MEDICO-ETHNOBIOLOGY, INDIGENOUS TECHNOLOGY AND INDIGENOUS KNOWLEDGE SYSTEM OF NEWAR ETHNIC GROUP IN KHOKANA VILLAGE OF LALITPUR DISTRICT, NEPAL

Anupa Panta

T.U Registration no: 5-2-1014-0004-2012

T.U Examination Roll. No. : 405/073

Batch: 2073/74

A thesis submitted for the partial fulfillment for the requirements for the award of Master's Degree in Science (Zoology) with special paper Ecology and Environment

Submitted to

Central Department of Zoology

Institute of Science and Technology

Tribhuvan University

Kirtipur, Kathmandu

Nepal

September, 2019

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).

Date:2076/05/22

Anupa Panta

T.U Registration no: 5-2-1014-0004-2012

T.U Examination Roll. No. : 405/073

Batch: 2073

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
प्राणी शास्त्र केन्द्रीय विभाग
CENTRAL DEPARTMENT OF ZOOLOGY
कीर्तिपुर, काठमाडौं, नेपाल ।
Kirtipur, Kathmandu, Nepal.

☎ ०१-४३३१८९६
01-4331896
Email: info@cdztu.edu.np
URL: www.cdztu.edu.np

पत्र संख्या :-
च.नं. Ref.No.:-

Central Department of Zoology
T.U., Kirtipur

RECOMMENDATION

This is to recommend that the thesis entitled "**MEDICO-ETHNOBIOLOGY, INDIGENOUS TECHNOLOGY AND INDIGENOUS KNOWLEDGE SYSTEM OF NEWAR ETHNIC GROUP IN KHOKANA VILLAGE OF LALITPUR DISTRICT, NEPAL**" has been carried out by **Ms. Anupa Panta** 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.

Date: 2076/05/22

Supervisor

Prof. Dr. Nanda Bahadur Singh
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
प्राणी शास्त्र केन्द्रीय विभाग
CENTRAL DEPARTMENT OF ZOOLOGY
कीर्तिपुर, काठमाडौं, नेपाल ।
Kirtipur, Kathmandu, Nepal.

☎ ०१-४३३१८९६
01-4331896
Email: info@cdztu.edu.np
URL: www.cdztu.edu.np

पत्र संख्या :-
च.नं. Ref.No.:-

Central Department of Zoology
T.U., Kirtipur

LETTER OF APPROVAL

On the recommendation of supervisor Prof. Dr. Nanda Bahadur Singh; Central Department of Zoology, Tribhuvan University, this thesis submitted by Ms. Anupa Panta entitled **"MEDICO-ETHNOBIOLOGY, INDIGENOUS TECHNOLOGY AND INDIGENOUS KNOWLEDGE SYSTEM OF NEWAR ETHNIC GROUP IN KHOKANA VILLAGE OF LALITPUR DISTRICT, NEPAL"** is approved for the examination for partial fulfillment of the requirement for the Master's Degree of Science in Zoology with special paper Ecology and Environment.

Date: 2076/05/22

Head of Department
Prof. Dr. Tej Bahadur Thapa
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

त्रिभुवन विश्वविद्यालय
TRIBHUVAN UNIVERSITY
प्राणी शास्त्र केन्द्रीय विभाग
CENTRAL DEPARTMENT OF ZOOLOGY
कीर्तिपुर, काठमाडौं, नेपाल।
Kirtipur, Kathmandu, Nepal.
☎ ०१-४३३१८९६
01-4331896
Email: info@cdztu.edu.np
URL: www.cdztu.edu.np

पत्र संख्या :-
च.नं. Ref.No.:-

Central Department of Zoology
T.U., Kirtipur

CERTIFICATE OF ACCEPTANCE

This thesis work submitted by Ms. Anupa Panta entitled **"MEDICO-ETHNOBIOLOGY, INDIGENOUS TECHNOLOGY AND INDIGENOUS KNOWLEDGE SYSTEM OF NEWAR ETHNIC GROUP IN KHOKANA VILLAGE OF LALITPUR DISTRICT, NEPAL"** has been accepted as a partial fulfillment for the requirement of Master's Degree of Science in Zoology with special paper Ecology and Environment.

Supervisor
Prof. Dr. Nanda Bahadur Singh
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Head of Department
Prof. Dr. Tej Bahadur Thapa
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

External Examiner
Asst. Prof. Dr. Ramesh Prasad Sapkota
Central Department of Environmental Science
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Internal Examiner
Assoc. Prof. Dr. Hari Prasad Sharma
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

Date: 2076/06/08

ACKNOWLEDGEMENTS

I express my sincere gratitude to Prof. Dr. Nanda Bahadur Singh, Central Department of Zoology, Tribhuvan University for his incredible supervision, consistent support and invaluable gratitude throughout the dissertation preparation.

I extend my hearty gratitude to Prof. Dr. Tej Bahadur Thapa, Head of Central Department of Zoology, Tribhuvan University for his motivation and support.

I am grateful to National Youth Council Nepal for providing me Research grants for the field work.

I would like to thank National Herbarium and Plant Laboratories (KATH) for their help in identifying unknown plant species.

I would like to thank Mr. Nanda Bahadur Maharjan and Mr. Bhim Raj Tuladhar for their support during data acquisition and kind co-operation. I have special acknowledgement to all the community people of Khokana village of Lalitpur District who provided their valuable time in collection and verification of data and information during focal group discussion. I would like to extend my sincere thanks to Mr. Deepak Singh, Jashyang Rai, Ms. Kusum Kunwar, Ms. Shruti Shakya and Ms. Nilam Prajapati for their valuable time, suggestions and incredible support throughout my work.

Finally, I express my deep gratitude to my parents and family members for their prolong help, support and inspiration.

Anupa Panta

TABLE OF CONTENTS

LIST OF TABLES

Table Title of tables Pages

LIST OF FIGURES

Figure Title of figures Pages

LIST OF PHOTOGRAPHS

LIST OF ABBREVIATIONS

CBS	Central Bureau of Statistics
IUCN	International Union for Conservation of Nature
NEFIN	Nepal Federation of Indigenous Nationalities
VDC	Village Development Committee

ABSTRACT

Newar are ancient civilized, they have rich knowledge, skills and techniques on the traditional utilization of natural resources for various purposes like traditional medicine, food, housing, industries and handicrafts. This study has been carried out in Khokana village of Karyabinayak Municipality, Lalitpur District, Nepal. The main objective of the study was to document ethno-medicinal applications of plant and animal species for the treatment of different diseases by Newar people in study area. The first field visit was carried on April 7 to 13 and second field visit was carried in May (17, 25, 29, and 30) and June (22, 23, and 24). Each day 4 hrs was spent in field. Total 82 individuals were interviewed among which 49 were male and 33 were female. For the data collection, group discussions, key informant questionnaire survey to Newar local healers and elder peoples have been carried out. During field visit total 14 medicinal animal species and 71 medicinal plant species were recorded. From the study it was found that Newar peoples use 14 animal species for the treatment of 16 types of ailments. Mammals (50%) and aves (29%) were mostly used for the preparation of ethnomedicine in study area than other. Maximum animal species were used to treat musculoskeletal disease followed by reproductive, integumentary and ophthalmological. For the different medicinal purposes, different parts and products of animal species such as bones, flesh, meat, milk, blood, honey, bile, fat, egg, and fecal matters were used as traditional medicine and meat of the animal species was mostly used for preparing ethnomedicine. Similarly, 71 plant species were used to treat 51 ailments in study area. Herbs (49%) were generally used plants for the treatment of diseases followed by shrubs, tree, climber, grass and fern. Maximum plant species in the study area were used to treat gastrointestinal diseases followed by integumentary, reproductive, musculoskeletal and leaves of the plants was mostly used for preparing ethnomedicine in the study area. During this field visits some of the indigenous technology and knowledge systems were also listed like mustard seed oil mill, traditional alcohol making, handicraft, agricultural practices, pest management in field etc. Due to the globalization and modernization indigenous knowledge and skills of medication have been less focused these days among the Newar people because of their inclination towards modern medicine and hospital facilities. It would be better to provide education, motivation to local healers and documentation on the use of such medicinal plants and animals to preserve such knowledge.

1. INTRODUCTION

1.1Background of the study

Medico-ethnobiology is the one of the component of ethnobiology. Medico-ethnobiology deals with the traditional practices of using animals and plants for medicinal proposes by people of different cultures and traditions. It is mainly divided into medico-ethnozoology and medico-ethnobotany. Ethno-medicine is the study of traditional medicines that have written sources e.g. Traditional Chinese medicine, Siddha, Unani and Ayurveda (Paudel 2015). Ethno-medicine develops the totality of health knowledge, value, belief, skill and practices relating to disease which are product of indigenous cultural development and are not explicitly derived from the framework of modern medicine (Foster and Anderson 1978).

Ethnography is the systematic study of people and cultures which is designed to explore the cultural phenomenon of the ethnic groups. The National Foundation for Development of indigenous Nationalities (NEDIN) Act-2002 defines Indigenous nationalities (adhibashi/janajati) as distinct communities having their own mother tongues, traditional cultures, written and unwritten histories, traditional homeland and geographical areas with egalitarian social structures. So, the skills and technology developed by indigenous people are indigenous skills and technology. Indigenous or traditional knowledge is the knowledge that is developed over time in a given community based on experience and adapted to local culture and environment. It includes the types of knowledge about traditional technologies of subsistence examples as tools and techniques for hunting or agriculture, midwifery, ethnobotany and ecological knowledge, traditional medicines and so on (Shrestha 2018). Indigenous people such as rural communities, tribes, ethnic societies are an invaluable bank of knowledge which is passes in verbally form one generation to another (Sharma and Dubey 2013). It is not even confined to the rural people rather. Any community possesses indigenous knowledge, rural or urban. In modern society also traditional knowledge constitutes an important alternative health care system.

There are about 250 million indigenous people scattered over global territories of 70 countries (Poudel 2015). Approximately 60% of the total indigenous people lived in Asia and 66.66% of them are particularly found in China and Asia (Singh 1995). Nepal is a multi-ethnic, multi-religious nation with about 126 ethnic groups speaking about 123 dialects

(Bista 1987, Bista 2004 and CBS 2012). They make up for 35.81 % of the country's population. Among them Newar are one of the indigenous peoples recognized by government of Nepal. Newars are found in every part of the country and beyond the boundary, but they are the original inhabitants of Kathmandu, Bhaktapur and Lalitpur. According to the latest National census 2011, the population of Newar was 1,321,933 which make up almost 5% of the total population of the country. They speak their own mother tongue which belongs to Tibeto-Burman language family and called as Nepal Bhasa. Newars include people of both mongoloid and Caucasoid extractions and practice both Hinduism and Buddhism. They have a distinct way of life, customs and traditions. They are very famous for the skills of woodcarving and agriculture.

1.2 Justification of the study

Nepal has 126 legally recognized ethnic communities (CBS 2012). Newar being one of the ethnic communities inhabits mainly in the central hilly region. As they are ancient civilized, they have rich knowledge, skills and techniques on the traditional utilization of natural resources for various purposes like traditional medicine, food, housing, industries, handicrafts etc. Khokana being traditional Newar village also called as 'living museum' recalls medieval time. The 13th century old Newar settlement of Khokana is famous for traditional way of producing mustard oil. So, it has been nominated to be listed as UNESCO World heritage site. Locals are also involved in wooden handicrafts and agriculture. Knowledge on traditional medicine plays role in identifying living organisms and treating human health problems and livestock. Indigenous technology and knowledge helps in technological process of developing countries by the used of local knowledge skills and resources. Since the majority of such communities are losing their socioeconomic and cultural characteristics. This helps in the conservation of biodiversity and their proper use for the well-being of mankind. Although Nepalese are well known for the wide spread use of traditional medicine with various levels of sophistication. Within the indigenous medical core, the vast knowledge of the traditional uses of animal species of therapeutic value is not well documented for the various regions of the country. Moreover, since most of the knowledge is conveyed along generations through verbally, the traditional knowledge as well as the product used by the people is under treat (Kendie et al. 2018). Thus, the present study is an initiation documentation of indigenous knowledge and technology regarding the use of

plants and animals in Khokana village with reference to Newar community which can be of great use for present and future generations. And this study would unveil the identification and an important asset in the field of pharmaceutical and phyto-chemistry.

1.3 Objectives of the study

1.3.1. General objectives

To documents the medico-ethnobiology, indigenous technology and indigenous knowledge system of Newar ethnic group in Khokana village of Lalitpur district, Nepal.

1.3.2 Special Objectives

1. To document the ethnography of Newar people in Khokana village.
2. To identify the medicinal animals to treat various disease of Newar ethnic groups in Khokana village.
3. To identify the medicinal plants to treat various disease of Newar ethnic groups in Khokana village.
4. To document the various form of indigenous technology and knowledge of Newar ethnic group in Khokana village.

1.4 Limitations of the study

The limitations of the research work are as listed below:

1. The language spoken by the people inhabiting at Khokana is Newari. Most of the people communicate in their own language which was greatest limitation.
2. Some of the elder people and healers hesitate to share knowledge of medicinal use of animals and plants because of losing knowledge if shared. So this ethical perception is another limitation.

2. LITERATURE REVIEW

Plants and animals are used by human beings from ancient time and are exist till now. The scientific study of human beings with their indigenous knowledge of animals and plants came in existence from the western countries. The Rig vedas described the medicinal values of plants, it is considered to be the oldest record available dating back 400 BC to 5000 BC (Maheshory 1995). The term ethno biology was first used in casettor in 1935; ethno-botany was used by Harsen Berger in 1895 and ethno-zoology by Meson in 1899 in the United State of America (Clement 1998).

In the context of Nepal, the proper documentation of plants resources for medicinal purpose begins by Banerji in eastern Nepal (Benarji 1957). His work was followed by (Devkota 1968) who has documented different animals and plants having medicinal values. There after several researchers have worked in this field. The pale of documentation of medicinal plants used by different ethnic group seems increased after 1980`s but the documentation of animal species for medicinal use is still in progress.

2.1 In the context of medico ethno-biology

Singh (1995) carried out the study on endangered Raute tribe and reported 188 different plant species belonging to 58 families and 48 different animal species belong to 16 orders, 23 families and 42 genera for various utilities out of 188 plant specious recorded, 68 were wild and 96 were cultural purposes. He reported Raute use 48 wild and domesticated farness out of which 38 were wild and 10 were domesticated.

Tamang and Singh (2009) studied Medical Ethnobiology and Indigenous Knowledge System of the Lapcha of Fikkal VDC of Ilam, Nepal for his Master Degree and found that altogether 19 animal species both wild and domesticated, belonging to 10 order 13 families have been used for the treatment of 21 different diseases/ailments and 61 species of medicinal plants belonging to 39 families and 58 genera for curing 36 different ailments by using their own indigenous knowledge. The respiratory tract infections, gastrointestinal disorders, skeleto-muscular problems and dermatological infections were the most frequent ailments/diseases treated.

Timilsina and Singh (2014) studied Ethnobiology and Indigenous Knowledge about Medicinal Animals and Plants in the Balami Ethnic Group in Nepal for her Master Degree and found that the list of 65 animal species belonging to 31 orders, 46 families and 62 genera. Out of which 55 species are wild and 10 species are domesticated. They use 15 species of animals for medicinal purpose among which 13 are wild and 2 are domesticated to cure 16 different types of diseases. Balami have brought altogether 185 different plant species into use. They use 45 different plant species to cure 55 different diseases out of which 32 are wild, 12 are cultivated and 1 is purchased from the remote area.

Poudel (2015) studied Medical Ethnobiology and Indigenous knowledge system found in Raji group of Nepal (A case study of Uttarganga village development committee, Surkhet, Nepal) for her Master Degree. The study revealed that Raji people use 36 animal species for the treatment of 30 types of ailments and 91 plants species are used to treat 60 types of diseases. Meat, skin, bone, blood, dung, carapace, urine, whole organism, tail, egg and fats of animal parts are used as traditional medicine. Similarly, plant parts such as root, fruit, leaf, whole plant, flower, latex, shoot stem hair, bark, rhizome, seed and young shoot are found to be used by the Raji people.

Rai and Singh (2015) studied Medico-ethnobiology in Rai Community from Baikunthe Village Development Committee, Bhojpur, Eastern Nepal and found that about 87 plant species belonging to 55 families were used in treating 65 types of diseases while 27 different animal species belonging to 23 families were used in healing 28 ailments. The community is rich in traditional medicinal knowledge and has been using several plants and animal species for healing ailments in their day to day life.

Ghimire (2016) studied Medico-ethnobiology and Indigenous knowledge system of Munda ethnic group in Jhapa, Nepal (a case study of Mechi Nagar Municipality**)** for her Master Degree. Analysis of the data revealed the use of 25 animal species belonging to 18 orders and 24 families and 25 genera to treat 27 different diseases and 61 plant species belonging to 41 families and 56 genera for the treatment of 55 different diseases. The gastro-intestinal, integumentary, reproductive, respiratory, musculoskeletal, nervous, urogenital, ophthalmological, otorhinolaryngological, dental and cardiovascular were the most frequently treated diseases.

2.2 In the context of Medico-ethnozoology

Tamang (2003) conducted the ethno-biological study of Tamang people of Ghorsyang VDC of Nuwakot district and reported the use of 12 animals and 44 plant species used for medicinal purposes.

Mahawar and Jaroli (2008) conducted the research on traditional 200 therapeutic studies in India and identified approximately 109 animals and 207 uses are reported in traditional medicine in different part of India. Of these the mammals constitute the highest number of animals used for medicinal purposes 40% mammals, 22% invertebrates, 17% birds, 11% reptiles, 2% fishes and 2% amphibians have been reported for medicinal purpose.

Luhani (2010) carried out the study on Zoo therapeutical knowledge of Jirels of Dolakha district and identified 35 animal species used in 50 different purposes.

Yirga et al. (2011) reported the use of 16 species of medicinal animals for treating 18 different human ailments by the people of Kafta – Humera district, Northern Ethiopia. This Zoo-therapy was conducted by using therapeutic based medicines.

Luitel et al. (2014) conducted the study on medicinal plant used by the Tamang community in Makwanpur district of central Nepal and identified out of 16% plant species belonging to 86 families and 144 genera to cure 89 human ailments were document.

Borah and Prasad (2016) carried out ethno-zoological study among the indigenous inhabitants in adjoining area of pobitora wild life sanctuary, Assam, India which resulted in the information on the remedial uses of different animals collected from Nath community and Karbis who used a variety of Zoo-therapeutic medicines for curing different ailments in their own traditional ways. From the study, a total of 26 ethno-medicinal animals and animal product were found to be used for the treatment of various ailments including asthma, chicken pox, pneumonia, and anemia.

Bagde and Jain (2017) studies on traditional and ethno-zoological practices by tribes and rural of Chhindwara district of Madhya Pradesh, India and found total of 18 animals and animal product were recorded and they are used in different ethno-medicinal purposes

including tuberculosis, asthma, rheumatism, cough and cold, paralysis, piles, dysentery etc. The zoo-therapeutic knowledge was mostly based on non- chordate and chordate animals.

Atlaf et al. (2017) studied ethno-medicinal and cultural practices of mammals and birds in the vicinity of river Chenab, Punjab- Pakistan and recorded 108 species of animals, which include: 83% birds and 17% mammals. In total 30 mammalian and 28 birds species were used to treat various diseases such as rheumatic disorders, skin infections and sexual weakness among several others, fats, flesh, blood, milk, and eggs were the most common utilization body part.

Borah and Prasad (2017) studied ethno-zoology study of animals based medicine used by traditional healers and indigenous inhabitants in the adjoining areas of Gibbon wild life sanctuary, Assam, India. The study recorded a total of 44 different species, 44 genera and 36 families of animals which are used for the treatment of 40 different animals. Insect occupied the highest uses (30.9%) followed by mammals (23.8%), fishes (16.7%), reptiles (11.9%), amphibians (7.1%) annelids (4.8%) and gastropods (4.8%).

Atlaf et al. (2018) studies on ethno-medicinal application of animals species by the local communities of Punjab, Pakistan and recorded the ethno-medicinal used of 57 species of animals including mammals, birds, fish, reptiles, amphibian and invertebrates (30, 25, 25, 7, 3.5 and 3.5% respectively) were documented. Meat, oil, brain, fats, milk, eggs and skin were the most utilized body parts. Those animals and their products are used to cure the human diseases like allergy, epilepsy, fever, join pain and backache to act as aphrodisiac and to enhance memory. *Columba livia* depicted highest fidelity level and used value of 98.86% and 0.89% respectively.

Kendie et al. (2018) studied ethno-zoological study of traditional medicinal appreciation of animals and their products among the indigenous people of Metema Woreda, North – Western Ethiopia and found 51 animal species to treat around 36 different ailment of the animals used therapeutically, 27 species were mammals, 9 were birds, 7 arthropods, 6 reptiles and 1 species each represented fish and annelids. The honey of the bee *Apis Melifera* was sused to relieve many aliment and score highest fidelity value (n= 35.97%). The snake (*Naja naja*) and the teeth of crocodiles had the lowest fidelity value (n = 2.56%).

2.2 In the context of Medico-ethnobotany

Manandhar (1990) investigated the ethnobotany of Danuwars of Siwalik and reported 80 medicinal plant species used to treat different diseases. Also, Manandhar (1995) carried out study on medicinal plants from Jajarkot district and documented 60 species to treat 25 diseases. Also in 21st century, a book entitled "National Register of Medicinal Plants in Nepal"with 150 different medicinal plants with their scientific names, medicinal uses and sites ofavailability (IUCN, 2000).

Balami (2004) studied ethnomedicinal uses of plants among the Newar community of Pharping village of Kathmandu district, Nepal and documented 119 species of plants used as medicine by the Newar community of Pharping village of Kathmandu district. All reported medicinal plants were used for 35 types of diseases like Diabetes, Epilepsy, Fever, Jaundice, Rheumatism and other condition such as incense, spice and flavourant etc.

Pandey (2006) conducted the study on the use of medicinal plants in traditional Tibetan Therapy system in upper Mustang and documented 93 species of medicinal plants belonging to 74 genera spread over 35 families used by Amchis to treat different diseases.

Kunwar and Bushmann (2008) carried out the research in Ethnobatay in the Nepal Himalayas and found an average of 21-28% of ethomedically important plants reported for Nepal and up to 55% of the flora from the study area had medicinal value.

Aryal (2009) investigated ethnobotany of Tharu people of Jayanagar VDC of Kapilvastu district of Nepal. He found 189 species of plants out of which 103 were cultivated, 68 were wild, including 71 species of medicinal plants and 42 species of fodder plants used by the Tharu people in his study.

Bhattarai et al. (2009) carried out research on Ethno-medicinal Plants Used by the People of Nawalparasi District, Central Nepal and 94 ethnomedicinal plant species belonging to 49 families under 86 genera were documented.

Thapa (2012) conducted study on Medico-ethnobotany of Magar Community in Salija VDC of Parbat District, Central Nepal. The study recorded the use of 75 species of medicinal plants belonging to 46 families and 72 genera for the treatment of 39 different ailments. The

most frequently treated illness were gastrointestinal ailments followed by dermatological infection and skeleto-muscular problem.

Malla et al. (2013) carried out research on Medico-ethnobotanical investigations in Parbat district of Western Nepal. A total of 61 plant species belonging to 59 genera and 43 families had been used by the local tribes for curing various human diseases.

Luiteal et al. (2014) conducted the study on medicinal plant used by the Tamang community in Makwanpur district of central Nepal and identified out of 161 plant species belonging to 86 families and 144 genera to cure 89 human ailments were documented.

Gupta et al. (2015) conducted the study on ethno- medicinal plants used in the healthcare system in Tamar Block of Ranchi district in Jharkhand, India. The investigation revealed that the medicinal plants of 53 species of 47 genera belonging to 31 families commonly used by Munda and Oraon tribes of different villages for the treatment of various ailments.

Bhattarai and Khadaka (2016) carried out research on Ethnobotanical survey of medicinal plants from Ilam District, East Nepal and during study period all together 102 plant species were recorded for their uses to cure at least 56 human ailments.

Singh (2017) conducted the study on Ethnomedicines used by Kochila Tharu tribes living near Bara District of Nepal. A total of 99 medicinal plant species used by Tharus as ethnomedicine for the treatment of various ailments which represent 50 families with the most prominent family being Asteraceae (12 species), followed by Fabaceae (8 species) and Lamiaceae (8 species). The 49 different ailments reported were grouped into 14 broad categories.

Bisht and Adhikari (2018) carried out research on Ethnobotanical Study of Traditional Medicinal Plants used by Banraji Community in Uttarakhand, West Himalaya and the study documented the indigenous knowledge and use of 70 (41 families and 64 genera) plants for the treatment of 31 human ailments. The family Asteraceae (14%) followed by Euphorbiaceae (9%), Lamiaceae and Urticaceae (6%) were the dominant families of plants utilized by the community.

2.3 In the context of Indigenous technology and knowledge system

Verma and Attri (2008) studied on Indigernous beekeeping for sustainable development on Himalchal Himalaya and found that because of varied agro-climate on Himalchal Pradesh, have a great variety of bee forage sources that provide the basioc for development of bee keeping industry in the state. Bee keeping with *Apis cerana* should be encouraged for rural households with low investment capacity.

The study on the indigenous knowledge of local people of Alasehir District in Aegean Region of Turkey unveiled the traditional knowledge of local names, aliments and diseases treated, therapeutic effects, parts of plants and methods of preparation so that these rich heritages would not be lost due to the various anthropogenic and other natural causes (Ugulu 2011).

Luu et al. (2014) studied on Traditional alcohol production and use in three provinces in Vietnam: an ethnographic exploration of health benefits and risks and found that older people favoured traditional alcohol, while younger people favoured brand-name beer. Typically people consumed 2-4 drinks daily, mainly at meal times. People consumed more alcohol at special events and festivals. Traditional alcohol manufacture, sale, and use in Vietnam is a long-standing practice and low- to moderate-risk to health.

Bhattarai and Das (2013) carried research on Scientific Study on Indigenous Technology of Dahi Making of Eastern Nepal and found that the preparation method is unique with steps like saans Marne, naato banne and uses special close necked wooden vessel carved out of wood called theki for fermentation. Caramelization during heating and duration of fermentation affects color, appearance and form of dahi. The best flavor comes from dahi prepared in daar theki. Heat treatment affects microstructure, texture and rheology of dahi. A good dahi should possess firm body, consistent quality with equal ration of sweetness and sourness. Dahi is indispensible item in Nepalese religious and cultural occasions which is nutritionally and therapeutically superior to milk.

3. MATERIALS AND METHODS

3.1 Study Area

3.1.1 Location

Lalitpur Metropolitan city, historically Patan is the third largest city of Nepal after Kathmandu and Pokhara and it is located in the south central part of Kathmandu valley. It lies within 27°40' N latitude and 819' E longitude having an area of 15.43 km^2. It is bounded by east in Imadol VDC, west by Kirtipur municipality and Kathmandu metropolitan city, north by Kathmandu metropolitan city and south by Godawori municipality. It is known for its rich cultural heritage, particularly its tradition of arts and crafts.

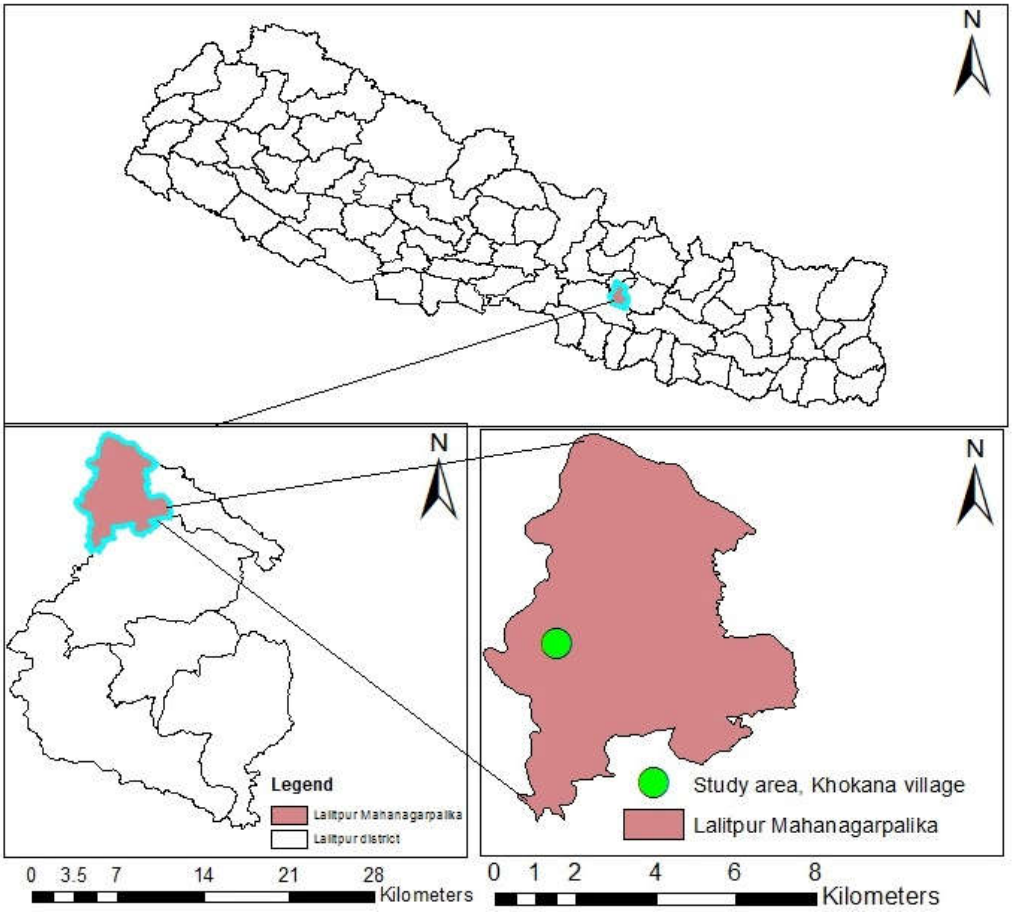


Figure 1: Map of Nepal showing Lalitpur district with Khokana as Study area

Khokana village (currently Karyabinayak municipality) is a former Village Development Committee (VDC) which has been merged with the neighboring VDC's of Bungamati, Chhampi, Dukucchap, Sainbu and other 38 VDC's to form metropolitan city of Lalitpur

district in the Bagmati zone of central Nepal. It is located at province 3, eight km south to Kathmandu city. It is traditional Newari village lies in 27.64ºN and 85.29º E. It is called as 'living museum' that recalls medieval time when Nepal was ruled by Malla kings. According to Nepal census 2011, Khokana had population of about 4,927 indigenous peoples living in 1,056 individual households. Since 1996 A.D Khokana has been nominated to be listed as a UNESCO World heritage, representing vernacular village and its mustard-oil seed industrial heritage.

3.1.2 Geography and Climate

Lalitpur is on the elevated tract of land in Kathmandu valley on the south side of the Bagmati River which separates it from the city of Kathmandu on the northern and western side. The Nakhu khola acts as boundary on the southern side. It was developed on the relatively thin layers of deposited clay and gravel in the central part of a dried ancient lake known as Nagdada. The city has an area of 15.43 square kilometers and divided into 29 municipal wards. Climate here is mild and generally warm and temperate. In winter, there is much more rainfall than in summer. The average annual temperature in Lalitpur is 25.7ºC and precipitation here averages 1128 mm. The average annual temperature in Khokana is 17.9ºC and precipitation here averages 1405 mm.

3.1.3 Vegetation and wildlife

The study area consists of small community forest which consists of a variety of vegetation ranging from forage to shrub and trees. Most of the area of forest is now covered by human settlement after 2015 earthquake. Different species of bird found in the study area like crow, drongo, pigeon, etc.

3.1.4 Demography

According to the CBS 2011 the total population of Newar was 1,321,933 which make up almost 5% of the total population of the country. And the population of Khokana village is 4,927 according to CBS 2011. The male and female population is 2,452 and 2,475 respectively.

3.2 Materials

Following materials were used during the study.

- Notebook and stationary
- Datasheet
- Camera
- Voice recorder
- Herbarium sheet

3.3 Methods

For the purpose of data collection, Khokana village were visited twice during April and June 2019. The preliminary visit was made on 10th March 2019. The first field visit was carried on 7th April to 13th April and second field visit was carried in May (17, 25, 29, and 30) and June (22, 23, and 24). Each day four hours was spent in field. By using purposive or judgment sampling method, sample of resource persons that included healers, knowledgeable elder people, community leader, medical plant and animal collector, school teacher as well as youth and local people from the study area were selected for the study. Total 82 individuals were interviewed among which 49 were male and 33 were female.The data were collected by semi structured interviews. The present study about the medico-ethnobiology, indigenous technology and knowledge of Khokana village regarding with Newar ethnic groups was conducted by following method.

3.3.1 Nature and sources of data

To fulfill the objectives of the research work types of data were used as primary and secondary data. The data were collected by using various methods of data collection which are describe below.

3.3.2 Primary data collection

3.3.2.1 Group discussion / interview

Group discussion with cetain group of people incliding local healers, elder people, community leader, school teacher, local industries worker and other knowledgeable people of the community was conducted. The set of questionnaire about their origin, language, festivals, educations, life style, indigenous knowledge, skills and technique were discussed.

3.3.2.2 Interview with key informants

Key informants for the traditional medicinal practices are the local healers and knowledgeable elder people. A number of questions about the traditional healing practices, plants and animals used as medicine for different diseases were asked. For the information of traditional skills and technique the related founder or workers were interviewed.

3.3.2.3 Field visit and observation

The study area was visited and observed in order to understand cultural and physical settings . The way of using medicinal plants and animals was observed and recorded. The actual condition of local/traditional skills and techniques were observed directly and their importance to the local people was analysed.

3.3.2.4 Sample collection and identification

Sample of different animals and plants both known and unknown were collected from the field visit. The collected sample were identified with standared literature and with the help of experts and key informants. The plants and animal species weere taxonomically classified into division, order, family, genera and species.

3.3.3 Secondary data collection

The secondary data relevant for the literature review and references were collected from different journals, theses, published books and articles and other.

3.4 Tools and Data Analysis

The collected primary and secondary data from the study area were analyzed with the help of Excel. They were presented in different forms like tables, charts, bar diagrams, etc. wherever possible.

4. RESULTS

During field visit total 71 medicinal plant species and 14 medicinal animal species were recorded. Recorded medicinal plants and animals were indentified with standard literature and with the help of experts. During this field visits some of the indigenous technology and knowledge systems were also listed. The results of the present research work have been presented into three categories; ethnography, medico-ethnobiology and indigenous technology and knowledge systems as below:

4.1 Ethnography of Newar

4.1.1 Origin

The term 'Newar' or 'Newa' referring to the inhabitant of Nepal appeared for the first time in an inscription dated 1654 in Kathmandu. For about a thousand years, the Newar civilization in central Nepal preserved preserve a microcosm of classical North Indian culture in which Brahmanic and Bhuddhist elements equal status. The common identity of Newar was formed in the Kathmandu valley and its surrounding districts. The main Rudrayani temple is said to be established by King Amara Malla in 15th century and thus the town of Khokana came into existence. Maharjans and Dangols of Pachali Bhairav have migrated to Khokana as proven by many similarities in cultures and traditions of People.

4.1.2 Physical Features

Newars are a mix of the highland Nepalese i.e the Khas Indo-Iranian and Sino-Tibetid people. The Newar people have narrow eyes, broad and flat nose, medium height with light to dark skin complexion.

4.1.3 Language

Nepal is a multi linguistic country among which Newari language is one. The language spoken by Newar people is known as Nepal Bhasa. Nepal Bhasa is spoken during Licchavi period but inscription in Nepal Bhasa emerged from 12th century and developed as the court and state language from 18th centuries. This language is used in stone and copper inscriptions, sacred manuscripts, official documents, journals, title deed, correspondence and creative writing. According to the data from 2011, there were approximately 846000 native speaker of Nepal Bhasa. The Newar people (Jyapu) of study area also speak their own dialects of Nepal Bhasa. Few of them also speak Nepali language. Some of the examples of the Newar language are given with their meaning in Nepali language as below:

Table 1: Some relation defining words in Newar, English and Nepali language respectively

S.N	Relation in Newari language	English language	Nepali Language
1	Sasa ma	Mother in law	Sasu
2	Sasa ba	Father in law	Sasura
3	Ma	Mother	Aama
4	Abu	Father	Buwa
5	Daicha	Elder Brother	Dai
6	Tata	Elder sister	Didi
7	Ke	Younger sister	Bahini
8	Kija	Younger brother	Bhai
9	Bhat	Husband	Pati
10	Kala	Wife	Patni
11	Bajya	Grand-father	Hajurbuwa
12	Aji	Grand-mother	Hajur aama

Table 2: Some Crops, vegetables and fruits in Newar, English and Nepali language respectively

S.N	Newar language	English language	Nepali language
1	Wa	Paddy	Dhan
2	Tu	Mustard	Tori
3	Nwaka	Stinging neetle	Sisnu
4	Lai	Radish	Mula
5	Kani	Maize	Makai
6	Kakacha	Bitter gourd	Titekarela
7	Musya	Soyabean	Bhatamash
8	Lava	Garlic	Lasun
9	Fasi	Pumpkin	Farsi
10	Tusi	Cucumber	Kankro

Table 3: Some Animals in Newar, English and Nepali language respectively

S.N	Newari language	English language	Nepali language
1	Khicha	Dog	Kukur
2	Ghu	Tiger	Bagh
3	Kharacha	Rabbit	Kharayo
4	Ghywo	Ox	Goru
5	Meh	Buffalo	Bhainsi
6	Saa	Cow	Gai
7	Khaa	Hen	Kukhura
8	Haa	Duck	Hansh
9	Sulpyacha	Leech	Juka
10	Khasa	Slug	Chiplekira

4.1.4 Dress and ornaments

The customs (dresses and ornaments) of Newar people is unique and different from other ethnic groups as per their tradition and culture. Older Newar people prefer to wear traditional clothes but nowadays most of the new generation wore modern dresses.

The traditional dresses of Newar people as per the elder were Daura (la) suruwa, Dhaka topi, stakot (laka), patika (jani) and bhoto (pwak la) for male and Haku patasi (fariya), cholo (la), patuka (gacha) for women. The ornaments used by Newar women are Makase (earing), Jantra, puma (pote), vipu (necklace) Shachika (sirbindu), Nyapu sikha (hair ornament), churi, silver kalli etc.

4.1.5 Education

Lalitpur is the first fully literate district across the country with 99.2 per cent literacy rate among people ranging from 15-60 years of age. In the study area also almost all the people ranging from 15-60 years age group are educated except few older people. Almost all children were sent to private school and few to the government school. Nowadays educated elder people were engaged in trade and business rather than agriculture.

There are total six schools in the study area where children went to study. Out of six schools two were government schools and four were private boarding schools. The lists of schools in the study area with their location are given below:

Table 4: The lists of schools in the study area with their location

S.N	Name of school	Location
1	Shree Rudrayani Secondary School (Government)	Dokashi
2	Yuba Pratibha Bidhya Mandir Secondary School (Government)	Dobu
3	Peace Garden Secondary School	Kayabasti Fongacho
4	Zing Secondary School	Dobu
5	Simran Academy	Gabu
6	Ganodaya Residential Higher Secondary School	Byagalbu

4.1.6 Occupation and economy

In Khokana mostly people were engaged in agriculture from ancient time. They have their own land which is sufficient to grow different seasonal food crops and cash crops which is great source of income for people living there. They were well aware of modern agricultural techniques for cultivating seasonal crops and vegetables. And another source of income for the people is traditional mustard seed oil mill, where they can work or sell mustard seed. Agro-tourism is also the one of the best income generating part of the study area. Tourists visit the place being vernacular ancient village.

Apart from this, people were engaged in other different economic sectors like carpet industry, stone carving, wood carving, wool weaving, business and trade. Most of the young people migrated to different foreign countries for education or in search of employment.

4.1.7 Religion and Festivals

During the month of August, October and November, Khokana is at its best with the festive season in the air. People living there celebrate festivals like Sikali Jatra, Kartik jatra, Gaijatra, Khayasanbhu, Bhimsen puja, Paha-charhey, Sithi nakha etc.

a) Sikali Jatra

Shikali Jatra is celebrated by a section of the ethnic Newar community living in Khokana dedicated to Rudrayani Goddess. The villagers, though practicing Hindus, do not celebrate Dashain. In place of Dashain they observe the colourful Shikali Jatra. The five-day long festival is dedicated to goddess Shikali also known as ‘Ajima’ or mother goddess. Masked dances following tantric rituals are performed by dancers garbed in colourful attires during the festival. The dancers represent 14 gods and goddesses of the Hindu pantheon. A wooden chariot with the idol of Goddess Rudrayani is carried through the village streets, finally resting in front of the Shikali Temple located on a grassy hill just outside the village. The procession, led by Newar priests wearing their white ritual costumes, sees the participation of devotees from Khokana and other parts of Kathmandu valley.

b) Kartik Jatra

Kartik jatra is celebrated in the month of Kartik (October- November). During this festival 14 deity representatives dances were performed and animal sacrifices are made.

c) Gaijatra (Gunhi Punhi)

Gaijatra is held in the month of August for two days. On the first day of Gaijatra frog is worshipped and after having cereal soup jatra begins from Rudrayani temple. And on the second day unique custom known as Deopokhari festival is celebrated where a baby female goat is thrown into De Phukhu (holy pond). Then group of people from nine division of village make a jump into the pond. The female goat is tortured to death. Goat is brutally torn apart by men using their bare hand and teeth. The man who succeeds to killed goat leads a dance procession follows. Although highly criticized by animal right activist, the ethnic custom is a way to please the deities for the well being of village.

d) Sithi Nakha

Sithi nakha is celebrated in the month of June. This is the main festival of the farmer for cleaning, renewing and renovating the community structure.

e) Bhimsn Puja

This puja is performed on the second day of Baisakh. Bhimsen is worshipped in this puja with the benefits comes from auditing yearly accounts of the oil mills for prosperity in the future.

f) Paha- Charhey

This festival is celebrated in the month of Chaitra by worshipping lord Mahadev. The festival is arranged by two guthis for entire community.

Apart from these, people in Khokana also celebrates Indra jatra, Manghe sankranti, Tihar, Sakimari purni (by cooking Colocassia fruit), Machindranath (Jabil jatra), Khayasanbhu (feast of bitten rice at first ofBaisakh) etc

4.1.8 Dance

The newar dance include sacred masked dance, religious dance without the use of masks known as Dyah Pyakhan, dance performed as part of ritual and meditation practice known as Chachaa Pyakhan and flok dance. Daboo Pyakha (masked drama dance) and dhime dance are also performed by Newar people.

The Newar people of Khokana, during their main festival of Sikali jatra, masked dances were performed following tantric rituals by dancers garbed in colourful attires. The dancers represent 14 gods and goddesses of the Hindu pantheon. Masked dances were also performed during kartik jatra and Gai jatra in Khokana.

4.1.9 Life cycle rituals

4.1.9.1 Birth

In Newar community when a baby was born, bath is given to the baby with hot water and wiped with clean piece of clothes. Naming ceremony is done in four days of a baby birth. During naming ceremony, the name is given to a newly born child by family priest. The ceremony includes a huge puja done in the baby's name. Both baby and mother anointed with tika, dakshina and gifts. Relatives were invited and offered food and drinks like Samebaji, hako chhoyala, mushya wacha, kaniko kwati, aaila etc. Their cultures are influence by both Hinduism and Buddhism. During naming ceremony jyotish (priest) inspect the child's stars and warn the family of any troubles the child might be prone to.

4.1.9.2 Marriage

In Newar community girls are married thrice in their lives. The first is called Ehee (Bel Bibaha), second is the marriage with sun which is called Bara Tayegu or Gufa Rakhne and last one is the marry to real bridergroom. Boys marry only once in a life with real bride.

a) Bel Bibaha

This is the ceremony in which girl married to the fruit called bel (wood apple). The bel is a symbol of Suvana kumar, the sun of lord Shiva or Vishnu. This is carried out when girl is around the age of 5-10 years old. Bel is considering very tough fruit because of its hard shell. So ceremony with the bel is conducted to ask lord for a similar strong groom. So, if once a

girl gets married bel, even if her human husband dies, she will not be called a widow as her husband in the form of lord Vishnu is immortal.

b) Gufa Rakhne (Bara Tayegu)

Bara Tayegu where 'Bara' means cave and 'Tayegu' means to put. In this ceremony girls are put in cave like surrounding where sunlight cannot pass. This is the ceremony in which girl are married to the sun. This marriage is carried around the age of 10-15 years of age. It is lasts for almost 12 days. They remain in a dark room for 11 days, away from any man to prove their purity. It is most that girl should not have menstruated ever before this ceremony. The 12^{th} day is marked by a huge celebration to signify the end of ceremony.

c) Non Divine Marriage

This marriage is happens with the man as per the belief of the family. However, since the girl has already been married twice, the presence of her husband is not mandatory. Arrange marriages are preferred rather than love. A father selects bride for his son and he appoints a mediator to carry on the negotiations from both sides groom and bride. In the mean time the horoscopes of both boy and girl are examined to see if they match well or not. If borth parents and jhyotish (astrologer) agree then confirmation ceremony is organized with several presentations of gifts, sweets, areca nut and fruits which are sending to bride parents from groom's parents. Then the date is fixed in consultation with the astrologer. The priest completes rituals the ritual invoking and offering food to various deities.

4.1.9.3 Death

When a person dies in Newar community, all villager and relatives are called for starting of death rites. When all the people arrive, work is divided to collect wood, clothes, bamboo and other necessary items. After that dead body is taken to graveyard to set fire on it. The mourning is done upto 12 days which is called ghaso in Newari. During which the Mourner and other blood relatives abstain from eating salt, tomato, milk etc. Again another ritual is carried on 45 days of death called as lachya and rituals carried in one year of death is called as dakela.

4.2 Medico-ethnozoology

Newar community in Khokana village of Karyabinayak Municipality has been using a number of animal species both wild and domesticated in their traditional healing system as medicines to cure several diseases. Findings of this research disclosed that altogether 14 animal species both wild and domesticated belonging to 10 orders, 11 families and 14 genera being used for the treatment of 16 different diseases/ailments. The list of animal species used in the traditional medicine by the Newar community of the study area is shown below (Table 5).

4.2.1. Diversity of animal species

The animal species used were both wild and domesticated in nature. The present study showed that Newar community of the study area used 4 wild (29%) and 10 domesticated (71%) animal species for traditional medicinal practices. Among the 14 animal species recorded for medicinal purposes from the study area, 7 were mammals, 4 were aves, and one was mollusca, insecta and arachnida. The share of mammals was 50%, aves was 29%, mollusca, insect and arachnida was 7% (Figure 2) .

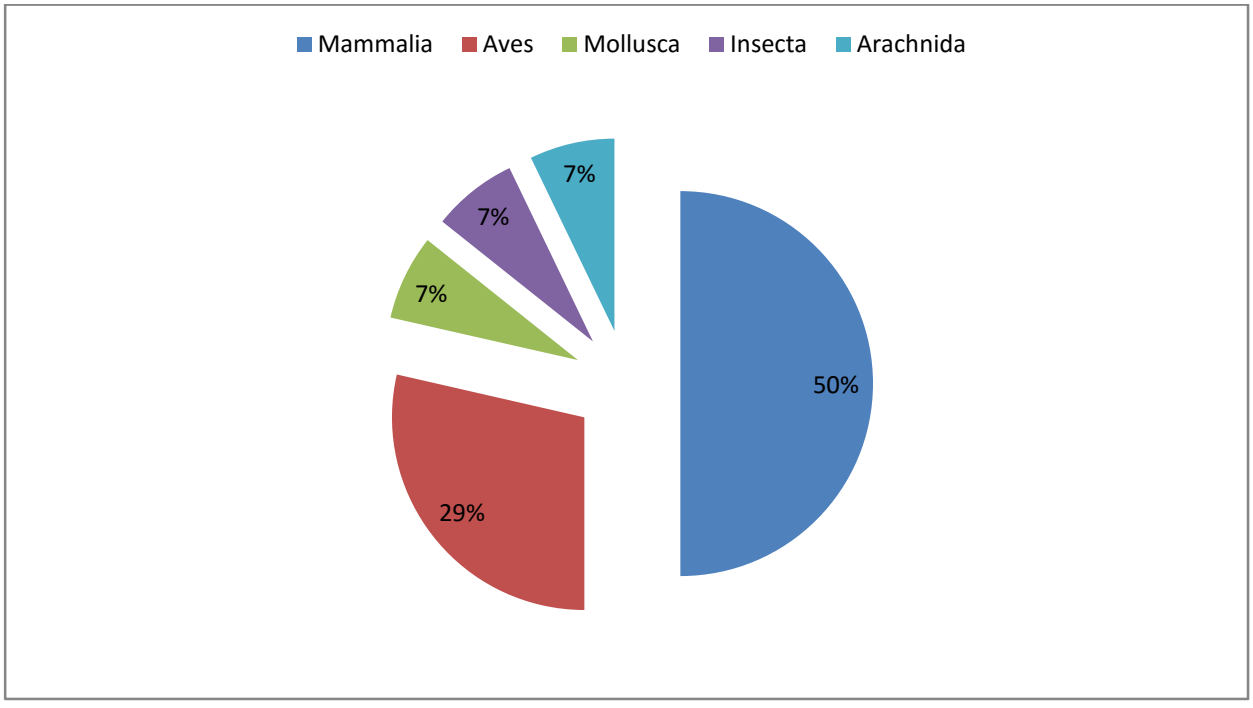


Figure 2: The share of animals belonging to different classes.

Table 5: Animals and their products used by Newar Ethnic group for the treatment of various Diseases

S. N	Local name	Common name	Scientific name	Order	Family	Class	Parts/products used	Forms of medicine	Medicinal uses
1	Khassa	Chipplekira/ Slug	*Anadenus* sp.	Pulmonata	Helicidae	Mollusca	whole organism /O	Raw/paste	bone fracture, body swollen,back pain
2	Me:he	Bhainsi/ Buffalo	*Bubalus bubalus*	Artiodactyla	Bovidae	Mammalia	Skin/Ligaments/ O	grilled skin/raw ligament	Abdominal pain, blood dysentry/to join fractered bone.
3	Makacha	Makura/ Spider	*Araneae* sp.	Arania	Araneae	Arachnida	net/T	web	blood clotting
4	Cholecha	Bakhra/Goat	*Capra hircus*	Artiodactyla	Bovidae	Mammalia	Bile/milk /O	Raw	to treat asthma/to relief eye pain
5	Haa	Hansh/Duck	*Anas* sp.	Anseriforms	Anatidae	Aves	Eggs/meat/O	boil/cooked	to get energy
6	Bakhucha	Parewa /Pegion	*Columbus livia*	Columbiforms	Columbidae	Aves	meat/O	Cooked meat is taken orally	to get energy mostly during pregnancy, to cure cold,Menstrual disorder
7	Sa	Gai/cow	*Bos* sp.	Artiodactyla	Bovidae	Mammalia	Urine/O	Urine is taken orally	during fever or Jaundice
8	Phoi	Bheda/Sheep	*Ovis aries*	Artiodactyla	Bovidae	Mammalia	meat/O	Cooked meat is taken orally	For cooling body
9	Khicha	Kukur/Dog	*Canis familiar*	Carnivora	Canidae	Mammalia	meat/O	Cooked meat is taken orally	to treat kalajar
10	Bakala	Bakulla/cattle egret	*Babulcus ibis*	Pelecaniformes	Ardeidae	Aves	meat/O	Cooked meat is taken orally	to treat blood dysentry(Ragat masi)
11	Battai	Battai /Quil	*Coturnix coturnix*	Galliformes	Phasinidae	Aves	Eggs/meat/O	cooked eggs or meat	to treat asthma, to get energy during pregnancy,to clear skin
12	Dhoh	syal/Jackle	*Canis aureus*	Carnivora	Felidae	Mammalia	Meat/Alcohol/O	alcohol prepared from meat of jackal and cereals	to treat rheumatism(batth rog).
13	Manu	Manchhe/ Human	*Homo sapiens*	Primates	Homonidae	Mammalia	milk/T	Milk of woman	to clear eyes
14	Kepicha	Dhamira/ Termite	*Termite* sp.	Isoptera	Termitidae	Insecta	mud/T	Termite house mud	to cure eye infection

4.2.2 Diseases/Ailments treated

In the present study, Newar community of the study area was found to use 14 species of animals for the treatment of 16 different diseases/ailments (integumentary, gastrointestinal, musculoskeletal, respiratory, reproductive, ophthalmological and cardiovascular. The list of diseases and animal species used by local Newar in Khokana village, Karyabinayak Municipality, Lalitpur District for curing those diseases are listed below (Table 6).

Table 6: List of diseases and animal species used for the treatment

S.N.	Name of Ailment	Types of Diseases	Medicinal animals used
1	Bone fractured	Musculo-skeleton	1. *Anadenus* sp. 2. *Bubalus bubalus*
2	Asthma	Respiratory	1. *Capra hiscus* 2. *Coturnix corturnix*
3	Rheumatism	Musculo-skeleton	1. *Canis aureus*
4	Jaundice	Gastrointestinal	1. *Bos* sp.
5	Blood dysentery	Gastrointestinal	1. *Bubalus bubalus* 2. *Babulcus ibis*
6	Eyes problem	Ophthalmological	1. *Homo sapiens* 2. *Termite* sp. 3. *Capra hiscus*
7	Blood clotting	Integumentory	1. *Araneae* sp.
8	Body pain	Musculo-skeleton	1. *Anadenus* sp.
9	Delivery problem	Reproductive	1. *Columbus livia* 2. *Coturnix coturnix*
10	Skin care	Integumentary	1. *Coturnix coturnix*
11	Cold	Respiratory	1. *Columbus livia*
12	Menstrual disorder	Reproductive	1. *Columbus livia*
13	Fever	Not a disease	1. *Canis familiar* 2. *Bos* sp.
14	To get energy	Not a disease	1. *Anas* sp. 2. *Columbus livia*

15	For cooling body	Not a disease	1. *Ovis aries*
16	Body swollen	Not a disease	1. *Anadenus* sp.

The different diseases/ailments were classified on the basis of the affected parts of the body. The results depicted that 19% of the diseases were gastrointestinal, 13% were integumentary and reproductive, 12% were gastrointestinal and respiratory, and 6% ophthalmological (Figure 3). Fever, weakness and psychic disorder could not be classified in the medical term.

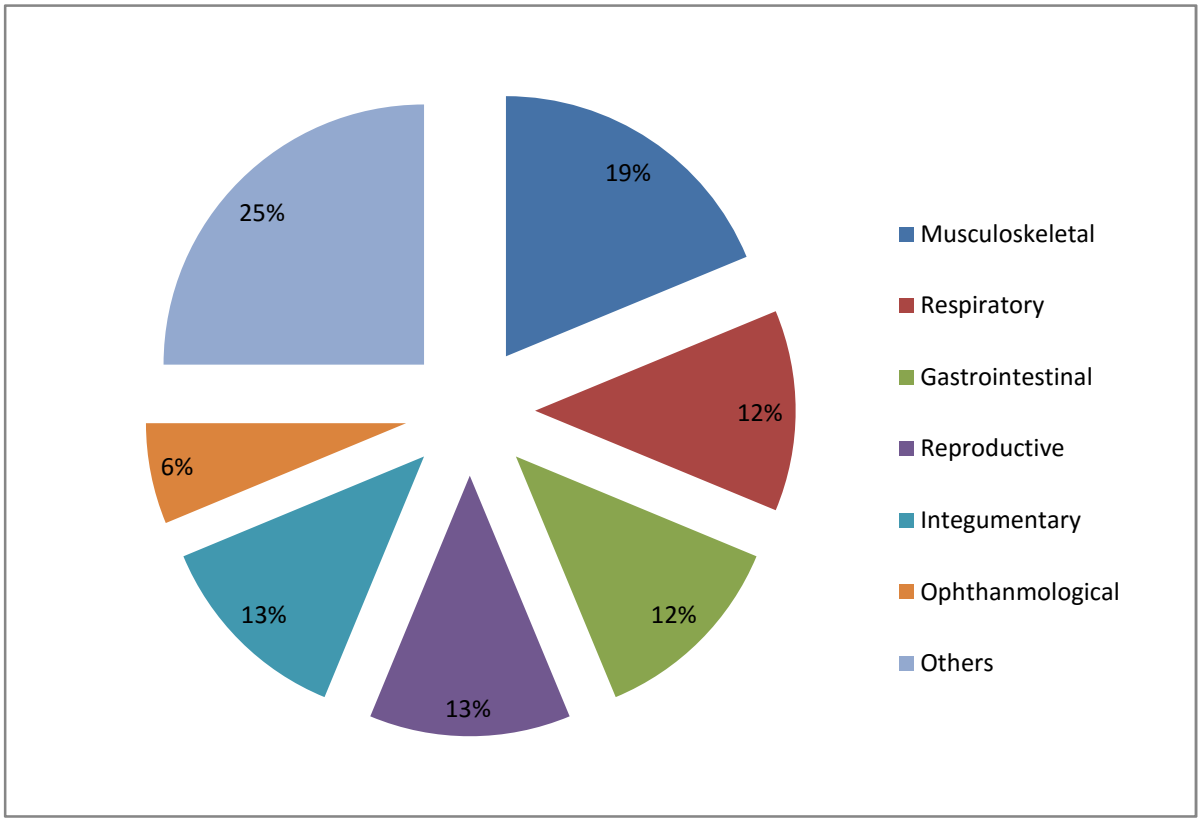


Figure 3: Number of ailments treated by different animal species according to the related system

4.2.3 Animal organs used

Whole body of the animal species or their organs and products from the animals were used for traditional medicinal practices. The used organs bile, testis, ligaments, skin and the animal products used were milk, meat, alcohol, eggs, urine, etc. The result shows that meat was used in 17 recipes and other parts and products of animal species used in different medicinal recipes were given in following graph (Figure 4).

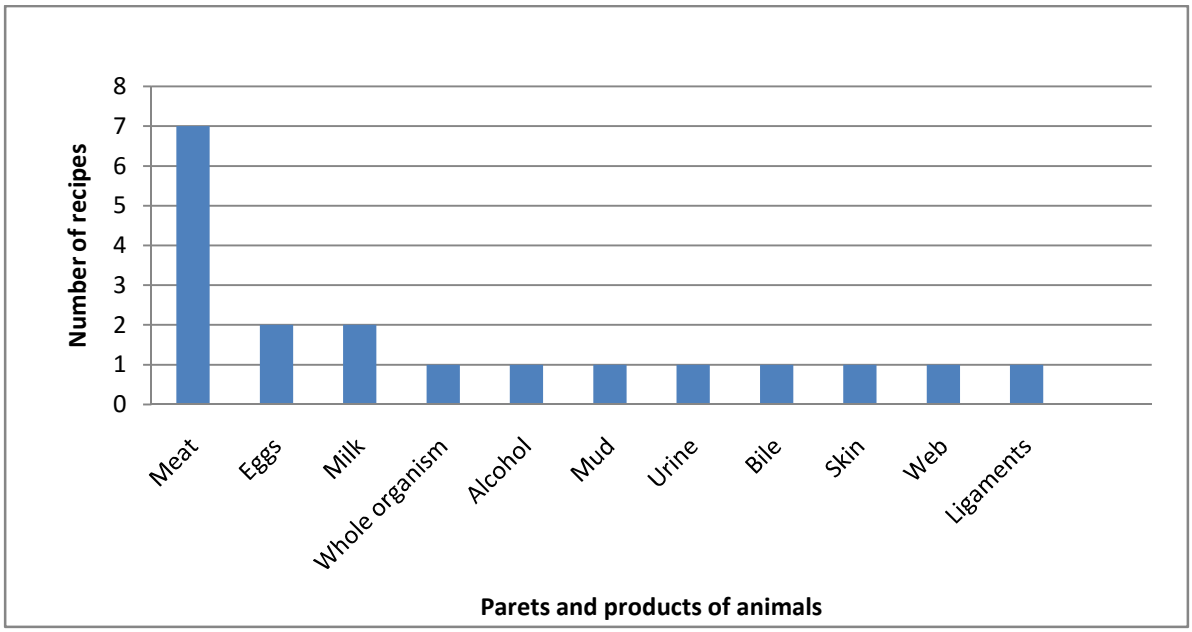


Figure 4: Body parts/products of animal species used in different medicinal recipes

4.2.4 Description of animal species used in medication

The animal species used in the traditional medicine by Newar community of Khokana village are described on the basis of collected information during field visits. The detailed information / descriptions are given in alphabetical order of family of the species.

A. Family : Araneae

1. *Aranea* sp. (Makura)

Part used: Web

Form of medicine: Web

Preparation and application: The web of the *Aranea* sp. is used in blood clotting.

Family: Anatidae

1. *Anas* sp. (Hansh)

Part used: Eggs / meat

Form of medicine: boiled / cooked

Preparation and application: The boiled / cooked eggs and meat of *Anas* sp. is used to get energy.

Family: Ardeidae

1. *Babulcus ibis* (Bakulla)

Part used: Meat

Form of medicine: Cooked

Preparation and application: Cooked meat of *Babulcus ibis* is taken orally to treat blood dysentery.

Family: Bovidae

1. *Capra hiscus* (Bakhra)

Parts used: Bile/milk.

Form of medicine: Raw

Preparation and application: Raw bile of *Capra hiscus* is taken orally to treat asthma. Raw milk of *Capra hiscus* is applied on eyes to relief from eye pain.

2. *Bubalus bubalus* (Bhainshi)

Part used: Skin / ligaments

Form of medicine: grilled skin / raw ligament.

Preparation and application: Grilled skin of *Bubalus bubalus* is taken orally to cure abdominal pain and blood dysentery. Raw ligament of animal is used to join fractured bone.

3. *Bos* sp. (Gai)

Part used: Urine

Form of medicine: Urine

Preparation and application: Urine of *Bos* sp. is taken orally during fever or jaundice.

4. *Ovis aries* (Bheda)

Part used: Meat

Form of medicine: Cooked

Preparation and application: Cooked meat of *Ovis aries* is taken orally for cooling body.

Family: Canidae

1. *Canis aureus* (Syal)

Part used: meat

Form of medicine: Alcohol

Preparation and application: Meat of jackle is mixed with millet or locally produced cereals and yeast to produce alcohol called "Syal Koraksi" and is taken orally to treat Rheumation (batth rog).

2. *Canis familiar* (Kukur)

Part used: Meat

Form of medicine: Cooked

Preparation and application: Cooked meat of *Canis familiar* is taken orally to treat Kalajar.

Family: Columbidae

1. *Columbus livia* (Parewa)

Part used: Meat

Form of medicine: Cooked

Preparation and application: Cooked meat of *Columbus livia* is taken orally to get energy mostly during pregnancy to cure cad and menstrual disorder.

Family: Helicidae

1. *Anadenus* sp. (Chiplekira)

Part used: Whole organism

Form of medicine: Raw / Paste.

Preparation and application: Raw / Uncooked whole organism is taken orally to cure back pain. Paste form of animal is applied to treat bone fracture and body swollen.

Family: Hemonidae

1. *Homo sapiens* (Mancche)

Part used: Milk

Form of medicine: Milk.

Preparation and application: Milk of women is used to cure eye infection.

Family: Phasinidae

1. *Coturnix coturnix* (Battai)

Part used: Eggs / meat

Form of medicine: Cooked

Preparation and application: Cooked meat / eggs of *Coturnix coturnix* is taken orally to treat asthma, to get energy during pregnancy. It is also taken to make clear skin.

Family: Termitidae

1. *Termite sp.* (Dhamira)

Part used: Mud

Form of medicine: Mud

Preparation and application: Mud formed from the home made by termite is used to cure eye infection.

4.3 Medical ethno-botany

Along with the different species of animal various species of plant has been also found to be used as medicines for treating different diseases in Newar community of Khokana village. The result shows that the community uses 71 medicinal plant species belonging to 43 families in treating 51 types of ailments. Plants having medicinal value in Newar community are given in the (Table 7).

4.3.1. Diversity of plants species

The plant species used were both wild and cultivated in nature. The present study showed that Newar community of the study area used 34 wild (48%) and 37 cultivated (52%) plant species for traditional medicinal practices. The result showed that among 71 medicinal plant species 35 were herbs, 16 were shrubs, 13 were trees, three were and grasses and one was fern, one was fern was found. The share of plant species herbs was 49%, shurbs was 23%, tree was 18%, climbers and grasses was 4% and fern was 2% (Figure 5).

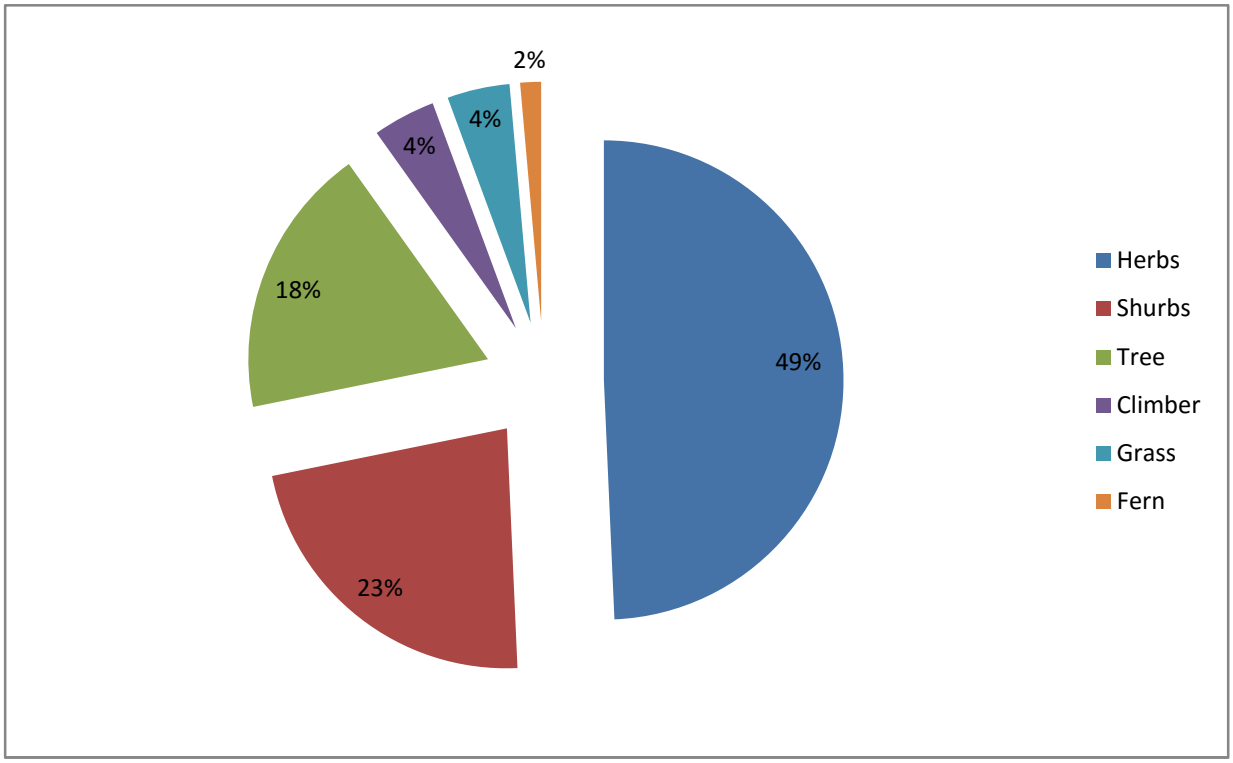


Figure 5: The share of plants belonging to different classes

Table 7: Plants and their products used by Newar ethnic group for the treatment of different diseases

S. N	Local name	Common name	Scientific name	Family	Life forms	Habitat	Parts used	Forms of medicine	Medicinal uses
1	Dhaswa	Titepati	*Arternisia vulgaris*	Compositae	Herb	wild	Leaves	juice/Liquid(fried/ cooked)/O	stomach pain, gastritis, antileech, cuts and wound, to worm during uterine prolapse, sprain, cold
2	Banmara	Banmara	*Ageratina adenophora*	Compositae	Herb	wild	Leaves	paste/juice/O	smashed leaves applied on cuts and wound
3	Lalupate	Lalupate	*Euphorbia pulcherrima*	Euphorbiaceae	Shurb	wild	Resin	resin/liquid/T	teethache
4	Tu:	Tori	*Brassica camprestris*	Brassicaceae	Herb	Cultivated	seeds	oil/T	massage during back pain/headache, to clear eyes/ears, pubic rashes, sprain
5	Khokachaghya	Kanikekuro	*Cyanogiossum zeylanicum*	Boraginaceae	Herb	wild	whole plant	paste/juice/T	applied on cuts and wound(blood clutting)
6	Kephu	mula	*Raphanus sativus*	Brassicaceae	Herb	Cultivated	seeds	Raw/Fried/O	to cure roundworm/Ascariasis
7	Palu	Aduwa	*Zingiber officinale*	Zingiberaceae	Herb	Cultivated	Root	Decoction/O	during stomach pain
8	Aaleha	Asuro	*Jastcia adhatoda*	Acanthaceae	shurb	wild	Root	Decoction/O	during stomach pain, joint/leg pain, Bronchitis
9	Na:ka	Sisnu	*Urtica dioica*	Utricaceae	Herb	wild	Leaves	boiling in water/O	sugar, for eyes, jaundice, fractured
10	Tulashi	Tulashi	*Ocimum tenuifloram*	Labiatae	Herb	Cultivated	Leaves	Decoction/O	Jaundice, cough, fever
11	Pa:	Nigalo	*Drepanostachy*	Poaceae	Shurb	Cultivate	Root	juice/Liquid/	piles

			um falcatum			d		T	
12	Nawa swa	Babari	*Ocimum basilicum*	Lamiaceace	Herb	Cultivated	Leaves	paste/juice/O	teethache, B.P low
13	Wala gha imha	Peepal	*Ficus religiosa*	Moraceae	Tree	wild	Leaves/ seed	paste/juice/O	Boils, piles
14	Bojho	Bojho	*Acora calamus*	Araceae	Herb	Cultivated	Rhizome	Raw/O	during respiratory problem, as antidote, tonsilitis, asphyxia, antilice
15	Lava	Lasun	*Allium sativum*	Liliaceae	Herb	Cultivated	Fruit	Raw/Fried/O	to warm body, gastritis, tonsilities
16	Kani	Makai	*Zea mays*	Poaceae	Shrub	Cultivated	seeds	Raw/Fried/O	for body warm
17	Ghoye	Supari	*Areca catechu*	Palmae	Tree	Cultivated	seeds	Raw/T	Eczema
18	Malta	Khursani	*Capsicum microcarpum*	Solanaceae	Herb	Cultivated	seeds	Paste/T	Herpes zoaster
19	Halu	Beasar	*Curcuma anguotifolia*	Zingiberaceae	Herb	Cultivated	Root	sugar+besar/ O	Diarrhoea
20	Tibu	Timur	*Zanthoxylum armatum*	Rutaceae	Shrub	wild	seeds	Decoction/O	teethache, gastritis
21	Aadhi swa	Jaifal	*Myristica fragrans*	Myristicaceae	Tree	Cultivated	seeds	paste/T	skin rashes
22	Imu	Jwano	*Trachyspermum ammi*	Umbelliferae	Herb	Cultivated	seeds	Fried/O	cough, cholera, menstrual cramps, lactation enhancer
23	Maley	Marich	*Piper nigrum*	Piperaceae	climber	Cultivated	seeds	paste/O	stomach pain, gastritis
24	Amba	Amala	*Phyllanthus emblica*	Euphorbiaceae	Tree	wild	Fruit	Raw/dried/O	cough, weakness, blood purification
25	Amasi	Amba	*Psidium guajava*	Myrtaceae	Tree	Cultivated	Fruit/Leaves	Raw/paste/boiled/O	to cure abdominal pain, blood dysyntry, bleeding gum

26	Amali	Lapsi	*Choerospondias axillaris*	Anacarduaceae	Tree	wild	seeds	robbing seed/barbicued seed/T	skin rashes/to cure wound
27	Ikochya	Bethe	*Chenopodium album L.*	Chenopodiaceae	Herb	wild	whole plant	curry/boiling in water/T	stomach pain, body pain, Labour pain, retain placenta
28	Tejpat	Tejpat	*Cinnamomum tamola*	Lauraceae	Tree	Cultivated	Leaves	Raw/powder/O	for spice and flavourant
29	Milwa kocha	Ghodtapre	*Centella aciatica*	Umbelliferae	Herb	wild	whole plant	paste/juice/O	Jaundice, fever, asthma, urine infection, uric acid
30	Khai wase	Bagena	*Melia azedarach*	Meliaceae	Tree	wild	seeds	soaking seeds/O	to treat roundworms/Ascarasis
31	La:washi	Pani amala	*Nephrolepis cordifolia*	Nephrolepidaceae	Fern	wild	Tubers	Raw/O	sugar, gastritis, jaundice, liver related ailments, indigestion
32	Karpasi	Siltimur	*Litesa cubeba*	Lauraceae	Tree	wild	seeds/bark	Decoction/O	gastritis, stomach pain, powder for spice and flavourant
33	Dasi kata	Dhasingari	*Gaultheria fragrantissima*	Ericaceae	Shrub	wild	Leaves	paste/O	Fractured body parts, Rheumatism, against hookworm
34	Ha:dha	Rittha	*Sapindus detergens*	Sapindaceae	Tree	wild	Seeds	paste/T	joining nerves
35	Pamnamghya	Chari amilo	*Oxalis corniculata*	Oxalidaceae	Herb	wild	Leaves	paste/juice/T	for eyes, tooth corrosion
36	Kurilo	Kurilo	*Asparagus racemosus*	Asparagaceae	climber	Cultivated	whole plant	cooked/powder/O	raw/powder for aphrodisiac, diabetes and tonic
37	Vang	Vang/gaja	*Cannabis sativa*	Cannabaceae	Herb	wild	Leaves	paste/juice/O	Diarrhoea, Abdominal disorder, constipation

38	Dattiwan	Dattiwan	*Achyranthes aspera L.*	Amaranthacea	Herb	wild	Leaves/ stem	paste/juice/O	stomach pain
39	Jimbu	Jimbu	*Allium hypsistum*	Amaryllidacea	Herb	Cultivated	whole plant	Dry plant/O	flues, cough, stomach pain, spices
40	Kunhu	Ghiuku mari	*Aloe vera*	Liliaceae	Shrub	Cultivated	Leaves	Gel/T	leaves gel used in burned areas, for skin care, intestinal worms
41	Dubo	Dubo	*Cynodon dactylon*	Graminae	Grass	wild	whole plant	paste/juice/T	Herpes Zoaster(Janae khatira)/shingles
42	Chwakan	Sungure kada	*Cirsium verutum*	Compositae	Shurb	wild	Root	paste/juice/O	to cure urinary trouble.
43	I ka:	Sarsiu	*Brassica camprestris*	Compositae	Herb	Cultivated	Seeds	oil/T	Massage for body pain, indigestion
44	Parijat	Parijat	*Nyctanthes arbor-tristris*	Oleaceae	Tree	wild	flower	cooked dried flower/O	sugar, pressure, blisters and wound
45	Neem	Neem	*Azadirachata indica*	Meliaceae	Tree	Cultivated	bark	Decoction/O	Malaria, respiratory problem, blister and allergy
46	Seto dubo	Seto dubo	*Cynodon dactylon*	Graminae	Grass	wild	whole plant	paste/T	Herpes zoaster(Janae khatira), Melasma, cuts and wound
47	Abijwalo	Abijwalo	*Dymeria cordata*	Caryophyllaceae	Herb	wild	whole plant	juice/Liquid/stem/O	Fever,common cold, conjunctivitis, sinusitis, headache
48	Aah	Aap	*Magnifia indica*	Anacardiaceae	Tree	Cultivated	bark/leaves	Decoction/O	stomach pain, blood dysentry, diabetes, hair fall
49	Jai	Jai	*Jasminum* sp.	Oleaceae	Shurb	Cultivated	Leaves	dipping in water/O	sore throat, rashes
50	Gulab	Gulab	*Rosa indica*	Rosaceae	Shurb	Cultivated	flower	paste/O	wound, cholera
51	Kah Swa	Dhatura	*Dhatura stramonium*	Solanaceae	Shurb	wild	Leaves	paste/juice/O	swelling body, cough in cattle, rabies,

									menstrual disorder
52	Tafo swa	Sayapatri	*Tegetes erecta*	Compositae	Herb	Cultivated	flower	Decoction/O	Sinusitis(pinash)
53	Pyaaj	pyaaj	*Alium cepa*	Liliaceae	Herb	Cultivated	Leaves	paste/T	to clear eyes/ears
54	Haku halo	Haledo	*Curcum caesia*	Zingiberaceae	Shrub	Cultivated	Root	paste/polera/O	Sarki khatera, evil eye(bigar pareko), piles, retain placenta, burning urination
55	Aalu	Aalu	*Solanum tuberosum*	Solanaceae	Herb	Cultivated	Fruit	Raw/T	burnt skin, skin care
56	Chamsur	Chamsur	*Lepidium sativum*	Brassicaceae	Herb	Cultivated	whole plant	Cooked/O	back pain, body pain
57	Tusi	Kankro	*Cucumis stivus*	Cucurbitaceae	climber	Cultivated	Fruit/powder	Raw/O	Jaundice, indigestion
58	Gajar	Gajar	*Daucus carotal*	Apiaceace	Herb	Cultivated	Fruit	Raw/O	Jaundice
59	Chatka	Ukhu	*Saccharum officinarum*	Graminae	Grass	Cultivated	Stem	RawO	Jaundice
60	Phaka	Karkala	*Colocasia schott*	Araceae	Herb	Cultivated	stem/leaves/tubers	dried plant with hot water/O	to cure blood dysentry.
61	Malta swa	Khursani phool	*Achania malvaviscus*	Malvaceae	Shrub	wild	flower	nector of flower/T	to cure rashes/blisters on toungue
62	waa	Dhan	*Orizy sativa*	Poaceae	Herb	Cultivated	seeds	Raw/O	Gastritis
63	Bi pasi	Thulo bihi	*Solanum torvum*	Solanaceae	shurb	wild	Seed	Fried/O	Fever, for cooling body
64	Lavyacha	Isabagol	*Plantago erosa wall*	Plantaginaceae	Herb	wild	Leaves	paste/T	Wound healing, anti-hemorrhagics
65	Naswa kulcha	_	*Viola sikkimensis W. Becker*	Violaceae	Herb	Wild	Leaves	Paste/O	Jaundice, to wash face

66	Nishalu ghya	Anikaley jhaar	*Crassocephalum crepidioidae*	Asteraceae	shurb	wild	leaves/ stem	Paste/T	to cure blisters
67	Dyak macha	_	*Taraxacum sp.*	Asteraceae	Herb	wild	Leaves	Paste/T	to cure eye problem, stomach pain, blood dysentry , leg pain
68	Nawa ghya	_	*Clerodendrum Chinense*	Lamiaceace	Shurb	wild	leaves/flower	Paste/T	Blood clotting
69	Macha ghya	Chipley	*Gonostegia hirta*	Urticaceae	Herb	wild	Root/Leaves	paste/T	to heal wound
70	Babucha swa	_	*Ocimum canum*	Lamiaceace	Herb	Cultivated	flower	Juice(Decoction)/O	to cure Acne and respiratory problem
71	Alkai swa	Patthar chatta	*Bryophyllum pinnatum*	Crassulaceae	Herb	Cultivated	Leaves	Raw/1-2 leaves boiling in water/O	to cure kidney stone, urinary disorder, wound, piles

Note: T= Topical and O=Oral

4.3.2 Diseases/Ailments treated

In the present study, Newar community of the study area was found to use 71 species of plants for the treatment of 51 different diseases/ailments like gastrointestinal, integumentary, musculoskeletal, respiratory, reproductive, otorhinolaryngo, dental, hematological, ophthalmological, cardiovascular, genitourinary nervous and others. The list of diseases and plant species used by Newar people in Khokana village, Karyabinayak Municipality, Lalitpur District for curing those diseases are listed below (Table 8).

Table 8: List of diseases and plant species used for the treatment

S.N.	Name of Ailments	Types of Diseases	Medicinal plants used
1	Cold	Respiratory	1. *Dymeria cordata* 2. *Arternisia vulgaris* 3. *Allium hypsistum*
2	Stomach pain	Gastrointestinal	1. *Arternisia vulgaris* 2. *Zingiber officinale* 3. *Jastcia adhatoda* 4. *Chenopodium album* 5. *Litesa cubeca* 6. *Achyranthes aspera* 7. *Allium hypistum* 8. *Magnifia indica*
3	Cough	Respiratory	1. *Ocium tenuiforam* 2. *Trachyspermum ammi* 3. *Phyllanthus emblica* 4. *Acora calamus*
4	Body pain	Musculo-skeleton	1. *Brassica camprestis* 2. *Jastcia adhatoda* 3. *Chenopodium album* 4. *Lepidium sativum* 5. *Taraxacum* sp.
5	Dysentery	Gastrointestinal	1. *Magnifia indica*

	(blood dysentery)		2. *Colocasia schoot* 3. *Psidium guajava* 4. *Taraxacum* sp.
6	Diarrhea	Gastrointestinal	1. *Curcuma anguotifolia* 2. *Cannabis sativa*
7	Cholera	Gastrointestinal	1. *Trachyspermum ammi* 2. *Rosa indica*
8	Jaundice	Gastrointestinal	1. *Ocium tenuifloram* 2. *Centella ociatica* 3. *Nephrolepis cordifolia* 4. *Cucumis sativus* 5. *Daucus carotal* 6. *Saccharum officinarum* 7. *Urtica diocia* 8. *Viola skkimensis*
9	Worms	Gastrointestinal	1. *Raphanus sativus* 2. *Melia azedzrach* 3. *Gaultheria fragrantissima* 4. *Aloe vera*
10	Gastritis	Gastrointestinal	1. *Arternisia vulgaris* 2. *Allium sativum* 3. *Zanthoxylumarmatum* 4. *Piper nigrum* 5. *Nephrolepis cordiolia* 6. *Litesa cubeba* 7. *Orizy sativa*
11	Abdominal distention	Gastrointestinal	1. *Psidium guajava* 2. *Cannabis sativa*
12	Constipation/indigestion	Gastrointestinal	1. *Cannabis sativa* 2. *Nephrolepis cordifolis* 3. *Brassica camprestris*

			4. *Plantago erosa*
13	Fracture	Musculo-skeleton	1. *Urtica dioica* 2. *Gaultheria fragrantissima* 3. *Gnostegia hirta*
14	Rheumatism	Musculo-skeleton	1. *Gaultheria fragrantissima*
15	Sinusitis	Otorhinolaryngological	1. *Tegetes erecta* 2. *Dymeria cordata*
16	Sore throat/ Tonsillitis	Otorhinolaryngological	1. *Acora calamus* 2. *Allium sativum* 3. *Jasminum* sp. 4. *Jastcia adhatoda*
17	Ear ache	Otorhinolaryngological	1. *Brassica camprestis* 2. *Allium cepa*
18	Herpes zoster	Integumentary	1. *Carpum* 2. *Cynodon dactylon*
19	Skin burns	Integumentary	1. *Solanum tuberosum* 2. *Aloe vera*
20	Melasma	Integumentary	1. *Cynodon dactylon*
21	Blisters and allergy	Integumentary	1. *Azadirachata indica* 2. *Nyctanthes arbor-tristris* 3. *Achania malvaviscus* 4. *Crusocephallum crepidioide*
22	Eczema	Integumentary	1. *Areca catechu*
23	Skin rashes	Integumentary	1. *Myristica fragrans* 2. *Choerospondias axillaris* 3. *Jasmimum* sp. 4. *Brassica camprestris*
24	Tonic	Integumentary	1. *Aloe vera* 2. *Asparagus racemosus*

25	Delivery problem	Reproductive	1. *Aternisia vulgaris*
26	Lactation	Reproductive	1. *Trachyyspermum ammi*
27	Menstrual cramps	Reproductive	1. *Trachyspermum ammi* 2. *Dhatura atramonium*
28	Labour pain	Reproductive	1. *Chenopodium album*
29	Retain placenta	Reproductive	1. *Asparagus racemosus* 2. *Curcum caesia*
30	Aphrodisiac	Reproductive	1. *Asparagus racemosus*
31	Blood pressure	Cardiovascular	1. *Ocimum basillicum* 2. *Nyctanthes arbor-tristris*
32	Cuts and wound	Integumentary	1. *Arternisis vulgaris* 2. *Ageratina adenophora* 3. *Cyanogissum zeylanicum* 4. *Choerospondias axillaris* 5. *Cynodon dactylon* 6. *Plantago erosa* 7. *Bryophyllum pinnatum*
33	Headache	Not a disease	1. *Brassica camprestris* 2. *Dymeria cordata*
34	Fever	Not a disease	1. *Ocimum tenuifloram* 2. *Centella aciatica* 3. *Dymeria cordata* 4. *Azadirachata indica* 5. *Solanum torvum*
35	Blood purification	Hematological	1. *Phyllanthus emblica*
36	Increase of body temperature	Not a disease	1. *Zea mays* 2. *Allium sativum*
37	Tooth ache	Dental	1. *Euphorbia pulcherrima* 2. *Ocimum basilicum* 3. *Oxallis corniculata*

38	Bleeding gum	Dental	1. *Psidium guajava*
39	Urinary disorder	Genitourinary	1. *Centella aciatica* 2. *Curcum caesia* 3. *Cirsium verutum* 4. *Bryophyllum pinnatum*
40	Asthma	Respiratory	1. *Centella aciatica*
41	Eyes problems	Ophthalmological	1. *Brassica camprestris* 2. *Urtica dioica* 3. *Oxalis corniculata* 4. *Dymeria cordata* 5. *Alium cepa* 6. *Taraxacum* sp.
42	Piles	Gastrointestinal	1. *Curcum caesia* 2. *Drepanostachyum falcatum* 3. *Ficus religiosa* 4. *Bryophyllum pinnatum*
43	Diabetes	Gastrointestinal	1. *Magnifillia indica* 2. *Nyctanthes arbor-tristris* 3. *Nephrolepis cordifolia* 4. *Urtica dioica*
44	Boils	Integumentary	1. *Ficus religiosa*
45	Sprain	Musculo-skeletal	1. *Alternisia vulgaris* 2. *Brassica camprestris*
46	To join nerves	Nervous	1. *Sapindus corniculata*
47	Blood clotting	Integumentary	1. *Cleodendrum chinense*
48	Acne	Integumentary	1. *Ocimum canum*
49	Stone	Gastrointestinal	1. *Bryophyllum pinnatum*
50	Weakness	Not a disease	1. *Phyllanthus emblica* 2. *Ficus religiosa*

51	Hair fall	Not a disease	*1. Magnifia indica*

The different diseases/ailments were classified on the basis of the affected parts of the body. The results depicted that 23% of the diseases were gastrointestinal, 21% were integumentary 12% were reproductive, 8% were musculoskeletal, 6% were otorhinolaryngological and respiratory, 4% were nervous and dental, 2% were cardiovascular, genitourinary, ophthalmological and hematological, and 8% others (Figure 6). Fever, headache, increase of body temperature, hair fall, weakness and psychic disorder could not be classified in the medical term.

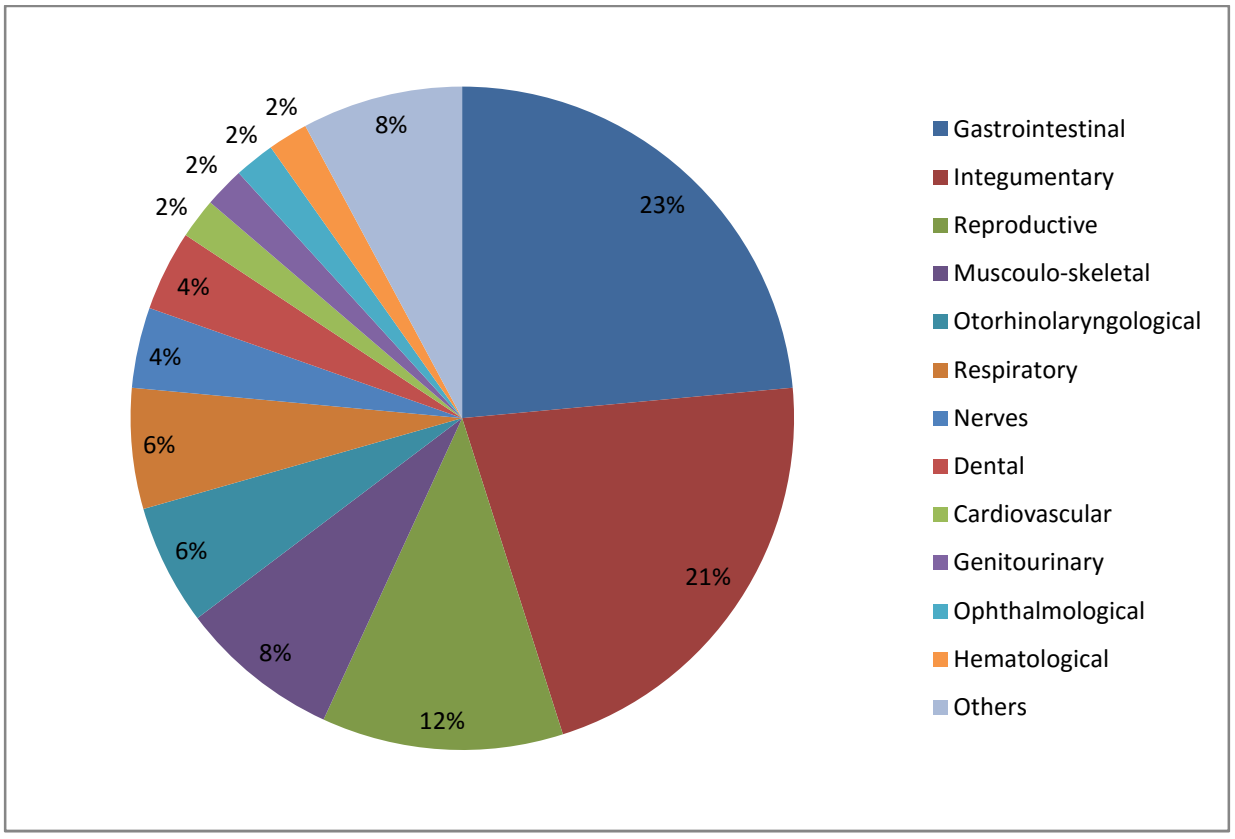


Figure 6: Number of ailments treated by different plant species according to the related system

4.3.3 Plants parts/products used

Whole plant species or their parts and products were used for traditional medicinal practices. The parts of plants like leaves, roots, stem, seeds, fruit, flower, tubers etc. were used. Different parts and products of plant species used in different medicinal recipes were given in following graph (Figure 7).

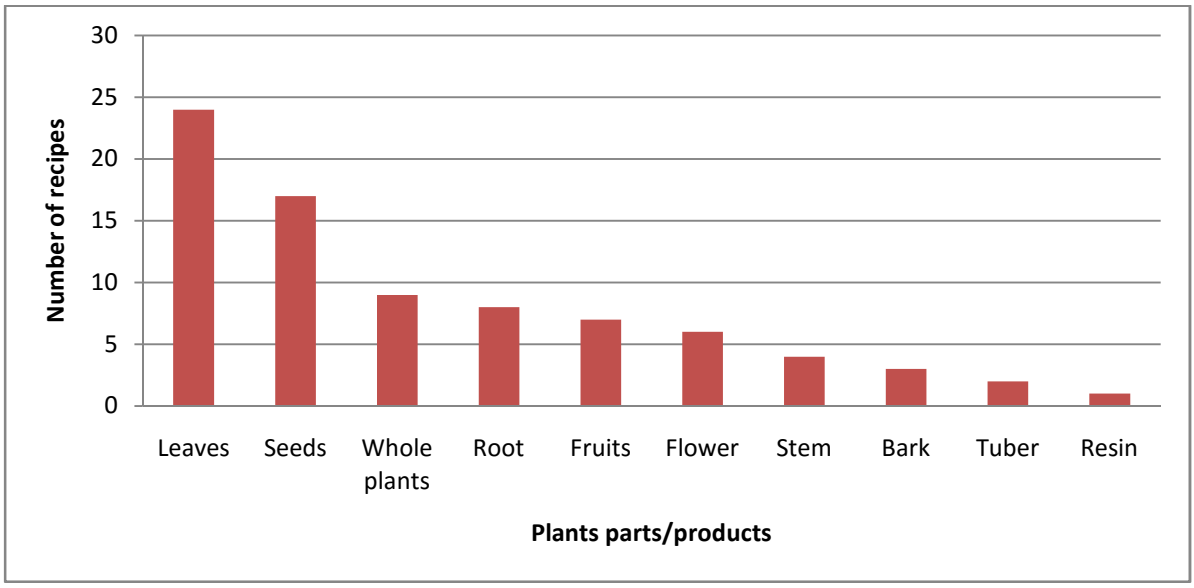


Figure 7: Parts/products of plant species used in different medicinal recipes

4.3.4 Description of plant species used in medication

The plants used in the traditional medicine by Newar community of Khokana village are described on the basis of collected information during field visits. The detailed descriptions are given in alphabetical order of family of the species.

Family: Acanthaleae

1. *Jastcia adhatoda* (Asuro)

Part used: Root

Form of medicine: Juice

Preparation and application: Root of *Jastcia adhatoda* is crushed and boiled in water and extracted juice or decoction is taken orally to cure stomach pain, join pain and Bronchitis.

Family: Anacardiaceae

1. *Magnifia indica* (Aap)

Part used: bark / leaves / cotyledons

Form of medicine: Juice / paste.

Preparation and application:

a) The leaves or bark of *Magnifia indica* after boiling in water is consumed to cure blood dysentery and stomach pain.
b) The cotyledons are mashed to make paste and applied to control hair fall.

2. *Choerosponaias axillaries* (Lapsi)

Part used: seeds

Forms of medicine: barbecued seed

Preparation and application: Barbecued seed of the plant species is applied to cure skin rashes and wound.

Family: Amaranthacea

1. *Achyranthes aspera* L. (Dattiwan)

Part used: Leaves / stem

Form of medicine: Paste / juice

Preparation and application: Stem or leaves of *Achyranthes aspera* is crushed and extracted juice is taken orally to cure stomach pain and blood purification.

Family: Amaryllidacea

1. *Allium hypsistum* (Jimbu)

Part used: whole plant

Form of medicine: Dry plant

Preparation and application: (a) Dry plant is taken orally to cure cough, stomach pain.

b) It is use to cure flues.

Family: Apiaceal

1. *Daucus carotal* (Gajar)

Part used: Fruit

Form of medicine: Raw

Preparation and application: Raw fruit of *Daucus carotal* is taken orally to cure jaundice.

Family: Araceae

1. *Colocasia schott* (Karkala)

Part used: stem / leaves / tuber

Form of medicine: dried plant Preparation and application: Dried plant is boiled with water or taken with hot water to cure blood dysentry.

2. *Acora calamus* (Bojho)

Part used: Rhizome

Form of medicine: Raw / dried

Preparation and application: Raw rhizome of Acora calamus is taken orally to treat respiratory problem, tonsilitis. It is also used as antidote and antilike asphyxia.

Family: Asparagaceae

1. *Asparagus racemosus* (kurilo)

Part used: whole plant

Form of medicine: cooked / powder

Preparation and application:

(a) Powder form of plant is taken orally for aphrodisiac.

(b) Raw plant is taken by cooking to cure diabetes.

(c) It is also used as tonic.

Family: Asteraceae

1. *Crassocephalum crepidioidae* (Anikale jhaar)

Part used: leaves / stem

Form of medicine: paste

Preparation and application: The paste of crushed leaves / steam is applied to cure blisters on the skin.

2. *Taraxacum* sp. (Newari name: Dyak macha)

Part used: leaves

Form of medicine: paste

Preparation and application: The leaves of plant are mashed to make paste which is used to cure eye problem, stomach pain and blood dysentery.

Family: Boraginaceae

1. *Cyanogiossum zeylanicum* (Kanike Kuro)

Part used: whole plant

Form of medicine: paste / juice

Preparation and application: *Cyanogissu zeylanicum* is crushed to make paste or juice which is applied on cuts and wound (it helps in blood clotting).

Family: Brassicaceae

1. *Brassica camprestris* (Tori)

Part used: Seeds

Form of medicine: oil

Preparation and application: oil of the plant`s seed is used to massage during back pain and headache. It is also applied to eyes / tar to clear eyes / ears.

2. *Raphanus sativus* (Mula)

Part used: seeds

Form of medicine: Raw / fried

Preparation and application: Raw or fried seeds of *Raphanus sativus* are taken orally to cure round worm /Ascariasis.

3. *Lepidium sativum* (Chamsur)

Part used: whole plant / fruit

Form of medicine: Cooked

Preparation and application: Fruit of plant is cooked by adding milk and sugar and taken orally to cure body pain or back pain. Green vegetable of young shoot is also taken to cure body pain.

Family: Cannabaceace

1. *Cannabis sativa* (Vang/Ganja)

Part used: Leaves

Form of medicine: Paste

Preparation and application: Plant paste is taken orally to cure diarrhea, abdominal disorder and constipation.

Family: Caryophyllaceae

1. *Dymeria cordata* (Abijwalo)

Part used: whole plant

Form of medicine: juice / paste.

Preparation and application:

a) Whole plant of *Dymeria cordata* is crushed and juice is extracted and about 2- 3 teaspoon is given 3 times a day to cure cough, cold, fever, and headache.
b) The juice inhaled from cloth is used to cure sinusitis. The juice is drop in eye to treat conjunctivitis.

Family: Chenopodiaceae

1. *Chenopodium album* L. (Bethe)

Part used: whole plant (fruit)

Form of medicine: Cooked, juice

Preparation and application:

a) The whole plant is cooked and taken orally to cure stomach pain and body pain.
b) The dry seed of plant is cooked with milk and sugar and is given orally to retention of placenta. The root is crushed and extracted juice is taken orally to get relief from labor pain.

Family: Compositae

1. *Arternisia vulgaris* (Titepati)

Part used: Leaves

Form of medicine: Juice / liquid (fried/cooked)

Preparation and application: The fresh / dry leave of *Arternisia vulgaris* is crushed and the juice extracted from it is taken orally to cure stomach pain gastritis, cold, etc. Additionally the fresh green leaves of plants is smashed and applied to cure cuts and wound. It is also used as anti-leech and to treat sprain and to worm during uterine prolapsed.

2. *Ageratina adenophora* (Banmara)

Part used: leaves

Form of medicine: paste / juice Preparation and application: The green leaves of the plant is smashed and applied to cure cuts and wound.

3. *Cirsium verutum* (Sungure Kada)

Part used: Root

From of medicine: paste / juice

Preparation and application: Root of *Cirsium verafum* is crushed to make paste and is taken to cure urinary trouble.

4. *Brassica camprestris* (Sarsiu)

Part used: Seeds

From of medicine: oil

Preparation and application: The oil extracted from the seed of *Brassica camprestris* (sarsiu) is used to massage during body pain. The seed is also taken orally to cure indigestion.

5. *Tegetes erecta* (Sayapatri)

Part used: flower

From of medicine: boiling in water

Preparation and application: The flower of the *Tegetes erecta* is boiled in water and *Ocimum tenuifloram* and prepared decoction is taken orally to cure Sinusitis (Pinash).

Family: Crassulaceae

1. *Bryophyllum pinnatum* (Patthar chatta)

Part used: leaves

Form of medicine: Raw

Preparation and application: one- two leaves of *Bryophyllum pinnatum* are boiled in water and extracted juice is taken orally to cure kidney stone, urinary disorder. Raw leaves of plant are also applied on wound after smashing.

Family: Cucurbitaceae

1. *Cucumis stivus* (Kankro)

Part used: fruit / powder

Form of medicine: Raw

Preparation and application: The raw fruit of *Cucumis stivus* is taken orally to cure jaundice. Powder form of plants fruit is taken during indigestion.

Family: Ericaceae

1. *Gavltheria fragrantissima* (Dhasingari)

Part used: Leaves

Form of medicine: paste

Preparation and application: Green leaves of plant are crushed to make paste and are taken orally to cure Rheumatism. The paste is also applied in fractured body part and against hookworm.

Family: Euphorbiaceae

1. *Euphorbia pulcherina* (Lalupate)

Part used: Resin

Form of medicine: Chop/liquid

Preparation and application: The resin of *Euphorbia pulcherina* is applied on teeth during teeth ache.

2. *Phyllantus emblica* (Amala)
Part used: fruit
Form of medicine: Raw / dried
Preparation and application: Raw fruit is taken during cough. The powder form of fruit is taken with lukewarm water during weakness and also raw the fruit is taken orally for blood purification.

Family: Graminae
1. *Cynodon dactylon* (Dubo)
Part used: whole plant
Form of medicine: paste / juice
Preparation and application: whole plant of *Cynodon dactylon* is crushed and prepared paste is applied to cure Herpes zoaster (Janae khatira/shingles).

2. *Saccharum officinarum* (Ukhu)
Part used: steam
Form of medicine: Raw
Preparation and application: Raw steam of saccharum officinarum is taken orally to cure jaundice.

3. *Cynodon dactylon* (Setudubo)
Part used: whole plant
Form of medicine: paste
Preparation and application: The paste made from crushing *Cynodon dactylon* is applied to cure Herpes zoaster. It is also used to cure melasma and cuts and wound.

Family: Labiatae
1. *Ocimum tenuifloram* (Tulashi)

Part used: leaves

From of medicine: boiling in water / Raw

Preparation and application: The 4 – 5 leaves of *Ocimum tenuifloram* to make decoction and is taken orally to cure cough and fever. It is also used to cure jaundice. Raw leaves are chewed for curing sure throat.

Family: Lamiaceae

1. *Ocimum basillicum* (Babari)

Part used: Leaves

Form of medicine paste / juice

Preparation and application: leaf juice is taken orally to cure low blood pressure. The paste of crushed babari leaves is applied during teeth ache.

2. *Ocimum canum* (Newari name: Babuchaswa)

Part used: Flower

Form of medicine: boiling with water / paste

Preparation and application: The flower of *Ocimum canum* is boiled with water and is taken orally to cure respiratory problem. The paste of flower is also applied to cure ache.

3. Clerodendrum *chinese* (Newari name: Nawa ghya)

Part used: Leaves / flower

Form of medicine: paste

Preparation and application: leaves or flower of *Clerodendrum Chinese* is crushed and prepared paste was applying on wound/cuts to clot blood.

Family: Lauraceae

1. *Cinnamomum tamola* (Tejpat)

Part used: Leaves

Form of medicine: Raw / powder

Preparation and application: Raw leaves of the plant are taken orally to treat sore throat powder form of plant is used for spice and flavoring.

2. *Litesa cubera* (Siltimur)

Part used: Seeds / bark

Form of medicine: boiling in water / decoction

Preparation and application: The seed or bark of *Litesa cubera* is boiled and decoction is taken orally to cure stomach pain, gastritis. The powder form of seed is also used for spice and flavoring.

Family: Liliaceae

1. *Aloe vera* (Ghiu kumari)

Part used: Leaves

Form of medicine: Gel

Preparation and application: The leaves gel of *Aloe vera* is applied in burned areas, and for skin care. The leaves of the plant are taken orally to cure intestinal worms.

2. *Alium cepa* (Pyaaj)

Part used: leaves

Form of medicine: paste

Preparation and application: The paste of leaves is applied on eyes or ears to clear it.

3. *Allium sativum* (Lasun)

Part used: Fruit

Form of medicine: Raw / fried

Preparation and application: The raw or fruit of *Allium sativum* is taken orally with lukewarm water to warm body and to treat gastritis and tonsillitis.

Family: Malvaceae

1. *Achania malvaviscus* (Khursani Phool)

Part used: Flower

Form of medicine: Nector of flower

Preparation and application: Nector of flower of *Achania malvaviscus* is used to cure rashes or blister on tongue.

Family: Meliaceace

1. *Azadirachata indica* (Neem)

Part used: bark / leaves

Form of medicine: boiling in water

Preparation and application: About 7 – 10 leaves are boiled in a one glass of water and half a glass of decoction is taken orally to cure respiratory problem, malaria. It is also used to cure blister and allergy.

2. *Melia azedarach* (Bagena)

Part used: seeds

Form of medicine: Soaking seeds

Preparation and application: The seed of *Melia azedarach* is soaked in water and is taken orally to treat round worm or Ascaris.

Family: Moraceae

1. *Ficus religiosa* (Peepal)

Part used: leaves / seeds (fruit)

Form of medicine: paste / juice

Preparation and application: The leave of *Ficus religiosa* is crushed and the prepared paste is used to cure boils / Piles. Ripe seeds or fruit of plant is taken to cure piles.

Family: Myristicaceae

1. *Myristica Fragrans* (Jaifal)

Part used: seeds

Form of medicine: paste (decoction)

Preparation and application: The seed of *Myristica fragrans* is rubbed with little amount of water and prepared paste is applied on skin rashes. Decoction of seed is also taken orally to prevent from cold.

Family: Myrtaceae

1. *Psidium guajava* (Amba)

Part used: Fruit / leaves

Form of medicine: Raw / paste / decoction

Preparation and application: Raw unripe fruit of *Psidium guajava* is taken orally to cure blood dysentery and abdominal pain. The leaves of plant are crushed and paste is applied to cure bleeding gum.

Family: Nephrolepidaceae

1. *Nephrolepis cordifolia* (Puni Amala)

Part used: Tubers

Form of medicine: Raw

Preparation and application: Raw tuber of *Nephrolepis cordifolia* is taken orally to treat gastritis, jaundice, sugar, indigestion and liver related ailments.

Family: Oleaceae

1. *Jasminum* sp. (Jai)

Part used: Leaves

Form of medicine: dipping in water / juice

Preparation and application: 5 – 6 leaves of *Jasminum spp* are dipped in water and extracted juice is taken orally to treat sore throat and rashes.

2. *Nyctanthes arbor- tristris* (Parijat)

Part used: flower / dry

Form of medicine: Cooked / Raw

Preparation and application: Cooked, raw or dry flower of plant is taken orally to cure sugar, pressure and blister and wound.

Family: Oxalidaceae

1. *Oxalis corniculata* (Chariamilo)

Part used: whole plant / leaves

Form of medicine: Raw / paste / Juice

Preparation and application: Juice extracted from the leaves of plant is used to cure eye pain. Raw plant is crushed and prepared paste is applied to treat teeth corrosion.

Family: Palmae

1. *Areca catechu* (Supari)

Part used: seed

Form of medicine: Raw

Preparation and application: Raw seed of Areca Catechu is rubbed with little amount of water and extracted product is applied to cure eczema.

Family: Piperaceae

1. *Piper nigrum* (Marich)

Part used: seeds

Form of medicine: decoction / powder

Preparation and application: The decoction prepared from the seed of *Piper nigrum* is taken orally to cure stomach pain; powder form of seed is taken with like warm water to cure gastritis.

Family: Plantaginaceae

1. *Plantago erosa wall* (Isabagol)

Part used: Leaves

Form of medicine: paste

Preparation and application: The leave of plant is crushed and extracted paste is applied as wound healing and anti – hemorrhages.

Family: Poaceae

1. *Drepanostachyum falcatum* (Nigalo)

Part used: Root

Form of medicine: Juice

Preparation and application: Juice prepared from crushed the root of *Drepunostachyum falcatum* is taken orally to cure piles.

2. *Zea mays* (Makai)

Part used: seed

From of medicine: Raw / fried

Preparation and application: Raw or fried seed of *Zea mays* are taken orally to make body warm.

3. *Orizy sativa* (Dhan)

Part used: Seeds

Form of medicine: Raw

Preparation and application: 4 - 5 raw seeds of *Orizy sativa* is used to cure Gastritis.

Family: Rosaceae

1. *Rosa indica* (Gulab)

Part used: Flower

Form of medicine: Raw

Preparation and application: Flower of *Rosa indica* is crushed and juice extracted from it is taken orally to treat cholera. Smashed petals from the flower of *Rosa indica* is also used to heal wound.

Family: Rutaceae

1. *Zanthoxylum armatum* (Timur)

Part used: Seed

Form of medicine: boiling in water

Preparation and application: 5 – 6 seeds of *Zanthoxylum armatum* are boiled in water and is taken orally to cure gastritis or seed can be chewed with lukewarm water at morning to cure gastritis. The seed can be chewed to get relief from toothache.

Family: Sapindaceae

1. *Sapindus detergens* (Rittha)

Part used: seed

Form of medicine: paste

Preparation and application: The paste prepared from the seed of *Sapindus detergens* is used to join nerves.

Family: Solanaceae

1. *Dhatura stramonium* (Dhatura)

Part used: Leaves / seed

Form of medicine: paste / juice

Preparation and application: 2 – 3 small seed is taken orally with banana to cure swollen body and rabies. Juice extracted from the leaves is taken to balance menstrual disorder. Seed of Dhatura is used to cure cough in cattle.

2. *Solanum tubersum* (Aalu)

Part used: Tuber

Form of medicine: Raw

Preparation and application: Fresh tuber of plant is applied on skin to treat burnt skin.

3. *Solanum torvum* (Thulo Bihi)

Part used: seed

Form of medicine: fried

Preparation and application: Fried seed of *Solanum torvum* is taken orally as pickle to treat fever and for cooling body.

4. *Capsicum microcarpum* (Khursani)

Part used: seed

Form of medicine: Paste

Preparation and application: The paste prepared from the seed / fruit of *Capsicum microcarpum* is applied on skin to cure Herpes zoaster.

Family: Umbilliferae

1. *Centella asiatica* (Ghodtapre)

Part used: whole plant

From of medicine: paste / juice

Preparation and application: Whole plant of *Centella asiatica* is crushed and extracted juice is taken orally to treat jaundice, fever, asthma, urine infection and uric acid.

2. *Trachyspermum ammi* (Jwano)

Part used: seed

Form of medicine: Fried

Preparation and application: Fried seed of *Trachyspermum ammi* is taken with lukewarm water to cure cough, cholera, menstrual cramps. The seed of jwano is boiled with water and is taken orally as lactation enhancer during pregnancy.

Family: Urticaceae

1. *Gonostegla hirta* (Chipley Ghaans)

Part used: Root / leaves

Form of medicine: paste

Preparation and application: The leaves or root of *Gonostegia hirta* is crushed and paste prepared is applied to heal wound.

2. *Urtica dioica* (Sisnu)

Part used: Leaves

Form of medicine: boiling in water

Preparation and application: The leaves of the *Urtica dioica* is boiled with water with *Zanthorylum armatum* to cure sugar, jaundice and also useful for eyes. The paste prepared from the *Urtica dioica* leaves is applied on fractured body part.

Family: Violaceae

1. *Viola sikkimensis* (Newari name: Naswa Kuccha)

Part used: Leaves

Form of medicine: paste

Preparation and application: Leaves of *Viola sikkimensis* is crushed and prepared paste is used to cure jaundice. It is also used to wash face.

Family: Zingiberaceae

1. *Curcum caesias* (Haledo)

Part used: Root

Form of medicine: Paste/polera

Preparation and application: Paste prepared from root is used to cure Sarki Khatira. Raw root is taken with lukewarm water to treat abdominal distension, piles, retain placenta and burning urination.

2. *Lurcuma anguotifolia* (Besar)

Part used: Root

Form of medicine: (sugar + besar) paste

Preparation and application: The root of besar is crushed and mixed with sugar and is taken orally to cure diarrhea.

3. *Zingiber officinale* (Aduwa)

Part used: Root

Form of medicine: boiling in water / decoction

Preparation and application: The root of *Zingiber officinale* is boiled in water and prepared decoction is taken orally during stomach pain.

4.4 Indigenous Technology

Newar people of Khokana had a lot of indigenous technologies and knowledge systems to meet their daily requirements. Indigenous technical knowledge refers to the act of using natural resources and is passed from one generation to another. It is farmer friendly, socially accepted, economic, environmental friendly and suited to the specific local and environmental conditions. Some of the indigenous technologies practiced by local people in khokana village were listed below:

4.4.1 Traditional mustard seed oil industry

Mustard oil is cooking oil for daily use not just in Nepal, but also in northern India, Bangladesh although some American chefs have begun experimenting with the oil. It is not only used for cooking but also for massaging small children as well as adult during body pain, applied to the skin and scalp to prevent dryness and for religious ceremonies. It thus may be called a product that is intimately connected to life.

Khokana is a unique village well known as producer of mustard oil. It is designated by the title 'Khokana the vernacular village and its mustard oil seed industrial heritage' on the world heritage site tentative list. The mustard oil seed industry has become the living heritage of the village. Visitors can smell the lovely aroma of roasted mustard through the narrow streets of Khokana.

4.4.1.1 History

The village of khokana established its policy of intensifying mustard oil manufacturing as its main industry during the agricultural off seasons, where there is less farm work to do, approximately 100 years age. At first four communities' oil mills were built by the equal share of each family of the four mills and mustard oil manufacturing was started. The exact time period in which these mills were established is unclear. The four oil mills of khokana were Gabu mill (Gwak Jyas oil mill), NHU mill (Sikali multipurpose co- operative oil mill), Kutu mill (closed) and Nhyabu mill (collapsed). According to interview survey, Gabu mill is the oldest with Kutu and Nhyaba mills being constructed later and NHU mill is the newest among them.

Each family of the Khokana village used the leaf mustard seed produced on farmland as a raw material. However with the improved efficiency of pressing work, production quality increased and raw materials produced on the farmland around the valley were no longer sufficient for its residents needs. As a result they began to collect leaf mustard seeds from the entire Kathmandu valley. They also used to collect mustard seeds in return of the oil when they used to sell oil door to door to far away village. Khokana intensified and increased the efficiency of mustard oil production through mills, it becomes widely known as producing area for mustard oil.

4.4.1.2 Process of mustard oil production

For the production of mustard oil following steps were used

a) Grinding and Frying

The seed of the mustard (raw material) was first roughly grinded and carried to a giant oven (called bhutu) for frying. The seed of mustard were fried with the heat of coal. Inside the oven, workmen continue carefully mixing the seed and continue to heat them until their unique and aromatic sent emerges. The unique aroma that fills the mill and surrounding area was due to the heating of the mustard seed.

b) Squeezing

The heated seeds were stuffed into a flat and tightly woven basket, gripped between two large wooden beams about 40 cm in length and squeezed. Of the two beams, the end of one was fixed in place before hand and the end of the other was held by a vice- like device with a large handle about the length of a person's spine. After depositing the seeds into the waven basket and inserting those between the beams a workman use all of his weight / power to turn the large handle and thereby squeeze the seeds.

c) Collecting

The bottom of traditional squeezer was formed in a dug state, so that the brown- colored mustard oil that dozes out of the woven basket collect in a container of this dug state part of the basket. The top of the woven basket opens widely and the bottom was a sharp- edged pentagon with one parts designed to gather oil effectively. The squeezing method is

traditional and is still employed despite the fact that it requires much work because it greatly improves the quality of the oil.

After first squeezing process, the pomace (pina) was like hardened cake inside the woven basket, but it is then finely crumbled a second time and deposited into next squeezed, which was mechanical. The oil squeezed from a mechanical squeezer was strong colored and somewhat poor in quality. Thus oil produce from khokana is 80% with old indigenous machine and 20% with modern machine.

4.4.1.3 Present status and possibilities

These mills were closed up to 15-20 years due to pure market value and lack of raw materials. Locals of the khokana stop producing mustard seed for 5 years. The local were discouraged to grow mustard seeds in the lack of manpower and irrigation facilities. At present out of four oil mills in Khokana two are restored. In 1990, through the support from UNESCO's Kathmandu office; two mills were restored and restarted their operations. They are: Gabu mill and NHU mill.

These mills now gathered raw material throughout the Kathmandu valley, terai (mostly Chitwan and Bardia) and India. In the recent years, the mill has been importing the mustard seed from Europe, Australia etc. They need 10,000 kg mustard seeds every month for its full operation producing 150- 200 liter oil daily. The oil produced from the mill is natural, pure and qualitable which can be also use as medicinal purpose. And the pomace also used as food (Chicken), compost (for rice field), washing hair etc.

The traditional industries that support development of Khokana, through means such as understanding of mustard oil production using buildings and experiencing traditional squeezing, may be useful for understanding tradition industries among visitors and residents.

4.4.2 Traditional alcohol making process

The liquor (alcohol) has long been incorporated into ceremonies and celebrations throughout the Nepal, so as in Newar community. The people of different ethnic group had specific alcohol making knowledge / practices. The best and strongest alcohol are often home made. Most of Newar people prefer locally available grains like rice and wheat to prepare homemade alcohol like Chhyang and Aila.

Aila is akin to tequita, one more Nepali spirit traditionally served in decorative pitches in Newar communities. For Newars, aila is indispensible during festivals are various religious rituals as libation, Prasad or Sagun (auspicious).

The process of making traditional Newari alcohol Aila is described below. Aila is usually prepared by Newari women before any festivals or socio – cultural events.

a) Fermentation

Alcohol fermentation is the anaerobic pathway carried out by yeast in which simple sugars are converted to ethanol and carbon-dioxide. In the traditional alcohol preparation also fermentation process was included. The mixture of rice, yeast (marcha, manapu) and mana (dried paddy) were fermented at least 15-16 days. The mixture must be stir daily. Millet was used instead of rice for an even stronger flavor.

b) Evaporation

This process was done by using traditional Evaporation and distillation. Clay and brass vessel designed especially for this purpose. The raw fermented mixture was then poured on the brass vessel called as Fosi having a small mouth and wide bottom and was cooked over a wood fire stove (Agena). Then another utensil a large clay jar just like gyampo called Hansil was kept over Fosi and made air tight. Now small clay jar called dubuli was kept inside the Hansil for the collection of alcohol. At the mouth of Hansil circular copper / brass basin was placed with full of cold water and made air tight with pieces of clothes. The water must be change 6-7 times after it gets warm for dilution of alcohol. Temperature of flame and cooling water were the two factors controlling the quality of this beverage during distillation.

The alcohol called aila was collected on dubuli (small clay jar) which was then pours to the container for further use. There are utensil such as anti (a brass vessel with a long narrow snout) and salincha (small clay bowl) that are especially designed to hold alcohol. This alcohol is useful to treat / cure common cold, gastric, weakness and to kill bacteria.

4.4.3 Handicraft

In Nepal the production of conventional handicraft is an age – old occupation. Handicrafts are distinctive feature of a specific culture or community through local craft skills and material. In the last 30 years export of handicraft from Nepal has been the most consistent and always growing. Thus, the developments of handicraft help in conservation of national heritage as well as create a job opportunities to the local people. The major handicraft found in the study are handmade carpet and stone / wood carving.

4.4.3.1 Handmade carpet

Nepal hand Knotted woolen carpet is one of the major export products, backbone of Nepalese economy. The art of carpet weaving is an old tradition in the Himalayan kingdom of Nepal. Women worker were found weaving handmade carpet at khokana village. It was the highest industrial employment generator particularly to the rural people who are deprived of education. They used Tibetan sheep wool as the raw materials for carpets. According to interview survey at Simran carpet on Khakana with three women employs 40- individuals were working there around the age of (30 – 35). The materials used to Knot carpet includes tan dago, wool(uon), wood (ne kath), kepasi (iron 9 rod), thaosa (hamber), chhuri (knife), kainchi(Seissors), panja(hand gloves), khopin Kath (wood), comb beaters Hull (to pull the wool downward), Kokath (to cover initial wool), phyak (to lift upward), khajola (for initial and end part).

The production process of Nepalese, Tibital carpet includes wool sorting and washing, carding, spinning dyeing, knotting, trimming, washing and drying, finishing and packing. The workers known as weavers were well trained and skilled in their art and have a very high versatility in knotting. One or more weavers work on a loom depending on the size of the carpet. Each weaver makes individual knots row. The designs were chartered out on a graph and the weaver translated the graphic designs into knots on a carpet. Most of the carpet industries on Khokana were established around 10 years ago.

4.4.3.2 Wood / stone carving

Lalitpur including Khokana is called as place of Arts. Most of the people in Khokana found making of metallic and stone carving statue. A substantial portion of population rather than agriculture is engaged in trades in handcraft. Some of the handicraft center like Khokana Hastakala center (metal craft) and Khokana stone carving (root craft, stone carving wood carving) are located in Khokana village.

4.5 Indigenous knowledge systems

Newar people have their own specific indigenous knowledge suitable to their environment. It has been described under different heading given below:

4.5.1 Agricultural practices

Most of the people living in Khokana are agro- pastoralist. They have sufficient land for farming. They mostly cultivate paddy, potato, maize, mustard, radish and other seasonal vegetation. Garlic farming is forbidden within the village due to religious value and believes. Though their main occupation is subsistence agriculture, there is no irrigation facility. Nowadays youngsters were not involved in agricultural practices.

4.5.2 Pest management in field

Newar people of khokana village used many traditional ways for the management of pest in field. They use organic pesticides and insecticides for pest control.

a) They prepare a mixture of cow's urine, *Arternisia vulgaris* (titepati), leaves of *Melia azedarach* (Bagena), *Jastcia adhatoda* and leaves of *Zanthoxylum armatum* and store for 4 weeks. After four weeks when manure was prepared and then one and half of manure is mixed with two liters of water and sprayed on tomato to control aphid and paddy field to control yellow colour on paddy leaves and other insect and pest.
b) They prepared special type of compost manure at home by mixing paddy's husk 1 kg mustard's pomace, 4 kg clay and some water to mix them. Then it was covered with the jute sack for 3 – 4 weeks. After 3 -4 weeks the manure was ready to use in paddy, maize and other vegetable field.
c) They also spray water, wood ash, dried leaves of titepati to control insect and paste.

4.5.3 Storage of grains

a) For seeds

The seeds are stored properly to protect liable seed. For the plants like maize, 5/6 cobs were selected and tied up together and kept to dry. The cobs were peeled off and seeds were used to sow whenever needed.

b) For food crops

The food crops are harvested, dried up in the sun and the plant were either beaten in stone to take out the grains or it was done with the help of machine and was winnowed using air blown. If needed again dried up in the sun. After that, food grains were kept in air tight sacks and stored for future use.

4.5.4 Livestock and poultry farming

Goat and duck are the major animals reared by Newar people of the Khokana village for meat as well as religious purpose. Some of them also reared sheep and few of them had buffalo and cow for milk purpose. The village is not allowed to raise chickens because of the main temple. It is believed that Goddess does not tolerate chickens or even eggs and those are forbidden in the temple.

4.5.5 Arts, Crafts and Technology

Newar people had unique knowledge of arts and crafts. So, the Khokana village is also called the ancient village of arts and crafts. Most of the male in the study area involve in the artistic display of wood carving, metallic carving and stone carving women are weaving hay mats (Sukul) using materials from locally available resources. Women are also involved in knotting handmade carpet.

5. DISCUSSION

5.1 Ethnographry of Newar People

Quite a lot of research about ethnography of different ethnic group had carried out throughout the world. This is the first ethnographic survey carried out on the Newar people residing in the Khokana village of Lalitpur district, Nepal.

This study reported living style of Newar people and their relationship with environmental resources. Newars are a mix of the highland Nepalese i.e the Khas Indo-Iranian and Sino-Tibetid people. Ninety seven percent residents are Newari who engage in agriculture are called 'Jyapu'. There are many whose family name is Dangol or Maharjan. Newar people (Jyapu) of study area also speak their own dialects of Nepal Bhasa and few of them also speak Nepali language too. The customs (dresses and ornaments) of Newar people is unique and different from other ethnic groups as per their tradition and culture. Older Newar people prefer to wear traditional clothes but nowadays most of the new generation wore modern dresses. In the study area also almost all the people ranging from 15-60 years age group are educated except few older people. In Khokana mostly people were engaged in agriculture from ancient time. During the month of August, October and November, Khokana is at its best with the festive season in the air. People living there celebrate festivals like Sikali Jatra, Kartik jatra, Gaijatra, Khayasanbhu, Bhimsen puja, Paha-charhey, Sithi nakha which were different from other ethnic group. They share different rites and rituals separately for different life cycle processes as birth, marriage and death. These types of finding also carried by (Paudel 2015) Raji ethnic group, (Ghimire 2016) Munda ethnic group, (Shrestha 2018) Doney ethnic group, (Tamang 2009) Lapcha ethic group for their respective ethnic groups.

5.2 Medical ethnozoological survey of Newar people

The different species of plants and animals reported with their traditional medicinal treatment in present research work were also supported by the finding of other researchers. The results showed that 16 types of diseases are treated by using 14 animal species belonging to 10 orders and 11 families. Among 14 species found in study area three species were used to treat eyes problem, two species were used to treat bone fractured, asthma, blood dysentery, delivery problem, fever and also to get energy and one species is used to cure rheumatism, Jaundice, blood clotting, body pain, skin care, body swollen, cold, menstrual disorders and

for cooling body. Different animal parts as well as products such as meat, egg, alcohol, milk, bile, urine, net, testis and ligament were used to treat above diseases/ ailments.

The present study had reported the use of meat or fermented liquid "Raksi" of *Canis aureus* in the treatment of rheumatism which is supported by the finding of (Shrestha 2018) as same is used by Doney ethnic group, (Ghimire 2016) by Munda ethnic group, (Paudel 2015) by Raji ethnic group. Whereas Benarji et al. (2010), Dhimal (2015) clearly reported the used of *Canis aureus* for the treatment of rheumatism and arthritis. Chalise (2010) reported the wine and meat of *Canis aureus* used for the treatment of asthma, against gout, joint pain, acidity and gyne- problem.

The present study found the meat of *Columba livia* was used in the treatment of cold, to get energy and during menstrual disorder which is supported by the finding of (Paudel 2015) who reported cooked meat of *Columbia livia* was used to treat arthritis and cold by Raji ethnic group and in (Ghimire 2016) Munda ethnic group used fecal matter of *Columba livia* to treat boils, blister and Carbuncles. In this study whole organism of *Anadenus* sp. had used in the body swollen, back pain and bone fracture. Similar uses had observed by (Tamang 2009) that Lapcha ethnic used saliva or whole organism of slug during bone fracture, to cure ringworm and cut and wound. Shrestha (2018) recorded that the whole body of slug for the treatment of fractured body part by Doney ethnic group. Ghimire (2016) recorded saliva or paste prepared from rubbing whole body of organism with milk to cure piles and (Lohani 2011) found that the used of raw slug for the treatment of tuberculosis and fracture by Magar ethnic group in central Nepal. This study recorded that grilled skin of *Bubalus bubalus* was used to cure blood dysentery similarly (Ghimire 2016) recorded dried dung of Bubalus bubalus was used to cure measles and scabies by munda ethnic group.

In the present study revealed, the used of ligament and grilled skin of *Bubalus bubalus* to join fractured bone and to cure blood dysentery respectively, web of *Araneae sps* was used for blood clotting on cuts and wound and mud used by *Termite* sp. to build home was used to cure eye infection.. To the extent of so far reviewed literature this finding has not been reported by preceding researches. Thus, the finding seems new addition in the ethnozoological field.

5.3 Medical ethnobotanical survey of Newar people

For the medico-ethnobotany the present study recorded 71 medicinal plants used to treat 51 types of diseases belonging to 43 families. Among 71 medicinal plant species found in study area eight plant species were used to cure stomach pain and jaundice, seven species were used to treat gastritis and cuts and wound, six species were used to treat eye problem, five species were used to cure body pain and fever, four species were used to treat cough, dysentery, worms, constipation, sore throat, blisters and allergy, skin rashes, urinary disaorder, piles, diabetes, three species were used to treat fracture and tooth ache, two species are used to treat dirrhoa, cholera, cold, abdominal distention, sinusitis, ear ache, herpes zoaster, skin burns, tonic, menstrual cramps, retain placenta, blood pressure, headache, weakness, sp[rain and to increase body temperature and finally one species was used to cure rheumatism, melasma, eczema, delivery problem, labour pain aphrodisiac, blood purification, bleeding gum, asthma, boils, hairfall, blood clotting, acne, stone and to join nerves.

The different species of plants reported wirh their medicinal uses by Newar ethnic group of the study are also supported by the various findings of other researchers.

The present study had reported the use of root of *Justice adhatoda* (Asuro) for the treatment of stomach ache, joint pain and bronchitis. This had been supported by the finding of (Paudel and Singh 2016) where they listed the use of root of *Justice adhatoda* for curing piles by Raji ethnic group. Whereas poudyal and Singh (2014) reported the use of root of *Justice adhatoda* for the treatment of blood purification by migratory tangbetons and further supported by Shrestha (2018) where they listed that Doney ethnic group used leaves of *Justice adhatoda* for treatment of sinusitis and fever.

Tamang (2009) reported the use of leaf of *Arternisia vulgaris* for the treatment of nose bleeding and scabbies by Lapcha ethnic group which is supported by (Paudel and Singh 2016) as the raw leaf of same plants for curing scabies, cut/wound and nose bleeding by Raji ethnic group. Dhami (2010) recorded the use of *Arternisia vulgaris* for the treatment of anorexia (inappetite), antihelmintic and diarrhea by Pahari ethnic group. While in contrast to this, current study had reported the uses of it's for the treatment of stomach pain, gastritis, antileech, cuts and wound, to treat worm during uterine prolapse, sprain and cold.

The current study had reported the use of *Cynodon dactylon* for the treatment of Herpes Zoaster while (Ghimire 2016) reported its use for the treatment of fever and pneumonia.

Ghimire (2016) reported that the use of *Psidium guajava* leaves for the reatment of diarrhea, dysentery; head ache and vomiting by Munda ethnic group, where as (Thapa 2012) found that it had been used for curing cough and constipation by Raji ethnic group. In constrast to this, magar ethnic group used leaves of *Psidium guajava* for the treatment of blood pressure (Thapa 2012) and in this study fruits and leaves of this plant was used for the treatment of abdominal pain, blood dysentery and bleeding gum.

Singh (2017) reported the use of *Melic azedarach* for the treatment of boils and blisters where as this study found the seed of *Melic azedarach* was used for the treatment of round worm. Balami (2004) reported the use of root juice of *Cirsium verutum* fir the treatment of urinary trouble by Newar ethnic group. Similar to this, current study also recorded this plants root is used to treat urinary trouble.

The results showed that some of the plants were blended with other plants and animals but majoritiesof animals and plants were used alone without blend. According to present study, the use of resin of *Ephorbia pulcharima* to cure teeth ache, the fruit paste of *Capsicum microcarpum* in Herpes Zoaster, nector of *Achania malvaviscus* to treat rashes/blisters on tongue, *Plantago erosa wall* to heal wound and as anti hemorrhages, *Solanum torvum* to treat fever and cooling body and *Clerodendrum Chinese* to treat blood clotting. To the extent so far reviewed literature this finding has not been reported by proceeding researchers. Thus, the findings seem new addition in this field.

5.4 Indigenous technology and knowledge system of Newar people

Luu et al. (2014) studied on traditional alcohol production and use in three provinces in Vietnam: an ethnographic exploration of health benefits and risks and found that older people favoured traditional alcohol. Similarly in this study newar elder people still preferred and practiced traditional alcohol making practice during special festivals and culture. Bhattarai and Das (2013) carried research on Scientific Study on Indigenous Technology of Dahi Making of Eastern Nepal and found that the preparation method is unique with steps like saans Marne, naato banne and uses special close necked wooden vessel carved out of wood called theki for fermentation.

There were various types of indigenous knowledge systems found in the Newar community such as, knowledge on pest management, agricultural skills etc. Raji ethnic group used wood ash, cow's urine and neem juice to control a kind of aphid (Lahi) in vegetables (Paudel 2015). similary this study found that Newar ethnic group used a mixture of cow's urine, *Arternisia vulgaris* (Titepati), leaves of *Melia azedarach* (Bagena), *Jastcia adhatoda* and leaves of *Zanthoxylum armatum* on tomato to control aphid and paddy field to control yellow colour on paddy leaves and other insect and pest.

This study found that generally male population in the study area were involved in the artistic display of wood carving, metallic carving and stone carving women were weaving hay mats (Sukul) and knotting handmate carpet using materials from locally available resources. Similarly, Ghimire (2016) reported that in munda community females were excellent in basket work and weaving and males were found making bamboo baskets (Doko) and Dhakki from the bamboo.

6. CONCLUSION AND RECOMENDATIONS

6.1 Conclusions

Newars ethnic group of Khokana village were seems to be mix of the highland Nepalese i.e the Khas Indo-Iranian and Sino-Tibetid people as they have narrow eyes, broad and flat nose, medium height with light to dark skin complexion. They had their own Language called Nepal Bhasa and celebrate their own different cultures and festivals and only few the festivals were resembeled with other ethnic group like manghe sankranti and tihar. Newar people in Khokana village showed high literacy rate and some of them are working in high post of governmental and non governmental agencies but their ancient occupation is agriculture.

Newar people have good skill of utilization of plants and animals for a medicinal purpose. The local healers (Baidhya) and older knowledgeable peoples were the most popular ones in the villages for utilizing the plants and animal species for medicine. The elderly man and women also had knowledge on traditional medicine by their experiences and practices. Mammals and aves were mostly used for the preparation of ethnomedicine in study area than other. Maximum animal species were used to treat musculoskeletaon disease followed by reproductive, integumentary and ophthalmological and meat of the animal species was mostly used for preparing ethnomedicine.

Likewise in case of medico-ethnobotany herbs were generally used plants for the treatment of diseases followed by shrubs, tree, climber, grass and fern. Maximum plant species in the study area were used to treat gastrointestinal diseases followed by integumentary, reproductive, musculoskeleton and leaves of the plants was mostly used for preparing ethnomedicine in the study area.

Large amount of the people of this community were engaged in agriculture. Newar people of the study area had a lot of traditional knowledge systems and techniques to meet their needs. They used their traditional techniques to produce mustard seed oil, which is famous in the study area and designated by the title ‘Khokana the vernacular village and its mustard oil seed industrial heritage’ on the world heritage site tentative list. Others traditional techniques found in study area were traditional alcohol making practices, handmade carpet, stone and metal carving. The indigenous knowledge was used in various aspects like farming, art, craft

and technology, medicinal skills, weaving and knitting etc. Indigenous technology and knowledge helps in technological process of developing countries by the used of local knowledge skills and resources.

Due to the availability of modern medicine and establishment of health posts and hospitals such traditional indigenous use of medicinal plants and animals is decline day by day. However, some old age people and women practice this method of treatment in these days too because of the convenient. The common ailments like diarrhea, gastritis, boils, cut wounds, menstrual disorder; Fracture etc. are cure through traditional medicine therapy.

6.2 Recommendations

Major recommendations of the study are presented as follows :

i) Motivations and Training

The local healers should be motivated for documentation of their knowledge to the youngsters for the benefit of their community and mankind at large. They must be encouraged to give training to youngsters about the ethnomedicine and traditional treatments.

ii) Discouraging hunting and killing

The random killing of wild animals should be discouraged. The adults, males and disabled should be selected for hunting purpose in necessity instead of females and juveniles.

iii) Formation of protection committee

Committee should be formed in the area for the sustainable use of medicinal animals and plants. Exploitation of medicinal plants and animals should be strictly barred.

iv) Education and awareness programmes

Awareness programmes on the importance of traditional medicines should be conducted so that the local people become aware about the conservation of animals and plants for sustainable use.

iv) Documentation

It would be better to document and keep record of medical ethnobiology and their indigenous technology and knowledge system and present it to the young generation for future use.

v) Encouraging practicing local technology

Indigenous technology and knowledge helps in technological process of developing countries by the used of local knowledge skills and resources. So, local people must be encouraged to involve in indigenous technology as much as possible.

7. REFERENCES

Aryal, S.P. 2009. Ethnobotany of Tharu: a case study of Jayanagar VDC of Kapilvastu district. M. Rd. Thesis, Central Department of Rural Development, Tribhuvan University, Kathmandu, Nepal.

Atlaf M., Javid, A., Umair, M, Iqbal, K.J., Rasheed, Z. and Abbasi, A.M. 2017. Ethnomedicinal and cultural practices of mammals and birds in the vicinity of river Chenab, Punjab – Pakistan. Journal of ethnobiology and ethnomedicinal, **13**(1): 41.

Atlaf, M., Umair, M., abbasi, A.R., Muhammad, N. and Abbasi, A.M. 2018. Ethnomedicinal applications of animal species by the local communities of Punjab, Pakistan. Journal of ethnobiology and ethnomedicinal, **14** (1): 55p.

Bagde ,N. and Jain, S. 2017. Traditional and ethnozoological practices by tribes and rurals of chhindwara district of Madhya Pradesh ,India.

Balami, N. 2004. Ethnomedicinal uses of plants among the Newar community of Pharping village of Kathmandu District, Nepal. Tribhuvan University Journal, **24**(1): 13-19.

Banerji, M.L. 1957. Some edible and Medicinal plants from east Nepal, Journal of Bombay Naturtal History Society, **53**: 153-155.

Behera, K.K. 2006. Ethnomedicinal plants used by the tribals of Similipal Bioreserve, Orissa, India: A pilot survey, Ethnobotanical Leaflets **10**: 149-173.

Bhattarai, K.R. and Khadka, M.K. 2016. Ethnobotanical survey of medicinal plants from Ilam district, East Nepal. Our nature, **14**(1): 78-91.

Bhattarai, S., Chaudhary, R. and Taylor, R.S. 2009. Ethno-medicinal plants used by the people of Nawalparasi District, Central Nepal. Our nature, **7**(1): 82-99.

Bhattarai, R. and Lal Das, S. 2013. Scientific Study on Indigenous Technology of Dahi making of Eastern Nepal. Journal of Food process Technology. **4**(253): 2p.

Bista, D.B. 1987. People of Nepal Ranta pustak Bhandar, Kathmandu, Nepal.

Bista, D.B. 2004. People of Nepal Ranta pustak Bhandar, Kathmandu, Nepal.

Borah, M.P. and Prasad, S.B. 2016. Ethnozoological remedial used by the indigenous inhabitants in adjoining area of pobitora wild life sanctuary, Assam, India, International Journal o Pharmacy and Pharmaceutical Sciences, **8**: 90-96.

Borah, M.P. and Prasad, S.B. 2017. Ethnozoological study of animals based medicine used by traditional healers and indigenous inhabitans in the adjoining area of Gibban wild life sanctuary, Assam, India. Journal of ethnobiology and ethno medicine, **13**(1): 39p.

CBS 2012. National Population and Housing Census 2011, Vol. 1. National Planning Commission Secretariat, Kathmandu, Nepal.

Chalise, M.K. 2010. Sustainable use of animals by the rural people in reference to Nepal, Ecological society of Nepal, pp 145-151.

Clement, D. 1998. The historical foundation of Ethnobiology, Journal of Ethnobiology. **18**(2): 161-187.

Devkota, K. 1968. Nepali Nighanatu. Royal Nepal Academy, Kathmandu.

Dhami, S.G. 2010. Ethnobiology of Pahari (A case study of badikhel VDC of Lalitpur district). M.Sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Dhimal, S.C. 2015. Dhimal samudaye ma jadibuti abhyaskarta.Journal of Indigenous nationalities, **14**(6): 58-82.

Foster, G.M. and Anderson, B. G. 1978. Medical anthropology: John Wiley & Sons, Inc. 605 3rd Avenue, NewYork, NY 10016, USA.

Ghimire, A. 2016. Medico-ethnobiology and Indigenous Knowledge System of Munda ethnic group in Jhapa, Nepal (A case study of Mechinagar Municipality). M.Sc.Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Gupta, D.S., Kumar, A. and Linda, P.S. 2015. Ethnomedicinal plants used in the health care system in Tamar block of Ranchi district, Jharkhand, India. Traditional Journal for Exchange of Knowledge **2**(2): 90-97.

IUCN, 2000. National Register of Medicinal Plants. International Union for Conservation of Natural Resources, Nepal Ministry of Forest and Soil Conservation.

Kendia, F.A., Mekuriaw, S.A. and Dagnwe, M.A. 2018. Ethnozoological study of traditional medicinal appreciation of animals and their product among the indigenous people of Mete Ma Woreda, North- Western Ethiopia. Journal of ethnobiology and ethnomedicinal, **14**(1): 37p.

Kunwar, R.M. and Bussmann, R.W. 2008. Ethnobiology in the Nepal Himalaya. Journal of Ethnobiology and Ethnomedicine **4**: 24.

Lohani, U. 2010. Zootheraputicasl knowledge of Jirels of Dolakha district, Central Nepal.

Luitel, D. Rokaya, M.B., Timsina, B. and Munzbergo, Z. 2014. The medicinal plant used by the Tamang community in Makwanpur district of central Nepal, Journal of Ethnobiology and Ethnomedicine, **10**: 1-5.

Lohani, U. 2011a. Eroding ethnozoological knowledge among Magars in Central Nepal, Indian Journal of Traditional Knowledge. (3): 466- 473.

Luu, B.N., Nguyen, T.T. and Newman, I.M. 2014. Traditional alcohol production and use in three provinces in Vietnam: an ethnographic exploration of health benefits and risks: BMC public Health. **14**(1): 731p.

Mahawar, M.M. and Jaroli, D.P, 2008. Traditional zootherapeutic study in India, journal of ethnobiology and ethnomedicine, **4**: 1-17.

Maheshwari, J.K. 1995. Interdisciplinary approaches in ethnobotany, A manual of Ethnobotany. S.K Jain (edits), Scientific Publishers, Jodhpur, India, pp: 19-27.

Malla, B., Gauchan, D. and Chhetri, R. 2014. Medico-ethnobotanical investigations in Parbat District of Western Nepal. Journal of Medicinal plants Research, **8**(2): 95-108.

Manandhar, N.P. 1990. Traditional phytotherapy of Danuwar tribes of Kamal Khanj in Sindhuli, Nepal, Nepal Fitole Rapia, **61**(4): 325-331.

Manandhar, N.P. 1995. A survey of medicinal plants of Jajarkot district, Nepal, Journal of Ethnopharmacology, **48**: 1-6.

Panda, T., Mishra, N., Rahimuddin, S., Pradhan, B.K., Rout, S.D. and Mohanty, R.B. 2018.Folk medicine used for the treatment of gynaecological disorders in rural areas of Bhadrak district, Odisha, India. Botanica, 24(2): 132-142.

Pandey, M.R. 2006. Use of Medicinal Plant in Traditional Tibetan Therapy System in upper Mustang, Nepal.Our Nature, **4**: 69-82.

Paudel, M. 2015. Medical Ethnobiology and Indigenous Knowledge System found in Raji group of Nepal. (A case study of Uttarganga Village Development Committee, Surkhet, Nepal). M.Sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Poudel, M. and Singh, N.B. 2016. Medical ethnobiology and indigenous knowledge system found in Darai ethnic group in Chitwan district, Nepal. (A case study of Mangalpur village Development committee). M.Sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Poudyal, R. and Singh, N.B. 2014. Ethno-medical uses of Animals and Plants among the Migratory Tangbetons of Pokhara, Nepal. Journal of Institute of Science and Technology, **19**(1): 145-149.

Rai, R. and Singh, N.B. 2015. Medico-ethnobiology in Rai community: A case study from Baikunthe Village Development Committee, Bhojpur, Eastern Nepal. M.Sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Sharma, N. and Dubey, N. 2013. Ethnobotanical aspects of Aegle marmelos: A review. International Journal of Biology, Pharmacy and Allied Sciences, **2**(11): 2148-2156.

Shrestha, P. 2018. Medical ethnobiology and indigenous knowledge system found in Doney ethnic group of Nepal.(A case study of Panchkhal Municipality, Kavrepalanchowk District) .M.Sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Singh, N.B. 1995. Study on Ethnobiology of Endangered Tribe, the Raute, M.Sc. Thesis. Central Department of Zoology. Tribhuwan University, Kathmandu, Nepal.

Singh, N.B. 1997. The endangered Raute tribe; Ethno-biology and biodiversity. GLOCERA ETHNOBIOLOGY Publications, Kathmandu, Nepal.

Singh, S. 2017. Ethnomedicines used by Kochila Tharu tribes living near Bara District of Nepal.

Tamang , G. 2003. An ethnobiological study of Tamang people. Our Nature, **1**: 37-41.

Tamang, P. and Singh, N.B. 2009. Medical Ethnobiology and Indigenous Knowledge System of the Lapcha of Fikkal VDC of Ilam, Nepal. M.Sc.Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Timilsina, S.H. and Singh, N.B. 2014. Ethnobiology and Indigenous Knowledge about Medicinal Animals and Plants in the Balami Ethnic Group in Nepal. M.Sc.Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.

Thapa, S. 2012. Medico-ethnobotany of Magar community in Salija VDC of Parbat District, Central Nepal. Our nature, **10**(1): 176-190.

Ulugu, I. 2011. Traditional ethnobotanical Knowledge about medicinal plantd used for external therapies in Alasehir, Turkey. International Journal of medicinal and Aromatic plants, **1**(2): 101-106.

Verma, S. and Attri, P. 2008. Indigenous beekeeping for sustainable development in Himalchal Himalaya.

Yirga, G., Teferi, M. and Gebreslassea, Y. 2011. Ethnozoological study of traditional Medicinal animals used by the people of Kafta- Humera district, Northern Ethiopia. International Journal of Medicine and Medical Science, **3**(10): 316- 320.

APPENDICES

APPENDIX 1: Checklist of total families of medicinal plants and animals

S.N	Family	Number of medicinal animal species
1	Araneae	1
2	Anatidae	1
3	Ardeidae	1
4	Bovidae	4
5	Canidae	2
6	Columbidae	1
7	Helicidae	1
8	Hemonidae	1
9	Phasinidae	1
10	Termitidae	1

S.N	Family	Number of medicinal plant species
1	Acanthaleae	1
2	Anacardiaceae	2
3	Amaranthacea	1
4	Amaryllidacea	1
5	Apiaceal	1
6	Araceae	2
7	Asparagaceae	1
8	Asteraceae	2
9	Boraginaceae	1
10	Brassicaceae	3
11	Cannabaceace	1
12	Caryophyllaceae	1
13	Chenopodiaceae	1
14	Compositae	5
15	Crassulaceae	1
16	Cucurbitaceae	1
17	Ericaceae	1
18	Euphorbiaceae	2
19	Graminae	3
20	Labiatae	1
21	Lamiaceae	3
22	Lauraceae	2
23	Liliaceae	3

24	Malvaceace	1
25	Meliaceae	2
26	Moraaceae	1
27	Meristicaceae	1
28	Myrtaceae	1
29	Nephrolepidaceae	1
30	Oleaceae	2
31	Oxalidaceae	1
32	Palmae	1
33	Piperaceae	1
34	Plantaginaceae	1
35	Poaceae	3
36	Rosaceae	1
37	Rutaceae	1
38	Sapindaceae	1
39	Solanaceae	4
40	Umbilliferae	2
41	Urticaceae	2
42	Violaceae	1
43	Zingiberaceae	3

APPENDIX 2: Questionnaires

A. For Group Discussion

1. Name:
2. Sex:
3. Age:
4. Occupation:
5. What types of diseases are most common in this area?
6. Do you treat all of these diseases?
7. Do you prefer traditional medicine or prefer going to hospital?
8. What type of diseases do you cure yourself by using traditional medicine?
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 plant and animal species?

For the preparation of traditional medicine and treatment

Local name of animals	Part / product used	Habit / Habitat	Forms of Medicine	Medicine preparation and application

Local name of Plants	Part / product used	Life forms	Habit / habitat	Forms of Medicine	Medicines preparation and application.

11. From where do you get these animals and plants for medicinal purpose?
12. Aare these all animal and plant species used for medicinal purpose easily available?
13. What do you do to preserve?
14. Are these medicinal animals and plants for sale? Do you use them for any commercial purpose?
15. How much faith do you have in such traditional medicines?
16. Do you go to the hospitals for treatment? In what cases?

17. Is there any documentation does so far on the plant and animal species of medicinal values found in your area as well as their traditional knowledge?
18. How did you acquire these traditional knowledge a about using plants / animal species using as medicine?

B. For ethnographic survey

A: General information of respondents

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

B. Language

1. What is your mother tongue?
2. Do you speak it?
3. Which language is preferred most?
4. Are all the children in your family able to communicate with their mother tongue?

D. Dresses and ornaments

1. What do the Newar women wear?
2. What do the Newar men wear?

E. Religion and Festivals

1. What is the main religion and festivals of Newar people?
2. Which God / Goddess do you worship?
3. What kind of puja do you perform?
4. What animals are used for sacrificing in these puja's?

F. Occupation / Economy

1. What is the main occupation of Newar people?

2. Do you all owe your own occupation and lands?
3. What occupations are there which are inherited from ancestors?
4. Is there any one from your family who supports your economy from abroad?

G. Education:

1. Are all the members literate in this family?
2. Do all the children go to school?
3. What kind of school do children go to? Government school or private school?

H. Dances

1. What types of dances are performed durimg festivals and rituals?
2. What types of clothes and ornaments are wear by dancers?

I. Life cycle and Rituals:

1. Birth rites:

a. What are the rituals performed during the child birth? For how many days are the rituals performed?
b. What differences can we observed in the rituals performed between baby boy and baby girl?

2. Marriage:

a. What types of marriage occurs in your community?
b. How is the marriage performed? For how long is married performed?
c. What is the specific age a boy and a girl to get married?
d. Is there any dowry system prevalent in your community?

3. Death

a. What are the rituals performed during the death of a person?
b. What do you do with the dead body?
c. How many days mourning are done?
d. What do you do after mourning is completed?

Questionnaires for indigenous Knowledge and Technology

1. What types of agricultural practices are most common?
2. What are the main / usual crops grown by the people in this village
3. Do you prefer traditional methods for preparing yeast / alcohol? How do you prepare it?
4. What are the traditional methods of pest management in field practices in these areas?
5. What do you do to store / preserve the food (grains)?
    a) For seed b) for food crops
6. Do you practice livestock and poultry farming?
7. What are the medicinal practices for your livestock?
8. What types of Arts crafts and technology are found in this area? Are you involving in these?
9. What are the advantages of traditional / indigenous knowledge system and technology? Do you found it reliable then modern technology?
10. What types of indigenous technology you are practicing?
11. What is your view about traditional way of producing mustard oil in this area?
12. What do you thing it should be preserved or should be replaced by modern technology?
13. Are you practicing the same way of producing mustard oil?
14. What are the raw materials used in production of local trade?
15. What are the traditional soil fertility management practices?
16. What types of handicraft making practices are found in this area?

Questionnaires for oil industry

1. Oil industry name:
2. Establishment date:
3. From where mustard seed available?
4. The oil prepared here is pure or mixed?
5. What types of technology is being used for the production of the mustard oil?

6. What is the present status of the oil industry?
7. Is the product sufficient for the valley?
8. In which season oil production is high?
9. Does this technology stay the same or does it change over time? And what are the causes of changes.
10. Does it complete with modern technology?
11. In your view, what are the advantages of indigenous technology?
12. When and where the knowledge of this technique emerged?
13. How many employs are working?
14. How long this technique may last?
15. What is the plant materials used to prepare to make this technology?
16. What are the main problems you are facing to run this oil industry?
17. What are the feature plants to conserve this traditional technology of oil production?

Questionnaires for Carpet Industry

1. Name of industry:
2. Establishment date:
3. From where the materials available?
4. What type of technology is being used for the production of carpet?
5. What is the present status of the carpet industry?
6. In which country / area, the produce carpet is supply?
7. Does this technology stay the same or does it change overtime? And what are the causes of change?
8. What are the instruments which are used to make carpet? And what are their works?
9. How many days does it take to complete one carpet?
10. How many employees are working?
11. Does it complete with modern technology?
12. What do you do to preserve this traditional technology?
13. What are the main problems you are facing to run this industry?

APPENDIX 3: PHOTOPLATES

A. Ethnography

Picture 1: Khokana village

Picture 2: Ward office in Khokana village

Picture 3: Farmer in Agricultural activities

Picture 4:Cleaning of Agricultural field

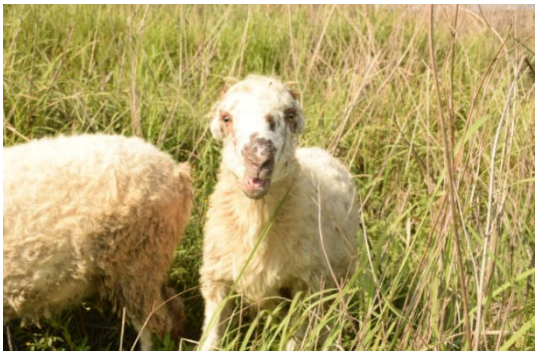
Picture 5: killing goat during deopokhari festival

Picture 6: Newari girls during ehee

B) Medico-ethnozoolog

Picture 7: *Anadenus spp*

Picture 8: *Anas spp*



Picture 9: *Ovis aries*

Picture 10: *Capra hiscus*

C) Medico-ethnobotany

Picture 11: *Cynoglossum zeylanium*

Picture 12: *Arternisia vulgaris*

Picture 13: *Urtica diocia*

Picture 14: *Justicia adhatoda*

Picture 15: Preparation of traditional medicine

Picture 16: Interview with key informant

Picture 17: Dry *Arternisia vulgaris* ready to sell

Picture 18: Discussion with key informant

D) Indigenous Technology

Picture 19: Gabu mustard seed oil mill

Picture 20: Interview with manager of Shikali oil mill

Picture 21: Newari Woman preparing traditional alcohol called Aila in Khokana village

Picture 22: Local women involving in Carpet industry in Khokana village

E) Indigenous Knowledge

Picture 23: Woman in wood carving

Picture 24: Interview with local people

Picture 25: Man in Metal carving

Picture 26: Seed and vegetable storage practice

Picture 27: Newari women practicing wool weaving and hay mat weaving