



## The Study of Ethnobotanical Uses by Local Healers in Taktse Chiwog from Central Bhutan

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### Authors' contributions

This work was carried out in collaboration among all authors. Author DP designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author TT managed the analyses of the study. Authors GB and TN managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

**Aim:** To document the ethnobotanical uses in Taktse *Chiwog* (Village blocks) by local healers.

**Study Design:** Semi-structured interview and direct interview was conducted with the prior approval from the *Chiwog* official. Two local healers/informants were contacted for interview before field visits based on their popularity and experience of using medicinal plants in their locality.

**Place and Duration of Study:** The study was conducted at Taktse *Chiwog*, Trongsa Dzongkhag, Bhutan between July and October 2019.

**Methodology:** Two local healers were identified based on their experience on ethno medical practice. Multiple approaches were taken such as botanical inventories, collection of plant specimens, semi-structured and direct interviews with local healers including free listing (FL) and preference ranking (PR) to collect the information on medicinal use/s using questionnaires.

**Results:** Eighty Two plant species from forty nine families were recorded with their ethno medicinal uses by the local healers against various ailments and diseases.

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**Conclusion:** This study suggests that most of the medicinal plants available within locality are commonly used by the healers for the treating different diseases, dislocation and fracture of musculoskeletal system.

**Keywords:** *Taktse Chiwog; local healers; Traditional Knowledge (TK); medicinal plants; local name; ethno medical preparation; preference ranking and treatment.*

## 1. INTRODUCTION

Bhutan is situated on the range of mountains, the Himalayas. Bhutan has a rich biodiversity of flora and fauna due to varied altitude and climatic condition. Bhutan is a biological hotspot in world with several endangered species of flora and fauna and more than 7,000 species of vascular plants. More than 600 medicinal plants have been identified in Bhutan and more than 200 of them are currently used by the Institute of Traditional Medicine Services (ITMS) in *gso-barig-pa* (traditional medical system) are effective [1,2,3,4,5,6,7,8,9,10,11,12,13].

In 1967, the Third King of Bhutan, His Majesty Jigme Dorji Wangchuck commanded the health department to establish a traditional medicine system for the welfare of the Bhutanese people and to preserve its rich culture and tradition. Accordingly, an indigenous dispensary was opened on June 28, 1968, at Dechencholing in Thimphu, and the medicinal herbs were collected from Lingzhi in Gasa and Langthel in Trongsa [14]. Since then, traditional medical services has grown rapidly over the years. Today, there are 51 traditional medicine units attached to the district hospitals and basic health units across Bhutan. The Preservation, conservation and sustainable utilization of medicinal plants in Bhutan are guided by sound legal frameworks and acts: Forest Act 1969, Plant Quarantine Act of Bhutan 1993, Forest and Nature Conservation Act of Bhutan 1995, Environmental Assessment Act 2000 and Biodiversity Act and Framework of Bhutan 2003 and 2006 [15,16,17].

108 Medicinal plants have been reported from the low altitude areas of Bhutan [1,3,4,12,13] and 116 from high altitude [6,8,11,18]. Total of 81 medicinal plants have been reported from eastern Bhutan, Trashigang *Dzonkhag* (*Gewog Block*), 165 ethnobotanical species used by Bumdelling communities in Trashiyangtse *Dzongkhag* and 61 different medicinal plants were recorded from Kilikhar *gewog* of Mongar *Dzongkhag* [2,19,20]. 100 medicinal plants were

also recorded from western Bhutan, Dagana *Dzongkhag* [8]. 134 species from Central Bhutan, Chokhor *gewog* of Bumthang *Dzongkhag* [21]. Those diverse medicinal plant species promote health, and can help to protect against diseases. The documentation of ethno-pharmacological information on traditional information on traditional knowledge of medicinal plant has broader important in world [5]. Peoples from Taktse *Chiwog*, still practices home remedies and local healing for treating different diseases. No study of this kind was carried out earlier in these *Chiwog* as far as literature review is concerned. It was crucial to document the TK on medicinal plants from this study area.

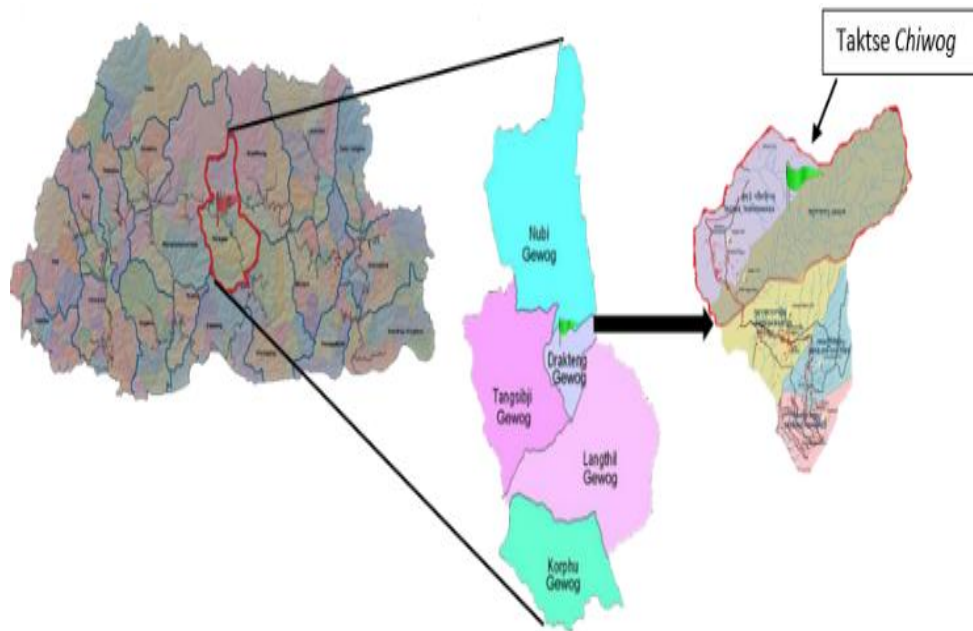
Therefore this study was carried out to document ethnobotanical data and traditional knowledge (TK) of local healers in using medicinal plants from Taktse *chiwog* (village blocks) of Trongsa, to treat different type of diseases and also to add on to the list of medicinal plants from central elevation to be used in Bhutanese Traditional Medicines (BTM).

## 2. METHODOLOGY

The *Mangmis* (*gup* assistant) and *Tshogpa* (*Chiwog* Representative to respective village) were approached. Key informants were identified. The study was conducted in Taktse *Chiwog* under Trongsa *Dzongkhag* in central region of Bhutan between July and October, 2019. Multiple approaches were taken to collect the data for the study, which comprised of botanical catalogs; collection of plant specimens; structured and informal interviews with key informants. The mounted herbariums for each species were submitted to the Coordinators of Taktse *Nangmen* (Traditional medicine) Club.

### 2.1 Study Site

Trongsa *Dzongkhag* is located in the central part of the Bhutan and has an area of 1807 sqKms' with elevation ranging from 800 m to 4800 m



**Fig. 1. Study site**

above sea level. Drakteng Gewog is the smallest of the five Gewogs under Trongsa Dzongkhag covering 84.59 sqKms. It consist of five Chiwogs with the population 3,617 [22]. Taktse Chiwog is located in the northern part Drakteng Gewog with the total area of 40 sq Km (Fig. 1). It comprises of five Chiwogs with the population 3,617. Taktse Chiwog is located in the northern part of Drakteng Gewog with the total area of 40 sq Kms (Fig. 1). It comprises of two villages Eusar and Tashidhingkha with 52 households and total of 1236 populations [23]. Agriculture farming is the main source of income for the majority of population and the villager enjoys a warm climate with sandy- loam soil type and an altitude ranging from 1100 meters to 2000 meters above sea level. This research is solely based on the information and data collected from the Local healer Ap (father) Shacha and Ap Jigme.

## 2.2 Data Presentation during and after Field Visits

Ethnobotanical data like collection number, local plant name, and parts used, their uses, ethnomedicinal preparation, habitat, locality, name of the informant and explanations were recorded during field visits using direct interviews and a semi-structured questionnaire. The Free listing (FL) by informants in their local dialect, Preference Ranking (PR), Use Value (UV) of medicinal plants were carried out and interpreted

[23] and carefully tabulated and analyzed after coming back from the field. The plants were identified using the Flora of Bhutan [24,25,26], internet resources and approval supports from the faculties of Menjong Sorig Pharmaceuticals.

## 3. RESULTS AND DISCUSSION

During this study, it was witnessed that apart from using modern medical facilities and performing rituals, the local healer was also consistently using medicinal plants. Many studies from have been carried out from different regions of Bhutan to document and investigate the uses of medicinal plants [1] but this report is the second time documentation from the central regions of Bhutan. This study have been carried out in the spotting the essentiality of locally abundant medicinal plants in villagers life. Eighty Two plant species from forty Nine families are recorded with their ethno medicinal uses by the local healers against various diseases. The 14 specimens collected were domesticated by the people for their day-to-day use found in their field. This method of domesticating in their farm orchard directly helps in conserve plant diversity. But informants has the least idea about the impact of environmental change and why there is a decline in the numbers of medicinal plants. Most of the specimens were found abundantly in their locality, which is an evidence of the area with plant host pot that supports the

**Table 1. List of medicinal plants used by local people with their ethno medicinal preparation and uses**  
**The name of the plants in official Language Dzongkha are written as (Dz) and local name as (L)**

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
1	<i>Acorus calamus</i> L.	Acoraceae	Zhutha (Dz) Zhuthala (L)	Sun-dry rhizome is powdered & used alone or mixed with other medicines as solution	Diarrhea and dysentery.
2	<i>Justicia adhatoda</i> L.	Acanthaceae	Bashaka (Dz) Khashemeto(L)	Decoction of leave and flowers are consume orally and leaves are boiled with to medicinal plants to apply externally.	Cough and cold, respiratory ailments and external cut
3	<i>Allium wallichii</i> Kunth.	Alliaceae	Lagop (Dz) Ram (L)	Consume raw bulb/ leaves. Leave and shoot are cooked and consume the soup.	Chewed to treat dysentery, cough and cold. The leave is also used for the ease of high altitude sickness.
4	<i>Coriandrum sativum</i> L.	Apiaceae	Whusu (Dz) Wyaisee (L)	Leaves were eaten raw and also extracted the decoction from mature seeds and the fresh leaves.	Avoid vomiting, cough, sore throat and as anappetizer.
5	<i>Centella asiatica</i> (L.) Urb.		Taimush(L)	The decoction of fresh leaves and stem were applied externally	External cut, wound and pneumonia
6	<i>Oenanthe javanica</i> (Bl.) DC		Zhimtsi (Dz) Nam(L)	Leaves and stem are taken raw/cooked.	Improve the flow of blood, appetite stimulator and jaundice.
7	<i>Rauvolfia serpentina</i> (L.) Benth. exKurz	Apocynaceae	Thingnye Zoenma (L)	The decoction of roots (which contain alkaloids) are blended with warm waters and	Reduce Blood pressure and insomnia.

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
8	<i>Zephyranthes</i> sp.	Amaryllidaceae	Meto Kumoth(Dz)	consume orally. The decoction of alkaloid extracted from fresh leaves, roots and flowers were consume orally as well as applied externally.	Reduce Fever, remedy for headaches and Cure Tetanus.
9	<i>Rhus chinensis</i> Miller	Anacardiaceae	Choka (Dz) BhrmSang(L)	Mature seeds are taken orally	Vomiting, Asthma and bronchitis
10	<i>Amorphophallus napanesis</i> (Wall.)Bogner & Mayo	Araceae	Dowgurow (Dz)	Young Shoots are cooked, corm are dried and powdered and taken mixed with water.	Dysentery and reduce Blood pressure.
11	<i>Colocasia esculenta</i> (L). Schott		Dow(Dz)/ Jakpa (L)	Young stem are collected and taken orally. Corm are dried and taken with water.	Diahhrea, skin disorder and body ache.
12	<i>Remusatia hookeriana</i> Schott		Dow(Dz)/ Raon Jakpa (L)	Leaves, shoot and rhizomes were dried, powdered and prepared the solution by mixing with water to consume orally.	Reduce High blood pressure and also cure ulcer.
13	<i>Artemisia vulgaris</i> L.	Asteraceae	Khempa(Dz) Dum (L)	Juice are extracted from the fresh leaves and also boiled with others medicinal herbs to apply externally.	Cough,cold and external cut
14	<i>Ageratina adenophora</i> (Spreng.) R.M.King &H.Rob.		Hyendho (D) Chakharpai Nyobay (L)	Fresh leaves and young stem were crush and squeezed to extract the juice and applied externally.	Fresh Cut (it help to form blood coagulation)

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
15	<i>Bidens pilosa</i>		Choebai Changzey (L)	Young leaves and shoot are crushed extracted the juice. The decoction of whole plants are used to apply externally.	Diarrhea, Constipation and External wound.
16	<i>Cirsium sp</i>		Sangchen Nyobay(L)	Young leaves can be soaked overnight in salt water and then decocted and young shoot are eaten raw	bleeding piles, external cuts and rheumatic joints
17	<i>Galinsoga parviflora Cav</i>		Kaywai Hendum(Dz) Jaga Yoema(L)	Leaves and stem were dried, grounded into powder to apply externally and also taken mixing with warm water.	Healing cut/wound and reduce cough and cold.
18	<i>Sonchus asper</i> (L.) Hill		Takhu (Dz)	The dried leaves and latex were pulverized and used to apply externally.	External wound.
19	<i>Asparagus racemosus</i> Wild	Asparagaceae	Ngekhakchung(Dz, L)	Young shoots are harvested and consume by cooking. The roots are dried and powered and consume blending with warm water.	Constipation, ulcer, diabetes, diarrhea and Tuberculosis (TB)
20	<i>Begonia josephii</i> A.DC.	Begoniaceae	Jajew (L)	Decoction from whole plants were consume directly.	Reduce high blood pressure and improve constipation.
21	<i>Cannabis sativa</i> L.	Cannabiaceae	Kayna (Dz) Namphai (L)	The dried leaves extract were applied externally or inhale the gas.	Sclerosis, nausea, vomiting and eye pain.
22	<i>Commelina benghalensis</i>	Commelinaceae	Korum (Dz)	Whole plants decoction	Reduce High blood

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
				are consume and poultice were used to apply externally.	pressure, dysentery, external wound and burn.
23	<i>Poranopsis paniculata</i> (Roxb.) Roberty	Convolvulaceae		Fresh or dried roots were prepared into poultice and used to apply or consume	Bone fracture/dislocation.
24	<i>Cuscuta reflexa</i> L.		Tshelma Robjal(Dz) Baldudha(L)	Fresh stems were crush and prepared the poultice to consume.	Headache, labour pain, bone fracture, fever.
25	<i>Kyllinga brevifolia</i> Rottb.	Cyperaceae	Kongba Azhang (L)	Fresh tubers and leaves are made into paste and eaten with rice.	Diarrhoea
26	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Tsemakewa (Dz) che (L)	The fruits and tuber is boiled and taken internally.	dysentery and diarrhea, fever and tumors
27	<i>Nephrolepis cordifolia</i> (L.) K. Presl	Nephrolepidaceae	Pangkay (Dz) Taree(L)	Juice of root and leaves are taken orally.	Fever, headache, liver and skin disorder.
28	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Auksak Nyobay(L)	The decoction from fresh leaves and young stem are taken orally.	Diarrhea, vomiting, constipation and asthma
29	<i>Ricinus communis</i> L.		Dhenthra (Dz) Chamala (L)	Oil are extracted from mature seed to consume or apply externally.	Rheumatism, worm infestation, relieve boil or skin infections.
30	<i>Euphorbia royleana</i> Boissier		Seyshing(Dz) Lushing(L)	The extraction of juice are consume orally	Asthma and bronchitis
31	<i>Erythrina arborens</i> Roxb.	Fabaceae	Khelmazhosha (Dz) Sindala(L)	The decoction/paste of fresh bark are consume as well as applied externally.	Dysentery, ulcer and boil
32	<i>Pisum sativum</i> L.		Baesem(Dz) Nambe (L)	The dried and powdered seed are	Skin ace and wrinkled skin. It is a source of protein.

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
33	<i>Alysicarpus</i> sp.		Tatru (L)	used as poultice on the skin and the also taken seed as a vegetable The decoction from whole parts of plant is use to apply externally or taken orally.	Fever, jaundice, diarrhoea, skin diseases and kidney stones.
34	<i>Phaseolus vulgaris</i>		Semchum (Dz) Sema(L)	The green and dried pods are boiled and pulverized.	Diabetes and reduces the blood sugar level.
35	<i>Quercus griffithii</i> Miquel.	Fagaceae	Sisi Shing (Dz) Sisi sang (L)	Seeds are cooked or eaten raw. The decoction of fresh bark were applied externally and boiled leaves were taken orally.	Acute diarrhea, dysentery and haemorrhages. Externally, it is used as a mouthwash to treat toothache or gum problems and is applied topically as a wash on cuts, burns.
36	<i>Bambusa Vulgaris</i>	Bambusioideae	Pakshing (Dz , L)	Young shoots are cooked or fermented.	Healing wounds, infection and respiratory disorder.
37	<i>Molineria capitulata</i> (Lour.) Herb.	Hypoxidaceae	Cowlay Shokpa(L)	Dried leaves and roots are powdered and prepared the solution to consume.	Asthma, jaundice, diarrhea
38	<i>Iris domestica</i> (L.) Goldblatt & Mabb.	Iridaceae		Powdered prepared from rhizome are consume orally.	Asthma, cough and stomach ache.
39	<i>Juglans regia</i> L.	Juglandaceae	Tago (Dz) Taga (L)	Mature Nuts were pulverized and taken orally. Decoction of Young leaves were used to apply externally.	Diarrhea, Asthma, constipation and external wound.
40	<i>Mentha Spicata</i> L.	Lamiaceae	Usila (Dz) Kushila (L)	Fresh leaves are consume orally and	Asthma and reduce blood pressure



Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
				decoction of dried leaves and stems were taken.	
41	<i>Pogostemon amarantoides</i> Benth		Namdha (Dz) Namna (L)	Young leaves were cooked and also extract the juice to apply externally	Headache, diarrhea, appetizer and snake bite
42	<i>Sida rhombifolia</i> L.	Malvaceae	Phiksang Nyobay(L)	Whole plants are dried and pounded into powder. The powders decoction is used to apply externally and taken orally.	Relieve swelling, headache and rheumatism.
43	<i>Paris Polyphylla</i> SM	Melanthiaceae	Thogtsampa(Dz, L)	Rhizomes were dried and pulverized for external use and to consume orally.	Diarrhea, dysentery, poisoning, burn and external cut.
44	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Laytay(Dz) Rok Robche(L)	The thin bark of stem are removed and cut into small pieces to dry. The dried the stems are pulverized into fine powder.	Piles, liver complaints, chronic rheumatism and also as muscle relaxant.
45	<i>Stephania glabra</i> (Roxb.) Miers		Pawserp(Dz) Dumang(L)	The decoction of Rhizome are taken orally	Poisoning
46	<i>Ficus semicordata</i> Buch.-Ham. ex Sm.	Moraceae	Omm Shing (Dz) Tsang Shing(L)	The juice extracted from fruits as well as from leaves are used to apply externally. The raw ripened fruits are eaten directly. leaf decoction in	Headache and scabies (Apply externally) Diarrhea and jaundice (orally)

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
				combination with other plant extract is taken orally	
47	<i>Leucas ciliata</i> Benth.	Lamiaceae	Phabaidum(L)	The crushed leaves are applied externally or taken orally.	Wounds, sores and chronic skin disease (Apply externally). mild fevers, colds, rheumatism and snake bites (Orally)
48	<i>Gmelina arborea</i> Roxb.		Japta Sang(Dz)	The juice extracted from the leaves are taken orally or applied externally.	Cough, ulcers and wounds.
49	<i>Calanthe plantaginea</i> Lindl	Orchidaceae	Wangpeimo (Dz) Sai olasey(L)	Young stem and flower were decocted and consume orally. The rhizome were dried, powdered and mixed with milk.	Headache, appetizer and poisonous.
50	<i>Otochilius lancitabius</i> <i>Seibenfaden</i>		Pusheltse(Dz) Pesinggucha(L)	The dried stem are pulverized and taken orally.	Tuberculosis
51	<i>Oxalis corniculata</i> L.	Oxalidaceae	Chunpa(Dz) Gagun(L)	Young leaves and shoot were taken orally. The juice of the plant, mixed with butter and applied externally.	Diarrhea, Fever, snake bites, muscular swellings, boils and pimples.
52	<i>Plantago asiatica</i> (Wall.) Z. Yu <i>Li</i>	Plantaginaceae	Japtajay(L)	The mature seed are dried and prepared poultice. The freshly collected leaves are smashed to extract juice.	Liver disease, stomach problems and Shivering

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
53	<i>Piper pedicellatum</i> C. DC	Piperaceae	Pepeling (Dz) Pepla(L)	Mature leaves are eaten betel-nut.	Tuberculosis and improve breathing.
54	<i>Cynodon dactylon</i> (L.) Pers	Poaceae	Saram(Dz) Kaga Nyobay(L)	The mature stem are tied around the nerves dislocation and also the decoction of leaves are taken orally as well as applied externally.	Bleeding and skin troubles, heart problem.
55	<i>Polypodiodes lachnopus</i> (Wall. ex Hook.) Ching	Polypodiaceae	Bayjang(Dz) Pesingtaree(L)	Rhizome are dried and prepared decoction with warm water and also the freshly collected rhizome were eaten orally.	Rheumatism, breathing problem and Subside thirst.
56	<i>Pyrrhosia mollis</i> (Kunze) Ching		Taree(L)	The fronds are pounded and mixed with gypsum to make a poultice and use to apply externally.	skin rashes
57	<i>Microsorium membranaceum</i> (D.Don) Ching		Colwlay Taree(L)	The decoction is used orally or applied externally.	Rheumatism and skin diseases
58	<i>Drynaria propingua</i> (Wall.ex Mett.)		Bayjang(Dz) Pesingsha(L)	The crushed rhizome and extracted juice were taken orally	Poisoning
59	<i>Aconogonon Molle</i> (D.DON) H.	Polygonaceae	Chuchu(Dz) Aii Chump(L)	Young leaves and shoots are consume orally. Extract juice and consume with warm water	Astringent and Shivering
60	<i>Fagopyrum Cymosum</i>		Thuyoep(Dz) Chumchum (L)	Young leaves and shoot were decocted and consume orally	Astringent and supply of iron.
61	<i>Persicaria rucinata</i> (D.Don)H.		Lalob(Dz) Zhulum(L)	Freshly prepared juice	Urinary tract infection

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
	Gross.			and taken orally	(UTI)
62	<i>Polygonum persicaria</i>		Chulob(Dz) Zholum(L)	A decoction of the whole plant, mixed with flour, has been used as a poultice.	Relieve stomach pain and whole body pain
63	<i>Pteris biaurita</i> L.	Pteridaceae	Nakay(Dz) Tankay Zhima (L)	Young stem were boiled and consume orally and also use as seasonal vegetable	Rheumatism
64	<i>Viscum album</i> L.	Santalaceae	Nayshaythup(Dz) Jashi (M)	Leaves are dried and consume orally by blending with warm water and the decoction are mended for external use.	Body aches and bone fractures and joint dislocation.
65	<i>Houttuynia cordata</i> Thunb	Saururaceae	Gaytsho (Dz) Drang (L)	Fresh leaves are consume with pickle and the decoction of roots are consume orally.	Constipation and appetizer and Tuberculosis
66	<i>Thalictrum</i> sp.	Ranunculaceae	Khoe Nyobay(L)	The decoction from whole plant were eaten directly.	Jaundice and fever
67	<i>Clematis buchananiana</i> DC.		Tsaja(Dz) Tsaja Rusee(L)	Juice extracted from root are used to inhale as well applied externally.	Ulcer and swelling
68	<i>Rubia majith</i> Roxb.	Rubiaceae	Saoth (D) Tshuth (L)	Fresh leaves and stem were crush and used to apply externally. The dried stem were cut into pieces, boiled to extract	Cure skin infection, diarrhea, dysentery, and chronic fever.

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
				the juice and consume orally.	
69	<i>Bergenia ciliata</i> (Haw.) Sternb.	Saxifragaceae	Langmche Namchu meto(Dz)	The decoction from Rhizome are used to apply externally also eaten directly.	Skin disease, diarrhea, Vomiting and Fever
70	<i>Agrimonia pilosa</i> Ledeb.	Rosaceae	Nyobay Puchen(L)	The juice extracted are applied externally or eaten.	Eczema, boil and allergy
71	<i>Fragaria nubicola</i> Lindl		Tsheloo Meto (Dz) Moelobe	Berries are chewed and extract the juice from leaves and consume with the mixture of <i>Berberis lyceum</i>	Constipation and Stomach ulcer
72	<i>Prunus cerasoides</i> Buch.-Ham. ex D.Don		Kham (Dz) Lee (L)	The extract juice from bark and fruit are applied externally. As well as consume orally.	Backaches, stimulates respiration and improves digestion.
73	<i>Rubus ellipticus</i>		Taktsar Meto(Dz) Tser Moelobe(L)	Berries are taken orally and extract the juice from bark. It is consume adding warm water	Renal tonic, cough and cold
74	<i>Brugmansia suaveolens</i> (Humb. &Bonpl. exWilld.) Bercht. &J.Presl	Solanaceae	Daw Gumju(L)	Plant parts can be smoked, eaten, drunk as a tea or taken as an enema.The decoction of leaves are applied externally.	Treat wounds, rashes, menstrual pain and snakebites.
75	<i>Daphne bholua</i> D.Don	Thymelaeaceae	Dhayshing(Dz) Shokshing(L)	The decoction of roots and bark are taken orally.	Fever and intestinal problem
76	<i>Girardinia diversifolia</i> (Link) Friis	Utricaceae	Zocha(Dz) kuoi (L)	The decoction of roots are taken orally and	Constipation, poisonous, headache and swollen joint.

Sl.#	Botanical Name	Family	Local/Dzongkha Name	Ethno medicinal Preparation	Treatment [s]
77	<i>Elatostema Lineolatum</i>		Damroo (Dz, L)	fresh juice extracted from the leaves are applied externally. Leaves and stems were cooked /decocted to consume.	Supplement iron to improve blood, jaundice, snake bite and factures
78	<i>Boehmeria hamiltoniana</i> Wedd.		Jagartsukpa (Dz) Naseymo(L)	The decoction from the fresh leaves as well as from the fiber use orally	urination problems and Rheumatism
79	<i>Urtica parviflora</i> Roxb.		Zocha (Dz) Kuei(L)	The decoction of leaves, stem are boiled with other plants apply externally. The juice extracted from the roots are also consume orally.	Arthritis, lower back pain and poison.
80	<i>Aloe vera</i> (L.) Burm.f.	Xanthorrhoeaceae	Agaru(Dz)	The jelly extracted from the leaves are used to apply externally.	Skin lotion and heart problem.
81	<i>Roscoea tibetica</i> Batalin	Zingiberaceae	Luiyee Meto (L)	The root is chewed directly and the Juice extracted from the roots of the plant is also taken.	Dysentery and diarrhea.
82	<i>Zingiber officinale</i> Roscoe		Gamuk (Dz) Saga (L)	Rhizome are made into pieces, boiled and extracted the juice to consume orally.	Nausea, Gout, cough and cold.

local community's health welfare and preservation of local knowledge. It has been found that either single plant or its parts are used to treat single ailment and sometimes combinations of more than one Plants are used for the treatment. Plants are ranked to three categories as I (most preferred), II (moderate) and III (less preferred) [Table 2]. Healers used Poultice (23%) method of ethno medicinal preparations as most common method followed by decoction (18%) and rubbing on body (14%) [Fig. 2]. This indicates that, patients visit healers for the first aids and to get immediate relief for minor injuries like cut/burn/headache/swelling and other ailments. Medicinal many of the medicinal plants are used to treat multiple

ailments by the local healers. For instance, *Rubia majith* Roxb., *Artemisia vulgaris* L., *Justicia adhatoda* L. *Oxalis corniculata* L. are not only use to apply externally but also taken orally to cure the major diseases like diarrhea, sneek bites, dysentery and the respiratory ailments. More importantly the indigenous uses of this plant species were uncommon in the life of young generations in Taktse locality, therefore this report will encourage the younger generations to use locally available plant species for the treatment of different disease. For the reference and genes conservation of medicinal species, we have also established the medicinal habitation hub in our school by collecting frequently used species.

**Table 2. Preference ranking (PR) of the uses of medicinal plants for treating common diseases preferred by the healers, Categorized into as I (Most preferred), II as (moderate) & III as (less preferred)**

<b>1. Dysentery (Thrak Shel Neth)</b>	<b>Rank</b>
<i>Dioscorea bulbifera</i> L.	III
<i>Agrimonia pilosa</i> Ledeb	II
<i>Acorus calamus</i> L.	III
<i>Zingiber officinale</i> Roscoe	II
<i>Allium wallichii</i> Kunth.	III
<i>Bidens pilosa</i>	I
<b>2. Jaundice (Thri Neth)</b>	<b>Rank</b>
<i>Tinospora sinensis</i> (Lour.) Merr.	I
<i>Ficus hispida</i> Linn	II
<i>Mentha</i> Sp	III
<i>Oenanthe javanica</i> (Bl.) DC	II
<i>Ficus semicordata</i> Buch.-Ham. ex Sm.	I
<i>Thalictrum</i> sp.	II
<b>3. Tuberculosis (Bay ken Neth)</b>	<b>Rank</b>
<i>Sonchus asper</i> L.	I
<i>Polygonum persicaria</i>	II
<i>Euphorbia hirta</i>	III
<i>Rubia majith</i> Roxb.	III
<i>Cannabis sativa</i>	II
<i>Centella coriacea</i>	I
<i>Houttuynia cordata</i> Thunb	III
<i>Asparagus racemosus</i> Wild	III
<b>4. Muscle Cramps (zuk sheth neth)</b>	<b>Rank</b>
<i>Ricinus cummunis</i> L.	I
<i>Sida rhombifolia</i> L.	II
<i>Tinospora sinensis</i> (Lour.) Merr.	II
<i>Polypodiodes lachnopus</i> (Wall. Ex Hook.) Ching	III
<i>Microsorium membranaceum</i> (D.Don) Ching	I
<b>5. Blood Pressure (Thrashuk Neth)</b>	<b>Rank</b>
<i>Rauvolfia serpentina</i> (L.)	I
<i>Benth. exKurz</i>	II
<i>Remusatia hookeriana</i> Schott	III
<i>Commelina benghalensis</i>	II
<i>Phaseolus vulgaris</i>	III
<i>Mentha Spicata</i> L.	I

<b>6. Fracture and broken limbs (<i>kam labh Tsik truk</i>)</b>	<b>Rank</b>
<i>Cirsium</i> sp	I
<i>Poranopsis paniculata</i> (Roxb.) Roberty	II
<i>Cuscuta reflexa</i> L.	III
<i>Pteris baurita</i> L.	II
<i>Boehmeria hamiltoniana</i> Wedd.	III
<b>7. Ulcer (<i>Ju ma Neth</i>)</b>	<b>Rank</b>
<i>Remusatia hookeriana</i> Schott	II
<i>Asparagus racemosus</i> Wild	III
<i>Erythrina arborensceus</i> Roxb.	II
<i>Clematis buchananiana</i> DC.	II
<b>8. Shivering (<i>Drangsong</i>)</b>	<b>Rank</b>
<i>Aconogonon Molle</i> (D.DON) H.	III
<i>Plantago asiatica</i> (Wall.) Z. Yu Li	II
<b>9. Against witch-craft/Poisoning (<i>Dug jo ni</i>)</b>	<b>Rank</b>
<i>Pogostemon amarantaiodes</i> Benth	III
<i>Stephania glabra</i> (Roxb.) Miers	II
<i>Oxalis corniculata</i> L.	III
<i>Urtica parviflora</i> Roxb.	III
<i>Girardinia diversifolia</i> (Link) Friis	III
<b>10. External burn and cut (<i>Tsik ma Dang Tog ma</i>)</b>	<b>Rank</b>
<i>Sonchus asper</i> (L.) Hill	III
<i>Ricinus cummunis</i> L.	I
<i>Justicia adhatoda</i> L.	II
<i>Ageratina adenophora</i> (Spreng.) R.M.King & H.Rob.	III
<i>Galinsoga parviflora</i> Cav	III
<i>Artemisia vulgaris</i> L.	III
<b>11. Diarrhoea (<i>Shel Neth</i>)</b>	<b>Rank</b>
<i>Begonia josephii</i> A.DC.	III
<i>Asparagus racemosus</i> Wild	II
<i>Roscoeia tibetica</i> Batalin	III
<i>Alysicarpus</i> sp.	I
<i>Paris Polyphylla</i> SM	III
<b>12. Skin Infection</b>	<b>Rank</b>
<i>Rubia majith</i> Roxb.	III
<i>Bergenia ciliata</i> (Haw.) Stern.	II
<i>Pyrosodamollies</i> (Kunde) Ching	III

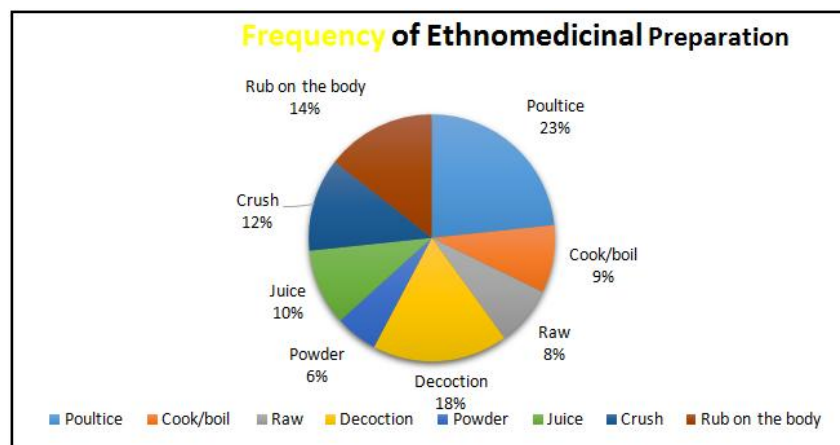
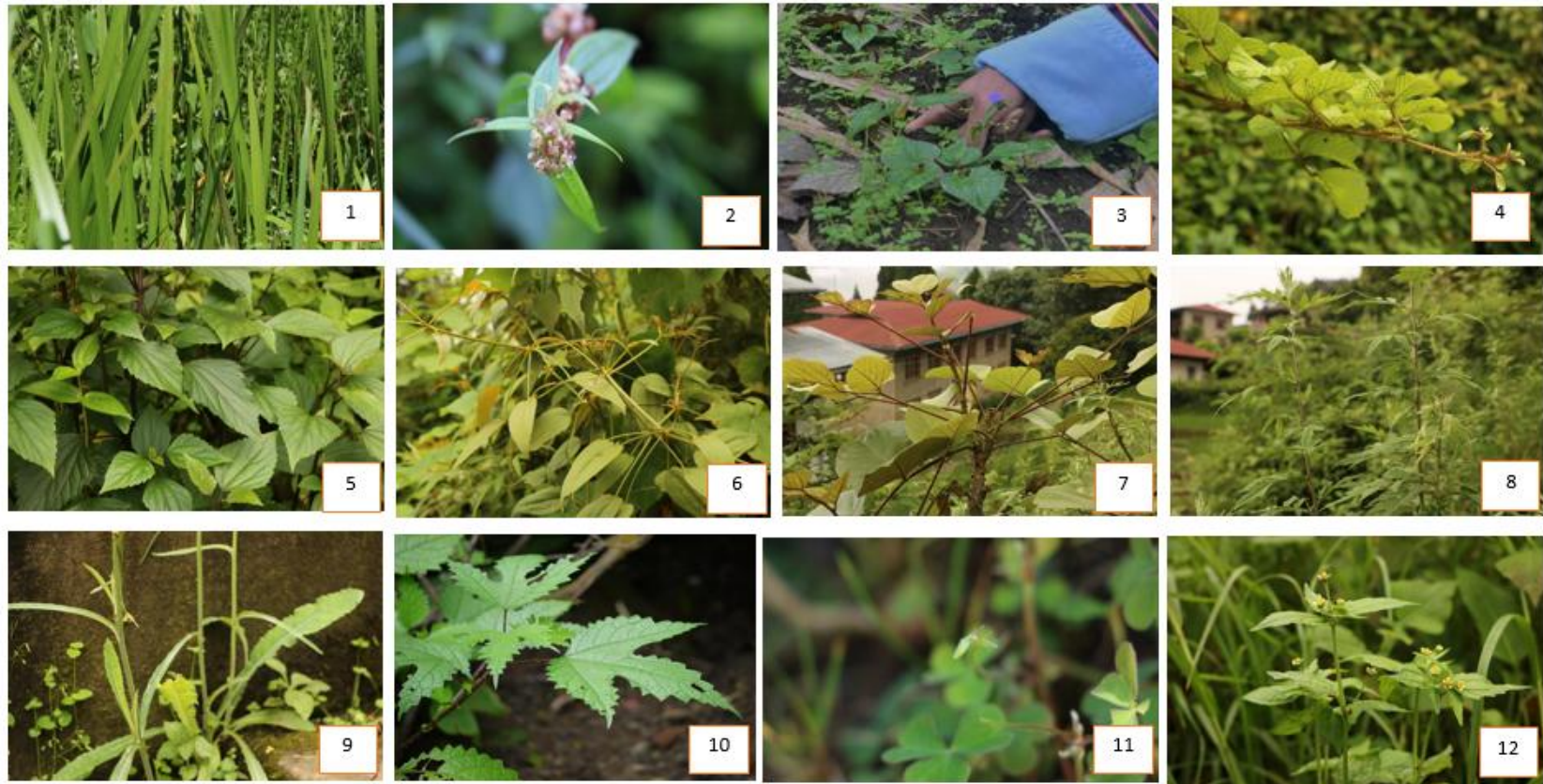


Fig. 2. Frequency of ethno medicinal preparation





**Fig. 3. Medicinal Plants (1) *Acorus calamus* L. (2) *Euphorbia hirta*. (3) *Houttuynia cordata* Thunb. (4) *Rubus ellipticus*. (5). *Ageratina adenophora*(Spreng.) R.M.King & H.Rob. (6) *Rubia majith* Roxb. (7) *Erythrina arborensceus* Roxb. (8) *Artemisia vulgaris* L. (9) *Sonchus asper*. (10) *Girardinia diversifolia*(Link) Friis. (11). *Oxalis corniculata* L. (12) *Galinsoga parviflora* Cav.**



**Fig. 4. Medicinal Plants. (13) *Bergenia ciliate* (Haw.) Sternb. (14) *Leucas ciliate* Benth.(15) *Plantago asiatica* (Wall.) Z.Yu Li. (16) *Aconogonon Molle* (D.DON) H.. (17) *Commelina benghalensis*. (18) *Nephrolepis cordifolia* (L.) K. Presl. (19) *Molineria capitulate*. (20) *Centella coriacea*. (21) *Pteris* sp. (22) *Justicia adhatoda* L. (23) *Dioscorea bulbifera* L. (24) *Ricinus cummunis* L.**





**Fig. 5. Taktse Nangmen (Medicinal) Garden. (2&5). *Butea parviflora* Roxb, and *Phyllanthus emblica* Linn. (Exotic from lower elevation)**  
(1, 3, 4, 6, 7, 8, 9, 10) Native Medicinal plants

#### 4. CONCLUSION

Our finding specify that, there is very good ethno medicinal knowledge still prevailing in the traditional society of central Bhutan particularly among the traditional healers and elderly persons without any scientific knowledge. The some specimens collected were domesticated by the people to conserve the species due to more threat in frequent collection for treating. Therefore, need for documenting TK on ethno-medicines used by local healers could prove to be method to preserve our plant diversity and addition of new plant species of therapeutic potential in Bhutanese Traditional Medicine System. Additionally it could be useful for carrying phytochemical studies in future and to add on to list of Bhutanese traditional medicine.

#### CONSENT

Prior consent was sought from each key informant before interview and they are properly acknowledged.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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