ETHNOMEDICINAL USES OF ANIMALS AND PLANTS BY THE BADI COMMUNITY OF KANCHANPUR DISTRICT, NEPAL

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August, 2022

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 sources of information have been specifically acknowledged by reference to the author(s) or institution(s).

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Date: 25 August 2022

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RECOMMENDATION

This is to recommend that the thesis entitled "**ETHNOMEDICINAL USES OF ANIMALS AND PLANTS BY THE BADI COMMUNITY OF KANCHANPUR DISTRICT, NEPAL**" has been carried out by Kamla Jaishi for the partial fulfillment of Master's Degree of Science in Zoology with special paper Ecology and Environment. 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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On the recommendation of supervisor "Dr. Bishnu Prasad Bhattarai" this thesis submitted by Kamla Jaishi entitled "**ETHNOMEDICINAL USES OF ANIMALS AND PLANTS BY THE BADI COMMUNITY OF KANCHANPUR DISTRICT, NEPAL**" 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 and Environment.

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CERTIFICATE OF ACCEPTANCE

This thesis work submitted by Kamla Jaishi entitled "**ETHNOMEDICINAL USES OF ANIMALS AND PLANTS BY THE BADI COMMUNITY OF KANCHANPUR DISTRICT, NEPAL**" has been accepted as a partial fulfillment for the requirements of Master's Degree of Science in Zoology with special paper Ecology and Environment.

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LIST OF ABBREVIATIONS

Abbreviated form	Details of the abbreviations
CBS	Central Bureau of Statistics
WHO	World Health Organization
UV	Use Value
ICF	Informant Consensus Factor
FL	Fidelity Level
IUCN	International Union for Conservation of Nature
GPS	Global Positioning System
ENT	Ear, Nose and Throat

ABSTRACT

Plants and animals have been used for therapeutic purposes by diverse ethnic groups in Nepal since time immemorial. The present study was conducted to document the traditional medicinal practices of using animals and plants by the Badi community of Kanchanpur district, Nepal. The data was collected by direct observation and interviews using semi-structured questionnaires and analyzed using quantitative tools like use value, informant consensus factor and fidelity level. The results of the study showed the use of 25 animals (18 wild and 7 domestic) and 61 plants (31 wild and 29 cultivated) for the treatment of 42 and 55 different types of human ailments respectively. The most widely used animal species was *Rattus rattus* (UV=0.125) with two use reports by 16 informants and mostly used plant species was *Tinospora cordifolia* (UV=0.096) with 3 use reports by 31 informants. The maximum number of animals and plants were utilized to cure musculo-skeletal problems and gastro-intestinal disorders respectively. Important animal and plant species for each ailment category were assessed using fidelity level. It was found that wild animals (18) and wild plants (31) were frequently used as ethnomedicine. Among them some are globally threatened species. Therefore this study can help formulate strategies for the conservation and sustainable utilization of natural resources.

1. INTRODUCTION

1.1. Medico-ethnobiology

Humans and their environment have a close relationship since they rely on various natural components, such as plants and animals, to thrive (Poudel and Singh 2016). Ethnobiology, in general, is the study of indigenous people's knowledge of animal and plant uses that has been passed down through generations. It engages in trans disciplinary research to better understand how local people interact with plant and animal resources (Timilsina and Singh 2014). Ethnomedicine deals with the study of traditional medicinal practices by different ethnic groups on the basis of their indigenous knowledge (Gubhaju and Gaha 2019). It also deals with the studies among tribes and rural people to document their unique wealth of information about animals and plants, as well as the quest for new drugs of animal and plant origin and the protection of beneficial and economically important species (Prakash 2017). Since ancient times, various societies have used biodiversity as a source of therapy (Vijayakumar et al. 2015).

Traditional remedies have been discovered to be an essential reference in the screening of major modern pharmaceuticals such as digitoxin, reserpine, tubocurarine, and ephedrine (Anyinam 1995; Gidey et al. 2011). The World Health Organization (WHO) estimates that about 80% of the world's more than six billion people rely primarily on animal and plant-based medications, with animal-based components accounting for around 8.7% of critical chemical compounds used in drug preparation (WHO 1993). Plants and animals, as well as their products, are the primary source of medicine and a highly valued resource in Nepal, particularly in rural areas, which rely on locally accessible medicinal animals and plants to cure disease (Paudyal and Singh 2014). Traditional medicine has been the focus for the primary health care in Nepal and rest of the world since time immemorial (Budha-Magar et al. 2020) and such knowledge has been transmitted through oral tradition from one generation to the next generation (Limbu and Rai 2013).

Ethnomedicine consist of those beliefs and practices relating to diseases that are the result of indigenous cultural development rather than being expressly derived from contemporary medicine's conceptual framework (Mishra and Rout 2009). Ethnic communities are found to be particularly close to nature because they have a wealth of

indigenous knowledge about how to use plants and animals sustainably (Maiti and Maiti 2011).

Traditional medical practice is observed to be more prevalent in developing countries than in developed countries, owing to the presence of more modern health services in developed countries (WHO 2013). Around 60% of commercially available medications are made up of bioactive substances collected from natural resources that have been used by various indigenous civilizations all over the world for centuries (Cragg and Newman 2013). Even after the revolution brought about by modern medicine, ethno-medicinal practices and beliefs are shaped in far-flung corners of the globe. It is due to the local people's interaction with the skilled patient healers, as well as the low cost and cultural acceptance (Timilsina and Singh 2014). People's traditional indigenous knowledge has made a significant contribution to the sustainable usage of biological resources for a variety of purposes such as food, medicine, clothing, dyes, construction, and so on (Tamang and Singh 2014). Approximately 87 percent of Nepalese people living in rural areas (CBS 2011) still rely on the formal and informal system of traditional medicines for healthcare, either directly or indirectly (Bhattarai 1992). Indigenous knowledge for using plant and animal parts as medicine has been the only means to save people's lives in Nepal's rural areas, where modern health care facilities are out of reach (Tamang and Singh 2014).

1.2. Ethnography

Badi is one of the marginalized ethnic communities of Nepal mostly inhabiting Surkhet, Dang, Jajarkot, Kailali, Banke, Rukum, Slyan, Kanchanpur and other terai and hilly districts. The Badi first arrived in west Nepal from India in the fourteenth century, first established in Salyan, then in Rolpa, Rukum and Jajarkot (Cox 2000). From the time of their arrival in Nepal until the 1950s, the Badi made a living as performers, traveling from one town to the next in groups of three or more families, producing song and dance performances and narrating stories from the great Hindu epics of the Mahabharat and Ramayana (Gurung 1982). The Government of Nepal classified Badi as "Hill Dalit," along with Damai, Sarki, Kami, and Gaine, as one of nine main social categories (CBS 2011). The Badi are considered untouchables among the untouchables which is the lowest rank of caste in western Nepal.

The Badi ethnic group accounts for 38,603 (0.1 percent) of Nepal's population of which 1,143 Badi peoples reside in Kanchanpur district (CBS 2011) but due to poverty and lack of employment, many Badi people had migrated to other places. Most of the Badi people are squatters and do not have their land. They have a very poor condition of living. They live in a small thatched-roofed house (Fig 1). A very few of them have a concrete house. Badi is also known as the "Singer Caste" since singing and dancing were the traditional Badi occupations that were the major source of their income. Nowadays they have switched to other occupations like laborers, manual workers, shopkeepers, farmers, etc. But still, the Badi community is facing many problems like persecution, poverty, and ignorance. They belong among the most back-warded groups in the country.

Various studies have been conducted on the traditional medicinal practices of different ethnic groups of Nepal by Rai and Singh (2015) on Rai ethnic group, Tamang and Singh (2014) on Lapcha group , Poudel and Singh (2016) on Darai ethnic group, Lohani (2011) on Jirel ethnic group, Budha-Magar et al. (2020) on Magar community, Rajbanshi and Thapa (2019) on Kisan ethnic group and Thapa (2020) on Tharu community. However, except some socioeconomic and cultural studies, there is even scarce on the study of ethnomedicinal knowledge of Badi community. Therefore, this study was carried out to explore and document the traditional medicinal knowledge system of the Badi community before vanishing which will be very useful for upcoming generations.

Figure 1: Thatched- roofed typical house of the Badi people

1.3. Objectives

1.3.1 General objective

The main objective of this study was to collect and document data on ethno-medicinal uses of animals and plants by the Badi community of Kanchanpur district, Nepal.

1.3.2 Specific objectives

- To explore the use, method of preparation and modes of administration of animals and plants for ethnomedicine.
- To examine the conservation status and threats to wild species of plants and animals that are used as traditional medicine.

1.4. Rationale of the study

Badi people are mostly illiterate and far from contemporary development facilities. They have a distinct kind of indigenous knowledge system which is beneficial to humanity. The traditional tools and techniques and indigenous knowledge system prevailing in the Badi community is on the verge of extinction because of modernization, cross-cultural society and displacement processes. There had been very few studies on the profession of Badi women (Cox 2000; Kharel and Suji 2019) but even the studies on the indigenous medicinal knowledge of the Badi community is lacking. Therefore, it is important to collect and document the indigenous knowledge system of the Badi group before it is lost forever after the death of elder people who practice traditional medicine for the treatment. This study contributed to documenting and preserving this unique and indigenous medicinal knowledge for future generations. The present study will be a valuable addition to the literature and will also be beneficial to research scholars.

1.5. Limitation of the study

- It was difficult to collect data on the traditional medicinal practices of the Badi people as they are shy and elusive in nature and they hesitate to share their information.

2. LITERATURE REVIEW

Humans have used flora and fauna since ancient times and continue to do so today. The western countries pioneered the scientific study of humans and their indigenous knowledge of animals and plants (Yineger et al. 2008). Ethnobiological studies including both animals and plants began in Nepal only in 1995, with the publication of ethnobiological study on the endangered Raute tribe. Following it, other researchers worked in this subject.

2.1. Medico-ethnozoology

As the value of pharmaceuticals derived from animals is recognized around the world, including in developed countries, medico-ethnozoological investigations are receiving more attention from researchers (Prakash 2017). A study conducted in Northern Ethiopia showed the use of 16 animal species both wild and domestic for the treatment of 18 different types of human ailments. The use of mammals was higher (34.62%) which is followed by fishes and birds. Most of the animal based medicine were prepared in their fresh form (72.7%) and most commonly used mode of administration of the drug was oral followed by topical. This study also showed that higher-aged people in society are more experienced in the traditional medicinal practice than the younger generation (Gidey et al. 2011).

Chakravorty et al. (2011) reported the use of 36 vertebrate species for the treatment of different types of human ailments by the Nyisi and Galo tribes of Arunachal Pradesh of Northeast India. The study showed that mammals comprise the highest percentage among the vertebrates used, it is followed by birds, fishes, reptiles and amphibians. The most used part of animals was meat and the method of preparation was cooking which is generally administered through an oral route. Borah and Prasad (2016) found that indigenous people of Assam, India uses a total of 26 ethnomedicinal animals and their products for the treatment of various human ailments. It was found that mammals contributed the highest percentage (34.62%) which is followed by fishes and birds. Animals were mostly consumed in raw form (28.7%) as ethnomedicine and the most common mode of the drug administration was oral (88.1%) followed by topical application (11.9%). This study also showed that higher-aged people in society are more experienced in the traditional medicinal practice than the younger generation.

An ethnomedicinal study was carried out on Migratory Tangbetons of Pokhara which recorded 17 medicinal animal species belonging to 8 families and 12 orders used for curing various ailments. Direct observation, questionnaire survey and key informant interview method were employed for primary data collection which was later compared with secondary data for the reliability and validity of the questionnaire (Paudyal and Singh 2014). A study on ethnomedicinal knowledge of the Balami group reported the use of 15 animal species (13 wild and 2 domestic) to cure 16 different types of ailments. This study used a random sampling method to recruit 29 respondents. Traditional healers and elderly people were the key informants (Timilsina and Singh 2014). Poudel and Singh (2016) conducted a study on ethnomedicinal knowledge of the Darai ethnic group which reported the use of 28 animal species to treat 22 ailments and the highest number of animals were found used for the treatment of Musco-skeletal diseases. Likewise, mostly used part was meat (25.64%) and the widely preferred form of medicine was a raw form (42%).

A comprehensive ethnomedicinal study of vertebrates showed the use of 58 (53 wild and 3 domestic) species of vertebrate animals to treat 62 types of human ailments (Adhikari et al. 2020). This study revealed that *Felis chaus* (UV=0.25) was the most widely used species with three use reports by 10 informants. Also, the cardiovascular and dental problems had the highest ICF value (0.974) with the cardiovascular problem having high use reports for 10 animal species and dental problems having 77 use reports for 3 animal species. Among the various methods of preparation of ethnomedicine, cooked meat was mostly used method and the most common method of administration of drug was oral.

2.2. Medico-ethnobotany

Plants used in traditional medicine have a diverse spectrum of components that can be utilized to treat both chronic and infectious ailments (Cunningham et al. 2012; Jayaprasad et al. 2012). A medico-ethnobotanical study conducted in the Kathua district of Jammu and Kashmir of India recorded the use of 197 plants both wild and cultivated for ethnomedicinal purposes. The important plants reported in this study were *Mentha longifolia, Curcuma domestica, Zingiber officinale, Ocimum tenuiflorum, Adiantum capillus-veneris, Viola odorata, Mentha arvensis and Acorus calamus* and Diabetes treatment had the maximum ICF value (0.96). This study also revealed that herbs were the most used medicinal plants and leaves were the maximum used plant part (Rao et al. 2015).

Tamang et al. (2017) conducted a study on ethnomedicinal knowledge of the Chepang community regarding the use of plants. The study was carried out using a semi-structured questionnaire method with key informants between the ages of 25 to 70 years. Chepang community was found to use 226 species of medicinal plants belonging to 198 genera and 93 families. Among the total species 95 species were herbaceous, 38 shrubs, 69 trees and 24 climbers. The Fabaceae was the largest medicinal plant family used for ethnomedicine. Among all the parts of plants, root (53 species) was used maximum for medicinal purposes. An ethnomedicinal study of the Kaski district showed the use of 105 medicinal plants belonging to 56 families and 99 genera in which Asteraceae and Poaceae were the most dominant families (Adhikari et al. 2019). Most of the plants were used for the treatment of digestive problems and mostly used plants were herbs (40%). The major part used was root and the most preferred mode of preparation of the drug was juice.

Another such study on the Magar community found the use of 82 medicinal plant species for various ailments (Budha-Magar et al. 2020). Group discussion, direct observation and interview methods were employed for the data collection. For the interview 50 respondents were chosen randomly of which five traditional healers were the rich source of knowledge. The study revealed that male and old people had more knowledge than female on the use of medicinal plants. The majority of medicinal plants were herbs and the most used part was root. The most common mode of administration of the drug was oral (51%) followed by topical (47%) and inhalation (2%).

A descriptive study on the ethnomedicinal practices by the Tharu community revealed the use of 74 plants belonging to 39 families, for the treatment of 11 categories of ailments (Thapa 2020). This study showed that the highest informant consensus factor (FIC) value was for respiratory troubles (0.84), followed by skeletomuscular disorder (0.83), and dermatological trouble (0.82). The highest frequency of citation (%) was found in *Azadirachta indica* (90 %), followed by *Calotropis gigantea* (67 %), *Euphorbia antiquorum* (67 %), and *Rauvolfia serpentina* (51 %). Fabaceae (6 spp.) was the most dominating family; herbs (47 %) the most frequently used life forms; leaves (32 %) the most frequently used plant part, and juice (30 %) was the most widely preferred mode of drug preparation. Bhatt et al. (2021) conducted a study in the Kanchanpur district regarding the ethnomedicinal values of weeds which showed the use of 108 weed species belonging to 44 families with the majority of Poaceae and

Asteraceae families (12%). The highest informant consensus factor (ICF) (0.75) was for fever and palpitation of the heart and the lowest ICF (0.45) was for paralysis and arthritis.

2.3 Conservation status and threats to medicinal animals and plants

Indigenous people have been extracting medicines from local plants and animals without threatening the population dynamics of the species because of the low level of harvesting (Anita et al. 2007). But due to over-hunting and over-fishing there has been a huge loss of wildlife over the globe (Boehlert 1996; Bennett and Robinson 2000; Bennett et al. 2002). The animals used for ethnomedicine are mostly wild species. Chakravorty et al. (2011) recorded the use of endangered and protected animal species like hornbill, pangolin, clouded leopard, tiger, bear, and wolf. Adhikari et al. (2020) also found the use of 10 globally threatened animal species for ethnomedicine. It was found that vertebrates are more prone to extinction than invertebrates (Ripple et al. 2017). Yineger et al. (2008) reported the maximum use of rare plant species (40%) for ethnomedicine by the Oromo ethnic group of Ethiopia. The finding of this study showed that the main threats to ethnomedicinal plants in that area were deforestation (25 species, 23%), drought (22 species, 20.56%), fire (16 species, 15%), overgrazing/over browsing (11 species, 10%) and agricultural expansion (8 species, 7%). Budha-Magar et al. (2020) also found that deforestation, lack of forest management and increasing population are the major threats to medicinal plants.

2.4 Research gap

A number of ethnobiological studies on the use of plants and animals in the traditional healing system were carried out in various ethnic groups of Nepal by many researchers like Lohani (2011), Limbu and Rai (2013), Ghimire (2016), Poudel and Singh (2016) and many others which guided further studies in this field. But still, there are many ethnic groups having traditional knowledge of using plants and animals as medicine to be explored. Badi ethnic group is one of them, whose ethnomedicinal knowledge is yet to explore. Therefore this study attempts to explore the traditional knowledge of the Badi community mainly focusing on ethnomedicinal uses of plants and animals in the Kanchanpur district of Nepal.

3. MATERIALS AND METHODS

3.1. Study area

3.1.1. Location

Kanchanpur District covers an area of 1,610 square kilometers and had a population of 134,868 in 2001 and 171,304 in 2011. It is located at 28° 38' to 29° 28' N latitudes and 80° 03' to 80° 33' E longitude that lies in a tropical lowland zone and ranges between the altitudes 176 and 1,528 meters above sea level. It consists of 7 municipalities and 2 rural municipalities. Bhimdattnagar is the headquarters of the Kanchanpur district. The district consist of Suklaphanta National Park which is rich in floral and faunal diversity. Many ethnic groups such as Tharu, Brahman, Chhetri, Thakuri, Sarki, Lohar, Thami, Badi, Damai, Kami, etc. with various cultural, linguistics and religious background live in the Kanchanpur district (CBS 2011). According to the census of 2011, the population of the Badi group is 1,143 in the Kanchanpur district. The study was carried out in the three municipalities namely Bhimdatta, Krishnapur and Suklaphanta municipality of the Kanchanpur district of Sudurpaschim Province, Nepal (Fig 2).

3.1.2. Climate

Kanchanpur district observes moderate climate prevailing. The average annual temperature for Kanchanpur is 32° C. The maximum temperature reaches up to 41° C in May and the minimum temperature reaches 10° C in December. The average annual rainfall is about 513 mm. It is dry for 249 days a year with an average humidity of 53% (DHM 2019).

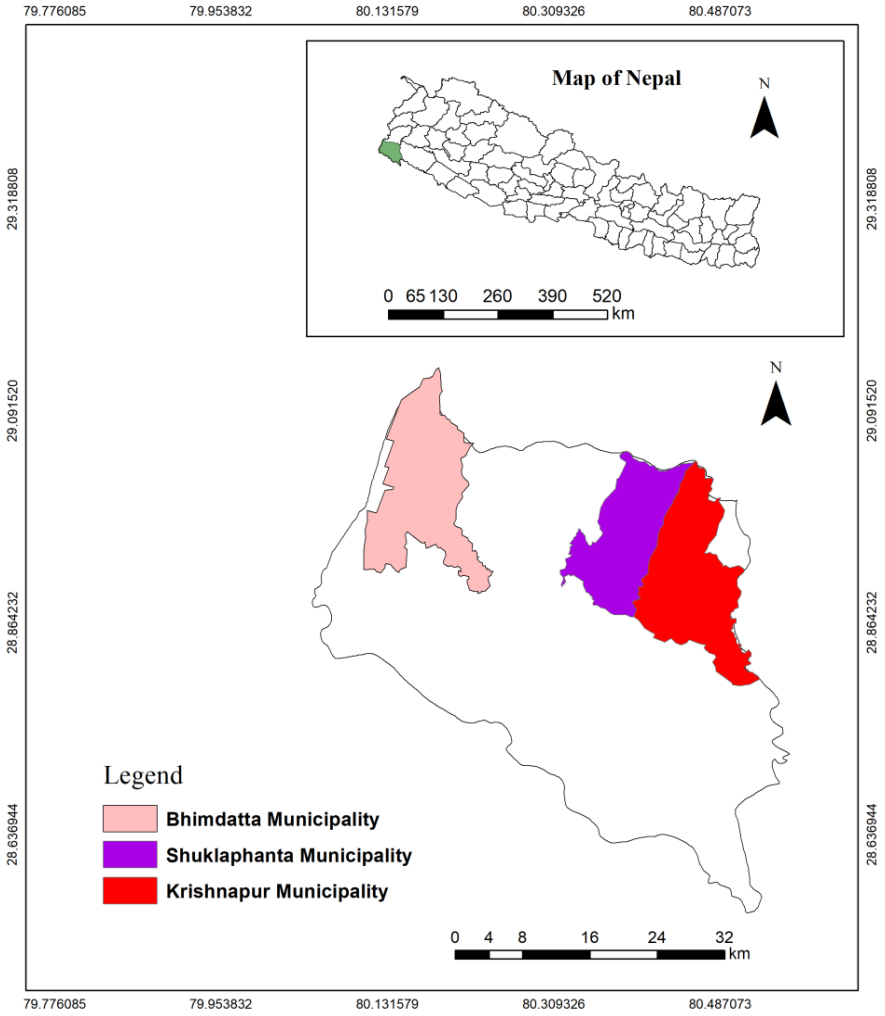

Figure 2: Map of Kanchanpur district showing study area

3.1.3. Flora and Fauna

Kanchanpur District consist of Suklaphanta National Park (SNP) in it. Major flora of this study area are Sal (*Shorea robusta*), Khair (*Acacia catechu*) and Sisoo (*Dalbergia sissoo*). A variety of vegetation ranging from grass to bushes is available in this area (Bhatt et al. 2021). This tropical area is also rich for faunal diversity such as swamp deer, wild elephants, Royal Bengal tiger, etc. The SNP is also home to Golden monitor lizard *(Varanus flovescens)*, Hispid hare, Blue bull *(Boselaphus tragocamellus)*, Barking deer *(Muntiacus muntjak)*, Hog deer *(Axis porcinus)*, Wild boar *(Sus scrofa)*, Leopard *(Panthera pardus)*, Jackal *(Canis aureus)*, Langur (*Semnopithecus hector*), and Rhesus monkey (*Macaca mulatta)* and different species of small mammals, birds, reptiles and fishes including various invertebrates (Poudyal et al. 2021).

3.2 Methods

3.2.1 Study design

The data was collected from September to November 2021. A preliminary survey was conducted in the first week of September for the site selection and field designing. Besides this, the information about the Badi community were collected from the municipality offices. Three municipalities of the Kanchanpur District namely Bhimdattnagar, Krishnapur and Shuklaphanta municipalities were chosen for the data collection on the basis of settlement of Badi peoples (CBS 2011) (municipality profile data and personal observation). There were altogether 206 households of Badi people (79 in Bhimdattnagar, 112 in Krishnapur, 9 in Shuklaphanta and 6 in Mahakali municipality) in Kanchanpur district. The houses of Badi people in Mahakali municipality were found closed during the study period due to their migration to other places. Therefore 200 households were chosen for the interview except the household of Mahakali municipality. Generally the peoples with age group ranging from 20 to 85 years having traditional knowledge on plants and animals were interviewed (Gautam and Timilsina 2022). The respondents were interviewed only once (Adhikari et al. 2020). The respondents were the local people of the Badi community, including traditional healers and social workers.

3.2.2 Data collection

Direct observation and semi- structured questionnaire survey method was used to collect ethnomedicinal data on the uses of animals and plants by the Badi ethnic group. Key informants (10 traditional healers) interview was useful to modify the questionnaires and verify the data obtained from household questionnaire survey. Generally a senior member of the family who was available at the time of data collection and had been familiar with traditional knowledge on using plants and animals for treatments was interviewed using a set of questionnaires. The questionnaires contained background information, household profiles, use of animals/plants and their parts for medicine and sanitary issues and it was prepared in English language (Appendix). Interviewer explained the questionnaire to each respondent in their local language. Photographs and images of different animals and plants were used while conducting interviews. During the data collection, photographs of the animals and plants used as ethnomedicine by Badi people were also taken. The unidentified

specimens/species was collected and identified on the spot with the help of local experts, and some were identified later in the Central Department of Zoology and Central Department of Botany of Tribhuvan University, Kirtipur. The detailed information, including local name of the animals and plants, parts used, methods of preparation and mode of administration were recorded.

Latin names and classification of the animals and plants were obtained from different literatures and the conservation status of each animal and plant was recorded by using different literatures (Lohani 2011; Bhatia et al. 2014; Poudel and Singh 2016; Alves et al. 2017; Bhattarai 2018; Adhikari et al. 2019; Adhikari et al. 2020; Budha-Magar et al. 2020; Gautam and Timilsina 2022) and IUCN Red Data Book (IUCN 2019).

All reported human-related diseases were classified into thirteen categories for plant based treatment and nine categories for animal based treatment on the basis of information gathered from informants in the study area as: cardiovascular problem, dental problem, dermatological problem, ear, nose and throat problem, gastro-intestinal problem, musculoskeletal problem, neurological problem, ophthalmological problem, reproductive problems, respiratory problem, urinary problems, endocrinal disorder and others (fever and headache) (Table 1).

3.3.3. Data analysis

The data was analyzed both qualitatively and quantitatively in MS-excel 2016. The data collected through interviews was generalized qualitatively for documentation of medicinal animals and plant species diversity and life forms and analyzed using the following three different quantitative tools:

i. Informant consensus factor (ICF):

The informant consensus factor for ailment category was calculated by;

$$ICF = \frac{Nur - Nt}{Nur - 1}$$

Where, N_{ur} is the number of use-reports in each ailment category and N_t is the total number of taxa used in each ailment category by all informants (Heinrich and Verpoorte 2012; Trotter and Logan 2019).

In each case if a species was mentioned by an informant as 'used', then we considered to be one 'use-report.' If one informant reported a species as a treatment for more than

one ailment in the same category, we considered it as one use-report (Amiguet et al. 2005). Thus, a species could be listed in several ailment categories of indigenous uses, but in terms of use-reports, each species was considered only once per informant in a single ailment category as described by (Amiguet et al. 2005).

The ICF ranges from 0 to 1, where high values (close to 1) indicates that there is a narrow well-defined group of animal species used to cure a particular ailment category and/or that information is exchanged between informants. On the other hand, low ICF values (close to zero) indicate that informants disagree over which animal to use due to random choosing or lack of exchange of information about the use among informants (González et al. 2016).

ii. Fidelity level:

To determine the most frequently used species for treating a particular ailment category. Fidelity level was calculated by;

$$FLsc = \left(\frac{N_{psc}}{N_s}\right) \times 100$$

Where N_{psc} is the number of use-reports cited for a given species *s* for a particular ailment category *c* and *Ns* is the total number of use-reports cited for any given species *s*. The species with the highest FL_{sc} value is considered the most preferred species for ailment category *c* (Friedman et al. 1986).

iii. Use value:

The relative importance of a species used as medicine is calculated with the help of the use value for the species (Phillips et al. 1994).

$$UVs = \sum \frac{Us}{Ns}$$

Where, Us is the number of use-reports cited by each informant for a given species *s* and N is the total number of informants interviewed for a given species *s*.

Kruskal wallis test was performed using PAST 4.0 (Hammer et al. 2001) to determine whether there was significant difference or not between the municipalities for the variables like occupation, gender, age and education.

Table 1: List of ailments treated by the use of plants and animals grouped into different categories (Adhikari et al. 2020).

SN	**Ailment categories/problems**	**Diseases treated by the use of plants**	**Diseases treated by the use of animals**
1	Cardiovascular	Anemia	Anemia
		Hemorrhage	Malaria
		High blood pressure	
2	Dental	Toothache	
		Cavity	
3	Musculoskeletal	Muscular pain/cramp	Muscular pain/cramp
		Muscular swelling	Muscular swelling
		Body pain/body ache/back pain	Body pain/body ache/back pain
		Joint pain	Joint pain
		Rheumatism	Rheumatism
		Sprain	Sprain
		Thorn prick	Strength
			weakness
			Hernia
			Arthritis
4	Reproductive	Infertility	Infertility
		Menstrual problems	Menstrual problems
			Sexual performance
			Virility
			Lactation
			Low sperms
5	Ear, Nose and Throat	Earache	Speech
		Sore throat	

6	Respiratory	Asthma	Asthma
		Corona	Pneumonia
		Cold	Cold
		Cough	Cough
			Tuberculosis
7	Neurological	Dizziness	Tetanus
		Stress	Ghost
		Insomnia	Epilepsy
			Paralysis
			Insomnia
8	Dermatological	Burns	Burns
		Wounds	Wounds
		Dry skin/lip	Dry skin/lip
		Dry hair/Hair fall	Boils
		Scabies	Cracked heel
		Pimples	Extreme hot
		Scar	Germs and bacteria
		Cracked heel	Blisters
		Rough skin	
		Abscess	
		Boils	
		Prickly heat rashes	
		Extreme cold	
		Blisters	
		Extreme hot	
		Cuts	
9	Gastro-intestinal	Stomach pain/ache	Stomach pain/ache

		Nausea	Constipation
		Vomiting	Indigestion
		Diarrhea and dysentery	Gastritis
		Constipation	
		Indigestion	
		Gastritis	
		Acidity/gas	
		Jaundice	
		Mouth blisters	
		Helminthes	
10	Ophthalmological	Eye weakness	
11	Urinary	Kidney stones	
12	Endocrinal	Diabetes	
13	Others	Headache	Fever
		Fever	

4. RESULTS

4.1. Demographic details of informants and their ethnomedicinal knowledge

A total of 200 informants (102 males and 98 females, aged between 20 to 85 years) participated in the study. Both male and female of Badi community were equally participated during questionnaires and had equal knowledge on the use of plants and animals for traditional treatments. A large number of respondents were in between 50 to 59 years (n=54). It was found that the respondents having age above 50 years had more knowledge and experience on using ethnomedicine than young (Fig 3).

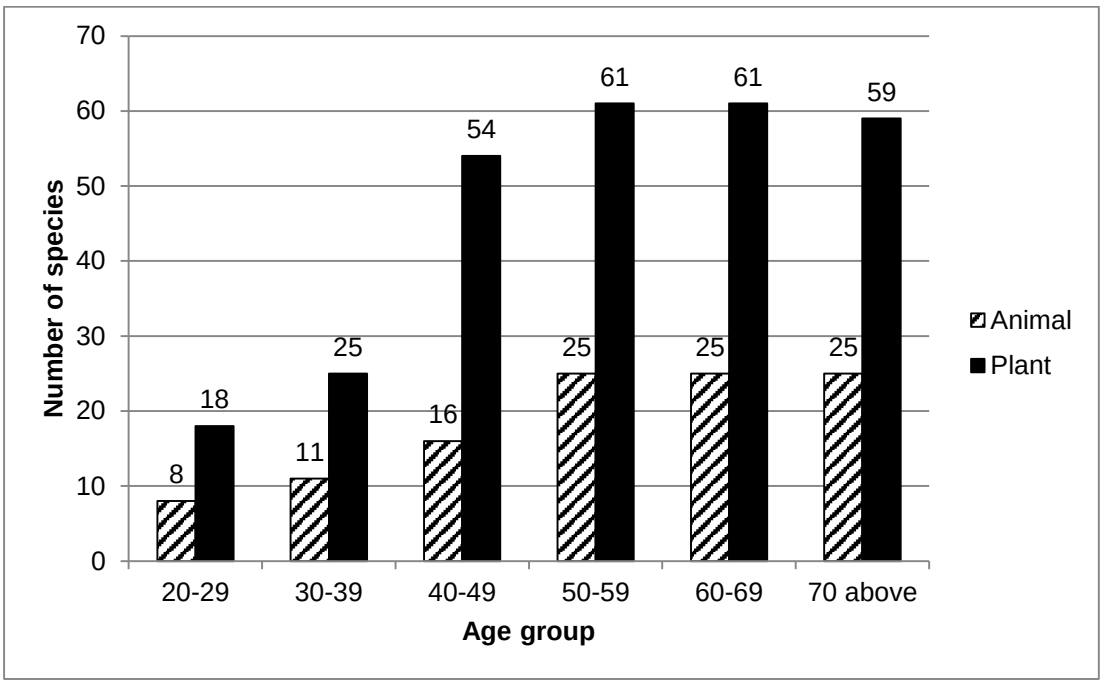

Figure 3: Relation between age group and use of animals and plants for ethnomedicine

Majority of the respondents were laborer (76.5%) who works on daily wages. A very few of them were farmer (7.5%). Labor and farmer had good knowledge of ethnomedicine than other people (Fig 4).

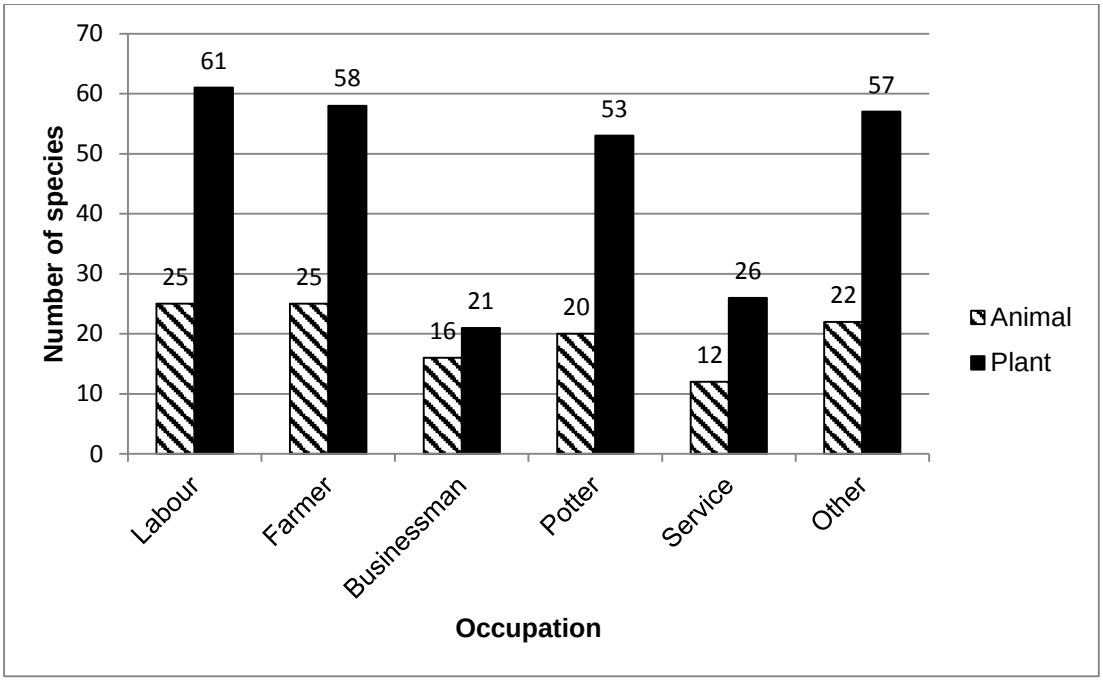

Figure 4: Relation between Occupation and use of animals and plants for ethnomedicine

Most of the respondents were illiterate (68%) who had never visited school in their life. There were about 28.5% of the respondents with basic level and 3.5% of them with secondary level education. It was found that illiterate people had more knowledge on traditional medicinal system than the literate ones (Fig 5). Detail demographic data of the informants belonging to three municipalities (Bhimdattnagar, Krishnapur and Shuklaphanta) is illustrated in the Table 2.

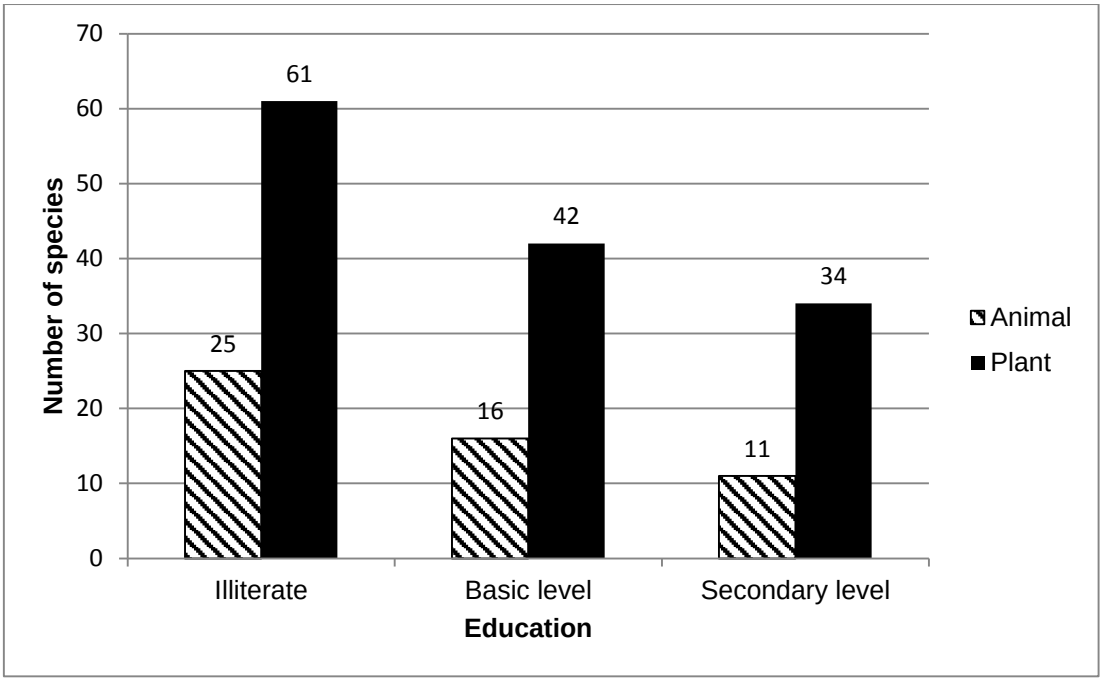

Figure 5: Relation between Education status and use of animals and plants for ethnomedicine

4.2. Medico-ethnozoology

The present study revealed the use of 25 animal species belonging to 17 orders, 20 families and 24 genera to cure 42 human ailments (Table 3). Out of all animals, 18 animal species were wild and seven were domesticated. The order, family, scientific names, English names, local names, IUCN category, use value, parts used and uses are presented in Table 3. Among 25 animal species, 11 species (44%) were Mammalia, 9 Aves (36%), 1 Reptilia (4%), 2 Pisces (8%) and one-one species of Arthropod (4%) and Annelida (4%) (Fig 6).

Table 2: Demographic profile of the respondents (service=Teacher and mechanic, other=Social worker and beggar)

Parameter	**Questionnaire (200)**	**Bhimdattanagar**	**Krishnapur**	**Suklaphanta**	**Total**	**Percentage**
	No of household interviewed	79	112	9	200	100
Occupation	Labour	64	81	8	153	76.5
	Buisnessman	6	2	1	9	4.5
	Farmer	8	7	0	15	7.5
	Potter	0	3	0	3	1.5
	Service	0	2	0	2	1
	Other	1	17	0	18	9
Gender	Male	42	55	5	102	51
	Female	37	57	4	98	49
Education	Illiterate	51	77	8	136	68
	Basic	24	32	1	57	28.5
	Secondary	4	3	0	7	3.5
Age group	20-29	9	7	0	16	8
	30-39	19	26	2	47	23.5
	40-49	20	28	4	52	26
	50-59	22	32	0	54	27
	60-69	8	10	0	18	9
	70-79	1	5	3	9	4.5
	Above 80	0	4	0	4	2

Table 3: Medicinal uses of animals and their body parts in traditional medicine by Badi community in Kanchanpur, Nepal

SN	Scientific name	English name	Local name	Order	Family	IUCN category	UV	Parts used	Uses
Class: Mammalia									
1	*Bos taurus* (Linnaeus, 1758)	Cow (D)	Gai	Cetartiodactyla	Bovidae		0.008	milk, urine, ghee, curd	Urine of cow help to kill germs and bacteria on the skin while taking bath with it; urine also help to relief from gastritis while drinking half tea glass early in the morning before meal; Milk of cow helps to promote strength and cures insomnia if drunk one glass of warm milk mixed with pinch of turmeric every night; massage by ghee of cow gets relief from muscular pain; also helps to moisturize dry skin/lips; curd improves digestion.
2	*Bubalus bubalis* (Linnaeus, 1758)	Buffalo (D)	Bhuiso	Cetartiodactyla	Bovidae		0.006	milk, meat	Promotes strength
3	*Rusa unicolor* (Kerr, 1792)	Sambar deer (W)	Jarayo	Cetartiodactyla	Cervidae	VU	0.047	meat, horn	Cooked meat promotes strength and virility: horn is rubbed to make a fine paste which is applied on wounds to reduce rash.

4	*Sus scrofa* (Linnaeus, 1758)	Wild boar (W)	Bandel	Cetartiodactyla	Suidae	LC	0.029	meat	Cooked meat is given to the epilepsy patient.
5	*Sus domesticus* (Erxleben, 1777)	Pig (D)	Sungur	Cetartiodactyla	Suidae		0.009	meat, gallbladder	Cooked meat promotes strength; boiled gallbladder with salt is given to asthma patient.
6	*Rattus rattus* (Linnaeus, 1758)	House Rat (W)	Muso	Rodentia	Muridae	LC	0.125	meat	Cooked meat helps to reduce malarial fever and promotes sexual performance.
7	*Hystrix indica* (Kerr, 1792)	Indian crested porcupine (W)	Dumsi	Rodentia	Hystricidae	LC	0.067	quails, meat	Keeping quails in home protect from ghost. Cooked meat is considered good to treat stomachache.
8	*Lepus nigricollis* (F. Cuvier, 1823)	Indian Hare (W)	Kharayo	Lagomorpha	Leporidae	LC	0.034	blood, meat	Fresh raw blood is given to the patient of asthma for 2 days continuously; cooked meat helps to reduce menstrual cramps and promote strength.
9	*Rhinolophus affinis* Horsfield, 1823	Bat (W)	Chamero	Chiroptera	Rhinolophidae	LC	0.026	meat	Cooked meat is given to the patient of asthma and tuberculosis.

10	*Capra hircus*	Goat (D)	Khasi	Artiodactyla	Bovidae		0.005	meat	Cooked meat provides strength to weak patients.
11	*Homo sapiens*	Human	maanxe	Primates	Homonidae		0.027	hair	Paste of human hair and aloe vera gel is applied on burn wound.
Class: Aves									
12	*Columba livia* (Gmelin, 1789)	Pigeon (W)	Parewa	Columbiformes	Columbidae	LC	0.008	meat, faecal matter	Cooked meat is given to the patients of Paralysis and joint pain; dry fecal matter is applied as a paste with mustard oil to treat boils and blisters.
13	*Spilopelia chinensis (Scopoli, 1786)*	Spotted Dove (W)	Dhukur	Columbiformes	Columbidae	LC	0.012	meat	Cooked soup meat mixed with garlic, ginger and black pepper paste provides relief from common cold.
14	*Passer domesticus* (Linnaeus, 1758)	House sparrow (W)	Geda	Passeriformes	Passeridae	LC	0.035	meat	Cooked meat helps to increase sexual potency and helps to treat infertility. Also provides relief from fever.
15	*Corvus splendens* (Vieillot, 1817)	House crow (W)	Kauwa	Passeriformes	Corvidae	LC	0.045	blood	Fresh raw blood is given to the patient of hernia; fresh blood is also applied on cracked heels.

16	*Pavo cristatus* (Linnaeus, 1758)	Common pea fowl (W)	Mayur	Galliformes	Phasianidae	LC	0.111	meat, feather	Cooked meat provide strength and increase virility; ash of feather is applied on forehead by Dhami/Jhakri to protect from ghost.
17	*Gallus domesticus*	Hen (D)	Kukudo	Galliformes	Phasianidae		0.008	egg, meat	Boiled egg provides strength and fulfill protein deficiency; cooked meat provides relief to Body pain and hot soup of it relief common cold.
18	*Bubulcus ibis* (Linnaeus, 1758)	Cattle egret (W)	Bakulla	Pelecaniformes	Ardeidae	LC	0.091	meat	Cooked meat provides coolness to the body and protects from hot.
19	*Psittacula krameri* (Scopoli, 1769)	Rose-ringed parakeet (W)	Swaa	Psittaciformes	Psittacidae	LC	0.077	meat	Meat of parrot is considered as good for the production of speech in child and it also helps for sexual performance to adults.
20	*Anas sp.*	Duck (D)	Haans	Anseriformes	Anatidae		0.013	egg, meat	Boiled egg and cooked meat soup both are used to treat pneumonia.
Class: Reptilia									
21	*Varanus flavescens* (Gray, 1827)	Golden monitor lizard (W)	Sun Gohoro	Squamata	Varanidae	LC	0.049	meat	Cooked meat is useful for patient of rheumatism and arthritis; paste of meat and coconut oil is applied on burn wound.
Class: Pisces									

22	*Labeo rohita* (Hamilton, 1822)	Rohu fish (W)	Maachha	Cypriniformes	Cyprinidae	LC	0.009	meat	Cooked meat soup by mixing ginger, black pepper and timur powder is used for the treatment of cold, anemia, pneumonia, fever and menstrual problems.
23	*Wallago attu* (Bloch & Schneider, 1801)	Cat fish (W)	Jungey machha	Siluriformes	Siluridae	NT	0.083	meat, gallbladder	Boiled gallbladder is prescribed to eat for the treatment of tetanus, cooked meat is prescribed to promote strength.
Phylum: Arthopoda									
Class: Insecta									
24	*Apis melifera*	Honeybee (W)	Gharmouri	Hymenoptera	Apidae		0.007	honey	Raw honey is prescribed to eat for the treatment of stomach pain; honey mixed with ginger and black pepper powder is given to get relief from cold and cough; raw honey is also applied on dry skin to get smooth skin
Class: Clitellata									
25	*Pheretima posthuma*	Earthworm (W)	Ganiula	Ophisthopora	Megascolecidae		0.027	whole body	Boiled or cooked earthworms are used to produce milk in lactating mothers.

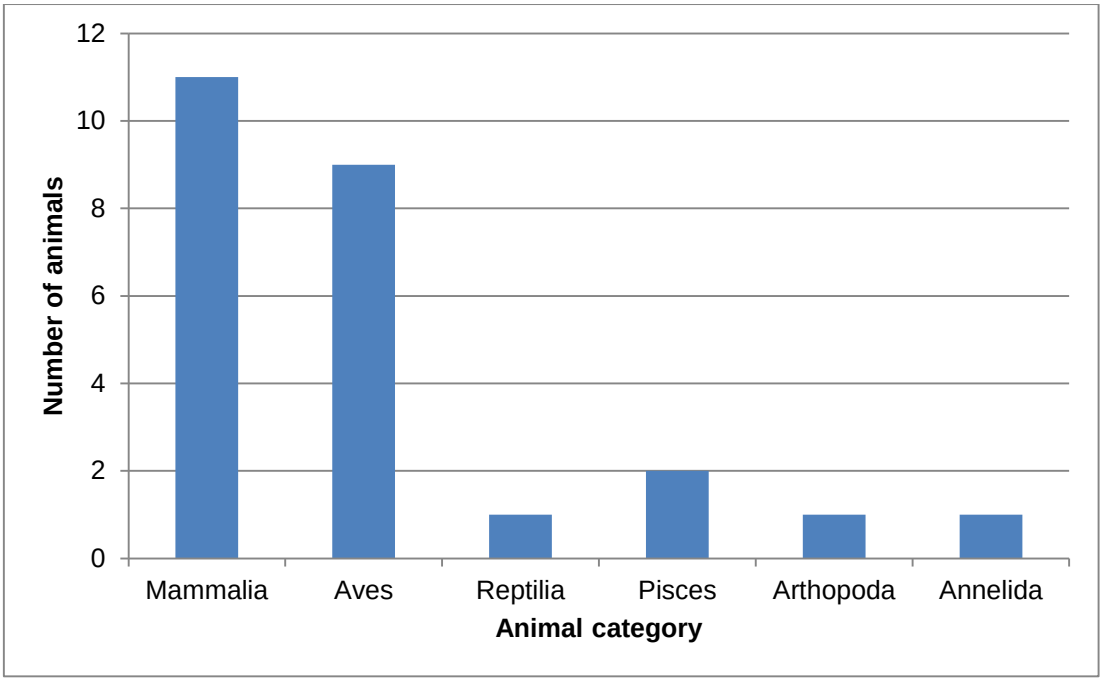

Figure 6: Category of animals used for ethnomedicine by Badi community.

4.2.1 Parts and products of animals used

This study showed that the animal parts and products used for treating various ailments are of 15 types. Meat was the most preferred parts (n=21) followed by milk, blood, gallbladder and egg (n=2 each) and feather, hair, honey, horn, whole body, quails, urine, ghee, curd and faecal matter (n=1 each) (Fig 7).

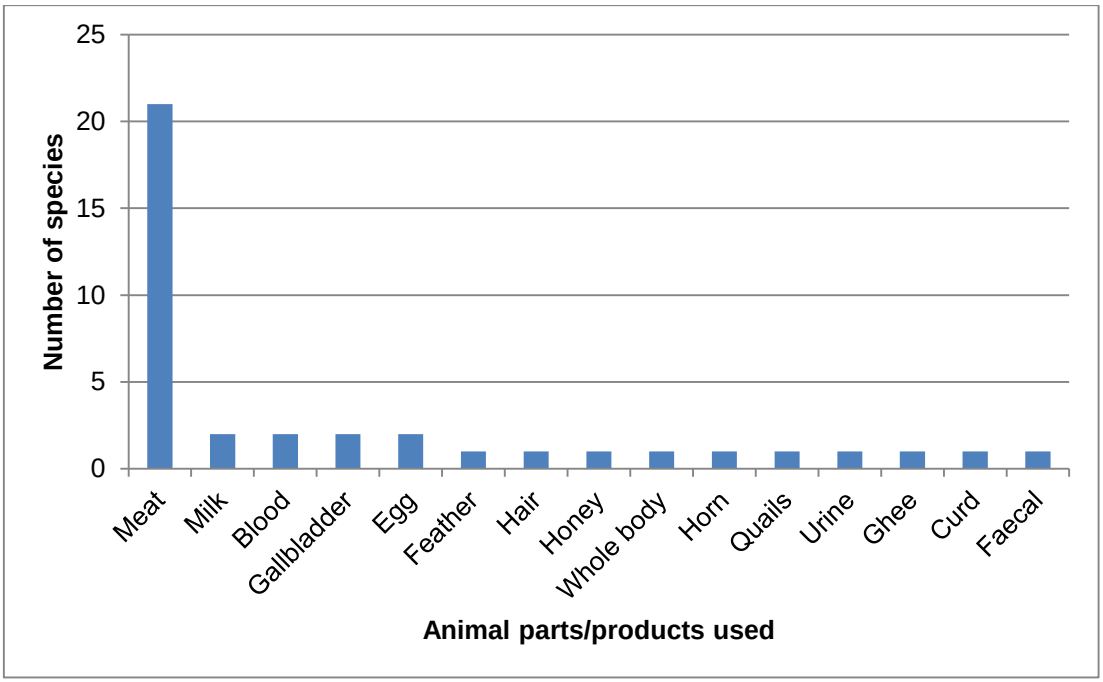

Figure 7: Parts and products of animals used in ethnomedicine by Badi community

4.2.2 Method of preparation and their administration

The ethno-medicines were prepared using eight different techniques. Cooked meat was commonly used (44%) followed by soup, boiled body parts raw, paste, fresh, dry and warm (Fig 8) and utilized either orally (77%) or topical (23%) (Fig 9).

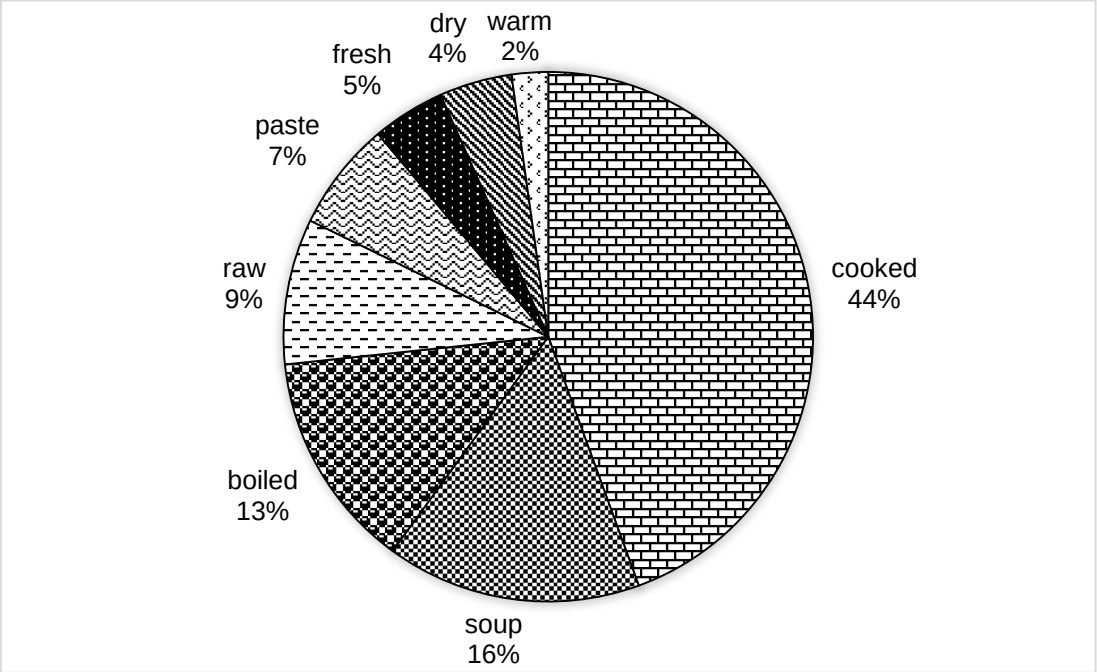

Figure 8: Methods of preparation of medicine from different parts of animals.

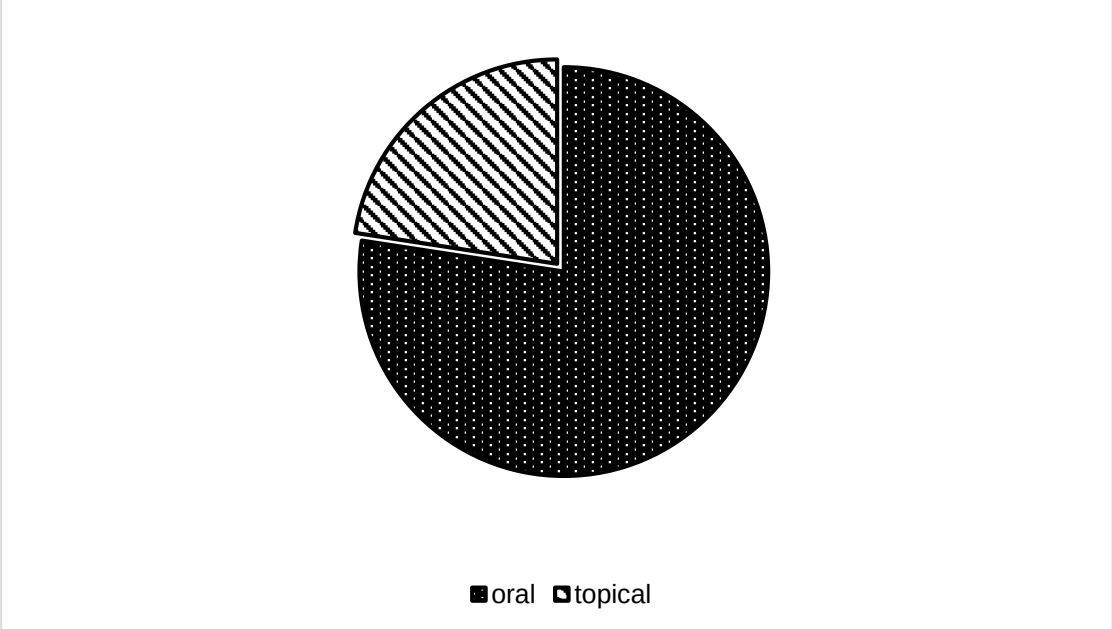

Figure 9: Mode of administration of animal based ethnomedicine

4.2.3 Informant consensus factor, fidelity level and use value

The maximum animal species (11) were used to cure various musculo-skeletal problems, followed by respiratory problems (9 species), dermatological and reproductive problems (8 species each). Majority of the informants agreed in the treatment of ENT problems (ICF=1) followed by musculo-skeletal problems, gastro-intestinal disorders, respiratory problems and cardiovascular diseases (ICF=0.99 each). The least agreement between informants was observed for dermatological problems (ICF=0.95) (Table 4).

Table 4: Categories of ailments and informant consensus factor (ICF) for ailment categories

Ailment categories	**Number of use-reports (N_{ur})**	**Number of taxa (N_t)**	**Informant consensus factor (ICF)**
Gastro-intestinal	276	3	0.99
Cardiovascular	115	2	0.99
Respiratory	958	9	0.99
Dermatological	139	8	0.95
Reproductive	215	8	0.97
Neurological	168	5	0.98
Musco-skeleton	1069	11	0.99
ENT	15	1	1
Others	28	2	0.96

When selecting the most preferred animal species for each ailment category, the highest FL (%) was taken in each category of ailment (Table 5). *Rhinolophus affinis, Spilopelia chinensis* and *Anas sp.* for respiratory diseases, *Bubulcus ibis* and *Homo sapiens* for dermatological problems, *Pheretima posthuma* for reproductive problems, *Sus scrofa* for neurological disorders, *Capra hircus* for musculo-skeleton problems has the highest

FL (100% each) and *Passer domesticus* has the lowest FL (14%) for other uncategorized category (fever).

On the basis of use value (UV), the most used animal species by Badi community was found to be *Rattus rattus* (UV=0.125) with two use-reports by 16 informants followed by *Pavo cristatus* (UV=0.111) with 3 use-reports by 27 informants, *Bubulcus ibis* (UV=0.09) with one use-report by 11 informants and *Wallago attu* (UV= 0.083) with 2 use-reports by 24 informants (Table 3).

Table 5: Most frequently used animal(s) for different ailment categories based on the highest FL (%) in each ailment category.

Ailment	**Animal**	**FL%**
Respiratory	*Rhinolophus affinis*	100
	Spilopelia chinensis	100
	Anas sp.	100
Dermatological	*Bubulcus ibis*	100
	Homo sapiens	100
Reproductive	*Pheretima posthuma*	100
Neurological	*Sus scrofa*	100
Musco-skeleton	*Capra hircus*	100
Cardiovascular	*Rattus rattus*	37.5
Gastro-intestinal	*Hystrix indica*	50
ENT	*Psittacula krameri*	41.7
others	*Passer domesticus*	14

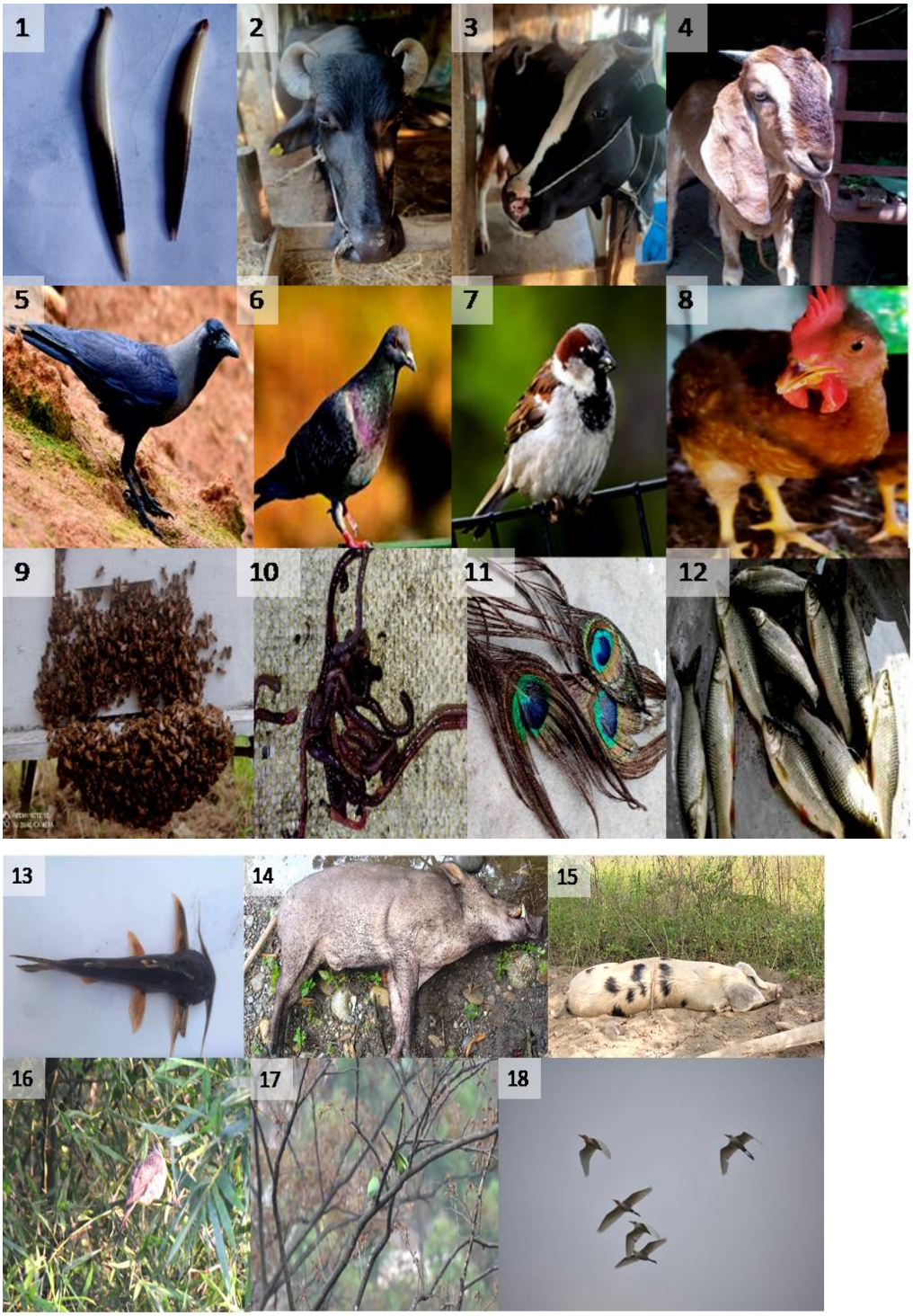

Figure 10: Animals and their parts used by Badi community as ethnomedicine, (1) Quails of *Hystrix indica* (2) *Bubalus bubalis* (3) *Bos Taurus* (4) *Capra hircus* (5) *Corvus splendes* (6) *Columba livia* (7) *Passer domesticus* (8) *Gallus domesticus* (9) *Apis melifera (10) Pheretima posthuma* (11) feathers of *Pavo cristatus*. (12) *Labeo rohita* (13) *Wallago attu* (14) *Sus scrofa* (15) *Sus domesticus* (16) *Spilopelia chinensis* (17) *Psittacula krameri* (18) *Bubulcus ibis*

4.3 Medico-ethnobotany

A total of 61 plant species both wild and cultivated, belonging to 24 orders and 38 families were found to be used by the Badi community for the treatment of 55 types of human ailments. The life form, order, family, scientific names, English names, local names, IUCN category, Use Value (UV), parts used and uses are presented in Table 6. Out of total plants, 23 were trees (38%), 19 herbs (31%), 11 shrubs (18%), 6 climbers (10%) and 2 grasses (3%) (Fig 11).

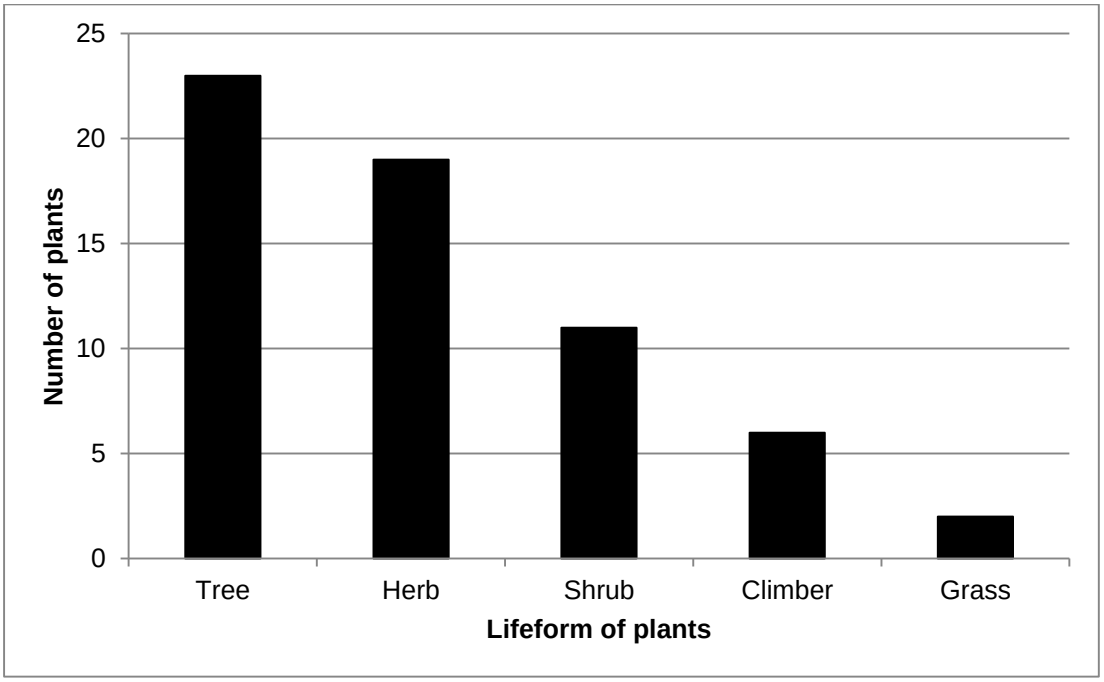

Figure 11: Life forms of plants used for ethnomedicine by Badi community

Table 6: Medicinal uses of plants and their parts in traditional medicine by Badi community in Kanchanpur, Nepal (W=wild, C=cultivated and UV=use value).

SN	Family	Scientific name	English name	Local name	IUCN Category	UV	Parts used	uses
Life form: Tree								
Order: Myrtales								
1	Myrtaceae	*Eucalyptus oblique*	Eucalyptus (W)	Liptis		0.0048	leaves	Raw leaves are boiled in water and given for the treatment of cough.
2	Myrtaceae	*Psidium guajava* L.	Guava (C)	Ambha	LC	0.0435	leaves	Leaves of guava are soaked overnight and the water is drunk every morning by diabetic patients
3	Myrtaceae	*Syzygium armaticum*	Clove (C)	Lwang		0.0138	seed	Raw seed or paste of seed is applied on toothache and paste is also used to make hot soup to get relief from cold.
4	Myrtaceae	*Syzygium cumini* (L.) Skeels	Java plum (W)	Jamun	LC	0.0111	bark	Bark is soaked overnight in water which is drunk in the early morning to control diarrhea.

5	Lythraceae	*Punica granatum* L.	Pomegranate (C)	Anaar	LC	0.0909	fruit	Juice is prescribed to drink daily by anemic patient.
Order: Fabales								
6	Fabaceae	*Senegalia catechu* (L.f.) P.J.H.Hurter & Mabb.	Khair (W)	Khayar	LC	0.0148	bark	Bark is soaked overnight in water and this water is considered good for body pain and stomachache.
7	Fabaceae	*Pterocarpus marsupium* Roxb	Vijaysar (W)	Vijaysar	NT	0.0556	latex	Latex is mixed in hot water, milk or tea to get relief from body pain.
8	Fabaceae	*Bauhinia variegate*	Orchid (W)	Koiraal		0.0303	flower	Flower of koiraal are boiled and made fine paste which is mixed with buttermilk and is given to drink once a day to treat diarrhea and dysentery.
Order: Malpighailes								
9	Euphorbiaceae	*Phyllanthus emblica* L	Indian gooseberry (W)	Aamla	LC	0.0909	fruit	Raw fruit is considered good for mouth blisters and eye weakness.
10	Putranjivaceae	*Putranjiva roxburghii* Wall	Putranjiva (C)	Gathiya	LC	0.0541	fruit	Soaked fruit is considered good for infertility and menstrual problems.
Order: Rosales								

11	Moraceae	*Ficus religiosa* L.	Peepal (W)	Peepal	LC	0.0385	leaves	Leaves are boiled to make hot water to get relief from cough.
12	Moraceae	*Ficus auriculata* Lour	Fig (C)	Timlo	LC	0.0123	fruit	Ripe fruit is used to treat stomachache.
13	Moraceae	*Ficus palmata* Forssk.	Wild fig (W)	Baidu	LC	0.0123	latex	Latex is applied to remove the thorn embedded.
14	Moraceae	*Ficus tinctoria* G.Forst.	Humped fig (W)	umar	LC	0.0145	latex	Paste of latex of umar, rose petals and mango bark are used to make fine paste and applied on abscess.
Order: Sapindales								
15	Anacardiaceae	*Magnifera indica*	Mango (C)	Aam		0.0159	bark	Paste of latex of umar, rose petals and mango bark are used to make fine paste and applied on abscess.
16	Meliaceae	*Azadirachta indica* A.Juss.	Neem (W)	Neem	LC	0.0073	bark, leaves	Brushing with bark of neem helps to prevent tooth decay; paste of leaves are used to treat boils, blisters, pimples, abscess and prickly heat rashes.
17	Rutaceae	*Aegle marmelos* (L.) Corrêa	Stone apple (W)	Bel	NT	0.0172	fruit	Fruit pulp of bel is considered good to treat constipation and stomachache.

Order: Brassicales								
18	Caricaceae	*Carica papaya* L.	Papaya (C)	Papto	DD	0.102	fruit	Ripe papaya is used to treat jaundice and constipation.
Order: Malvales								
19	Dipterocarpaceae	*Shorea robusta* Gaertner	Sal (W)	Sal	LC	0.0196	latex	Latex is mixed with curd and given to the patient of stomachache.
20	Bombaceae	*Bombax ceiba* L.	Simal (W)	Simal	LC	0.0357	flower	Flower are cooked to make vegetable and given to get from constipation.
Order: Laurales								
21	Lauraceae	*Cinnamomum tamala* (Buch.-Ham.) T.Nees & C.H.Eberm	Bay leaf (W)	Tejpatta	LC	0.0047	leaves	Bay leafs are used in tea and hot water and given to treat cold and cough.
Order: Zingiberales								
22	Musaceae	*Musa puspanjaliae* Gogoi & Häkkinen	Banana (C)	Kera	LC	0.0096	fruit	Raw bananas are boiled and fried in ghee and given to the patient of diarrhea.
Order: Ericales								

23	Sapotaceae	*Diploknema butyraceoides* (M.B.Scott) H.J.Lam	Indian butter tree (W)	Chuiri	LC	0.0224	fruit	Paste of fruit is used to cure cracked heels.
Lifeform: Shrub								
Order: Malpighailes								
24	Euphorbiaceae	*Euphorbia royleana*	Cactus (W)	Siundi		0.0053	latex	Latex is used to cure muscular swelling, cramps, sprain, boils and abscess.
25	Euphorbiaceae	*Acalphya hispida*	Chenille plant (C)	Khursaani phool		0.0625	bark	Bark is soaked overnight in water and this water is given to asthmatic patients.
Order: Gentianales								
26	Asclepiadaceae	*Calotropis gigantean*	Swallow wort (W)	Ank		0.0175	latex	Latex is used topically to cure muscular swelling, sprain and cramp.
Order: Myrtales								
27	Lythraceae	*Lawsonia inermis* L.	Henna (W)	Mehendi	LC	0.0323	leaves	Paste of henna leaves are applied topically on cuts and wounds.
Order: Sapindales								
28	Rutaceae	*Citrus aurantifolia*	Lemon (C)	Kagati		0.0074	fruit	Lemon juice is used to control vomiting and dizziness.

29	Rutaceae	*Zanthooxylum armatum*	Timur (C)	Timur		0.0072	seed	Paste is applied on toothache, powder is mixed with hot soup which is useful to cure cold and cough.
Order: Solanales								
30	Solanaceae	*Datura metel*	Daturo (W)	Dhaturo		0.027	fruit, leaves	Dried and Roasted fruit is used to treat toothache; dry leaves are burnt and the smoke is inhaled for the treatment of asthma, stress and insomnia.
31	Solanaceae	*Capsicum annum*	Green chilly (C)	hariyo kursaani		0.0689	fruit	Green chilly is considered good for gastritis and diabetes.
Order: Rosales								
32	Rosaceae	*Rosa sp.*	Rose (C)	Gulaab		0.0145	flower	Paste of petals is used to cure abscess.
Order: Proteales								
33	Nelumbonaceae	*Nelumbo nucifera*	Lotus (W)	Kamal	DD	0.0667	Flower	Cooked flower is useful to treat body pain.
Order: Poales								
34	Bromeliaceae	*Ananas comosus*	Pineapple (C)	Bhuikatahar		0.0769	fruit	Riped fruit is good for treating constipation
Lifeform: Herb								

Order: Asparagales								
35	Amaryllidaceae	*Allium cepa*	Onion (C)	Pyaaz		0.0238	stem	Raw onion acts as anthelmintic.
36	Asphodelaceae	*Aloe vera*	Gheukumari (C)	Gheukumari		0.0116	all part except root	Drinking aloe vera juice daily in empty stomach helps to cure gastritis; gel is applied on burns for fast recovery, also it makes smooth and clear skin.
37	Amaryllidaceae	*Allium sativum*	Garlic (C)	Lasun		0.0225	rhizome	Roasted garlic is eaten in empty stomach for curing gastritis; paste of garlic and ginger is mixed with hot soup used to get relief from cough and cold.
Order: Zingiberales								
38	Zingiberaceae	*Curcuma anguistifolia*	Turmeric (C)	Haldo		0.0063	rhizome	Water boiled with turmeric powder is useful to cure cough, cold and corona; warm milk with turmeric powder is used for the treatment of fever and insomnia; paste of turmeric helps to make clear skin curing pimples.
39	Zingiberaceae	*Zingiber officinale* Roscoe	Ginger (C)	Aado	DD	0.0083	rhizome	Paste mixed with hot water or tea is used to get relief from gastritis, cold and cough; raw ginger is used for controlling vomit.

40	Zingiberaceae	*Amomum subulatum* Roxb.	Black cardamom (C)	Thuli alaichi	DD	0.0049	seed	Powder mixed with hot water or tea is used to cure cold and cough.
Order: Brassicales								
41	Brassicaceae	*Brassica campestris*	Mustard (C)	Tori		0.0059	seed	Warm mustard oil is useful for curing dry skin and hair, muscular pain, earache and headache.
42	Brassicaceae	*Raphanus raphanistrum*	Raddish (C)	Choto	LC	0.0213	stem	Raw raddish is used to treat constipation.
Order: Asterales								
43	Compositae	*Artemisia vulgaris*	Mug wort (W)	Kurjo (titepati)	LC	0.0196	leaves	Powder made from dry leaves is rubbed on body to cure scabies, boils and blisters.
44	Asteraceae	*Ageratum conyzoides*	Goat weed (W)	Neelo gandhe	LC	0.0074	leaves	Paste of leaves is applied on cuts and wound to control bleeding.
Order: Caryophyllales								
45	Chenopodiaceae	*Chenopodium album*	White goosefoot (W)	Bethya		0.0435	all part except root	Fine paste of white goosefoot is made after boiling then it is mixed with buttermilk and eaten to get relief from body pain and diarrhea.

46	Amaranthaceae	*Achyranthes bidentata*	Datiwan (W)	Abaa mark	LC	0.0714	stem, leaves	Brushing with stem prevents tooth decay and toothache; paste of leaves mixed with rose petals and latex of umar is used to cure abscess.
Order: Lamiales								
47	Lamiaceae	*Mentha spicata* L.	Mint (W)	Pudina	LC	0.0476	leaves	Raw leaves boiled to make tea is useful for the treatment of headache, nausea, vomiting gas and acidity.
Order: Acorales								
48	Araceae	*Acrorus calamus*	Bojho (W)	Bojho		0.025	leaves	Raw leaves are chewed to cure common cold.
Order: Fabales								
49	Fabaceae	*Trigonella foenumgraecum*	Fenugreek (C)	Methi		0.0571	seed	Powder of fenugreek seed is heated with mustard oil and massaged on head to cure headache and hairfall.
Order: Apiales								
50	Apiaceae	Trachyspermum ammi	Carom (C)	Jwaan		0.0048	seed	Carom powder mixed in hot water or tea is used to get relief from cold and cough, also it produces heat in body which protects from extreme cold weather.

Order: Poales								
51	Poaceae	*Hordeum vulgare*	Barley (C)	Zau	LC	0.0345	leaves	Green and soft leaves of barley is soaked in water and this water is taken along with the barley leaves for the treatment of diabetes.
Order: Ranunculales								
52	Ranunculacea	*Nigella sativa*	Black cumin (C)	Kaaljiri		0.0118	seed	Powder of black cumin is boiled with water and is taken for the treatment of cough.
Order: Saxifragales								
53	Crassulaceae	*Kalanchoe pinnata*	Pattharchat (W)	Pattharphod		0.0238	leaves	Raw leaves are taken orally for curing kidney stones.
Lifeform: Climber								
Order: Cucurbitales								
54	Cucurbitaceae	*Momordica charantia*	Bitter gourd (C)	Titokarela		0.0714	fruit	Juice or cooked vegetable is prescribed for high blood pressure
55	Cucurbitaceae	*Lagenaria siceraria*	Bottle gourd (C)	Lauki		0.0556	fruit	Juice or cooked vegetable is prescribed for high blood pressure

Order: Piperales								
56	Piperaceae	*Piper nigrum*	Black pepper (C)	Marcha		0.0081	seed	Black pepper powder is mixed with hot water or tea and taken sip by sip to get relief from cold, cough, headache and sore throat.
57	Piperaceae	*Piper longum*	Long pepper (C)	Pipali		0.0312	seed	Powder of long pepper mixed with hot water is prescribed for cough, indigestion and rheumatism.
Order: Ranunculales								
58	Menispermaceae	*Tinospora cordifolia*	Gurjo (W)	Gurjo	LC	0.0968	stem	Pieces of stem are soaked in water overnight and this water is taken in early morning which helps to cure stomachache, diabetes and high blood pressure.
Order: Solanales								
59	Convolvulaceae	*Cuscuta reflexa* Roxb.	Aakashbeli (W)	Aakashbeli	LC	0.0714	root	Root of Aakashbeli taken raw help to treat jaundice.
Lifeform: Grass								
Order: Poales								

60	Graminae	*Cynodon dactylon*	Dubo grass (W)	Dubo		0.04	leaves	Paste of leaves are used to control hemorrhage
61	Poaceae	*Saccharum officinarum*	Sugarcane (C)	Likhu		0.0088	stem	Juice of sugarcane is considered good for curing jaundice and also helps to cool body in summer.

4.3.1 Parts of plants used

The present study revealed that parts of plants used to treat various ailments are of 10 types. Leaves (n=15) was the most frequently used parts, followed by fruit (n=14), seed (n=9), bark (n=6), stem and latex (n=5 each), flower (n=3), rhizome (n=3), all parts except root (n=2) and root (n=1) (Fig 12).

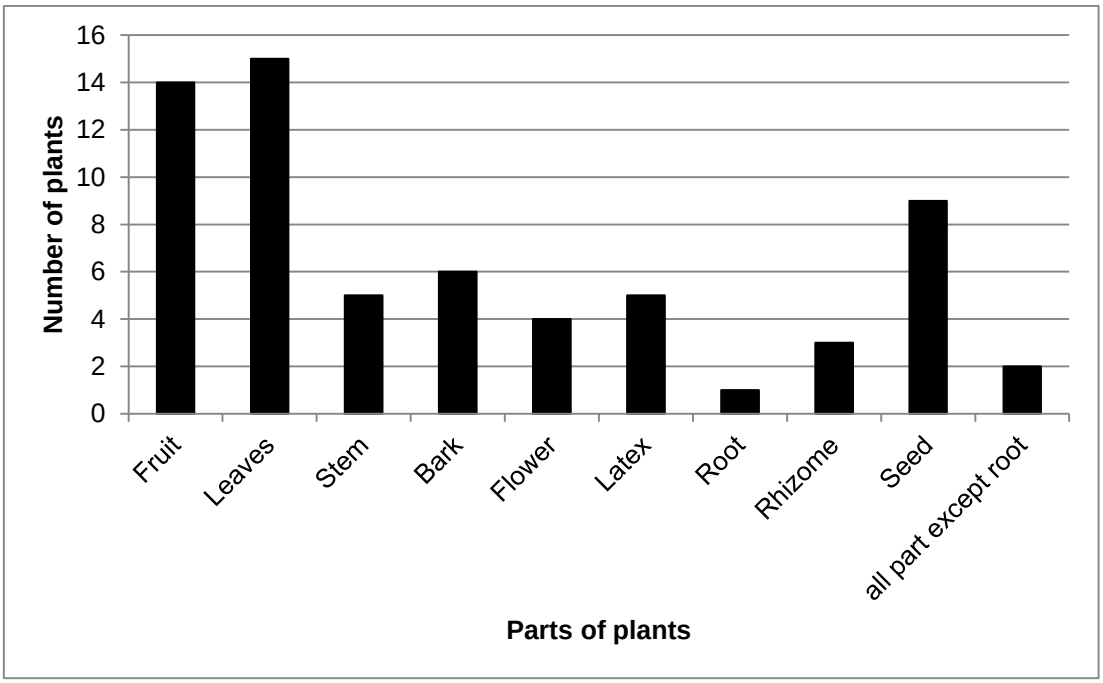

Figure 12: Parts of plants used in ethnomedicine by Badi community.

4.3.2 Method of preparation and their administration

There were altogether 14 types of preparation methods used for plant based ethnomedicine by Badi community. Most of the parts of plants were used in raw form (n=18) followed by paste (n=16), boiled (n=15), soup (n=12), juice (n=8), powder (n=7), soaked (n=6), cooked (n=5), dry (n=4), roasted (n=2) and warm, oil and gel (n=1 each) (Fig 13). The most common mode of administration of plant based ethnomedicine was oral (69%) followed by topical, drop and inhalation (Fig 14).

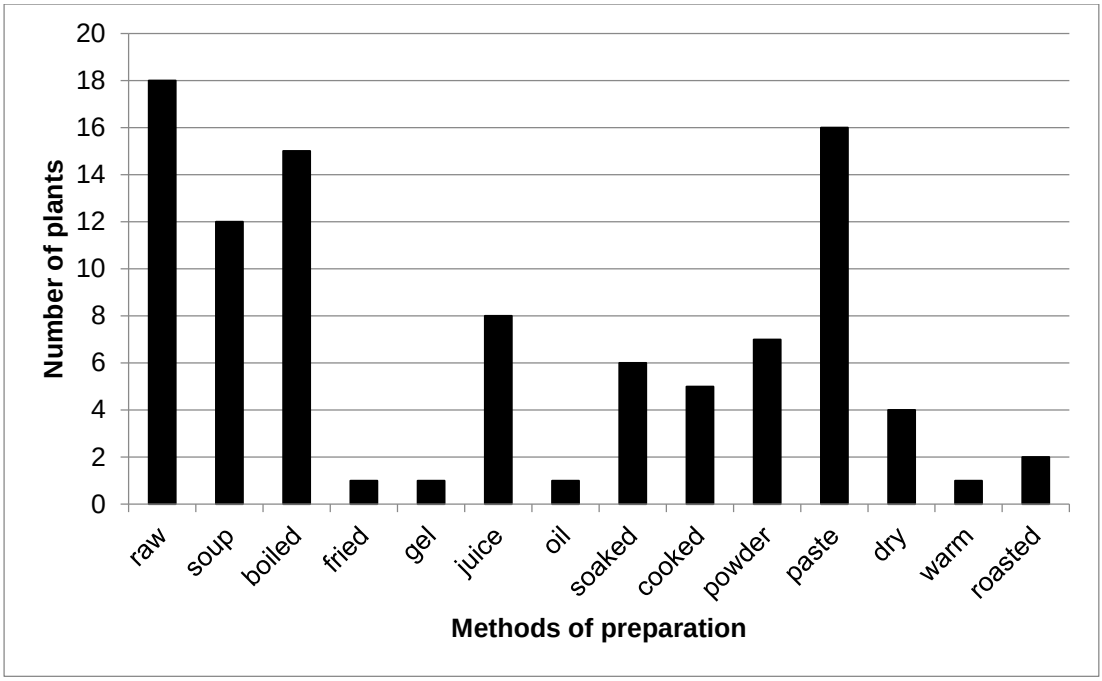

Figure 13: Methods of preparation of medicine from different parts of plants.

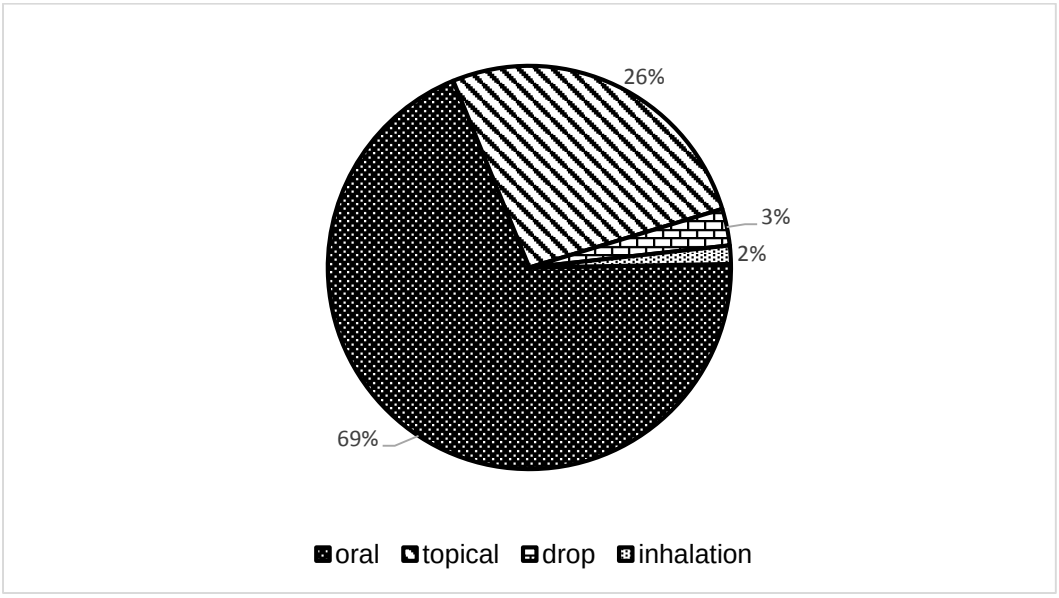

Figure 14: Mode of administration of plant based ethnomedicine

4.3.3 Informant consensus factor, fidelity level and use value

The present study showed that maximum plant species (25) were used to cure gastrointestinal disorders followed by respiratory and dermatological problems (16 species each) and musculo-skeletal problems (9 species). Most of the informants agreed in the treatment of reproductive problems and urinary problem (ICF=1) followed by respiratory problems, dermatological problems, musculo-skeletal problems and dental

problems (ICF=0.99 each). The least agreement among informants was found in the treatment of cardiovascular problems (ICF=0.94) (Table 7).

Table 7: Categories of ailments and informant consensus factor (ICF) for the ailment categories

Ailment categories	**Number of use-reports (Nur)**	**Number of taxa (Nt)**	**Informant consensus factor (ICF)**
Gastro-intestinal	1353	25	0.98
Cardiovascular	74	5	0.94
Respiratory	2617	16	0.99
Dermatological	1381	16	0.99
Reproductive	23	1	1
Neurological	113	3	0.98
Musculo-skeleton	780	9	0.99
Endocrinal	92	5	0.96
Urinary	42	1	1
Dental	483	5	0.99
ENT	121	5	0.97
Others	405	7	0.98

The highest FL% in each category of ailment was taken for the selection of most preferred plant species for each ailment category (Table 8). Gastro-intestinal disorder had the maximum plant species (13 species) with 100% fidelity level followed by respiratory problems and dermatological problems (7 species each), Musculo-skeletal problems and cardiovascular problems (4 species each), endocrinal problems (2 species) and urinary problems (1 species) with 100 % fidelity level. *Phyllanthus emblica* has the lowest fidelity level (27%) for ENT problems.

The most commonly used plant species was *Tinospora cordifolia* (UV=0.096) with 3 use-reports by 31 informants. It is followed by *Punica granatum* (UV=0.090) with 1

use report by 11 informants and *Phyllanthus emblica* (UV=0.090) with 2 use reports by 22 informants (Table 6).

Table 8: Most frequently used plants(s) for different ailment categories based on the highest FL (%) in each ailment category

Ailment	**Animal**	**FL%**
Respiratory	*Acrorus calamus*	100
	Cinnamomum tamala	100
	Ficus religiosa	100
	Nigella sativa	100
	Amomum subulatum	100
	Acalphya hispida	100
	Eucalyptus obliqua	100
Dermatological	*Artemisia vulgaris*	100
	Rosa sp.	100
	Diploknema butyraceoides	100
	Ficus tinctoria	100
	Lawsonia inermis	100
	Magnifera indica	100
	Ageratum conyzoides	100
Endocrinal	*Psidium guajava*	100
	Hordeum vulgare	100
Cardiovascular	*Momordica charantia*	100
	Cynodon dactylon	100
	Lagenaria siceraria	100
	Punica granatum	100
Reproductive	*Putranjiva roxburghii*	62
Neurological	*Datura metel*	58

Musculo-skeleton	*Calotropis gigantean*	100
	Pterocarpus marsupium	100
	Ficus palmate	100
	Nelumbo nucifera	100
Gastro-intestinal	*Bombax ceiba*	100
	Carica papaya	100
	Cuscuta reflexa	100
	Shorea robusta	100
	Aegle marmelos	100
	Musa sp.	100
	Ficus auriculata	100
	Raphanus raphanistrum	100
	Ananas comosus	100
	Bauhinia variegate	100
	Saccharum officinarum	100
	Syzygium cumini	100
	Allium cepa	100
ENT	*Phyllanthus emblica*	27
Dental	*Syzygium armaticum*	87
Urinary	*Kalanchoe pinnata*	100
Others	*Trigonella foenumgraecum*	83


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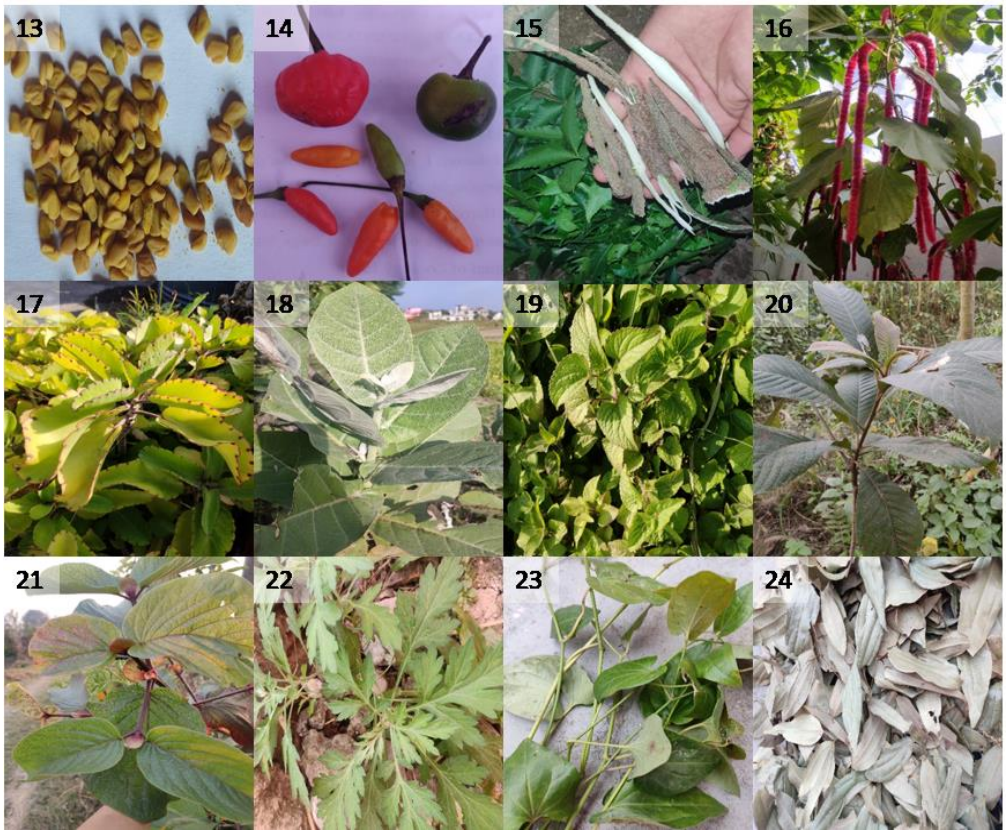
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Figure 15: Plants and their parts used by Badi community as ethnomedicine, (1) *Rosa sp* (2) *Mentha spicata* (3) *Cynodon dactylon* (4) *Senegalia catechu* (5) *Ficus auriculata* (6)*Tinospora cordifolia* (7) *Datura metel* (8) *Ficus religiosa* (9) *Shorea robusta* (10) *Aegle marmelos* (11) *Amomum subulatum* (12) *Cuscuta reflexa* (13) *Trigonella foenumgraecum* (14) *Capsicum annum* (15) *Azadirachta indica* (16) *Acalphya hispida* (17) *Kalanchoe pinnata* (18) *Calotropis gigantean* (19) *Ageratum conyzoides* (20) *Diploknema butyraceoides* (21) *Ficus tinctoria* (22) *Artemisia vulgaris* (23) *Piper longum* (24) *Cinnamomum tamala* (25) *Saccharum officinarum* (26) *Achyranthes bidentata* (27) *Ficus palmata* (28) *Aloe vera* (29) *Lawsonia inermis* (30) *Trachyspermum ammi* (31) *Curcuma anguistifolia* (32) *Carica papaya* (33) *Zanthooxylum armatum* (34) *Brassica compestris* (35) *Zingiber officinale* (36) *Euphorbia royleana* (37) *Acrorus calamus* (38) *Psidium guajava* (39) *Putranjiva roxburghii*

4.4 Conservation status of medicinal animals and plants

This study showed that out of the total reported wild animal species (18), one species is Vulnerable (VU) (*Rusa unicolor*) and one is Near Threatened (NT) (*Wallago attu*) and 14 species are Least Concerned (LC) according to IUCN Red List (Fig 16). The other 2 animal species were not listed in IUCN red data book. Out of the total wild plants, 2 species are NT (*Aegle marmelos and Pterocarpus marsupium),* 4 are Data Deficient (DD) (*Amomum subulatum, Zingiber officinale, Nelumbo nucifera and Carica papaya*) and 25 plants are LC (IUCN Red Data Book) (Fig 16).

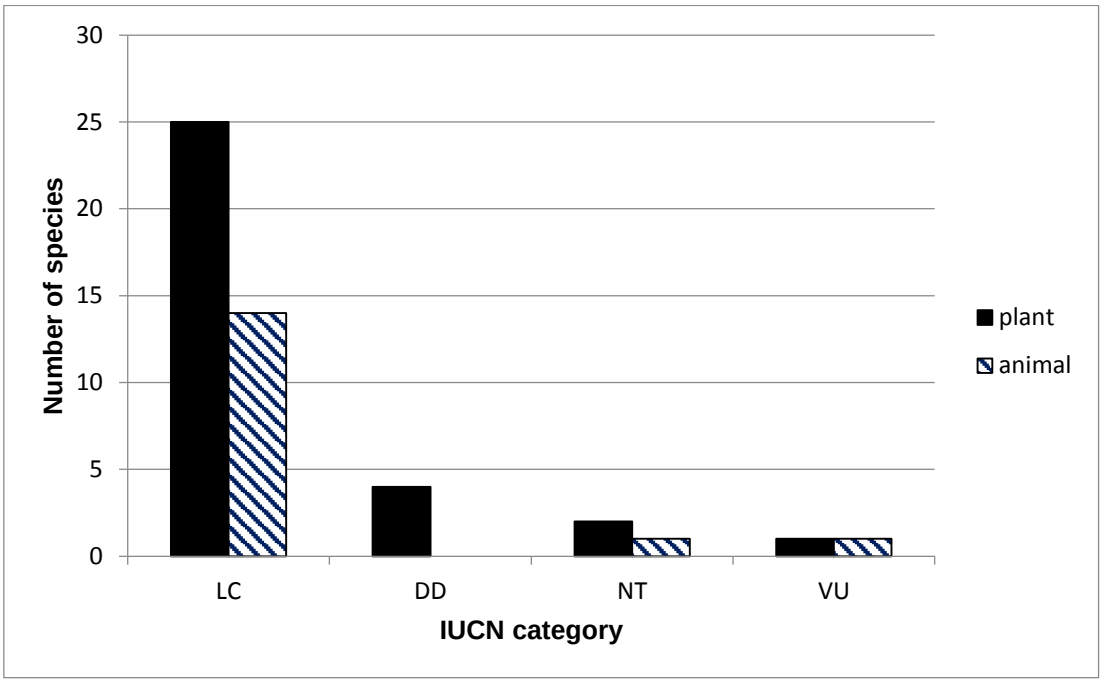

Figure 16: Conservation status of plant species used in ethnomedicine by the Badi community

4.5 Sanitary issues while using animals and plants for ethnomedicine

This study showed that 81% of the respondents were aware of sanitary issues while using the animals and plants and their products for ethnomedicine. They used traditional methods such as washing, boiling, Sun drying, Roasting and smoking before use (Fig 18).

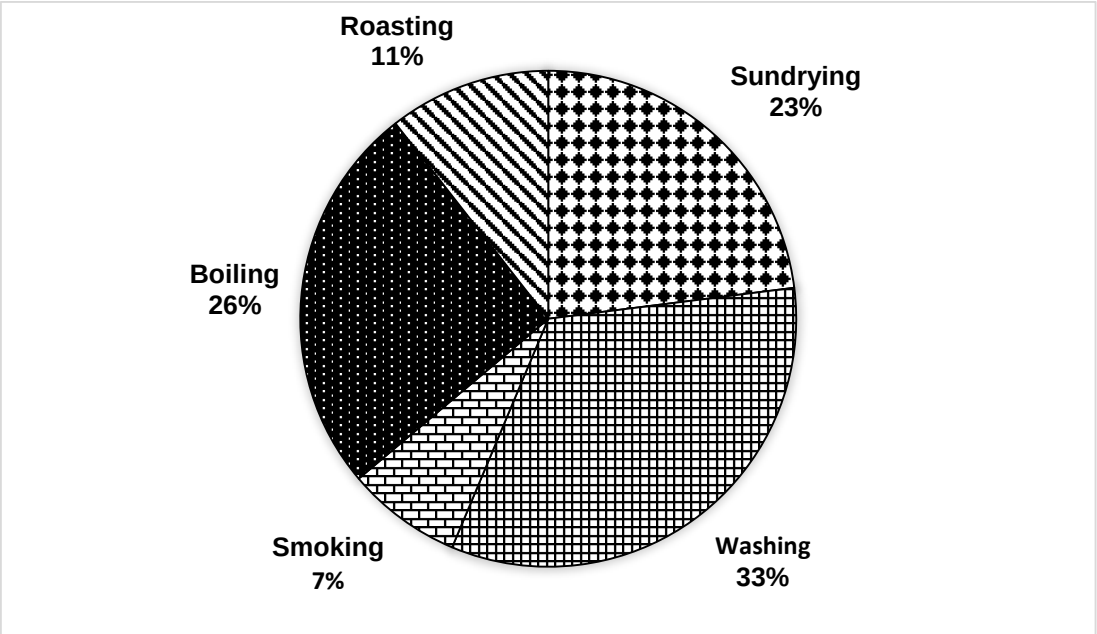

Figure 17: Sanitary methods while using ethnomedicine

5. DISCUSSION

This study revealed that the Badi people had a good knowledge of ethnomedicine based on the use of animals and plants. People aged above 50 years were found more knowledgeable and experienced than younger generation. The reason behind less knowledge among the younger generation might be due to the growing number of health facilities, migration of people to urban areas, the influence of mixed cultural society and low interest of the young generation towards ethnomedicine (Yineger et al. 2008; Ferreira et al. 2009; Angmo et al. 2012; Alves et al. 2017). The major occupation of the Badi people was a laborer than farmers as most of them were landless (Cox 2000). The study also reported that there is lacking of transferring ethnomedicinal knowledge to next generation as reported by the study of Angmo et al. (2012), Bhatia et al. (2014) and Rao et al. (2015). This could be due to low interest among the younger generation in learning and practicing it (Shrestha and Dhillion 2003; Balami 2004; Emmanuel and Didier 2011; Bhatia et al. 2014). The present study also found that illiterate peoples were having more knowledge of ethnomedicine than the literates. This could be related to the fact that literate people are more likely to be exposed to modernization and used to visit health clinics and hospitals for treatments (Shankar et al. 2001; Hoare 2007; Emmanuel and Didier 2011; Bhatia et al. 2014).

5.1 Medico-ethnozoology

Badi community of Kanchanpur district was found to use 25 species of animal including both wild and domestic to treat 42 human ailments belonging to nine disease categories. Mammals possess the highest usage (44%) for ethnomedicine followed by Aves, Pisces, Reptiles, Arthropods and Annelids. The reason behind the high usage of mammals may be because mammals are rich in protein and necessary supplements (Alves et al. 2009; Ferreira et al. 2009; Adhikari et al. 2020). Animals such as *Bos taurus, Bubalus bubalis, Sus domesticus, Lepus nigricollis, Capra hircus, Columbia livia, Streptopelia chinensis, Pavo cristatus, Gallus domesticus, Anas sp., Labeo rohita, Wallago attu* and *Apis melifera* were used for both food and medicinal purposes (Kakati and Doulo 2002; Alves et al. 2009; Lohani 2010; Adhikari et al. 2020). Animals such as *Passer domesticus, Rusa unicolor, Rattus rattus, Sus scofa, Bubulcus ibis, Varanus flavescens* and *Pheretima posthuma* were used for only medicinal purposes (Lohani 2011; Adhikari et al. 2020).

Different body parts of these animals such as meat, milk, blood, gallbladder, egg, feather, hair, honey, horn, whole body, quails, urine, ghee, curd and faecal matter were used to treat various types of human ailments such as cooked meat of *Sus scrofa* is given to the patient suffering from epilepsy which is similar to the findings of Lohani (2012) and Adhikari et al. (2020). Likewise fresh blood of *Lepus nigricollis* is considered good to treat asthma which was also reported by Quave et al. (2010) and Poudel and Singh (2016) in their studies. Among all body parts, meat was the most preferably used part for traditional medicinal practices due to its high medicinal properties (Adhikari et al. 2020). The highest use of meat among all other body parts for ethnomedicine was also reported by Lohani (2011) in Magar community of Central Nepal, Poudel and Singh (2016) in Darai ethnic group of Chitwan, Nepal, Rai and Singh (2015) in Rai community of Baikunthe Village Development Committee of Bhojpur, Eastern Nepal and Adhikari et al. (2020) in Annapurna Landscape of Chitwan, Nepal.

The agreement among the informants (ICF) on the use of ethnomedicinal animal species was high for ENT problems, musco-skeletal problems, gastrointestinal problems, respiratory problems and cardiovascular diseases. The maximum number of animals were used for the treatment of musco-skeletal problems which is in agreement with the result in the work of Timilsina and Singh (2014) and Poudel and Singh (2016).

The fidelity level (FL) is important for identifying the most preferred species used by people to treat specific ailments. Eight medicinal animal species had a 100% fidelity level. Respiratory problems had the maximum of three species with 100% FL followed by dermatological problems having two species with 100 % FL, reproductive, neurological and musco-skeletal problems had one- one species with 100% FL. Generally 100% fidelity level for a specific animal indicates that all of the use reports mentioned the same method for using the animal treatment (Srithi and Balslev 2009; Bhatia et al. 2014).

Animal species with the highest use-value were *Rattus rattus, Pavo cristatus, Bubulcus ibis and Wallago attu.* The high UVs of these species certified their consistent use in the treatment of different diseases (Altaf et al. 2018). Cooked meat of *Rattus rattus* is given to the patient suffering from malarial fever. Also its meat is used to increase sexual performance in male. Adhikari et al. (2020) also recorded the use of cooked meat of *Rattus rattus* for increasing sperms in males. Tamang and Singh (2014) found its use

to cure fever and to increase sexual activity. Badi people also use cooked meat of *Pavo cristatus* to promote strength and virility. And they believed that applying ash of its feather on the forehead protects from a ghost which is similar to the findings of Lohani (2010), Quave et al. (2010), Lohani (2012) and Adhikari et al. (2020). The cooked meat of *Bubulcus ibis* was found to be used for protection against hot weather. Adhikari et al. (2020) also reported its use for gum bleeding and protection from heat. The boiled gallbladder of *Wallago attu* is considered good for the treatment of tetanus and cooked meat is used to promote strength. Similar findings were also reported by Lohani (2010) and Poudel and Singh (2016).

The present study showed that the cooking method (44%) was mostly used method for drug preparation followed by soup, boiling, raw, paste, fresh, dry and warm. Cooked meat is generally consumed as ethnomedicine. The most common mode of administration of medicine was oral (77%) which is much higher than topical application (23%). Similar results were observed in other studies (Benitez 2011; Chakravorty et al. 2011; Lohani 2012; Kim and Song 2013; Borah and Prasad 2016; Adhikari et al. 2020). However topical application is also very important way to treat muscular pain, cramps, cracked heels and skin allergies (Benitez 2011; Chakravorty et al. 2011; Borah and Prasad 2016; Adhikari et al. 2020).

5.2 Medico-ethnobotany

This study reported the usage of 61 plant species both wild and cultivated belonging to 38 families for the treatment of 55 types of human ailments. Of the total plant species, the maximum proportion was trees (38%) followed by herbs, shrubs, climbers and grasses which is similar to the studies of Joshi et al. (2010) and Rai and Singh (2015)**.** The high percentage of usage of trees may be due to the settlement of Badi people near forest areas and also due to the medicinal properties of trees (Joshi et al. 2010).

The different parts of plants used for ethnomedicine included fruit, leave, stem, bark, flower, latex, root, rhizome, seed and all part except root. Leaf was mostly used among other parts of plants. This might due to the presence of a higher concentration of secondary metabolites and biologically active compounds in the leaf in comparison to other parts of plants (Bhattarai et al. 2009; Srithi and Balslev 2009; Joshi et al. 2010; Bhattarai 2018; Umair et al. 2019). The majority of ethnobotanical studies confirmed that leaves are the most commonly employed plant parts in the formulation of medicine

(Srithi and Balslev 2009; Bhatia et al. 2014; Rahaman and Karmakar 2015; Shrestha et al. 2016; Bhattarai 2018; Mandal et al. 2020). Maximum utilization of leaves than other plant parts indicates the sustainable use of natural resources because using other plant parts may damage the entire plant (Rahaman and Karmakar 2015; Basak et al. 2016; Mandal et al. 2020).

It was found that the majority of the informants agreed on the treatment of reproductive problems and urinary problems (ICF=1 each) with the use of plant species. The maximum number of plants were used for the treatment of gastrointestinal disorders which is similar to the findings of Andrade-Cetto (2009), Bhatia et al. (2014) and Heinrich et al. (1998).

The most preferred species for treating a particular ailment category is represented by its fidelity level. Twenty plant species were found to have a 100% fidelity level. The gastrointestinal problems had the maximum number of plant species (13 species) which had a 100% fidelity level. Respiratory and dermatological problems had seven species with a 100% FL. ENT problems had only one species with a low fidelity level (27%). A low fidelity level number indicates that the same or different parts of the same plant have diverse medicinal properties (Bhatia et al. 2014).

Plant species with the highest use value were *Tinospora cordifolia, Punica granatum* and *Phyllanthus emblica.* The local uses stem of *Tinospora cordifolia* for the treatment of stomachache, diabetes and high blood pressure. Gautam and Timilsina (2022) also recorded *Tinospora cordifolia* to cure high blood pressure and Malla et al. (2015) recorded its use for stomach ailments whereas Bhatia et al. (2014) reported its use for hyperpyrexia. Juice of *Punica granatum* was found to be used to treat anemia by Badi people. Whereas in the Rai community it was found to be used for curing low blood pressure (Timilsina and Singh 2014) and in the Tharu community it was used for the treatment of diarrhea and dysentery (Thapa 2020). Badi people use *Phyllanthus emblica* for curing mouth blisters and eye weakness as it is rich in vitamin C (Munesh et al. 2011). *Phyllanthus emblica* is also used for treating gastritis, diarrhea, dysentery and anemia (Kunwar et al. 2009; Thapa 2020).

This study revealed that the majority of plant parts were taken as raw form (n=18) followed by paste, boiled, soup, juice, powder, soaked, cooked, dry, roasted, warm, oil and gel. At maximum time fresh parts of plants were used for medicine preparation. It

is because fresh plant materials are more effective than dry ones ((Rahaman and Karmakar 2015; Mandal et al. 2020). The most common mode of drug administration was oral followed by topical, drop and inhalation. Data from previous studies also revealed that people prefer to take drugs orally (Rokaya et al. 2010; Basak et al. 2016; Abbas et al. 2017; Bhattarai 2018; Thapa 2020).

5.3 Conservation status and threats to wild animals and plants used as ethnomedicine

Most of the animal species used for ethnomedicine were wild. Among which one species is Vulnerable (*Rusa unicolor*) and one is near threatened (*Wallago attu*). The government has made various strict rules and regulations for the protection of wildlife. But still due to religious and cultural issues and lack of awareness, lives of many wildlife are at a declining stage.

Badi people were found quite concerned about the importance of medicinal plant species. However, conserving the medicinal plant species was difficult because many plant species were taken from the wild as most of the Badi people are squatters and they do not have their land for cultivation.

Various factors were considered major hazards to medicinal animals and plants that were obtained from the survey of the study area. The major threats to medicinal animals and plants include over exploitation, urbanization, deforestation, lack of forest management, expansion of agricultural land and unsustainable use of natural resources (Srithi and Balslev 2009; Altaf et al. 2018; Budha-Magar et al. 2020; Gautam and Timilsina 2022).

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Badi people of the Kanchanpur district have a good knowledge of ethnomedicine based on the use of animals and plants. Higher-aged (above 50) people had more traditional knowledge than the younger groups due to their long experience in using natural resources. A total of 25 animal species were used for the treatment of 42 ailments belonging to 9 categories. Cooked meat of the mammals occupied the highest proportion. The most commonly used animal was *Rattus rattus* and ENT problem had the highest ICF value. A total of 61 plant species were reported for the treatment of 55 types of human ailments and used either orally or topically. The most commonly used plant was *Tinospora cordifolia* and reproductive problems and urinary problems had the maximum ICF value. Badi people are less aware about the conservation of plants and animals. The majority of animals and plants used as ethnomedicines are wild and some of them are at risk of extinction. However, people's dependency on ethnomedicinal plants and animals has been greatly reduced as a result of readily available allopathic medications, modernizations and low interest among the young generations. It may serve to conserve wildlife and plants but the valuable ethnomedicinal knowledge of indigenous people may disappear completely in upcoming years.

6.2 Recommendations

- For the protection of valuable plants and animals, sustainable utilization should be done by adopting appropriate conservation measures and alternative options (cultivation) should be developed for the treatments of ailments instead of using wild animals.
- Traditional medical knowledge should be promoted and supported among the younger generation and documentation of such knowledge should be enhanced for its long-term conservation.

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APPENDIX

Questionnaires for Ethnobiology/Ethnomedicine

Are you willing to give answer to the following questions? Yes/No, If Yes proceed to Qn. 1-22

1. Address: _____ 2.Land: …..Katha regd. land …Katha Non regd. land

3. Ward No. _____ 4. Village/Tole Name_____

5. Location status: ____

5.1. Longitude: _____ B. Latitude_____ C. Altitude (M asl) _____

5.2. Dist. to nearest health centre:…….. Access to health centre: bus (…...hr.), walk (…....hr.) 5.3. Dist. to nearest city/market:……..

6. Name of the Respondent: _____ 7. Age _____

8. Sex (√) 1. Male 2. Female

9. Highest educational qualification of the respondent (Use Edu Code):_____

(1-Illiterate, 2- Basic, 3- Secondary, 4- University)

10. Caste: _____ 11. Family size: (M=___, F=____, Child=_____)

12. Livelihood option: Job- Gov. service/teacher, Business- shop/hotel, Farming, Social worker, Forest resources dependent, Chiuri culture and others if any please specify:……

13. Treatment system

a. Go to wizard doctor (Dhami) b. Use of ethnomedicine

c. Use of homeopathy d. Go to Health center or hospital

14. Use of animals and animal parts for medicine

Name of animal	Local name	Parts use	Ailment category	Preparing and using methods	Available source

15. If any animals use in any special ritual activities? List them

Name of animal	Local name	Name of ritual activities	Animal used	Mythological prospective

16. Sanitary Issues: - Use of animals

a. Sun drying b. washing c. Smoking d. Boiling e. Roasting f. Raw f. Others if any……

17. Please mention side effects while using animals or their product as ethnomedicine, if any

Vomiting……Diarrhoea……Dizziness……Allergy……Others…….

18. Please tell about the effectiveness of animal based traditional medicine.

a) highly effective b) effective c) less effective d) not effective

19. If ethnomedicine does not works what did you do?

a) Go to the hospital b) take allopathic medicine c) other……

20. Trade of animals for ethnomedicine, if any.

PHOTO PLATES

Interviewing with Badi people

Worshipping place of Badi people

Typical house of Badi people