Quantitative analysis and documentation of women's ethnomedical knowledge in Western West Bengal, India

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Research

Abstract

Background: Indigenous women in every tribal society of "Jangalmahal" area of Western West Bengal are truly accredited for restoration, transmission and preservation of their ethnomedicinal knowledge like ethnomedical men but their knowledge is not yet recognized and documented for their holistic use, evaluation and validation. This research focuses on the knowledge and perception of ethnomedicinal plants and indigenous therapeutic practices of common indigenous women and women traditional healers.

Methods: A cross-sectional survey was executed among 400 tribal women and 10 women ethnomedical healers in 10 remote forest villages selected by stratified random sampling procedure of Western West Bengal. The women healers mainly identify the medicinal plants and provide the information about importance, plant parts used, mode of administration of medicines, preferred medicinal plants. The tribal women respondents provide the information about the effectiveness of these medicines and validation of the knowledge provided by the ethnomedicinal women healers. A semi-structured and open-ended questionnaire schedule was employed for calculation of descriptive statistical techniques like CPP, ICF, FL, UV, IV, CSI, PCC.

Results: Altogether 60 plant species of 34 families have been identified by women traditional healers used for 38 ethnomedicinal preparations for curing 22 types of diseases. Women healers mostly practice oral administration of ethnomedicines (72%). Multiple medicinal plants were cited against particular ailments, and mixing of two or more different medicinal plants (38%) against a single ailment was reported.

Conclusions: The documented ethnomedicinal knowledge of the common indigenous women and women healers from this study can be used to support the country's primary health care system of human and livestock. It will be helpful in future studies to validate bioactivity of selected medicinal plants as well as to increase their acceptability in health care systems both nationally and internationally.

Keywords: Indigenous women, Jangalmahal, Ethnomedicinal plants, Therapeutic practices, Stratified random sampling, Descriptive statistics Women traditional healers, Diseases, Ethnomedicine, Health care.

Background

Indigenous women are truly accredited for restoration transmission and preservation of their tradition culture and knowledge (Agarwal, 1992; Gaard & Gruen, 1993; Merchant, 2005; Mies & Shiva, 1993; Shiva, 1988). In the scenario of ethnomedical knowledge they are not the exceptions. It is now proved that throughout the history, they are working as the safeguard of Mother Nature, society and family. IUCN (2011) also works with the collaboration of its members of "Indigenous People's Organization" for the promotion of leadership of indigenous women for conservation and management of natural resources.

The study of natural resources which are traditionally used to cure or manage ailments in diverse ethnic culture is collectively termed as "Ethnomedicine" (Kayani *et al*.2015). Scientifically, Ethnomedicine is the study of indigenous medicine of tribal people, their knowledge and practices that have merely passed over verbally for centuries and evolved since the time immemorial. This practice is a complex and multi-disciplinary system constituting the use of plants, spirituality and the natural environment and has been the source of healing for people for millennia (Quinlan, 2011). Now it is recognized as a branch of medical anthropology which deals with the ailments of human and animals as per the traditional treatments of particular ethnic groups (Blaut, 1979; Schultes& Hoffmann, 1987; Sargent& Johnson, 1996). Each and every community has their own specific mode of medicinal culture.

Indigenous knowledge is the traditional identity of, ethnic culture, traditions and heritage. It should be respected, preserved and cheered by not only by the governments but also all the people of the earth. (UNESCO, 1999; UN, 2019). This knowledge provides the harmony between man-nature relationships and natural services for sustenance of life. It is an intergenerational, active, total knowledge connected with real experience (Battiste, 2005). They restore and transmit their traditional culture and knowledge in orally and inscriptively (Basso, 1996; Morphy, 1995).

Indigenous women have played triple role as a woman, as indigenous and as environmental protector (UNEP,2022). They preserve this biodiversity of any ecosystem; pass their traditional indigenous knowledge from generation to generation. However, they are often brutally blamed, harassed, tortured and even killed for protecting their surrounding natural resources, culture, heritage and traditions (UNEP, 2022).

Since the ancient times, people of India have been utilizing herbal medicines. In the modern period the so-called civilized people use modern medicines which are seemed to be pure and standardized by quality control components, but the indigenous people are dependent on this ethnobotanical medicine with great faith (Tolossa *et al*, 2013). With rigorous research the ethnomedicinal herbs have now become one of the most appreciable treasures used not only by the pharmaceutical companies but also for nature therapy and even cosmetics. As per the record of WHO, from 94 plant species out of estimated 250000 flowering plants, 122 type compounds were extracted and 80 percent of these were related to ethnomedicinal purposes. (Fabricant & Farnsworth, 2001).

"Ayurveda" is the Indian traditional medicinal knowledge emphasizing the balance between nature-body-mind. Ayurveda mainly believe the medicinal herbs used by the indigenous communities and herbal treatments using plant parts. Beside Ayurveda, the other ethnic health care system such a Yoga, Unani, Siddha and Homeopathy are collectively designated as AYUSH has now come under a specific Ministry. Today, this AYUSH system of health care is running parallel with the modern health care systems in India by establishing separate medical colleges and hospitals.

Western Bengal is tribal dominated area with 11.3% (Census, 2011) of Indian population. As the family head, tribal women usually perform as the manager of all aspects of the family - food, shelter, health, education etc. Throughout the literature survey the authors could not find any survey on the medical knowledge of women. However, actually women have profound and accurate knowledge about the ethnomedicinal plants of their surrounding places because they are close to nature rather their male counterparts. The therapeutic uses of these plants are also determined by these women. Thrusts are always given on the ethnomedical "men", their medicines, practices, diseases, and medical care but most of the cases these medicines are prepared by female members.

The authors feel that the knowledge of indigenous women is scientific and technical and this knowledge should be valued and archived for preservation of biodiversity as well as keeping this identity alive. Only this knowledge can support for the resilience of family, society and nature in the time of challenge and crisis(Avilez *et al.* 2016).

No research has been found on the ethnomedicinal knowledge of recognized women traditional healers who have been found in every tribal village more or less one in number.

In this research the thrust has been given on the crucial knowledge of indigenous women regarding ethnomedicinal plants, their therapeutic uses, preparations, cultural significance and values.

Total numbers of scheduled tribe population in West Bengal are 5296953 (Census, 2011) under 40 distinct tribal communities compared to 645 indigenous tribes in India having precious knowledge and wisdom of wild plants and animals for curing illness. Most of this indigenous knowledge is undocumented and verbally delivered from generations to generations. Most frequently it has been seen that after the unfortunate death or the absence of potential successor of the traditional healer, the traditional ethnomedicinal knowledge is lost forever. This is an irreplaceable loss of this knowledge not only for that community but also for the whole world.

In West Bengal although, the tribal families are all female headed but the ethnomedicinal practice is done mainly by the male members. It doesn't mean that there are no female practitioners but they are not so well known or recognized. After one year of rigorous search of many forests embedded tribal villages, the authors identified 10 female ethnomedicine practitioners in Western Jangalmahal area of West Bengal. The authors are able to uncover such astonishing insights of ethnomedicinal health care system which were not yet documented in anywhere by establishing personal relationship.
So, this present research is confined to only the documentation and quantitative analysis of the crucial knowledge of indigenous women regarding ethnomedicinal plants, their therapeutic uses, preparations, cultural significance and values in a very local level scale.

Here we have not analyzed any comparison between the knowledge of male and female regarding the knowledge about ethnomedicinal plants and ethnomedicine. We have documented only the knowledge of females-both traditional healers and common villagers.

The leading author has been working for several years on knowledge and wisdom of ethnomedicine among indigenous people at local grass root level. As the head of the family in Indian tribal society, every woman plays a crucial role as mother, wife, and daughter who is actually taking care of health, diagnosing the illness and implementing the first treatment (Doyal, 2005; Menendez, 2003). Not only that they have the responsibility to make sure about the family economy. As they are very close to nature rather than males, they have profound knowledge about the wild as well as cultivated medicinal herbs surrounding their habitat.

Materials and Methods

This present work was completely exploratory field-based household level primary data base research. Only few secondary level demographic and forest statistics were employed for the general information about the respondents and the study area. The study area map has been prepared by composing administrative maps on Google earth image using Arc GIS software 10.3 versions.

Ten villages (Table 1) were selected for intensive field study. These villages had been selected through stratified random sampling by considering i) remoteness, ii) presence of forest cover, iii) tribal dominance, iv) Poor economy and v) the presence of tribal woman healer. The people of these tribal dominated, remotely located, and poor economy villages were so marginalized in this region that they did not have the access to minimum needs of livelihood particularly health facilities. All these ten villages have one or more tribal woman healers practiced as medical person for both people and livestock. The main target groups were the scheduled tribe women. Total numbers of respondents were 410. Among 410 respondents, 400 are common tribal women and10 were identified women traditional healers. Among 400 common tribal women, 10 were selected as key informants for ten villages. Here, the key informants were the tribal female members of local rural governance who had profound knowledge about the village. They helped the authors for identifying the women healers. These 400 women had been selected as equal proportion that was 40 for each village considering all education and economy level.

The perception survey had been done by following purposive and snowball techniques with the help of open ended and semi structured questionnaire survey schedule by personal interviewing and group discussion. Identification and sample collection of ethnomedicinal plants (Cunningham, 2001) were done by the active help of women traditional healers as well as common tribal women in the nearby forests of the study villages. Here we thrust only the perception of tribal women.

The field visits were executed in all three monsoonal phases such asi) pre monsoon period- 14th April to 17th April 2022, ii) monsoon period- 22nd August to 26th August 2022, iii) post monsoon period- 3rd December to 9th December 2022 keeping in mind the growing season of plants.

The analyses of information were done by employing descriptive statistical techniques like Use Value (UV), Informant Consensus Value for Plant Part (CPP), Importance Value (IV), Informant Consensus Factor (ICF/Fic), Fidelity Level (FL), Cultural Significance Index (CSI), Preference Ranking method (PR) and bi-variate Regression Analysis with Pearson's Correlation Coefficient (PCC) to analyze of the highest use value of plant parts, the effective therapeutic value, high level of healing potentiality, consensus value of plant parts, most preferred medicinal plants, traditional knowledge about those medicinal plants which will be used to cure particular type of disease, mode of preparation, administration of medicines and overall the cultural significance of each medicinal plant along with economic and socio-cultural profile of informants, will be the outcomes of this research. The annotation of the formula of these methods is presented in the Fig. 1.

Sixty (60) ethnomedicinal plants were collected with the permission of Chandabila forest Beat Officer and preserved in separate packets by pasting corresponding voucher numbers. These plants are arranged accordingly the voucher number with their botanical name, genus and authorities as *Tephrosia purpurea* L. etc. (Supplementary material)

All plants were identified and double checked by women traditional healers of each village. These samples were verified from www.worldfloraonline.org. The collected plant samples are carefully preserved accordingly to their voucher number as per convenient rule (Jain & Rao, 1977) in herbarium center at Midnapore College (Autonomous) for future references. It was very much difficult to gather information about the preparation of ethnomedicine from 4 traditional healers. They claimed that these medicines are the blessings of God and they saw these preparations in their dreams.

Study area

West Bengal is that strategic state in India that extends from the mighty Himalaya in the north and charismatic Bay of Bengal in the South covering the international boundary with Bangladesh, Nepal and Bhutan. Western Bengal is mainly the lateritic, undulating, forest covered, plateau region with domination of scheduled tribe population.

Nayagram Community Development (CD) block was selected for study due to its vast natural resources in respect to plants with medicinal importance and also for the Medicinal Plant Garden which was founded by the 'National Medicinal Plant Board' at the Murakati village under Patina Forest Beat of Chandabila Forest Range in the year 2016.

The area is dry and soil is red lateritic. Prevalent climate of the area is tropical monsoon type with an annual rainfall around 1615 mm. The natural forest is dry deciduous**sal** (*Shorearobusta*C.F.Gaertn.) dominated along with good potential of medicinal plants.

Main composition of the human resource in the study area is occupied by tribal people. The communities are Santhals, Mundas, Lodhas, Bhumijs, Oraon and Kheria. All the people are mostly forest dependent but some are associated with cultivation though others collect fibers, flosses, medicinal plants from forests and waste lands and fishes from river Subarnarekha nearby.

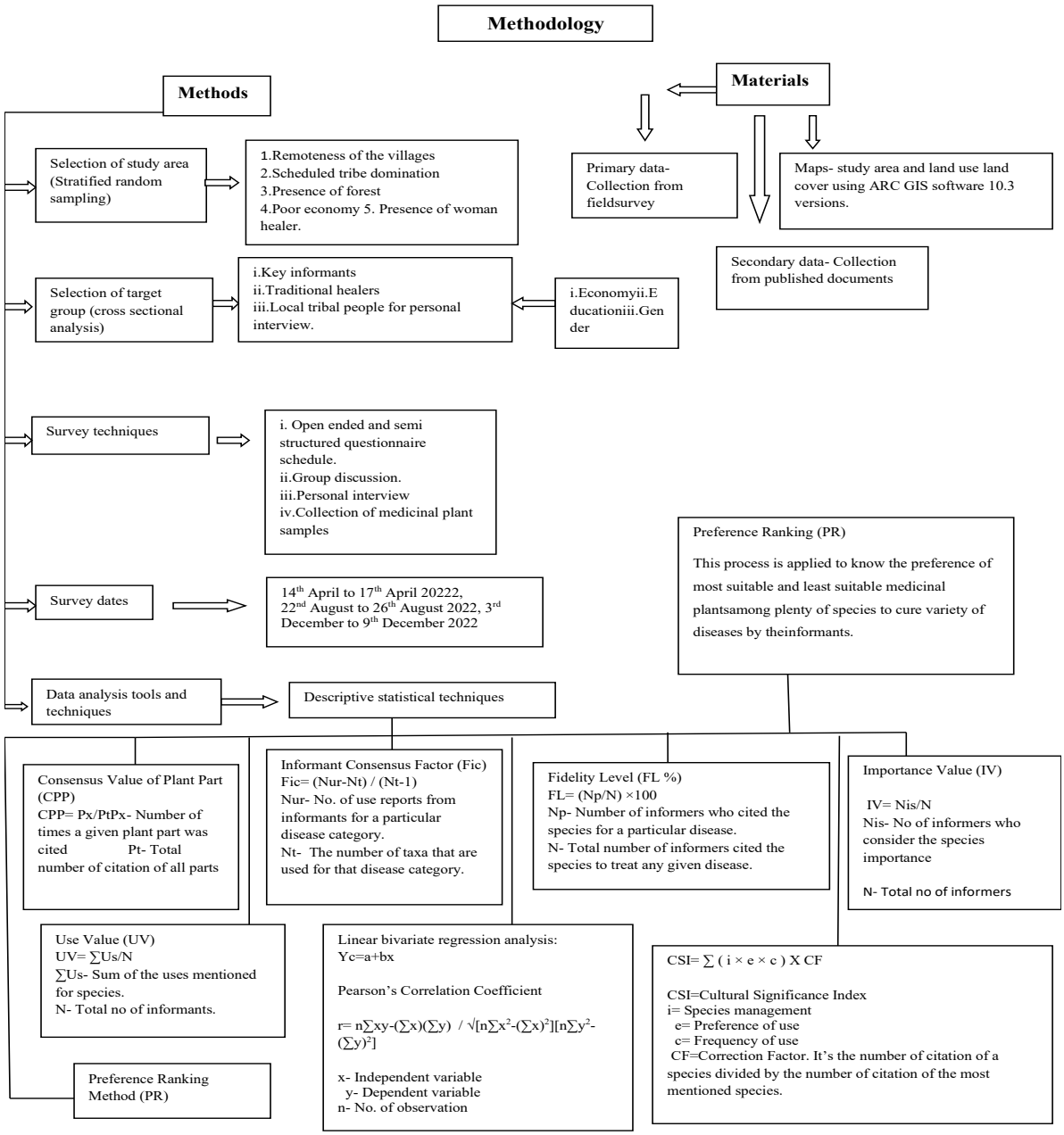

Figure 1. Methodology

Brief demography, literacy and working status of the people of ten selected villages are presented in the Table 1. All the selected ten villages (Fig. 2) have high percentage of scheduled tribe (ST) population, low literacy rate, low rate of main workers (as per the Census of India, 2011 who worked for 183 days/year or 6 months or more/year), and very high rate of marginal (who worked for less than 6 months/year) and non-working population (who did not at all work). These villages are left behind in terms of educational and working opportunities.

Forty common tribal women of each village were selected across different economic and educational classes for the perception survey. Each of the ten villages had only one woman traditional healer. Actually, women traditional healers do not exist in every village. Therefore, those villages were selected where at least one women healer is present.

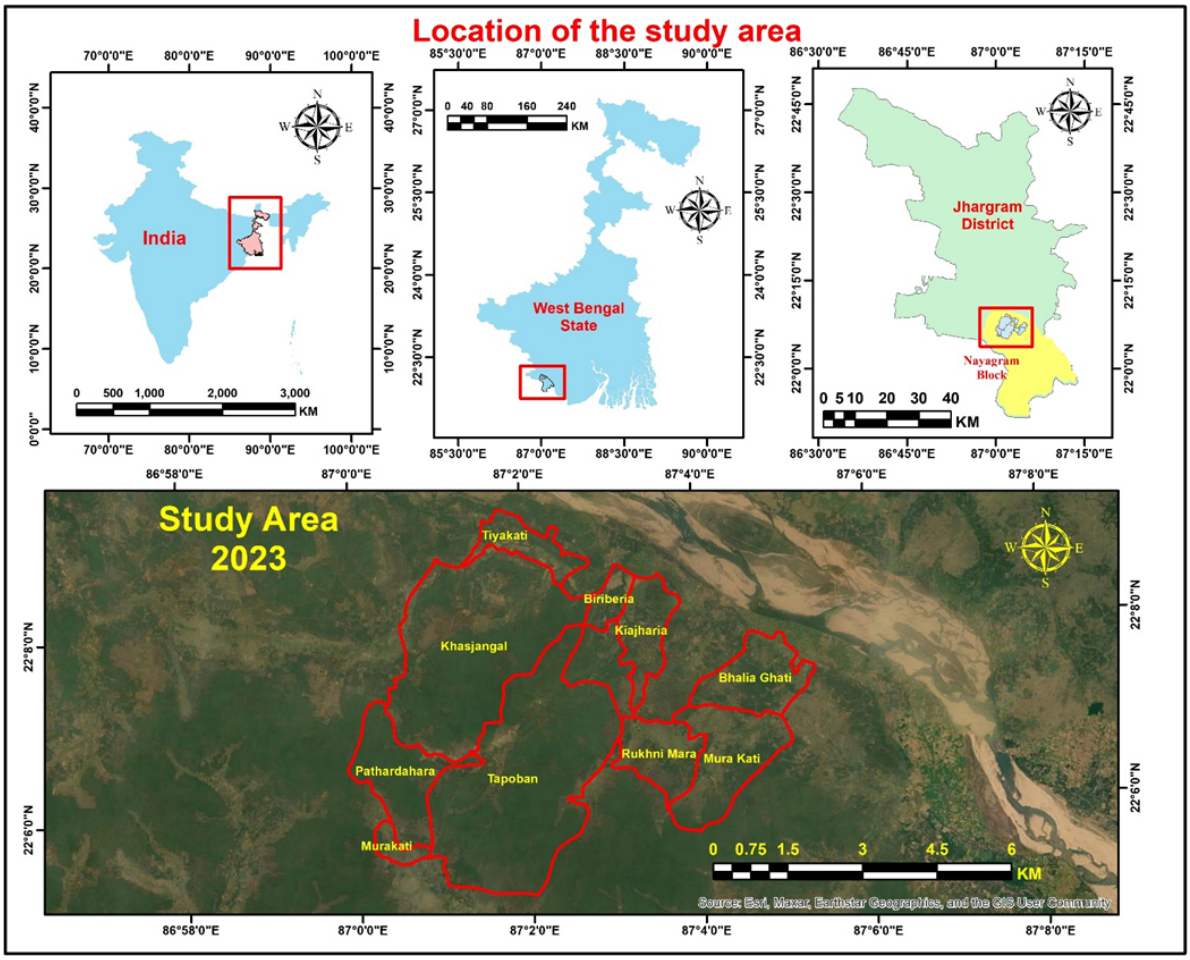

Figure. 2 Location of the study area

Result and Discussion

Various quantitative and qualitative studies on ethnomedicine and documentation of ethnomedicinal plants were carried out in various fields (Caunca&Balinado, 2021; Hoffman & Gallaher, 2007), but no research highlights the perception of tribal women who are actually responsible for all well-being of their families and also tribal women healers who actually prepared the ethnomedicines and determine the doses.

Mother Nature has her own unique biotic reserve to protect mankind being from their sufferings. People have to choose right one from this treasure to rehabilitate them without harming her. Medicinal herbs are the greatest gift of nature for surviving from diseases and sufferings. (Fransworth&Soejarto, 1991; IUCN, 2022)
Causes behind the use of ethnomedicine

First of all, we have to know about the necessity of ethnomedicine for the treatment of human and livestock. In the following Table 2, we have clearly mentioned the economic status, faith on ethnomedicine of the respondents and the availability of the modern health care facilities.

Table 1. Demography, literacy and working status of informants. Source: Census of India, 2011

Selected Villages	JL No	Village code	Area (Hectares)	Total population	Forest cover (Hectares)	No. of Respondents	ST population (%)	Literacy Rate (%)	Main worker (%)	Marginal worker (%)	Non-worker (%)	Dominant ethnic group	Total respondents*
Biriberia	033	340847	64.9	501	8	40	52.5	54.3	1.2	30.9	67.9	Santhal	41
Pathardahara	030	340844	297.7	226	110.4	40	26.1	75.7	35.0	11.9	53.1	Santhal	41
Murakati	028	340842	61.4	253	6	40	49.8	65.6	54.9	1.2	43.9	Santhal	41
Tapoban	031	340845	1171.6	773	945	40	93.3	37.9	54.1	0.8	45.1	Santhal,Munda	41
Tiyakati	010	340824	140.4	282	20.2	40	74.5	48.6	5.3	42.6	52.1	Santhal	41
Khasjangal	053	340825	1029.6	471	902.1	40	97.5	26.1	20.4	39.7	39.9	Santhal, Bhumij	41
BhaliaGhati	057	340871	237.2	1051	60.7	40	83.8	47.1	32.1	33.7	34.3	Santhal, Kheria	41
Mura Kati	056	340870	318	482	121.4	40	76.6	56.6	22.4	35.1	42.5	Santhal	41
Kiajharia	039	340853	173.93	325	20.2	40	75.4	44.0	51.4	2.5	46.2	Santhal, Sabar, Lodha	41
Rukhnimara	040	340854	192.24	629	8.9	40	55.5	52.3	54.1	2.2	43.7	Santhal, Oraon	41
*40 tribal women respondents and 01 women traditional healers of each village													

Table 2. Economy, education and health care status

Name of the villages	Economic status of respondents (%)				Faith on ethnomedicine (%)	Health care status	
	<₹10000	₹ 10000-₹ 20000	₹ 20000-₹ 30000	>₹30000		Distance to nearest health centre (km)	Distance to district hospital (km)
Biriberia	49	37	12	2	91	8	80
Pathardahara	31	51	14	4	78	4	63
Murakati	38	44	15	3	83	3.5	60
Topoban	48	30	11	1	96	4.5	66
Tiyakati	43	37	18	2	82	7.5	80
Khasjangal	53	38	09	00	98	5	65
Bhalia Ghati	47	37	14	2	81	3.5	85
Mura Kati	35	48	16	1	84	4	80
Kiajharia	41	43	14	2	83	8	80
Rukhni Mara	40	39	18	3	79	13	80

Source: Field survey

There are three main causes came out from the field survey behind the dependency on ethnomedicine. These are i) economy, ii) availability of health care facilities and, iii) Faith and confidence on ethnomedicine. Due to the poor economy, they cannot afford the modern medicines and the travel cost to go to the district hospital. These medicines are cheaper and free from side effects. Both the healers and common women were very much confident regarding the fact of side effects. The primary health centers are also far away from their villages (2-10 kms). Particularly in the night time and in medical emergency they have to depend on these ethnomedicines. It has also been evident that the common respondents have great faith on these medicines. They feel these as their own medicines.

Among the ten women traditional healers listed above (Fig. 3), Parvati Kisku, Boro Baske, Fulki Saren, Dumni Kisku are independent professional ethnomedical practitioners. Others practiced with their husbands. These female healers are also engaged in collection of medicinal plants from forests and surrounding areas, preparation the medicines. They have profound knowledge about ethnomedicinal issues like or more than their male counterparts.

1. a

1. b

1. c

1.d

1.e

1.f

1.g 1.h 1.i 1.j

Figure 3 List of ten indigenous women healers of studied ten villages
1.a: Parvati Kisku, age 43, Biriberia village; 1.b: Kakoli Murmu, age 48, Pathardahara village 1.c: Boro Baske, age 65, Murakati village 1.d: Chaitani Hansda, age 51, Topoban village 1.e: Jadumoni Tudu, age 42, Tiyakati village 1.f: Gouri Mandi, age 54, Khasjangal village 1.g: Churki Besra, age 61, Bhalia Ghati village 1.h: Sunarami Mandi, age 57, Mura Kati village 1.i Fulki Saren, age 46, Kiajharia village: 1.j: Dumni Kisku, age 76, Rukhni Mara village

Every indigenous people have their own specific cultural entity. In the present study areas, they possess particular knowledge about ethnomedicinal plants and ethnomedicines. They have great faith on these medicines. They invariably use these for the ailments of human and their livestock. The women traditional healers mainly identify the medicinal plants and provide the information about importance, plant parts used, mode of administration of medicines, preferred medicinal plants. The indigenous women respondents provide the information about the effectiveness of these medicines and validation of the knowledge provided by the ethnomedical women. The detail list of the medicinal plants with their vernacular name, scientific name, genus, family, field photograph, plants parts used and diseases to be cured as per the response of informants has been provided in supplementary material.

Quantitative analysis of ethnomedicinal plants

Women traditional healers had identified 60 ethnomedicinal plants of 34 families which have the capacity for curing more than one disease. The detail quantitative analysis of these plants along with their importance value, use reports and fidelity level cultural significance index are given in the following Table 3.

Importance Value (IV)

To know the informant's perception regarding the relative importance of any plant species, the IV method is adopted (Friedman *et al.* 1986). Among 60 plant species the IVs range from 1.00 to 0.14 (Table 3). The highest IV value has been found in *Phyllanthus emblica, Curcuma longa,* this high value is the indicator of the high reliance of the traditional women healers on these plants. These are very important for effective treatment.

Use Value (UV)

Use value determines the significance of each and every plant as per the number of use report by the total informants surveyed (Phillips *et al.* 1994; Prance *et al*. 1987). In Table 3 each use value of all collected medicinal plant was determined for the assessment of the commonness in use report in the whole surveyed area. The value ranges from 0.11 to 0.98. The highest value indicates the high informant use values of a plant for preparation of herbal medicine. The high UV plants are *Curcuma longa (0.98) Ocimumtenuiflorum (0.97),Nyctanthes arbour-tristis (0.96), Azadirachta indica, (0.95), Nephelium lappaceum(0.90)* (Table 3). These high used value plants indicate their high utilization, importance and availability. Almost all informants know the name of these plants and their utilizations. Among these above plants *Nyctanthes arbour-tristis Curcuma longa, Ocimumtenuiflorum*are cultivated and*Azadirachta indica, Nephelium lappaceum* are wild in nature. About 36 plant species are used to treat more than 4 diseases each whereas 12 species are used to treat only one disease each. It was also noticed that the medicinal plants which are used repetitively are more biologically alive. These plants are needed to be preserved for further scientific investigation in future.

Table 3. Calculation of Importance value (IV), Use value (UV), Fidelity level (FL) and Cultural Significance Index (CSI) as per the consensus of tribal women.

Voucher no.	Scientific name	IV	UV	FL (%)	Cultural Significance Index (CSI)					
					Management (i)	Preference (e)	Frequency (c)	i x e x c	Correction Factor(CF)	CSI
MP 1	*Andrographis paniculata* (Burm.f.) Wall	0.7	0.87	82	1	2	2	4	0.76	3.04
MP 2	*Hygrophila auriculata* (Schumach.) Heine	0.5	0.85	85	1	2	2	4	0.49	1.96
MP 3	*Justicia adhatoda* L.	0.84	0.75	88	1	2	2	4	0.82	3.28
MP 4	*Acorus calamus* L.	0.44	0.62	62	1	1	1	1	0.31	0.31
MP 5	*Aloe vera* (L.) Burm.f.	0.6	0.51	92	2	2	2	8	0.94	7.52
MP 6	*Achyranthes aspera* L.	0.4	0.45	52	1	1	1	1	0.28	0.28
MP 7	*Mangifera indica* L.	0.56	0.21	82	1	1	1	1	0.34	0.34
MP 8	*Spondias mombin* L.	0.58	0.22	69	1	1	1	1	0.38	0.38
MP 9	*Hemidesmus indicus* (L.) R.Br. ex Schult.	0.96	0.91	100	2	2	2	8	0.98	7.84
MP 10	*Holarrhenapubescens* Wall. &G.Don	0.64	0.57	78	1	1	1	1	0.48	0.48
MP 11	*Holarrhena pubescens* Wall. & G. Don	0.38	0.29	62	1	1	1	1	0.41	0.41
MP 12	*Finlaysonia obovata* Wall.	0.34	0.22	26	2	1	1	2	0.22	0.44
MP 13	*Carissa carandas* L.	0.6	0.66	82	1	1	1	1	0.54	0.54
MP 14	*Borassus flabellifer* L.	0.42	0.26	51	1	1	1	1	0.28	0.28
MP 15	*Agave americana* L.	0.84	0.74	98	1	1	2	2	0.74	1.48
MP 16	*Blumealacera* (Burm. f.) DC	0.34	0.45	58	1	1	2	2	0.42	0.84
MP 17	*Enydra fluctuans* Lour.	0.58	0.45	72	1	1	2	2	0.48	0.96
MP 18	*Elephantopus scaber* L.	0.56	0.15	58	1	2	2	4	0.58	2.32
MP 19	*ceiba* var. ceiba A.Robyns	0.2	0.49	32	1	1	1	1	0.31	0.31
MP 20	*Terminalia arjuna* (Roxb. ex DC.) Wight &Arn.	0.42	0.82	65	1	1	1	1	0.22	0.22
MP 21	*Terminalia bellirica* (Gaertn.) Roxb.	0.74	0.6	92	1	2	2	4	0.72	2.88
MP 22	*Terminalia chebula* Retz.	0.76	0.74	89	1	2	1	2	0.62	1.24
MP 23	*Coccinia grandis* (L.) Voigt	0.32	0.41	68	1	1	1	1	0.34	0.34

MP 24	*Shorea robusta* C.F.Gaertn.	0.42	0.80	68	1	1	1	1	0.21	0.21
MP 25	*Diospyros melanoxylon* Roxb.	0.56	0.65	77	1	1	1	1	0.48	0.48
MP 26	*Ricinus communis* L.	0.8	0.7	92	1	2	2	4	0.78	3.12
MP 27	*Tragi ainvolucrata* L.	0.42	0.34	52	1	1	2	2	0.38	0.76
MP 28	*Cajanus cajan* (L.) Millsp.	0.24	0.67	39	2	1	1	2	0.28	0.56
MP 29	*Abrus precatorius* L.	0.84	0.21	98	2	2	2	8	0.84	6.72
MP 30	*Albizia lebbeck* (L.) Benth.	0.42	0.5	63	1	1	1	1	0.38	0.38
MP 31	*Butea monosperma* (Lam.) Taub.	0.78	0.7	80	2	2	2	8	0.72	5.76
MP 32	*Cassia fistula* L.	0.6	0.45	73	1	2	1	2	0.53	1.06
MP 33	*Senna auriculata* (L.) Roxb.	0.38	0.20	56	1	1	1	1	0.17	0.17
MP 34	*Tephrosia purpurea* L. Piers	0.14	0.13	12	1	1	1	1	0.17	0.17
MP 35	*Vachellia nilotica* (L.) P.J.H. Hurter & Mabb.	0.32	0.26	58	1	1	1	1	0.32	0.32
MP 36	*Curculigo orchioides* Gaertn.	0.36	0.73	42	1	1	1	1	0.32	0.32
MP 37	*Leucas mollissima* Wall.	0.12	0.15	19	1	1	1	1	0.13	0.13
MP 38	*Ocimum tenuiflorum* L.	0.8	0.97	100	1	2	2	4	0.82	3.28
MP 39	*Vitex negundo* L.	0.66	0.55	84	1	1	1	1	0.42	0.42
MP 40	*Careya arborea* Roxb.	0.78	0.68	92	1	1	1	1	0.65	0.65
MP 41	*Hibiscus rosa-sinensis* L.	0.56	0.77	78	1	1	1	1	0.42	0.42
MP 42	*Azadirachta indica* A.Juss.	0.84	0.95	100	1	1	2	2	0.52	1.04
MP 43	*Moringa oleifera* Lam.	0.3	0.42	21	1	2	2	4	0.28	1.12
MP 44	*Nyctanthes arbor-tristis* L.	0.62	0.96	65	1	1	1	1	0.58	0.58
MP 45	*Oxalis corniculata* L.	0.5	0.52	68	1	2	2	4	0.38	1.52
MP 46	*Millettia pinnata* (L.) Panigrahi	0.3	0.14	33	1	1	1	1	0.22	0.22
MP 47	*Phyllanthus emblica* L.	1	0.65	100	1	2	2	4	0.92	3.68
MP 48	*Chrysopogon aciculatus* Trin.	0.62	0.24	71	1	1	1	1	0.48	0.48
MP 49	*Paederia foetida* L.	0.58	0.6	71	1	1	2	2	0.62	1.24
MP 50	*Aegle marmelos* var. mahurensis Zate	0.74	0.36	95	1	1	1	1	0.64	0.64
MP 51	*Nephelium lappaceum* L.	0.82	0.9	100	1	1	1	1	0.81	0.81
MP 52	*Schleichera oleosa* (Lour.) Oken	0.44	0.7	94	1	1	1	1	0.28	0.28
MP 31/53	*Madhuca longifolia*J .F.Macbr.	0.64	0.55	68	1	1	1	1	0.54	0.54
MP 54	*Datura stramonium* L.	0.64	0.32	68	1	1	1	1	0.46	0.46
MP 55	*Solanum surattense* Burm.f.	0.64	0.65	82	1	2	1	2	0.52	1.04

MP 56	*Holoptelea integrifolia* (Roxb.) Planch.	0.36	0.36	62	1	1	1	1	0.28	0.28
MP 57	*Holoptelea integrifolia* (Roxb.) Planch.	0.22	0.35	48	1	2	1	2	0.42	0.84
MP 58	*Ampelocissus latifolia* (Roxb.) Planch	0.6	0.57	41	2	2	2	8	0.59	4.72
MP 59	*Cissus quadrangularis* L.	0.62	0.32	88	2	1	1	2	0.61	1.22
MP 60	*Curcuma longa* L.	1	0.98	100	2	2	2	8	0.94	7.52

Source: Field survey

Fidelity Level (FL %)

The fidelity level is calculated to understand the preferred medicinal herb for a particular disease category by the informants (Kushwaha *et al*. 2018; Mahmood*et al.* 2013). To see the use value as well as relative preference of plant species by local people, the FL will be measured (Seid &Aydagnehum, 2013). In this research, women respondents identified 60 plant species which have 100 % to 12% fidelity level (Table 3). Maximum FL value has been observed for *Ocimumtenuiflorum, Azadirachta indica, Phyllanthus imblica, Curcuma longa, Hemidesmus indicus, Nephelium lappaceum* plants and the lowest FL value has been observed for *Tephrosia purpurea L. Piers* (12%), *Leucas mollissima Wall* (19%) plants This maximum FL value meant the high healing potentiality of plants against these corresponding ailments. Herbs of highest FL value could be aimed to promote phytochemical exploration to discover the bioactive compounds which are accountable for their high healing potentiality. Among these high Fl value plants*Hemidesmus indicus, Nephelium lappaceum,Azadirachta indica* are wild in nature and*Ocimumtenuiflorum,Phyllanthusimblica, and Curcuma longa* are cultivated. These plants have to be conserved through both ex-situ and in-situ methods for future necessity because there may be a chance of deterioration of these plants.

To validate the perception of informants about the significance of use of medicinal plants the bivariate regression analysis with scatter diagram is employed between Importance Value (IV) and Fidelity Level (FL%) in the following (Fig. 4).

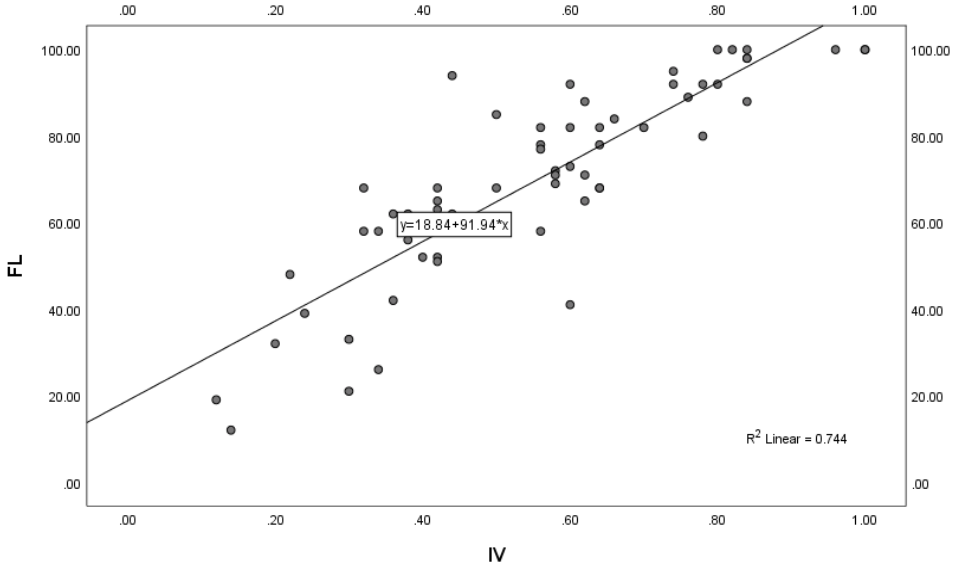

Figure. 4 Bivariate Regression analysis between IV (Importance Value) and FL (Fidelity Level in %)

Pearson's coefficient correlation has been calculated between importance value (IV) and fidelity level (FL %). The correlation value of 0.862 shows a high positive correlation between that section of informants who consider species as significantly important and percentage proportion of informants asserting the use of a particular plant for the same major purpose. This high correlation value claims their use patterns across the ethnomedicinal plant species are significantly matched. The determination (r^2) value of 0.744 clearly expresses that around 74% variation in importance value can be explained by that of fidelity level. These findings are clearly depicted in the scatter diagram (Fig.4)

The summery statistics of the relationship between Importance Value (IV) and Fidelity Level (FL%) are given in the following (Table 4).

Table 4. Summery statistics

Statistical parameters	**Values**
Mean	0.5567
Standard Deviation	0.21342
Correlation (r)	0.862
Determination (r^2)	0.744
t-test	12.977
P- value(Two sided)	0.000
P- value (One sided)	0.000
Degree of freedom	58
No of observation	60

Cultural Significance Index (CSI)

Turner (1988) first introduced this method for the assessment of cultural significance of the use of plants in anthropocentric approach. This index is used to calculate the overall usefulness of a total plants i.e. food, ceremony, construction, medicine etc. This very present research only highlights on the medicinal use of plants as per the belief and knowledge of local indigenous people and use as ethnomedicine. Therefore, this method is used for medicinal use only (Diliarosta*et al.* 2021). This method is based on 5-point scale weighted ranking of various factors determined by researcher depending on the views of informants. This subjective method was assigned by 0, 0.5, 1, 1.5, 2 score values as per use value. Later on, this method was modified by Silva *et al.* (2006) and Stoffle *et al*. (1990). Turner adopted three variables such as management of species (i), preference for species use (e) and frequency of species use (c). It considers the magnitude of informant's consensus allowing the researcher to mention the knowledge of each and every informant in an objective manner. In this research the method preferred by Silva *et al*. was adopted. They adapted one important factor which is Correction Factor (CF) for reduction of subjectivity and sensitivity. CF is the ratio between the number of informant's citation of species use of a given taxon and the number of informant's citation of the most mentioned species. The three variables such as i, e and c are illustrated in the following (Table 5).

Table 5. Illustrations of three variables of i, e, and c

Variables	**Weighted ranking**	
	1	**2**
Management of species (i)	Not so managed or conserved	Properly managed or cultivated or conserved anyway
Preferences of use of species (e)	Not so preferable or availability of other species for that particular use	Preferably used for s particular purpose
Frequency of use (c)	Rarely cited plants	Effectively use of that particular species for that particular purpose

About sixty (60) plants species were identified by the informants belonging to 34 families (supplementary material). The CSI values fluctuated from 7.84 to 0.13. *Hemidesmus indicus* obtained the highest CSI value of 7.84 and *Leucas mollissima*scored the lowest CSI value of 0.13. The top ten scorer plant species with CSI values are given below (table 6)

Table 6. Ten top scorer plant species with CSI values

Species	**CSI Score**	**Disease to be cured**
Hemidesmus indicus	7.84	digestive problems, diarrhea, blood disorders, cough, fever, anorexia, asthma, itching and leprosy
Curcuma longa	7.52	Strengthening the overall energy of the body, relieving gas, dispelling worms, improving digestion, regulating menstruation, dissolving gallstones, and relieving arthritis
Aloe vera	7.52	Stabilize blood sugar, burns and other skin disorders, wounds and ulcers, prevent of acne and moisturizes the skin.
Abrus precatoris	6.72	Sprain
Ricinus communis	5.76	abdominal disorders, arthritis, backache, muscle aches, chronic backache and sciatica, chronic headache, constipation, expulsion of placenta, gallbladder pain, period pain, menstrual cramps, rheumatism, sleeplessness, and insomnia, burns
Ampelocissus latifolia	4.72	Elephantiasis
Phyllanthus emblica	3.68	Immunomodulation, antioxidant, antiulcerogenic, anticarcinogenic, antimicrobial, and antiallergic, diabetes, fever, anemia, jaundice, bleeding disorders, hiccough, arthritis.
Ocimumtenuiflorul	3.28	Sore throat, diabetes, heart disease, obesity, oral care, bleeding gums, wounds, enhances memory, anxiety
Justicia adhatoda	3.28	Asthma, bronchitis, and coughs, fever, dysentery, digestive problems.
Butea monosperma	3.12	White discharge

Informant Consensus Factor (FIC)

Informant Consensus Factor is an important measurement to determine the informant's knowledge about the medicinal herbs which are used to cure particular type of disease (Mootoosamy & Fawzi, 2014; Trotter & Logan, 1986). It also shows the degree of understanding and cultural consistency among respondents regarding the benefits of uses of medicinal herbs. In this study all citation of species is recorded individually so that same respondent and same species can participate in many such cases. Here the mentioned diseases have been categorised into 22 ailments group. The Fic value of these categories' ranges from 0.93 to 1.00. All disease clusters had a Fic value of greater than 0.5 and hence, all of them could be recognised for authentication of biodiversity and isolation and delineation of the dynamic principles by potential researches in each category (Caunca&Balinado, 2021; Giday*et al*. 2007).

Fic values of 1.00 indicate the treatment against these ailments clusters is very effective and vigorously used by women tribal healers' multiple times. Renal, neuropathic, lymphatic disorder, immune-suppressive disease, psychological disorders, poisoning due to animal toxin, and baldness have carried the maximum Fic value of 1.00. This means that these species are high consensus species which are used particularly for these disease clusters and have high prospects of future investigation of medicinal studies such as Pharmacology or Phytochemistry etc. (Chowdhury & Karmakar, 2015; Tabuti*et al.* 2012). The documentation of ethnomedicinal herbs with high Fic value has indeed provided the precious knowledge of the discipline like Pharmacology for future better health care. Maximum number of species are used to treat the gastrointestinal (18), respiratory (15), metabolic disorder (12), and general signs and symptoms (11), this means that these types of disorders cure very common among the indigenous people of these areas (Table 7).

Table 7. Informant Consensus Factor (FIC)

Disease category	**Disease reported**	**No. of plant species**	**No. of use report**	**FIC values**
Cardiovascular	Heart attack, hypertension (Blood pressure).	9	210	0.9617
Musculoskeletal	Leprosy, arthritis, fracture	5	120	0.9664
Respiratory	Sore throat, cough, asthma, upper respiratory tract infection	15	370	0.9621
Renal	Kidney diseases	1	40	1.0000
Neuropsychiatric	Anxiety, hysteria, depression, memory loss	5	172	0.9766
Metabolic derangements	Diabetes, obesity, hyperglycemia	12	320	0.9655
Gastrointestinal disorder	Vomiting, stomach pain, dysentery, diarrhea, constipation, indigestion, piles (haemorrhoids)	28	388	0.9302
General signs and symptoms	Fever, headache, weight loss.	11	240	0.9582
Hypersensitivity reaction	Allergy, itching.	3	70	0.9710
Neuropathy	Paralysis	1	25	1.0000
Dermatological manifestation	Ring worm, leukoderma, heel crack, hair fall, scabies	6	160	0.9686
Vector borne diseases	Scabies, dengue, malaria	4	92	0.9670
Physical injuries	Physical trauma, burns, infections ulcers	10	180	0.9497
Hematological diseases	Bleeding gums	5	132	0.9695
Lymphatic disorders	Elephantiasis	1	31	1.0000
Immunosuppressive disease	AIDS	1	26	1.0000
Reproductive system	Infertility	3	75	0.9730
Psychological	Aphrodisiac,	1	28	1.0000
Genetic Mutation	Cancer	6	88	0.9425
Animal toxins	Snake bite	1	31	1.0000
Liver disease	Jaundice	3	65	0.9688
Baldness	Baldness	1	14	1.0000
Cardiovascular	Heart attack, hypertension (Blood pressure).	9	210	0.9617
Musculoskeletal	Leprosy, arthritis, fracture	5	120	0.9664
Respiratory	Sore throat, cough, asthma, upper respiratory tract infection	15	370	0.9621
Renal	Kidney diseases	1	40	1.0000
Neuropsychiatric	Anxiety, hysteria, depression, memory loss	5	172	0.9766

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Lymphatic disorders	Elephantiasis	1	31	1.0000
Immunosuppressive disease	AIDS	1	26	1.0000
Reproductive system	Infertility	3	75	0.9730
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Animal toxins	Snake bite	1	31	1.0000
Liver disease	Jaundice	3	65	0.9688
Baldness	Baldness	1	14	1.0000

Preference Ranking (PR) of ethnomedicinal plants

This process is applied to know the preference of most suitable and least suitable medicinal plants among plenty of species to cure variety of diseases by the informants (Martin, 1995). Five-point score values are given to these plants according their uses. The most preferable plant gets 5 points and the least preferable gets 1 point for treating the selective diseases. To make the preference ranking of medicinal plants, the 10 women traditional healers had been asked about their choices among 60 identified medicinal plants for the treatment of some selected diseases. As per their preferences, five most preferred and five least preferred plants with their scores among 60 medicinal plants are shown in the following (Table 8).

Table 8. Preference Ranking (PR) of ethnomedicinal plants

Plant name	**Score given by 10 women traditional healers (th)**										**Total Score**	**Rank**
	th 1	**th 2**	**th 3**	**th 4**	**th 5**	**th 6**	**th 7**	**th 8**	**th9**	**th10**		
Most preferred medicinal plants												
Curcuma longa	4	5	4	5	5	5	4	4	5	5	46	1st
Ocimumtenuiflorum	5	4	4	4	5	4	4	5	4	5	44	2nd
Nyctanthesarbor-tristis	4	4	5	4	4	5	4	3	4	4	41	3rd
Azadirachta indica	4	4	3	4	3	4	4	4	4	4	38	4th
Hemidesmusindicus	5	4	4	3	4	3	4	3	3	4	37	5th
Least preferred medicinal plants												
Tephrosia purpurea	1	1	1	1	1	1	1	1	1	1	10	1st
Millettia pinnata	1	1	1	1	1	2	1	1	1	1	11	2nd
Elephantopusscaber	1	2	1	1	1	1	1	2	1	1	12	3rd
Leucas mollissima	1	1	1	2	1	2	1	2	1	1	13	4th
Abrus precatorius	1	1	1	1	2	1	2	2	1	2	14	5th

Source: Field survey

Consensus value of plant parts (CPP)

It determines the degree of commoners among respondents regarding the use of medicinal plant parts. The results reveal that all parts of plant were used for preparation of medicines.

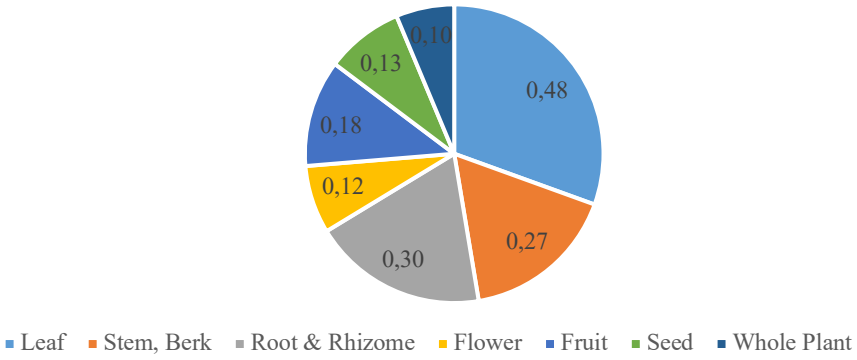

Figure. 5 Consensus value of plant parts

The leaves of the plant (CPP = 0.48) were used more frequently followed by root & rhizome (0.30) stem & berk (0.27), fruit (0.18), seed (0.13), flower (0.12).). Moreover, the CPP value of 0.10 had been found in those plants whose all parts were used for medicinal purpose. These plants were *Chrysopogonaciculatus, Hygrophyla auriculata, Ampelocissus latifolia; Andrographis paniculata, Ocimumtenuiflorum* (Fig. 5). There is a threat to extinction of those plants whose roots are used. These plants have to be conserved or regenerated or cultivated to maintain their availability in nature. The use of leaves is rather more sustainable and effective method for the survival of these plants (Chowdhury and Karmakar, 2015; Tolossa*et al.* 2013)

Mode of administration of medicines

The traditional women healers prepare medicine in various ways mainly depending on type of ailments. These medicines are administered both orally and topically.

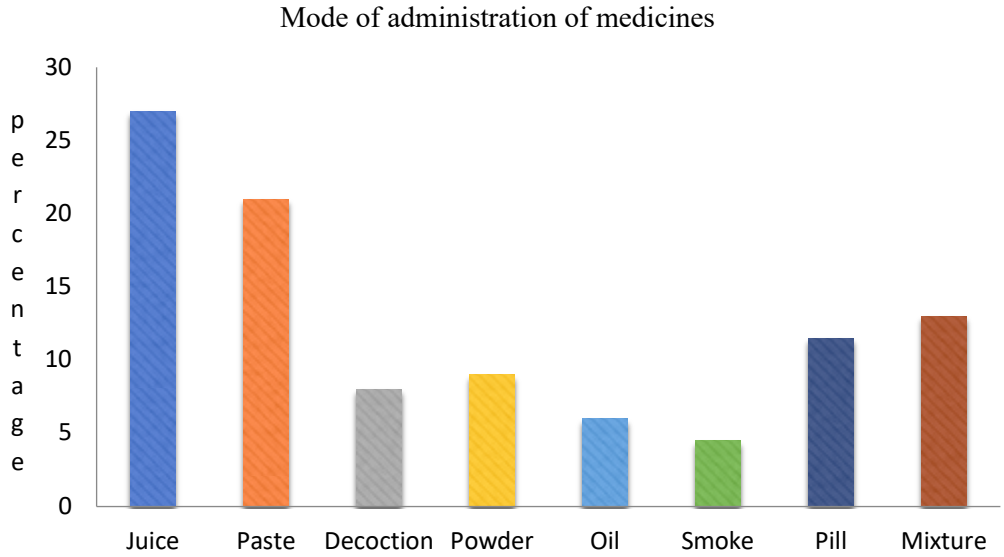

Figure. 6 Mode of administration of ethnomedicines

The main use has been found as juice (27%), followed by paste (21%), mixture (13%), pill (11.5%), powder (9%), decoction (8%), oil (6%) which has been extracted particularly from seeds and 4.5%medicines are used as smoke (Fig. 6). They prepare these medicines with the help of some ingredients like oil, salt, turmeric, honey, etc. The effectiveness of medicine depends on the preparation by following exact rules and regulations (Mahato, 2022). Women healers of this region are specialized in women specific diseases, paediatric diseases, snake bite, jaundice, cuts & wounds, common cold and cough, leucorrhoea etc.

This ethnocentric and qualitative analysis needs much experience and attachment with the cultural group for authentic results. Researchers should have to be cautious about their bias because the validity of this type of research is mainly

depended on the assessment capacity of them. Furthermore, the responses of each and every informant should be recorded individually for analysis of the degree of variability among informants.

Conclusion

Ethnomedicinal knowledge is very crucial and effective for ensuring the primary health care of tribal people particularly for those who cannot afford the costly allopathic drugs. This study mainly focuses on the perception, knowledge and capability of female tribal healers and tribal common women about the identification of medicinal plants, their therapeutic uses. They are not at all appreciated and males are recognised as healers. No such study has been initiated regarding their knowledge and wisdom in India as well as abroad. Among 10 women healers, 6 are practiced along with their husbands and 4 are practiced independently. People called them 'Ojhani' (means female doctor). Authors here just documented their knowledge and analysed their perception through various techniques.

It also noticed in focused group discussion sessions that most of the respondents were advocating for the necessity of conservation of these medicinal herbs which are actually the means of their survival. They were strongly against the commercialization of these herbs and manmade forest fire.

An unique habit of the women traditional healers was observed that they have tried to conserve these plants which are very necessary to cure more than one diseases such as *Hemidesmus indicus*, *Phyllanthus imblica*etc.by planting them in their household surroundings 'Jaherthans'(places of warship). The effectiveness of all these documented ethnomedicinal plants particularly those whose use value, importance value and informant consensus value are high should be examined scientifically and preserved against bio piracy and extinction.

A comprehensive national policy framework should be formulated keeping in mind the different user groups. This policy should respect the traditional knowledge about medicinal plants, their ex-situ and in-situ conservation as well as their cultivation, impose control on exporting endangered species; prohibit man-made forest fire, take strict legal action against any type of unethical or illegal activities, give recognition of the practice of traditional healers by providing them scientific training about preparation of medicine, diagnosis of diseases and doses of drug administration (Fransworth&Soejarto, 1991; Jha, 1996; Srivastava *etal.* 2013).

Declarations

List of abbreviations: JL: Jurisdiction Level; CPP: Informant Consensus Value for Plant Part; CSI: Cultural Significance Index; Fic: Informant Consensus Factor; FL: Fidelity Level; IV: Importance Value; PCC: Pearson's Correlation Coefficient; MP: Medicinal Plant; PR: Preference Ranking method; UV: Use Value; AYUSH: Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy

Ethics approval: All participants gave their prior informed consent.

Consent for publication: All participants shown in images gave their prior informed consent to have the images published.

Availability of data and materials: All data are used either collected from field survey, or calculated by authors, or from open source.

Competing interests: The authors declare that this research is an original work, and they have no competing interests. Any type of artificial intelligence has not been used in this research.

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Author's contribution: Manishree Mondal (MM) and Swastik Das (SD) conceptualized the research and reviewed the literatures. Field survey was conducted by MM and Arup Kumar Sau (AKS). Data organized, tabulated and calculated by AKS. MM and SD analyzed the information and drafted the manuscript. SD gave inputs on the ethnobotanical and ethnomedicinal aspects of this study. Puja Karmakar (PK) helped in data entry and formatting the manuscript. All authors thoroughly read and approved the final manuscript.

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SUPPLEMENTARY MATERIAL

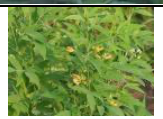
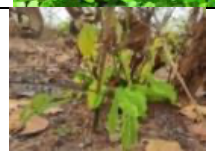
Details of recorded ethnomedicinal plants from the field

Voucher no.	Local name	Scientific name	Family	Field photo	Parts used	Diseases to be cured
MP 1	Kalmegh	*Andrographis paniculata* (Burm.f.) Wall	Acanthaceae		Whole plant	Common cold, allergies, immunity, diabetes, digestion, inflammation, malaria, filarial, liver disease.
MP 2	Kulekhara	*Hygrophila auriculata* (Schumach.) Heine	Acanthaceae		roots, stem, leaves, fruit, and flower	Increase hemoglobin, diabetes, blood sugar, anti-inflammatory digestion, s stomach and liver function immunity.
MP 3	Basak	*Justicia adhatoda* L.	Acanthaceae		Leaves	Asthma, bronchitis, and coughs, fever, dysentery, digestion.
MP 4	Bach	*Acorus calamus* L.	Acoraceae		Root	Anxiety, depression, stress, emotional and physical trauma, cancer, and HIV.
MP 5	Grithkumari	*Aloe vera* (L.) Burm.f.	Aloeaceae		Leaves	Blood sugar, burns, skin disorders, wounds and ulcers, acne and moisturizes the skin.
MP 6	Apang	*Achyranthes aspera* L.	Amaranthaceae		Root	Hemorrhoids, indigestion, cough, asthma, anemia, jaundice and snake bite

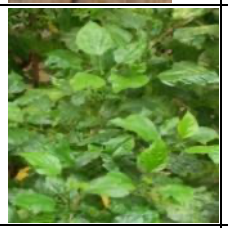
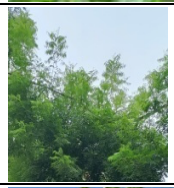
MP 7	Aam	*Mangifera indica* L.	Anacardiaceae		Fruit, seed	Dentifrice, antiseptic, astringent, diaphoretic, stomachic, tonic, laxative and diuretic ,diarrhea, dysentery, anemia, asthma, bronchitis, cough, hypertension, insomnia, rheumatism, toothache, leucorrhea, hemorrhage and piles
MP 8	Amra	*Spondias mombin* L.	Anacardiaceae		Fruit	Body immunity, fights anemia, heart, digestion.
MP 9	Ananta mul	*Hemidesmus indicus* (L.) R.Br. ex Schult.	Apocynaceae		Root	digestion, diarrhea, blood disorders, cough, fever, anorexia, asthma, itching and skin diseases like leprosy
MP 10	Kurchi	*Holarrhena pubescens* Wall. &G.Don	Apocynaceae		Seeds	Amoebic dysentery.
MP 11	Kurchi	*Holarrhena pubescens* Wall. & G. Don	Apocynaceae		Leaves	dysentery, antimicrobial, anti-inflammatory, and analgesic.
MP 12	Dudhi lata	*Finlaysoniaobovata* Wall.	Apocynaceae		Leaves and root	Fevers, hyperglycemia, constipation

MP 13	Boinchi	*Carissa carandas* L.	Apocynaceae		Leaves, root, fruit,	Stomach pain, reduce blood pressure,
MP 14	Tereldare	*Borassus flabellifer* L.	Arecaceae		Gum	Jaundice
MP 15	Mulumma	*Agave americana* L.	Asparagaceae		Leaves and roots	Constipation, cancer, baldness, anti-inflammatory
MP 16	Randoi	*Blumea lacera* (Burm. f.) DC	Asteraceae		leaves	External cut
MP 17	Hingcha	*Enydra fluctuans* Lour.	Asteraceae		Leaves, stem	hysteria, nervous conditions, bronchitis, asthma and whooping cough.
MP 18	Mejurjhati	*Elephantopus scaber* L.	Asteraceae		Whole plant	Dysuria, diarrhea, dysentery, swellings and stomach pain, vomiting

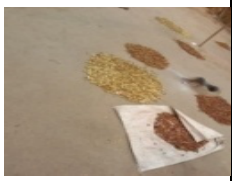
MP 19	Shimul	*Bombex ceiba* var. *ceiba* A.Robyns	Bombacaceae		Root	Diarrhea, white discharge, diuretic
MP 20	Arjuna	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae		Stem, Bark	heart failure, ischemic, cardiomyopathy, atherosclerosis, myocardium necrosis, blood diseases, anemia, venereal and viral disease
MP 21	Bohera	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae		Fruit	Respiratory infections, recurrent fever, constipation, ulcer, hemorrhoids
MP 22	Haritaki	*Terminalia chebula* Retz.	Combretaceae		Fruit	Cough constipation, gas, and bloating, indigestion, detoxification.
MP 23	Kundri	*Coccinia grandis* (L.) Voigt	Cucurbitaceae		Leaves	Diabetes
MP 24	Sal	*Shorea robusta* C.F.Gaertn.	Dipterocarpaceae		Leaves, stem, bark, seed	leprosy, wounds, ulcers, cough, gonorrhea, headache, diarrhea, and vaginal discharges, stomachic disease
MP 25	Kendu	*Diospyros melanoxylo* Roxb.	Ebenaceae		Leave, root, bark	Malaria, diarrhea and dysentery, cuts and bruises, scabies, hyperglycemia.

MP 26	Eradom	*Ricinus communis* L.	Euphorbiaceae		leaves, roots, bark, fruit, seeds, flowers	abdominal disorders, arthritis, backache, muscle aches, chronic backache, sciatica, chronic headache, constipation, expulsion of placenta, gallbladder pain, period pain, menstrual cramps, rheumatism, sleeplessness, insomnia, burns
MP 27	Sengalsing	*Tragia involucrata* L.	Euphorbiaceae		Seed	Hair fall
MP 28	Arhar	*Cajanus cajan* (L.) Millsp.	Fabaceae		Seed	Blood pressure, anemia, aids weight loss, boost energy, promotes a healthy heart disease, digestive
MP 29	Kawet	*Abrus precatorius* L.	Fabaceae		leaves	Sprain
MP 30	Lata siris	*Albizia lebbeck* (L.) Benth.	Fabaceae		Leaves and roots	leukoderma, leprosy, asthma, piles, diarrhea , dysentery, kidney diseases, skin diseases, itching,
MP 31	Polash	*Butea monosperma* (Lam.) Kuntze.	Fabaceae		flower	White discharge

MP 32	Bandar lathi	*Casssia fistula* L.	Fabaceae		Leave, fruit	Piles, ring worm
MP 33	Amtua	*Senna auriculata* (L.) Roxb.	Fabaceae		Leaves	Ear pain, obesity, diabetes
MP 34	Bon Nil	*Tephrosia purpurea* L. Piers	Fabaceae		Stem	Fever, liver cirrhosis
MP 35	Babla	*Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.	Fabaceae		Leave, stem, bark, seed, gum	oral & dental hygiene, burn injuries and skin diseases
MP 36	Turom	*Curculigo orchioides* Gaertn.	Hypoxidaceae		Root	White discharge of women, urine with semen, aphrodisiac, immunostimulant, hepatoprotective, anti-oxidant, anti-cancer, anti-diabetic,
MP 37	Dhandhuru para	*Leucas mollissima* Wall.	Lamiaceae		Leaves	Headache

MP 38	Tulsi	*Ocimum tenuiflorum* L.	Lamiaceae		leaves, stem, flower, root, seeds and even whole plant)	Sore throat, diabetes, heart disease, obesity, oral care, bleeding gums, wounds, enhances memory, anxiety
MP 39	Nishinda	*Vitex negundo* L.	Lamiaceae		Latex, leaves	Pain, cough, over weight
MP 40	Kum	*Careya arborea* (Roxb.)	Lecythidaceae		Bark	Use for Asthma
MP 41	Joba	*Hibiscus rosa-sinensis* L.	Malvaceae		Flower, leaves	Appetite, colds, heart, nerve diseases, upper respiratory tract pain and swelling, fluid retention, stomach irritation, disorders of circulation, for dissolving phlegm, increase urine out
MP 42	Neem	*Azadirachta* indica A.Juss	Meliaceae		Leaves, stem, flower	Inflammation, constipation, stomach ulcer, flatulence, etc., heal wounds, hair scalp disease.
MP 43	Mungdodare	*Moringa oleifera* Lam.	Moringaceae		Leaves, Flower	Pox, high blood pressure

MP 44	Shiuli	*Nyctanthes arbor-tristis* L.	Oleaceae		Leaves	Fever
MP 45	Tandichata mara	*Oxalis corniculata* L.	Oxalidaceae		Leaves	Gastric problem, Stomach ache
MP 46	Karajdare	*Millettia pinnata* (L.) Panigrahi	Panigrahi		Seed	Heel crack
MP 47	Amlaki	*Phyllanthus emblica* L.	Phyllanthaceae		Fruit	Immunomodulation, antioxidant, antiulcerogenic, anticarcinogenic, antimicrobial, and antiallergic, diabetes, fever, anemia, jaundice, bleeding disorders, hiccough, arthritis.
MP 48	Chorkanta	*Chrysopogon aciculatus* Trin.	Poaceae		Whole plants	Anti-emetic, intestinal parasites, indigestion, profuse menstruation, colds and bruises.
MP 49	Painalata	*Paederia foetida* L.	Rubiaceae		Tree sap	Stomach pain during pregnancy, headaches and paralysis
MP 50	Bhel	*Aegle marmelos* var. *mahurensis* Zate	Rutaceae		Fruit	Diarrhea and cholera, digestion, cholesterol, diabetes, skin infections, blood purifier, scurvy, cancer.
MP 51	Ramdatan	*Nephelium lappaceum* L.	Sapindaceae		Fruit	Diabetes, blood pressure, digestion, dengue and cancer.

MP 52	Kusum	*Schleichera oleosa* (Lour.) Oken	Sapindaceae		Bark	Itching, acne, burns, skin troubles, rheumatism (external massage), hair dressing hair growth, leprosy, inflammation ulcer
MP 53	Mohul	*Madhuca longifolia* J.F.Macbr.	Sapotaceae		Bark	Used for rheumatism, chronic bronchitis, diabetes mellitus, and bleeding.
MP 54	Dhutra	*Datura stramonium* L.	Solanaceae		Leaves, root	Analgesic, anthelmintic, anti-inflammatory, stomach and intestinal pain that results from worm infestation, toothache, fever, dandruff and falling hair.
MP 55	Rangoni	*Solanum surattense* Burm.f.	Solanaceae		Seed	Toothache, Malaria
MP 56	Challa	*Holoptelea integrifolia* (Roxb.) Planch.	Ulamaceae		Stem and bark	Ring worm
MP 57	Parashi	*Holoptelea integrifolia* (Roxb.) Planch.	Ulamaceae		Flower	Antibacterial, anti-inflammatory, antimalarial, galactosemic, anti-asthmatic, antidiarrheal, anticancer, antioxidant, antireality

MP 58	Icewar	*Ampelocissus latifolia* (Roxb.) Planch	Vitaceae		leaves, roots, bark, fruit, seeds, flowers	Elephantiasis
MP 59	Hadjod	*Cissus quadrangularis* L.	Vitaceae		Stem	Swelling, relieve pain, fractures, and aid in healing fractures.
MP 60	Halud	*Curcuma longa* L.	Zingiberaceae		Root	Strengthening energy level, digestion, regulating menstruation, dissolving gallstones, and relieving arthritis.

Source: Field survey; (MP= Medicinal Plant)