,

Preparation and application: Raw fruit is mixed with milk and taken orally to treat disorders after delivery of child and treat fractures .Also applied topically for speedy recovery of fractures.

Family : Cannabaceae

21. *Cannabis sativa* Local Name: Ganja

Parts used: Leaf Forms: Decotion

Preparation and application: Decotion of young leaves are applied on cuts and wounds .It is believed to be antiseptic in nature.

Family : Capparaceae

22. *Crafeiva unilocularis* Local Name: Siplikan

Parts used: Leaf Forms: Decotion

Preparation and application: Decotion of leaves is taken in urinary infection. Also used as vegetable.

Family: Caryophyllaceae

23. *Drymaria cordata* Local Name: Abijalo

Parts used: Whole plant Forms: Juice

Preparation and application: Juice of whole plant is taken on empty stomach to treat gastritis.

Family: Combretaceae

24. *Terminalia chebula* Local Name: Harro

Parts used: Fruit Forms: Powder

Preparation and application: Fruits are dried and powdered. Along with it equal amount of powder of *Terminalia bellirica* and *Emblica officinalis* are mixed and taken with warm water to treat gastritis and abdominal disorder.

Family: Compositae

25. *Artemesia indica* Local Name: Titepati

Parts used: Leaf Forms: Juice

Preparation and application: Leaves are crushed to extract juice and applied on fresh cuts and wounds.

26. *Eclipta prostata* Local Name: Bhringiraj

Parts used: Leaf Forms: Juice

Preparation and application: Leaves are crushed to extract juice and applied on fresh cuts and wounds between toes.

Family: Convolvulaceae

27. *Cuscuta reflexa* Local Name: Akashbeli

Parts used: Whole plant Forms: Juice

Preparation and application: Juice is taken orally to treat dysentery and jaundice. Also plants are tied on legs, hands and neck for speedy recovery.

28. *Ipomea aquatica* Local Name: Karmi saag

Parts used: Whole plant Forms: Cooked

Preparation and application: Plant is cooked and given to newly delieverd mother to enhance lactation.

Family: Costaceae

29. *Costus specious* Local Name: Betlauri, Larkaiyai

Parts used: Stem Forms: Cooked,

Preparation and application: Stems are cooked and taken orally to treat joint pain due to increased uric acid in blood.

Family: Cucurbitaceae

30. *Cucurbita maxima* Local Name: Farsi

Parts used: Fruit Forms: Raw

Preparation and application: Fruit is made small pieces and taken raw to treat jaundice.

31. *Cucumis sativus* Local Name: Kakro

Parts used: Seed Forms: Paste

Preparation and application: Seeds are crushed along with Juglan regia and Flour of Fagopyrum esculentum and water to make watery paste and taken orally (1 glass a day) to treat tonsillitis.

32. *Trichosanthes dioca* Local Name: Parbal

Parts used: FruitSeed Forms: Cooked

Preparation and application: Fruits are cooked and taken as vegetable to reduce excess heat in body.

Family: Dipterocapaceae

33. *Shorea robusta* Local Name: Sal

Parts used: Resin Forms: Raw

Preparation and application: Resin are considered to be antimicrobial and applied over wounds and fracture to relieve pain.

Family: Ericaceae

34. *Rhododendron sp* Local Name: Gurans

Parts used: Flower Forms: Raw, dried

Preparation and application: When chicken bone or fishbone gets stuck on throat dried flower is made paste with water and taken orally.

Family: Euphorbiaceae

35. *Euphorbia hirta* Local Name: Dudhejhar

Parts used: Root Forms: Decotion

Preparation and application: Root decotion is given to nursing mother deficient in milk once a day.

36. *Emblica officinalis* Local Name: Amala

Parts used: Fruit, Leaf Forms: Juice, powder

Preparation and application: Leaves are crushed to extract juice and given orally to treat snakebite. Also, powdered fruit along with *Terminali chebula* and *T. Bellirica* given for gastritis.

37. Jatropha Curcas Local Name: Sajiwan

Parts used: Stem Forms: Juicer

Preparation and application: Juice of stem are taken orally to treat constipation.

Family: Fabacea

38. *Mimosa pudica* Local Name: Lajjawati jhar

Parts used: Root, Flower Forms: Raw, Juice

Preparation and application: Paste of root is added with 30 ml water and taken 2 teaspoon two times a day to treat blood in stool. 3-4 Fresh flowers are consumed directly to treat gastritis.

Family: Gramineae

39. *Saccharum officinarum* Local Name: Ukhu

Parts used: Stem Forms: Juice

Preparation and application: Juice along with *Centella Spp* is taken orally to treat jaundice.

Family: Hypercaceae

40. *Hypericum cordifolium* Local Name: Areli, Areto

Parts used: Bark Forms: Paste

Preparation and application: Paste is massaged on joints to treat Rheumatism.

Family: Juglandaceae

41. *Juglans regia* Local Name: Okhar

Parts used: Fruit Forms: Tablet/Paste

Preparation and application: The fruit is grinded and mixed with flour of *Fagopyrum esculentum* and egg of Venellus indicus to make tablets/paste which are taken two times a day to treat typhoid.

Family: Lamiaceae

42. *Pogosteomon benghalensis* Local Name: Rudhilo

Parts used: Leaf Forms: Decotion

Preparation and application: Leaf decotion is used to treat fever and chronic typhoid.

43. *Ocimum sanctum* Local Name: Tulsi

Parts used: Leaves Forms: Decotion, Steam

Preparation and application: The leaves are boiled with turmeric and taken when hot to treat tonsillitis. Also leaves are boiled in water and steam is taken to treat cold and sinusitis.

44. *Ocimum basilicum* Local Name: Babari

Parts used: Leaves Forms: juice

Preparation and application: The leaves are crushed and juice is applied on head and joints to treat fever.

Family: Loranthaceae

45. *Viscum album* Local Name: Hadchur

Parts used: Whole plant Forms: Paste

Preparation and application: Whole plant is grinded along with equal amount of *Sikari lahara* and *Urtic*a *dioca* to make paste.The paste is applied over fracture part and supported by rigid object to prevent any movement.It is the traditional way of healing fractures.

Family: Lygodiaceae

46. *Lygodium japonica* Local Name: Janai lahara

Parts used: Leaves Forms: Paste

Preparation and application: Paste of leaves is applied to treat Ringworm.

Family: Malvaceae

47. *Bombax ceiba* Local Name: Simal

Parts used: Root, Flower Forms: Juice, Decotion

Preparation and application: Root is crushed and 2-3 teaspoon of juice is extracted and taken orally to treat measles. Decotion of flowers are given for dysentery and abdominal pain.

Family: Meciaceae

48. *Azadirachta indica* Local Name: Neem

Parts used: Leaves, shoots Forms: Decotion, Ash

Preparation and application: Fresh shoots are used as toothbrush to prevent teeth and gums diseases. Leaves are boiled in water and taken bath when warm to treat wounds in body. Likewise young shoots are burned and ash is mixed in a glass of water and taken orally after straining to treat worms.

49. *Psidium guajava* Local Name: Amba

Parts used: Young leaves Forms: Raw; Decotion

Preparation and application: Young shoots are either chewed raw or bolied in water and decotion is taken to treat diarrhoea. Leaf juices are also used for urinary problem.

Family: Menispermaceae

50. *Tinospora sinensis* Local Name: Gurjo

Parts used: Rhizome Forms: Juice

Preparation and application: 2-3 drops of juice of rhizome is dropped in ears twice a day to treat earache.

51. *Cissampelos pareira* Local Name: Batulpate

Parts used: Roots Forms: Juice

Preparation and application: Juice of leaves is taken orally to treat cough and worms. Likewise plant juice is given to stop bleeding after delivery.

Family: Moraceae

52. *Ficus benghalensis* Local Name: Bar

Parts used: Leaf Forms: Powder

Preparation and application: Tender leaves are dried and made powder. One teaspoon powder is taken along with warm water once a day to treat Dysentry.

53. *Antrocarpus lakoocha* Local Name: Badahar

Parts used: Bark Forms: Powder

Preparation and application: Bark is dried and made powder. 1teaspoon of powder is taken orally each day to treat gastritis.

Family: Musaceae

54. *Musa paradisiaca* Local Name: Kera

Parts used: Flower Forms: Cooked, Dried

Preparation and application: Young flowers inside inflorescence are cooked to make delicious Aachar. Also they are dried and stored. During muscular and chest pain dried flowers are made paste adding water and massaged on the area.

Family: Myricaceae

55. *Myrica esculenta* Local Name: Kafal

Parts used: Fruit Forms: Raw

Preparation and application: Ripe fruits are taken orally to treat abdominal infection and diarrhea.

Family: Myrtaceae

56. *Syzygium aromaticum* Local Name: Lwang

Parts used: Fruit Forms: Paste

Preparation and application: 3-4 cloves along with equivalent weight of *Cuscuta reflexa* are grinded and taken orally once a day to treat tonsillitis.

Family: Onocleaceae

57. *Matteuccia struthiopteris* Local Name: Neuro

Parts used: Young Leaf Forms: Decotion

Preparation and application: Young leaves are boiled in water with salt. and taken orally . It is considered powerful in combating diarrhea and blood in stool.

Family: Oxalidaceae

58. *Oxalis corniculata* Local Name: Chariamilo

Parts used: Leaf Forms: Juice

Preparation and application: 2-3 drops of leaf juice are dropped inside ear to treat Earache. Fresh leaves are chewed to relieve toothache.

Family: Poaceae

59. *Cynodon dactylon* Local Name: Dubo

Parts used: Young shoots Forms: Raw

Preparation and application: A bunch of 7 young shoot is taken and neck is combed with it if hair is tuck on throat

60. *Thyranolaena maxima* Local Name: Amriso

Parts used: Inflorescence Forms: Raw

Preparation and application: Water is dropped from bunch of inflorescence of the plant and drunk to treat urinary infection (*Dhatu pareko; it is a disease in which the colour of urine is white)* in children. Likewise, a bouguet is made and along with mantras kept on navel of newly delievered mother if the placenta doesn't come out easily.

Family: Rhamnaceae

61. *Ziziphus mauritiana* Local Name: Bager

Parts used: Root ,Bark Forms: Juice, Paste

Preparation and application: Juice is extracted from root and mixed with equal amount of juice of Ghodtapre along with a pinch of powdered *marich* and taken once a day to treat abdominal disorders. Also paste of bark is applied on boils.Ripe fruits are dried and crushed and then boiled in water. It is allowed to cool for one night and taken orally (abt 1 glass) in morning to treat cough.

Family: Rosaceae

62. *Prunus persica* Local Name: Aaru

Parts used: Leaves Forms: Paste

Preparation and application: Paste of leaves is mixed with small amount of mustard oil and applied on wounds of cattles.

Family: Rutaceae

63. *Citrus medica* Local Name: Bimiro

Parts used: Root Forms: Juice, powder

Preparation and application: Fresh juice or powder of root is taken with warm water to treat dysentery and stomach pain.

64. *Aegle marmelos* Local Name: Bel

Parts used: Leaves, fruit Forms: Decotion, Juice, Raw

Preparation and application: Decotion of leaves is taken for controlling diabetes. Also fresh 7 leaves of Bel and 7 leaves of *Nyctanthes arbortristis* (Parijat) are grinded and juice is taken as liver tonic. Ripe fruit is taken as cooling agent during hot days.

Family: Solanaceae

65. *Solanum virgianum* Local Name: Kantakari

Parts used: Root Forms: Decotion

Preparation and application: Decotion of root is taken twice a day for several days to treat cough, asthma and chestpain.

66. *Solanum melogene* Local Name: Bhanta

Parts used: Root Forms: Juice

Preparation and application: Juice of root is given to newly delievered women for easy removal of placenta.

Family: Umbelliferae

67. *Centella asiatica* Local Name: Ghodtapre

Parts used: Wholeplant Forms: Juice

Preparation and application: Whole plant is grinded to extract juice and mixed with sugarcane .The mixture is taken 2-3 glasses each day to treat Jaundice.

Family: Urticaceae

68. *Urtica dioca* Local Name: Sisnoo

Parts used: Leaves Forms: Cooked

Preparation and application: Leaves are cooked and eaten to maintain blood pressure.

Family: Xanthorrhoeaceae

69. *Aloe vera* Local Name: Ghiukumari

Parts used: Leaf Forms: Juice

Preparation and application: Fresh gel inside leaves is applied topically on burnt areas and boils.

Family : Zingiberaceae

70. *Amomum zingiber* Local Name: Aduwa

Parts used: Rhizome Forms: Juice

Preparation and application: 1-2 teaspoon of juice is extracted from rhizome by grinding .It is then warmed and mixed with equal amount of honey and taken orally to treat cough.

4.3 Indigenous knowledge system

Various knowledge system found in Darai community are given below:

4.3.1 Preparation of Bamboo products and Fishing equipments

- Darai people owned good knowledge on preapation of various products from bamboo.For eg. Bamboo baskets called *Doko* and *Dhakiya*, Hat (Topi), Craddle (*Kokro*) etc. Likewise fishing equipments like *Dhadiya* to store fish and fishing nets were also made by Darai people.

4.3.2 Agriculture

- Excreta/dung of domestic animals like cow, buffalo, goat, hen etc were used in fields as organic manure to increase fertility of soil.
- Darai people practiced alternation of crops to increase fertility of soil.
- Ashes of firewood were spread on field as insecticides.
- Seeds were stored in containers made from hay of paddy called *Potayei, Mohari and* bamboo called *Bhakari.* Dried shoots of *Azadirachta indica* and *Acorus calamus* as mixed with grain to prevent pests.
- Compost manure was prepared by mixing equal amount of cattles urine and various plants .The mixture was allowed to decay for some days and then wateri added and sprayed on fields to increase fertility and kill aphids too.

4.3.3 Foods

- Various wild edible plants like *Chenopodium* (Bethe) and edible fern (Neuro), Garlic pear *(Siplikan*), Mushroom like *Padke chyau, Khetale chyau , Dioscorea Spp* (Bantarul) and shoots of Bamboo *(Tama),* wild asparagus and pointed gourd were collected and eaten as vegetable.
- Fresh water snails collected from paddy fiels were also eaten.

4.3.4 Preparation and use of materials from locally available materials

- Darai people made various materials using locally available resources. Mats locally called Gundri are prepared from *Typha angusta* (Pater) and Hay of paddy.
- Brooms wee made from *Thyranolaena maxima* (Amriso). *Imperata cylindrica* (Siru) were used to make ropes for fastening fooder and forages

- Similary dried Maize plants were used to make bars around houses and shed of domestic animals.

4.3.5 Preparation of Natural colours and dyes and fishing poison

- Darai people extracted natural black dye from *Eclipta prostata* (Bhringijhar) to blacken hair.
- Young shoots of *Pogostemon benghalensis* (Rudilo) yield blackish blue colour which was used by Darai people to decorate house. Likewise, Bark of *Myrica esculenta* (Kafal) was beaten with water to extract black colour.
- Black deposit of kerosene light was mixed with milk to prepare ink for making tattoos
- Fish poison was made by crushing *Aconitum Spp* (Bikh).It is then spread on water After sometime fishes of the area died and were collected.

4.3.6 Natural Medicines for livestocks

- Dried leaves of *Cannabis sativa* (Ganja) were fried in Ghee and fed to livestocks suffering from cold and abdominal disorder.
- Paste of *Urtica dioca* (Sisnoo) was applied to broken legs of cattles and supported by rigid woods for fast recovery.*Bixa orellana* (Simrik) were also given orally for speedy recovery
- Tubers of Colocasia (Pidalu) were given to enhance lactation in cattles.
- Also Leaves of *Euphorbia hirta* (Pati) were spread in cage of Chickens and Ducks to treat body lice and mites.

4.3.7 Preparation of indigenous drink *Moat/ Muna*

- Alcohol is very important in Darai community and was prepared using locally available grains like wheat and maize.A number of plants were used for making *Marcha,* a substrate used to prepare such local beverages like *Clerodendrum viscosum* (Bhanti), *Vernonia cinera.* (Marchajhar) These locally prepared alcohol are called Moat/Muna.

4.3.8 Conservation of Biodiversity

- Plants like *Ficus benghalensis, Aegel marmelos, Musa Spp* are considered religiously important and conserved.
- Medicinal plants were either collected by local healers or elder male.
- Female animals were more preserved than male animals.
- Medicinal plants to be collected were collected using certain guidelines by the collectors, which help in the sustainable use of those species. For e.g. when the roots or rhizome of plants had to be collected, then only the required amounts was collected, and kept some of them in their original places for their regeneration.

5. DISCUSSIONS

Darai people of Mangalpur were found very close to nature. They not only worshiped nature but also efficiently utilized resources available. They seemed to be rich in various traditional knowledge with respect to utilization of medicinal plants and animals. Their ancestor were fisherman and boatsman. However, they were seen engaged in various profession at the time of study; Agriculture being most important one. The ethnobiological study carried out in Darai community of Mangalpur VDC in Chitwan district are discussed here.

The result showed usage of 28 animals for the treatment of 22 ailments. Among 28 animal 11 belonged to class mammalia; eight to class Aves; four to class insect, two to reptilia and mollusca each and one to pisces. Among animals used 16 species were wild whereas remaining were domesticated. For medicinal pupose various parts and products of animal species were used. They included meat; whole organism; skin; bone; fat; blood; milk; egg; body fluid; antlers; hoof, carapace; brain testicles; wax and shelter. Among them mostly meat was used followed by whole organism, fat; bone and egg in equal number. Among the animal species used nine were used to treat musculoskeletal diseases; six were used to treat gastrointestinal and integumentary each; three for respiratory; two for otorhinolaryngo; two for haematilogical; one for cardiovascular and nervous disease each.

The animal species reported for folk medical utility in present study were also supported by findings of other researchers. For example, alcohol of meat of *Canis aurens* for treatment of rheumatism was also supported by Dhakal (2004) and Thapa (2008). However Neigi & Palyan (2007) reported the use of meat in treating Paralysis and blood for Asthma. Likewise, Honey of *Apis cerana* for treating cough was also reported by Tamang (2003), Koirala (2004) and Thapa (2008). In present study *Anadenus* species was reported to treat ringworm and heal fracture of which later one was supported by Thapa (2008). Darai people used Honey Bee larva as souce of protein and testicles of male goat for sexual power, the similar use had been observed by Chalise (2010) in his research. The antlers of *Axis axis* were found to be used as traditional bone strengthening in present study which was also agreed by Kawtikwar et al. (2010). However, some of the species of

animals like *Philaenus spomarius* (Thukekira) used for enhancing lactation in newly delivered mother, Maggots of Musca Spp for treatment of Typhoid were not mentioned in any other researches.

Darai people of Mangalpur VDC were found to use 76 plant species for treatment of 36 different ailments. Among 76 plants 23 were trees, 13 were shrubs, 32 were herbs, four were climber, two were grass and parasitic herb and creeper each one. Some of the plant species were found to have more than single therapeutic uses. Some were used singly whereas some in combination with other plants. Some were even mixed with animal parts to make medicines. Most of the plants reported were found to be previously mentioned for medicinal uses in other literatures

Terminalai bellirica and *T. chebula* used to treat gastritis and abdominal disorder is supported by Ghimire (1999) whereas Tamang (2003) reported the use of plants for treating cough.In present study *Calotropis gigantean* is used for treating sprain, the similar use have been observed by Ale et al (2009), Dangol (2010) and Rai (2004). However, Pokhrel (2006) reported its use in gout and rheumatism treatment and swelling of finger joints. *Viscum album* as in present study was also documented for its use in healing fractures by Coburn (1984). Similary, *Cuscuta reflexa* and *Saccharum officinarum* were found to be used by Darai community in treatment of jaundice which is also mentioned in various previous researches like IUCN (2004), Thapa (2008), Malla & Chhetri (2009). *Cannabis sativa* reported to use stop bleeding in cuts and wound in present study was agreed by Devkota and Karmacharya (2003) and Watanabe et al. (2005). On other hand Joshi and Joshi (2007) reported the use of plant in treatment of Scabies. Similary, *Euphorbia hirta* used for treating cuts and wounds was also observed by Manandhar (1993) and Joshi & Joshi (2007). *Acorus calamus* was reported for treatment of sorethroat in present study. On the contrary its usage for treating Tonsilitis was documented by Bhattrai et al. (2009) and Hasan et al (2013) and Tamang (2003) reported its use in bronchitis. *Mimosa pudica* reported for treatment of gastritis in present study was observed to be used in cuts and wounds by Panthi and Chaudary (2003) whereas Acharya and Pokhrel (2006) observed its used for treatment of scabies. *Urtica dioca* used to heal fractures by Darai community was also reported by Rajbhandari (2001). Plant Spp such as Colocasia Spp, Prunus Spp were reported to treat different ailments in Domesticated animals Likewise plants like *Clerodendrum viscosum,*

Vernonea cinera were reported to be used in making local liquor which was also observed by Dangol (2008).

Traditional healers called Jhakri/ gurau performed various rituals and medicinal practices in Darai community of Mangalpur. Also elder members of the community had sound knowledge of medicinal plants and animals. Simple ailments like cough, diarrhea, dysentery, abdominal pain and diorders, eye, ear and toothache were treated using traditional medicines. Darai people only visited hospital in case of complicated diseases. However, young generation were seen inclined more towards modern medicine and had lack of interest in learning traditional medicines.

Darai people were found to plant some medicinal plants around their home while rest were collected from nearby forest, bufferzone of CNP, Forest along shores of Narayani river, marshylands (*Rampur ghol*) etc. Collection and treatment of plants were done only in specific days and time of the day. Darai people seemed concerned about conservation of Medicinal plants and animals.

6. CONCLUSIONS

The Darai people of the Mangalpur VDC of Chitwant District owned good knowledge on the traditional utilization of locally found medicinal herbs. Almost all the people had little or more knowledge on the medicinal properties of plant species and their uses. However, local healers (Dhami/Jhankri) were the most popular one in the village for practicing the folk medicine. Besides them, the other knowledgeable groups, like women and elders, also practiced home remedies. They had acquired such knowledge from their long term experiences and practices as well as from their ancestors.

The findings of present study have been condensed below

- Darai people of Mangalpur had their unique dresses, cultures, rites and rituals. They spoke their native language called Darai kura. They followed hindu religion and celebrated various festivals tihar being most important one. Various dance forms like *Chudka*, *Sorahi* and *Ghatu* were performed.
- Darai people used different types of animals and plants for treatment of different types of ailments/diseases.
- They were found to use 28 animals species for treatment of 22 different types of ailments/diseases.
- The ailments/diseases included typhoid, rheumatism, abdominal disorders, lactation enhancement, eczema, Heart pain, intestinal pain, burns and boils, cracked skin, cough, blurred vision, bodyache, nervous disorder, muscular pain, fracture, pneumonia, menstural disorder, Sprain, tonsillitis, anal infection, eye irritation, and malaria.
- Likewise, Darai people used 76 plant species for the treatment of 36 different types of ailments/diseases.
- The ailments/diseases included diarrhea, dysentery, abdominal disorder, cough, lactation enhacement, fracture, abdominal pain, anaemia, antihelminthic, asthma, body pain, bone prick, blood pressure, constipation, cuts and wounds, delivery facilitation, diabetes, heat, gastritis, fever, earache, jaundice, measles, menstrual disorder, rheumatism, constipation, sinusitis, snakebite, ringworm, toothache, tonsillitis, scars, uric acid, typhoid, blood/mucous in stool and urinary disorder.

- Darai people are rich in indigenous knowledge in making bamboo products and fishing equipments like *Doko*, *Dhadiya*, Kokro and fishing nets. They also have good knowledge on making fishing poison using plants species like *Aconitum Spp.*
- Dari people prepare their own local alcohol called Moat/Muna using grains like maize, wheat etc. They possesed sound knowledge to make yeast using different types of plant species like *Vernonia cinera*, *Clerodendrum Spp* etc.

Darai people of the study area were found to be more or less aware of the importance of the medicinal plant species. Medicinal plants were seen planted in their garden. However, only few were conscious about the management and conservation of medicinal plants and animals. Very few were involved in cultivation of medicinal plants. Local healers and the knowledgeable groups, who mostly make the use of medicinal animals and plant species for folk remedy, have their own collection guidelines that, directly or indirectly, contribute in the sustainable use of such resources.

7. RECOMMENDATIONS

- **Aawareness programs and campaigns**

  Various programmes and campaigns should be conducted for the local healers as well as villagers on the importance of traditional medicine. Awareness should be created along with the feeling of ownership regarding the conservation, cultivation and utilization of medicinal plants Conservation activities with local participation should be conducted. Providing suitable guidelines and training to the villagers on the identification, collection and conservation of medicinal plants would be helpful.

- **Documentation**

  Investigation and research works should be carried out and documentation of traditional medicines and Indigenous knowledges of various ethnic group should be promoted by Government to prevent loss of such ancient and useful knowledges.

- **Encouragement and motivation**

  Traditional healers as well as younger generation should be motivated to practice and conserve the traditional medicine in the study area. Darai people should be encouraged to involve in cultivation of medicinal plants and develop market for it.

- **Scientific Analysis**

  Biochemical analysis should be done for verification of efficiency of medicinal properties of plants and animals so as to prevent harvesting of endangered species even for simple ailments.

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APPENDICES

Appendix 1: Checklist

I. For group discussion

Date-……..….

1. Name: ……..
2. Sex: ……..
3. Age: ……
4. Occupation: …….
5. Family members: ……
6. What types of diseases are most common here?
7. Do you treat all of them?
8. What are the diseases you treat for?
9. Which animals and plants are used to treat each disease?
10. Can you please give the information on the preparation of traditional medicine by using different species?

For the preparation of traditional medicine and treatment

i. Name of the disease: ……
ii. Name of medicinal animal and plants used: …….
iii. Preparation process
iv. Treatment procedure

11. From where do you get animal and herbal plants for medicinal purpose?
12. Are the plants used for medicinal purpose easily available?
13. What measures you take to preserve of such plants?
14. Do you harvest and sell medicinal plants from your area?Are you involved in commercial cultivation of medicinal palnts?

15. How much faith do you have in such traditional medicines? Do you go to hospitals or not? In which cases?

16. In your view, How can such knowledge be preserved and promoted?

II . Schedule on Ethnography

A. General information of respondents

1. Name :……..... …….. 2. Age :…… 3. Sex: …….
4. Occupation: …….. 5. VDC/Municipality: ……

B. Population

1. Type of family: …….. 2. Total members: ……

C. Language

i. What is your mother tongue?Do you speak it?

ii. Now a days which language is preferred most?

iii. Are all the children also able to communicate with their mother tongue?

D. Physical Features

i. What is the distinct feature of Kisan people?

- Shape of face: ……..
- Complexion: ……
- Nose: ……
- Eyes: …….
- Lips: ……
- Hair: …….
- Height: …….

E. Dress and Ornaments

i. What do Kisan Men wear?

ii. What do Kisan women wear?

F. Religion and Festivals

i. What is the religion of Kisan people?

ii. Which God/ Goddess do you worship?

iii. What are your main festivals?

iv. Do you sacrifice any animals in festivals?

v. In which festivals, what are the animals sacrificed?

vi. What are the religious belief behind this?

G. Origin

i. Since how long you have been living in this region?

ii. Is this the original place? If not, from where and when they migrated?

iii. Do you know any myths behind your origin?

H. Occupation

i. What is the main occupation of Kisan people?

ii. Is there any occupation inherit from ancestors?

I. Education

i. Are all the members of the family are literate?

ii. Do all the children go to school?

iii. What kind of school they are sent to? Is it government or private?

J. Life cycle and Rituals

a. Birth

i. What are the rituals performed during the child birth? For how many days?

ii. Is there any difference in the rituals performed between boy and girl?

b. Marriage

i. What is the specific age of boy and girl to get marry?

iii. What types of marriage occurs in your community?

iv. Is there any dowry system?

c. Death

i. What will you do to the dead body?

ii. For how many days mourning is done?

K. Health

i. Where do you go for medication when you are sick?

ii. Do you belief in the traditional healing practices?

L. Can you explain indigenous knowledges prevalent in your community (Agriculture, seed storage. pesticides, natural dyes etc)

Appendix 2 Tables

Table 3: Animals used to treat various ailments/diseases by Darai people

S. N0.	Class	Order	Family	Scientific name	Local name	Habit
1	Insecta	Hymenoptera	Apidae	*Apis cerana*	Mauri	Domestic
2	Insecta	Hymenoptera	Ichhneumonidae	*Ichhneumonida Spp*	Kamalkutti	Wild
3	Insecta	Diptera	Muscidae	*Musca Spp*	Mankha	Wild
4	Insecta	Hemiptera	Cercopidae	*Philaenus spomarius*	Thukekira	Wild
5	Aves	Charadiformes	Charadriidae	*Vanellus indicus*	Huttityau	Wild
6	Aves	Galliformes	Phasanidae	*Gallus gallus*	Kukhura	Wild
7	Aves	Coraciiformes	Coraciidae	*Coracias benghalensis*	Theuwa	Wild
8	Aves	Columbiformes	Columbidae	*Columba livia*	Parewa	Domestic
9	Aves	Accipitriformes	Accipitridae	*Gypus Spp*	Giddha	Wild
10	Aves	Galliformes	Phasanidae	*Pavo cristata*	Majur	Wild
11	Aves	Passeriformes	Passeridae	*Passer domesticus*	Bhagera	Wild
12	Aves	Anseriformes	Anatidae	*Anas Spp*	Haans	Domestic
13	Mammalia	Artiodactyla	Bovidae	*Bos indicus*	Gai	Domestic
14	Mammalia	Artiodactyla	Bovidae	*Bos Taurus*	Goru	Domestic
15	Mammalia	Artiodactyla	Bovidae	*Ovis aries*	Bheda	Domestic
16	Mammalia	Artiodactyla	Bovidae	*Bubalus bubalis*	Bhaisi	Domestic
17	Mammalia	Artiodactyla	Bovidae	*Capra Spp*	Bakhra, Boka	Domestic
18	Mammalia	Artiodactyla	Cervidae	*Axis axis*	Mirga/Harin	Wild
19	Mammalia	Perrisodactyla	Equidae	*Equus Spp*	Ghoda	Domestic
20	Mammalia	Artiodactyla	Suidae	*Sus scrofa*	Sungur	Domestic
21	Mammalia	Primates	Homonidae	*Homo sapiens*	Manche	
22	Mammalia	Lagomorpha	Leporidae	*Orgodactylus Spp*	Kharayo	Domestic
23	Mammalia	Carnivora	Canidae	*Canis aurens*	Syal	Wild
24	Pisces	Perciformes	Channidae	*Channa Spp*	Bhoti Machha	Wild
25	Reptilia	Testudines	Testudinadae	*Testudo Spp*	Kachuwa	Wild
26	Reptilia	Squamata	Varanidae	*Varanus Spp*	Sun Gohoro	Wild

27	Mollusca	Opisthophora	Viviparidae	*Bellamya Spp*	Ghogi	Wild
28	Mollusca	Pulmonata	Helicidae	*Anadenus Spp*	Chiplekira	Wild

Table 4. Types of diseases treated using various animal species

S. No.	Name of the Ailment	Type of Disease	Animal species used
1	Abdominal disorder	Gastrointestinal	*Coracias benghalensi*
2	Anal infection	Integumentory	*Capra Spp*
3	Body ache	Musculoskeletal	*Bellamya Spp*
4	Blurred vision	Otorhinolaryngo	*Axis axis*
5	Boils and wounds	Integumentory	*Testudo Spp, Axis axis*
6	Cough	Respiratory	*Apis cerana*
7	Cracked skin/heels	Integumentory	*Apis cerana, Sus scrofa, Channa Spp*
8	Eczema	Integumentory	*Gallus gallus domesticus, Anas platyrhynchos*
9	Eye irritaton/redness	Otorhinolaryngo	*Homo sapiens*
10	Fracture	Musculoskeletal	*Gypus Spp, Bos indicus, Anadenus Spp, Ovies aries, Canis aurens*
11	Heart pain	Cardiovascular	*Pavo cristatus*
12	Intestinal pain	Gastrointestinal	*Orygodactylus Spp*
13	Malaria	Haematological	*Varanus Spp, Bellamya Spp*
14	Menstural disorder	Reproductive	*Gallus gallus domesticus*
15	Muscular pain	Musculoskeletal	*Channa Spp*
16	Nervous disorder	Nervous	*Capra Spp*
17	Pneumonia	Respiratory	*Gallus gallus domesticus, Columba livia*
18	Rheumatism	Musculoskeletal	*Canis aurens*
19	Sprains	Musculoskeletal	*Bos indicus*
20	Tonsilitis	Otorhinolaryngo	*Bos Taurus*
21	Typhoid	Gastrointestinal	*Venellus indicus, Ichhneumonida Spp, Equus Spp, Musca Spp*
22	Lactation	Reproductive	*Philaenus spomarius*

Table 5. Plant species used to treat various ailments/diseases by Darai people

S.N.	Family	Scientific name	Local name	Darai name	Life form
1	Acanthaceae	*Adhatoda vasica*	Asuro		Shrub
2	Acanthaceae	*Rungia parviflora*	Runchejhar		Herb
3	Acanthaceae	*Barleria cristata*	Bhedekuro		Herb
4	Amaranthaceae	*Achyranthes bidentata*	Datiwan		Herb
5	Amaranthaceae	*Amaranthus spinosus*	Lunde		Herb
6	Amaryllidaceae	*Allium sativum*	Lasun		Herb
7	Arecaceae	*Areca catechu*	Supari		Tree
8	Anacardiaceae	*Mangifera indica*	Aanp		Tree
9	Annonaceae	*Annona squamosal*	Sitafal,sarifa		Tree
10	Apocynaceae	*Rauvofolia serpentine*	Sarpagandha		Shrub
11	Apocynaeae	*Apocynaceae*	Gulaichi		Tree
12	Apocynaceae	*Holarrhena pubescens*	Dudhkhirra	Dudhekhiro	Tree
13	Apocynaceae	*Calotropis gigoneta*	Aank		Shrub
14	Araceae	*Acorus calamus*	Bojho		Herb
15	Asteraceae	*Mikenia micarantha*	Banmara		Shrub
16	Bixaceae	*Bixa orellana*	Simrik		Tree
17	Bromeliaceae	*Ananas comosus*	Bhuikatahar		Herb
18	Caryophyllaceae	*Drymaria cordata*	Abijaalo		Herb

19	Cannabaceae	*Cannabis sativa*	Ganja		Herb
20	Capparaceae	*Crafeiva unilocularis*	Siplikan		Tree
21	Combretaceae	*Terminalia chebula*	Harro		Tree
22	Combretaceae	*Terminalia bellirica*	Barro		Tree
23	Compositae	*Artemesia indica*	Titepati		Herb
24	Compositae	*Eclipta prostate*	Bhringiraj	Bhrigijhar	Herb
25	Convolvulaceae	*Cuscuta reflexa*	Aakashbeli	Pahelolhara	Parasitc herb
26	Convolvulaceae	*Ipomoea aquatic*	Kalami	Karmi	Herb
27	Costaceae	*Costus specious*	Bethlauri	Larkaiya	Herb
28	Cucurbitaceae	*Cucurbita maxima*	Farsi		Climber
29	Cucurbitaceae	*Cucumis stivus*	Kakro		Creeper
30	Cucurbitaceae	*Trichosanthes dioca*	Parbal		Climber
31	Dipterocapaceae	*Shorea robusta*	Sal		Tree
32	Ericaceae	*Rhododendron arboretum*	Laaligurans		Tree
33	Euphorbiaceae	*Euphorbia roylena*	Siudi		Shrub
34	Euphorbiaceae	*Emblica officinalis*	Aamala		Tree
35	Euphorbiaceae	*Euphorbia hirta*	Dudhejhar		Herb
36	Euphorbiaceae	*Jatropha curcas*	Sajiwan	Sajjin	Shrub
37	Fabaceae	*Mimosa pudica*	Lajjawati		Herb
38	Gentianaceae	*Swertia nervosa*	Titepati	Pati	Herb

39	Gramineae	*Saccharum officinarun*	Ukhu		Grass
40	Hypercaceae	*Hyperiucum cordifolium*	Areli,Areto		Shrub
41	Juglandaceae	*Juglans regia*	Okhar		Tree
42	Lamiaceae	*Pogosteomon benghalensis*	Rudhilo		Herb
43	Lamiaceae	*Ocimum santum*	Tulsi		Herb
44	Lamiaceae	*Ocimum basilicum*	Babari	Barbi	Herb
45	Lamiaceae	*Leucas Spp*	Gumpati		Herb
46	Loranthaceae	*Viscum album*	Hadchur		Shrub
47	Lygodiaceae	*Lygodium japonica*	Janai Lahara		Climber
48	Malvaceae	*Bombax ceiba*	Simal		Tree
49	Meciaceae	*Azadirachta indica*	Neem		Tree
50	Menispermaceae	*Tinospora sinensis*	Gurjo		Climber
51	Menispermaceae	*Cissampelos pareira*	Batulpate		Herb
52	Moraceae	*Artrocarpus lakoocha*	Badahar		Tree
53	Moraceae	*Ficus benghalensis*	Bar		Tree
54	Musaceae	*Musa paradisiacal*	Keraa		Herb
55	Myricaceae	*Myrica esculenta*	Kaaphal		Tree
56	Myrtaceae	*Psidium guajava*	Ambaa		Tree
57	Myrtaceae	*Syzygium aromaticum*	Lwang		Tree
58	Oleaceae	*Nyctanthes arbortristis*	Parijat		Tree

59	Onocleaceae	*Matteuccia struthiopteris*	Neuro		Herb
60	Oxalidaceae	*Oxalis corniculata*	Chariamilo		Herb
61	Poaceae	*Cynodon dactylon*	Dubo		Grass
62	Poaceae	*Thyranolaena maxima*	Amriso		Shrub
63	Polygonaceae	*Fagopyrum esculentum*	Fapar		Herb
64	Rhamnaceae	*Ziziphus mauritiana*	Bayer		Shrub
65	Rutaceae	*Citrus medica*	Bimiro		Tree
66	Rutaceae	*Aegle marmelos*	Bel		Tree
67	Scrophulariaceae	*Scorparia dulcis*	Siudi		Herb
68	Solanaceae	*Withania somnifera*	Ashwaganda		Shrub
69	Solanaceae	*Solanum capsicoides*	Kantakaari		Shrub
70	Solanaceae	*Solanum melongene*	Bhanta		Shrub
71	Umbelliferae	*Centella asiatica*	Ghortaapre		Herb
72	Umbelliferae	*Carum copticum*	Jwaano		Herb
73	Umbelliferae	*Anethum sowa*	Swoup		Herb
74	Urticaceae	*Urtica dioica*	Sisno		Herb
75	Xanthorrhoeaceae	*Aloe vera*	Ghiukumari		Herb
76	Zingiberaceae	*Amomum zingiber*	Aduwa		Herb

Table 4. Types of diseases treated using various plant species

Name of the Ailment	Type of Disease/Ailments	Medicinal Plant Used
Abdominal Disorder	Gastrointestinal	*Terminalia checbula, T. bellirica, Phyllanthus emblica, Ziziphus mauritiana, Myrica esculenta,Nyctanthes arbortristis*
Abdominal Pain	Gastrointestinal	*Citrus medica, Magnifera indica; Leucas Spp*
Anaemia	Haematological	*Barleria cristata*
Antihelmenthic	Gastrointestinal	*Annona squamosa, Azadirchta indica, Cissampelos pareira*
Asthma	Respiratory	*Ocimum sanctum, Solanum virgianum*
Body Pain	Musculoskeletal	*Musa paradisiaca*
Bone Prick	Not a disease	*Rhododendron spp*
Blood Pressure	Cardiovascular	*Urtica dioca*
Blood/mucous in stool	Gastrointestinal	*Mimosa pudica, Magnifera indica, Matteuccia struthiopteris*
Constipation	Gastrointestinal	*Jatropha curcas*
Cough	Respiratory	*Adhato vasica, Amomum zingibar, Solanum virgianum, Cissampelis pareina; Ziziphus Mauritian; Leucas Spp*
Cuts and Wounds	Not a disease	*Prunus persica, Shorea robusta, Azadirachta indica, Eclipta prostata, Artemisia*
Delivery facilition	Not a disease	*Solanum melogene*
Diabetes	Gastrointestinal	*Annona squamosal,*
Diarrhoea	Gastrointestinal	*Matteuccia struthiopteris, Myrica esculenta, Psidium guajava, Vernonia cinera,*
Dysentry	Gastrointestinal	*Cuscuta reflexa, Citrus medica, Ficus benghalensis, Bombax ceiba*
Earache	Otorhinolaryngo	*Oxalis corniculata, Tinospora sinensis*
Fever	Not a diseases	*Ocimum basilicum; Plumeria Spp*
Fracture	Musculoskeletal	*Calotropis gigoneta, Viscum album, Urtica dioca,Bixa orellana*

Heat	Not a disease	*Trichosanthes dioca, Scorparia dulcis; Holarrhena pubescens; Ananas comosus*
Gastritis	Gastrointestinal	*Terminalia checbula, T. bellirica, Phyllanthus emblica,Antrocarpus lakoocha*
Jaundice	Gastrointestinal	*Cuscuta reflexa, Centella asiatica, Saccharum officinarum, Cucurbita maxima*
Lactation Enhancement	Not a disease	*Colocasia esculenta, Euphobia hirta, Carum copticum, Anethum sowa; Ipomoea aquatic*
Measles	Integumentory	*Bombax ceiba*
Menstural Disorder	Reproductive	*Carum copticum*
Rheumatism	Musculoskeletal	*Hypericum cordifolium*
Ringworm	Integumentory	*Lygodium japonica, Oxalis corniculata*
Scars	Integumentory	*Areca catechu*
Sinusitis	Otorhinolaryngo	*Ocimum sanctum*
Snakebite	Not a disease	*Rauvofolia serpentine*
Sprains	Musculoskeletal	*Calotropis gagonita*
Toothache	Dental	*Azadirachta indica, Achryranthes bidentata*
Tonsilitis	Otorhinolaryngo	*Syzium aromaticum, Acorus calamus, Ocimum sanctum; Fagopyrum esculentum; cucumis sativus*
Typhoid	Gastrointestinal	*Juglans regia, Pogosteomon benghalensis*
Uric acid	Cannot be classified	*Costus specious*
Urinary disorder	Genitourinary	*Thyranolaena maxima, Psidium guajava, Crafeiva unilocularis*

Appendix 3 Representative Photographs.

Darai women making mat (Gundri)

Darai man making fishing net

Fishing equipments made of Darai people.

Shelter of Ichhneumonida wasp

Wild pointed gourd

Tattoos in legs of a Darai women

Hat made from Bamboo

Healer Rambilas Darai with wife

Medicinal plant *Plumeria Spp*

Interview with Darai women

Interview with Traditional Healer

Medicinal plant *Calotropis gigoneta*