Present status of women and their traditional ecological knowledge in Chakrata district, Dehradun, Uttarakhand: A study

Abstract

The present study outlines the data which interprets the socio-economic study of status and economic condition of women in Chakrata District of Dehradun, the capital of Uttarakhand State. The article discusses the gap in documentation and understanding of women roles in agriculture, horticulture and animal husbandry and discusses about their traditional ecological knowledge. The study area is well-known for its traditional ecological knowledge which is being used by the women in daily lives, but this traditional ecological knowledge lacks a comprehensive study and proper documentation. In Chakrata district, apart from the daily routine of household work, women have an active participation on the agricultural fields. Under the present study 6 villages have been taken namely, Buraswa, Bangoti, Patti, Rawana, Mehrawna, and Shirba. The livelihood of women in these areas is based on their income mainly coming from agriculture, horticulture, and animal husbandry. The present research article is based on the questionnaire focussing on women's socioeconomic status and traditional ecological knowledge. The article provides the comprehensive analysis of the Government has enacted series of policies consisting special privileges for the people residing in this area. The result shows that women related to upper caste are in better condition than the women belonging to schedule caste community. The governmental policies and facilities are enjoyed more by the women belonging to upper caste due to their awareness when compared to the schedule caste women.

Keywords: *Ecological knowledge; Agriculture based economy; Socio-economic status; Schedule caste; Policies; Rajput Caste*

Introduction

Chakrata is a hill town located in Dehradun district of Uttarakhand, India.Chakrata, part of the "Jaunsar-Bhawar" region, lies between 30 º 31' to 31 º 3' N latitudes and 77 º 42'to 78 º 5' E longitudes, covering an area of approximately 1,999.50 km^2in India. It is one of the six blocks of district Dehradun. Physiographically, the high mountainous region is situated between the upper course of river Yamuna and Tons. (Gupta et al. 2019). It is located 88 km from Dehradun and is situated at a height of about 7,000 m Above Sea Level (ASL). Agriculture is the main occupation in Chakrata which is a mountainous terrain and falls in North West Himalayas. However, the study area is the part of scheduled tribe area as declared by the Government of India, thus,every individual irrespective of their caste, creed or sex come under the scheduled tribe population.As it is a rain-fed area farmers are totally dependent upon rainfall for irrigation purpose.Organic farming is practiced by everyone as it is the rain fed area. The people of this area mainly rely on agriculture, horticulture and animal husbandry.

According to the 2011 census of India, the total Chakrata population is 49,607 people living in this tehsil, of which 26,536 are male and 23,071 are female. The population of Chakrata in 2021 is 61,513 Literate people are 26,659 out of which 16,489 are male and 10,170 are female. Total workers are 2496 depending on agriculture, horticulture and animal husbandry out of which 16,046 are men and 8,923 are women. A total of 13,382 Cultivators are dependent on agriculture farming, out of which 8,675 are men and 4,707 are

women. Out of 1,020 people who work in agricultural land as labor, 685 are men and 335 are women in Chakrata.

Primary Census Abstract, 2011				
Uttarakhand, Dehradun District, Chakrata Sub-District, Rural Area				
No. of households: 5,399				
S. No.	**Indicators**	**Persons**	**Males**	**Females**
1	Population	44,490	22,819	21,671
2	Child Population	7,399	3,714	3,685
3	Scheduled Castes	18,638	9,705	8,933
4	**Scheduled Tribes**	**24,052**	**12,119**	**11,933**
5	Literate	22,366	13,171	9,195
6	Illiterate	22,124	9,648	12,476
7	Workers	21,459	12,934	8,525
8	Non Workers	23,031	9,885	13,146

Table 1 Primary census 2011 (source: Government of India, www.censusindia.gov.in)

Study Area Chakrata Tehsil consists of 110 villages. Out of 110 the present study is focussed on the 6 villages of Chakrata Block namely, Buraswa, Rawana, Mehrawna, Patti, Shirwa, and Bangoti. These villages were selected on the basis of population and the data available on various Government websites. These villages have motorable road and are 24-30 km away from the Chakrata Town. Given below is the geographical location of Chakrata (Kumar et al. 2019)

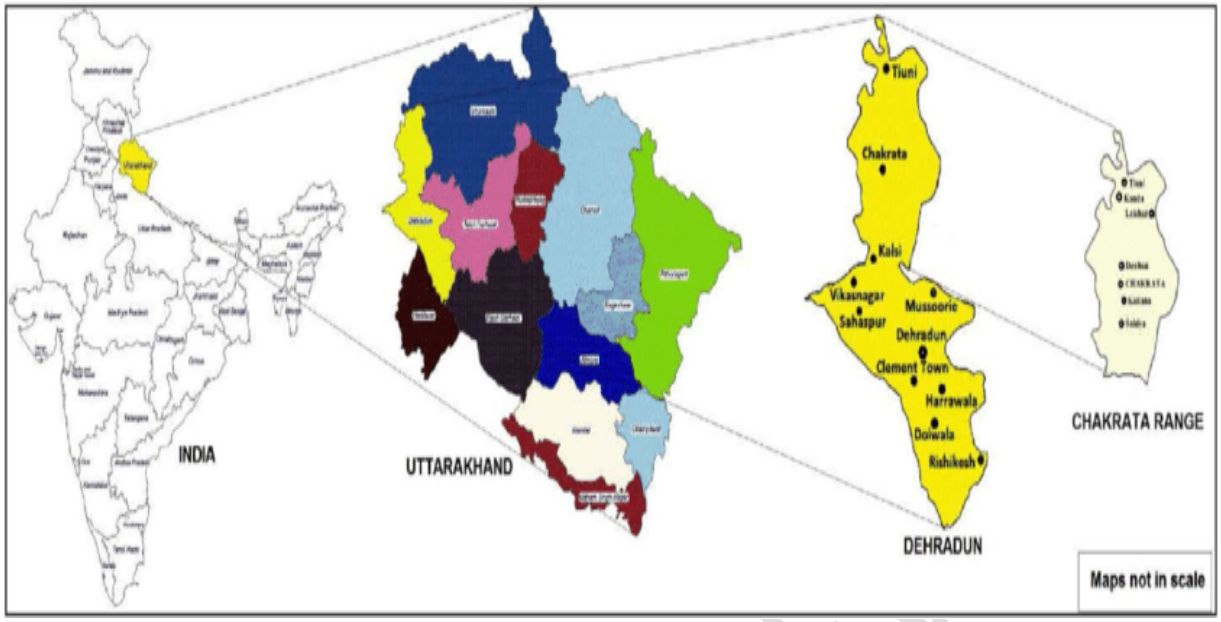

Figure 1 Geographical location of Chakrata (Source:Kumar et al. 2019)

Methodology

The questionnaire method was used to find the socio-economic status of women in the study area. The elderly people in all the villages were interviewed in local language (Jaunsari) with the help of Gram Pradhan and some students who were well versed in both Hindi and Jaunsari language.The summary of the details of these villages as per the Primary Census Abstract, 2011 are given below in Table 2:

Table 2 Details of population in study area

Indicators	Buraswa	Bangoti	Patti	Rawana	Shirwa	Mehrawana	Total
Population	574	237	218	303	470	269	**2237**
Child Population	82	35	45	38	89	48	**337**
Scheduled Castes	296	178	107	142	208	146	**1077**
Scheduled Tribes	256	59	111	160	253	122	**961**
Literate	328	100	94	163	212	137	**1162**
Illiterate	246	137	124	140	258	132	**1075**
Workers	170	197	138	250	160	223	**1261**

Non Workers	404	40	80	53	310	46	**976**

The diagrammatic representation of indicators like population, child population, schedule caste, schedule tribe, literate, illiterate, working population and non-workers is given below in figure 2.

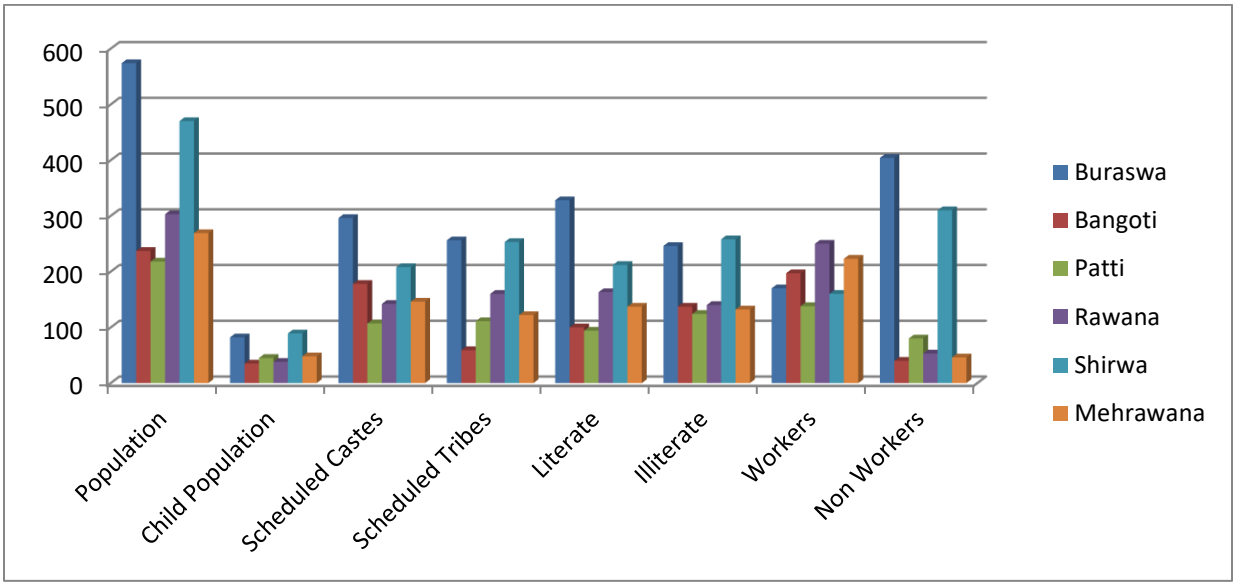

Figure 2 Data representation of the study area

Results and Discussion

The survey was undertaken in the month of October 2024and the result is as follows:

Women population in the study area

The representation of women in all the six villages is likely to be less in Buraswa, Bangoti, Patti, Rawana, Shirwa, Mehrawana. Table 3 & Figure 3shows the women representation in the study area.

Table 3 Population distribution (male and female)

Indicators	Buraswa	Bangoti	Patti	Rawana	Shirwa	Mehrawana	Total
Male	310	205	150	223	222	205	1315
Female	282	117	168	185	179	171	1102
Total	592	322	318	408	401	376	2417

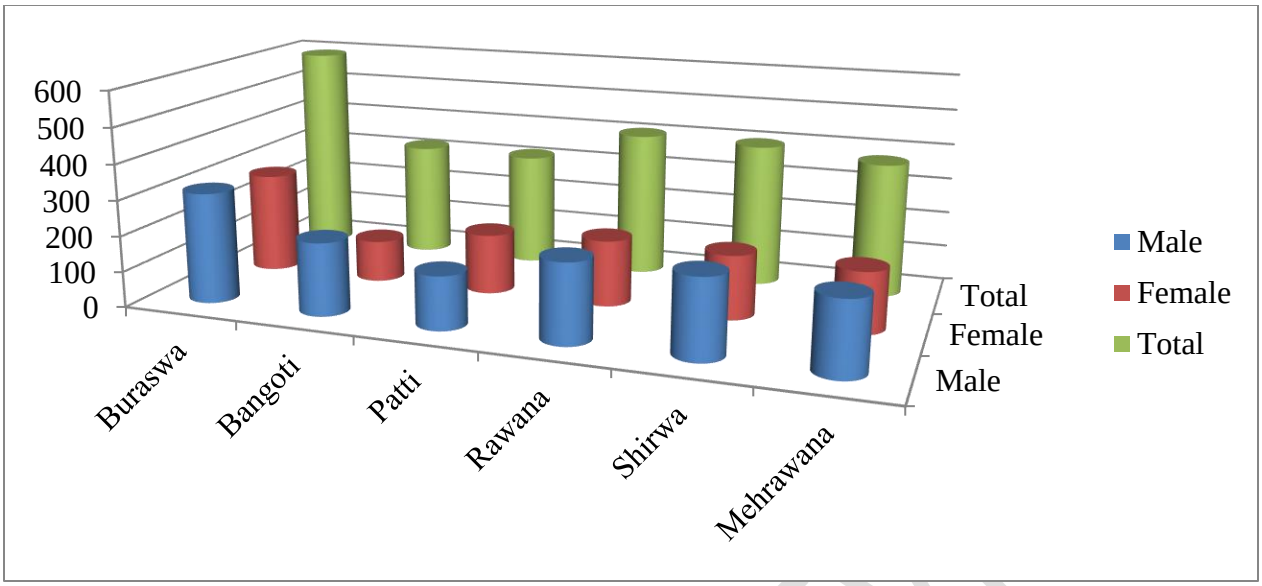

Figure 3 Diagrammatic representation of population distribution (male and female) in the study area

*Women population in the target area***:** The present study deals with thesocio-economic status of the women which includes health and hygiene as one of the main issue of women in Chakrata Block. The women population is mentioned in the table 4 below:

Table 4 Distribution of women population in the study area

Villages	Buraswa	Bangoti	Patti	Rawana	Mehrawana	Shirba	Total
Women Population	284	110	118	137	123	236	885

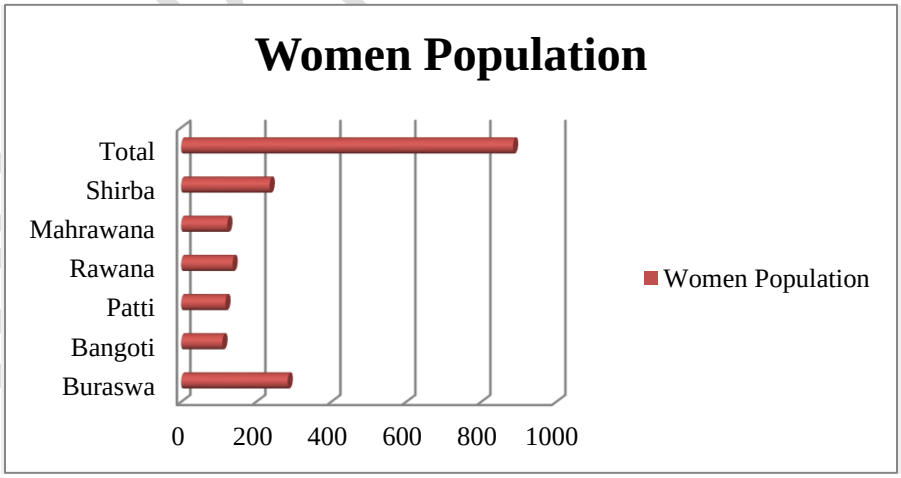

Figure 4 Diagrammatic representation of distribution of women population in the study area

The study was conducted on 959 women in total. More of health and hygiene problem persists in the village in order of Bangoti >Shirwa>Rawana>Patti>Meharwana>Buraswa. Table below shows the females inthe age group (35-49).

Table 5 Number of females in the age group of 35-49 years

Villages	Buraswa	Bangoti	Patti	Rawana	Mahrawana	Shirba
Age group (35-49)	102	55	58	57	44	102

Women of Bangoti, Shirwa, and Rawana are not in a good hygiene status specially when asked about menstrual hygiene (Sahu 2017). 55 elderly women in Bangoti are using unhygienic cloth during their menstrual cycle. Use of sanitary pads was very less. Women use sanitary pads only when it is availablein the nearby '*Aanganbadi*' Centre and the adolescent girls are using sanitary pads which are made available to them through the school, some NGOs or *Aanganbadi* centres.

Strongest Aspect among women in the area

The women in the study area are well versed in Indigenous traditional knowledge. They have a valuable knowledge of medicinal plants and heal some common diseases like flu and fever mostly at home with the effective plant species which are mentioned in Table 7 (Singh 1997; Negi 2010).

Aanganbadi, primary schools and senior secondary schools are available in the area and this shows the enthusiasm of the younger generation towards pursuing education. The schools of the village reflect a good enrolment of students. But on the other hand literate elderly women population is very low due to the lack of awareness and the excessive household responsibilities and work which these women bear on a daily basis (Ballabh and Negi 2018).

Women in the target area of six villages from Chakrata block are ignorant about the need of protein, carbohydrates, calcium, iron and vitamin to their body. They do not have awareness on the need of a balanced diet. Bijalwan et al. (2015) studied the health condition of women in Chakrata block and found that around 40% of the women above 35 years of age are suffering from Pelvic organ prolapsed (POP). POP significantly lowers women quality of life, resulting in physical pain, psychological distress, and sexual complaints leading to occupational and social limitations. Women generally wake up early and start their day by preparing tea and meals for the entire family. Even today, a social taboo persists that women should not eat before the other members in the family, this causes delay or even skipping of meal for the women of the house due to which the chronic energy deficiency is persisting in many women (Pant 2016; Kandari and Bahuguna (2017)) (table 6). Lack of proper sanitation facilities, access to safe drinking water and medical facilities were observed (Bahuguna 2019).

Table 6Literacy level and chronic energy deficiency in women

Chakrata Region	Percentage	Effects
Women Literacy level	Average- 70% ST Women 64.10%	Low literacy level due to which they are not

		economically independent and cannot focus on nutritional diet.
Total number of women suffering from Chronic Energy Efficiency	43.59%	Cannot work efficiently, severe pain in body parts
Total number of women suffering from iron deficiency	Non-Pregnant Women 43.4% Pregnant & Elderly Women 46.4%	Dizziness, weakness, fatigue, fast heart rate, brittle nails, shortness of breath

Traditional ecological knowledge (TEK) among women

According to Bhatt et al. 2024, TEK has been explained as a unique/peculiar knowledge of any community and their relationships with the immediate natural environment including traditional cultural relations among all living beings through generations. TEK in Chakrata district is tabulated below in Table 7 was deduced after discussion with the adult women group (> 40 years of age) of Buraswa, Bangoti, Patti, Rawana, Mehrawna, and Shirba villages. The local language i.e. Jaunsari was used during the discussion. The former Sarpanch (also known as Pradhan) helped the authors during the whole study in translating Jaunsari to Hindi.

Female populations are mainly using their traditional knowledge system for treating wounds, diarrhea, eczema and ringworm, skin ailment, cough, jaundice, fever, conjunctivitis, asthma, bronchitis, diabetes, leprosy, piles, joint pain etc. (Joshi and Chuahan 2018; Kala 2020; Gairola 2022).

Table 7 Traditional ecological knowledge among women of Chakrata district

Common Name	Scientific Name	Nature of the plant	Part of the Plant Used	Health Benefits
Burans	*Rhododendron arboreum*	Shrub	Flower used in the form of juice	Skin disease, antibacterial, antioxidant, anti inflammatory
Lingda	*Diplaziumesculentum*	Fern	Whole plant used in the form of cooked vegetable	Diabetes, Asthma, constipation, Pharmacological properties such as antioxidant, antimicrobial, immunomodulatory and antianaphylactic
Pahari Pudina	*Mentha longifolia*	Herb	Leaves and flower heads used in form of decoction	Used in treatment of cough, cold, respiratory ailments, bowels,

				loss of appetite, diarrhea, and dysentery
Jungli Pudina	*Ageratum conyzoids*	Herb	Flower juice	The fresh juice of the flower when poured on a wound helps in clotting the blood
Vasa	*Justicia adhatoda*	Herb	Whole plant	Used in treatment of cough, cold, asthma and chronic bronchitis other respiratory ailments
Sadabahar	*Catharanthus roseus*	Herb	Decoction made up of flowers and leaves are used as herbal tea	Widely used in diabetes, leukemia, sore throat, malaria
Pharan	*Allium stracheyi*	Herb	Dried flowers are used as spice in preparation of food	Widely used in jaundice, cold, cough, wound-healing and other stomach problems
Gurmar/Madhunashini	*Gymnemasylvestre*	Shrub	Leaves	Used in lowering the blood sugar levels, effective in weight management and cough
Kingor	*Berberis aristata*	Shrub	Roots	Used in diabetes, eye and ear infections, jaundice, diarrhoea and fever
Kala jeera/jeeri	*Carum carvi*	Herb	Seeds are used in preparing aqueous extract with water	Used in diabetes and is also used for weight loss
Lehsun	*Allium sativum*	Herb	Bulbs are consumed orally	Decreases cholesterol and blood sugar levels

Bahera	*Terminalia bellirica*	Tree	Dried fruits and Bark are used in powdered form	Mainly used for relieving the problem of constipation and piles. Women use the powder of bark for weight loss
Bhimal	*Grewiaoptiva*	Tree	Bark is used as a paste	Used in bone fracture
Amla	*Emblica officinalis*	Tree	Fruit juice	Widely use as hair tonic and is known for better digestion and immunity
Gandela	*Murrayakoenigii*	Herb	Leaf	Heals wounds and cuts, helps in treating dysentery and constipation.
Tulsi	*Ocimum sanctum*	Herb	Leaves juice	Used in cold, cough and fever
Kala Bansa	*Barleriaprionitis*	Herb	Leaves juice	Used in asthma, cold, cough and relieves from chest congestion
Pattharchur	*Bergenia ciliata*	Herb	Leaves juice	Used in treatment of kidney stones
Hisar	*Rubusellipticus*	Herb	Fruit, leaves and bark	Fruits are used for better digestion and juice of leaves and bark is used for removing the kidney stone
Kandali	*Urtica dioica*	Herb	Leaves	Used in treatment of pain in muscles and joints, arthritis, it is used as herbal tea also.
Pyaaz	*Allium cepa*	Herb	Bulb juice	Widely used in ear pain
Kachnar	*Bauhinia variegata*	Tree	Stem, bark, flowers	Used in the treatment of thyroid in powdered form. Decoction of

				flowers is used in excessive menstrual bleeding in women

The results show that the women in the study area though literate or illiterate holds very important position at their home. From home to agricultural fields they hold key position in decision making (Sonam 2019; Parween and Merchant, 2021). Kandari et al. (2018) carried out a gender based comparative analysis of the agricultural workers in Uttarakhand and found that under varied circumstances, female work participation in agriculture is mostly done to satisfy the subsistence level of household need and is still greater than their male counterparts. The comparison of pre- and post-harvest participation by men and women in agricultural activities shows that, despite the fact that more women work in agriculture than men, men still play a larger role in the pre-harvest and post-harvest activities that require decision-making, such as plowing, choosing seeds, and applying chemical fertilizers. Overall study of male and female participation in pre- and post-harvest activities demonstrates that female participation in agriculture is higher than male participation. The girls belonging to new generation are studying in villages or the towns nearby. Girls have the liberty in choosing their career. The women belonging to older generation are a little conservative about their thoughts but wish that the condition of the villages should change and all the children must be empowered with literacy.

Adult women in all the villages hold the treasure of traditional knowledge (Anthwal et al. 2010; Bargali et al. 2022). Women are using the traditional knowledge related to floral species in their daily routine. Cold, cough, fever, body pain and health problems related to menstrual cycle are mainly treated at home (Ojha 2020). Though most of the population living in the villages is diabetes free, regular use of some plant species which are helpful in diabetes control are still used (Semwal et al. 2021). A study undertaken in Chakrata block by Dobhal et al.(2007) concluded that different plant parts like roots followed by leaf, whole plant, bark, ripe fruit, seed, flower, and petals were being used by the villagers mainly females, in treating various diseases. The use of traditional medicine is found widespread in the region with higher percentage of population relying on it (Bhatt et al. 2013; Gairola 2013). Tiwari and Upadhyaya (2020) studied the plant species of ethno-medicinal importance and found that people in Almora district in Uttarakhand, India are still using the plants with medicinal properties for their dental problems.

Why traditional ecological knowledge (TEK) needs to be conserved?

With the advent of new technologies the traditional ecological knowledge is being used less. The use of TEK is totally organic i.e. without any side effects on health but due to the reasons mentioned below in figure 5TEK is getting lost slowly and gradually.

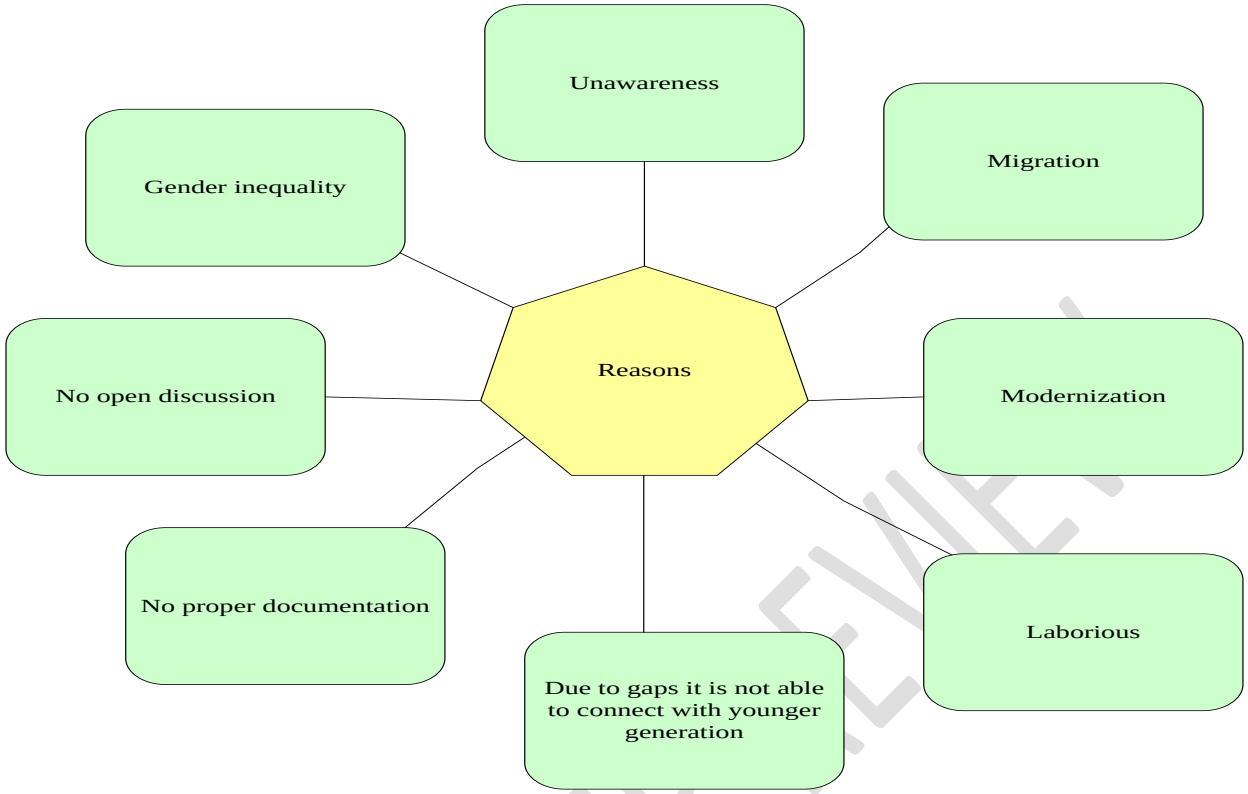

Figure 5 Reasons for degradation of traditional ecological knowledge

Recommendations

Traditional ecological knowledge needs to be conserved. TEK can help us understand health and disease in a much better way by grounding our understanding of environmental, social, and biological determinants of health (Bartwal et al. 2011; Finn et al. 2017). Some recommendations are given to improve the status of the women belonging to schedule caste and schedule tribe. The figure 6 below mentions the recommendation which can be undertaken for popularization of TEK.

1. Documentation and Preservation of TEK: A comprehensive database is required for documentation and preservation of TEK. It will help in transmission of TEK to future generations. Thus, digital platforms and community engagement may help in record and safeguard the valuable knowledge and indigenous practices.
2. Community Based Conservation Initiatives: Increased community participation for conserving and popularization of TEK. It can be achieved by involving local leaders, elderly people and women in collaboration profits with objective of sustainable development and biodiversity conservation.
3. Awareness on Health and Hygiene: Education programs and workshops especially on menstrual hygiene and dietary awareness. The non-governmental organizations (NGOs) and local leaders may play an important role in promotion of health and hygiene.
4. Improvement in Access to Government Policies: Information camps may be organized in areas where the schedule caste and schedule tribe communities are present so that they may get the benefits of the various Government policies and programs. A simplified

application procedure to avail the benefits of various Government policies and program should be made available to these communities so that maximum benefits may be availed.

5. Improved Infrastructure: Overall living conditions may be made better for women by providing clean drinking water, proper sanitation and healthcare facilities. Better transportation facilities and market connectivity may help women to sell their products related to agriculture and horticulture.

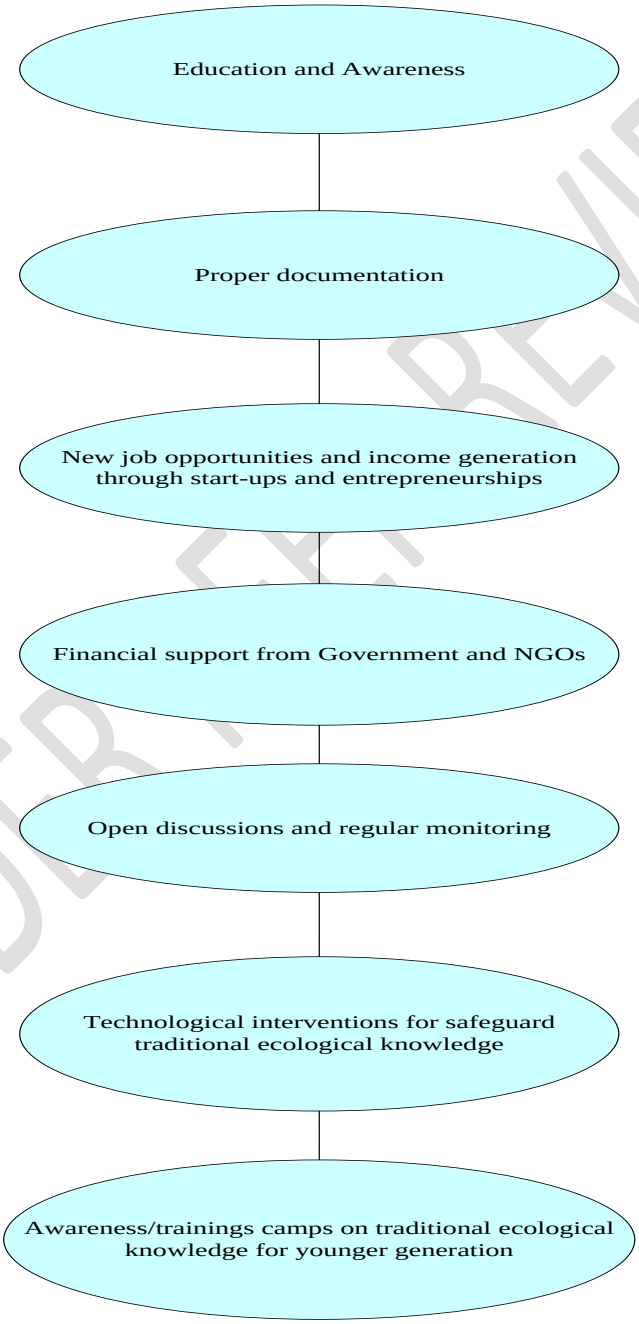

Figure 6 Steps for popularization of traditional ecological knowledge

Conclusion

The study concludes that women are the important pillars of the Jaunsari tribe. The issue which was found during the study was that the women are less informed. Though the women are more hard workers when compared to male, beginning from home to the agricultural fields they fulfill all the responsibilities efficiently but they lack the self-care. The similar results have been also concluded by Srivastava and Srivastava (2017) and Vohra and bahukhandi (2021). Hygiene conditions needs to be improved for women. The government's programs have helped tribal women overcome financial challenges and improve their quality of life (Malyadri 2020). In some tribal areas, women in Self Help Groups (SHG's) make strong family decisions. Additionally, women members were found to have higher monthly savings, political engagement, and poverty reduction (Thapliyal and Sati 2014).

Women of Jaunsari tribe are well versed with the traditional and ecological knowledge but the elderly women who possess this knowledge are illiterate thus a data bank of traditional ecological knowledge is lacking. Further research and development is required to save this traditional ecological knowledge with the help of technology and create a data bank so that the knowledge does not become extinct.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

References

1. Gupta SK, Rout PC, Tyagi P (2019) Community Based Tourism Development AmidComplex Mountain Issues: A Strategic Analysisof Chakrata Region of Uttarakhand, Int. J. Hosp. Tour. Syst.12:47-55.
2. Kumar A, Aswal S, Chauhan A (2019) Ethnomedicinal Investigation of Medicinal Plants of Chakrata Region (Uttarakhand) Used in the Traditional Medicine for Diabetes by Jaunsari Tribe, Nat. Prod., 9:175–200 https://doi.org/10.1007/s13659-019-0202-5
3. Sahu G (2017) Maternal Healthcare Among 'Jaunsari' Women in Uttarakhand: Issues and Concern. Journal of Social Inclusion Studies, 3:82–94. https://doi.org/10.1177/2394481120170106
4. Singh KK (1997) Studies on Native Medicine of Jaunsari Tribe of Dehradun District, Uttar Pradesh, India, Int. j. Pharmacogn. 35:105-110, https://doi.org/10.1076/phbi.35.2.105.13289
5. Negi CS (2010) Traditional Knowledge and Biodiversity Conservation: A Preliminary Study of the Sacred Natural Sites in Uttarakhand, Central Himalaya, J. biodivers. 1:43-62.
6. Ballabh C, Negi G (2018) Correlation between Rural Sex Ratio and Female Literacy in District Dehradun (Uttarakhand): A GeographicalAnalysis, J. Creat. Res. Thoughts 6:157-161
7. Bijalwan RP, Bhagavatula M, Semwal VD (2015) Morbidity of Uterine Prolapsed among the Women in the Chakrata Block of Dehradun District, Indian J. Community Health 27:103-109
8. Pant BR (2016) Demographic profile and nutrition status of women in Uttarakhand, Envis Bull. Himal. Ecol. 24:101-108
9. Kandari P, Bahuguna U (2017) Associative analysis of Socio-Economic and Nutritional status of Adult females in the Hill Rural Areas of Uttarakhand: A Study of Pauri, Tehri and Rudraprayag districts,Indian J. Dev. Res. Soc. Action, 13: 99-112.
10. Bahuguna R (2019) Problems and challenges faced by Jaunsari women of Uttarakhand: a study of Kalsi block in Dehradun district, International J. Res. Humanit. Soc. Sci., 7:1-12.
11. Bhatt H, Jugran, HP, and Pandey, R (2024). Cultural ecosystem services nexus with Socio-Cultural attributes and traditional ecological knowledge for managing community forests of indian western Himalaya. *Ecological Indicators* 166, 112379.
12. Joshi J, Chauhan P (2018). Access Benefits and Sharing of Traditional Knowledge of Medicinal Plants Practiced in Jaunsar Regions. Asian Journalof Agriculture and Life Sciences, 3:4-9.
13. Kala CP (2020) Medicinal plants used for the treatment of respiratory diseases in Uttarakhand state of India. Stud Ethno-Medicine 14:1–8. https://doi.org/10.31901/24566772.2020/14.1-2.597
14. Gairola SU (2022) Traditional medicinal knowledge of plant species found in Maldeota Village, Dehradun, Uttarakhand (India), J. Mater. Environ. Sci., 13:271-280.
15. Sonam (2019) Micro-finance and women pradhans in the panchayats: field notes from Dehradun district, Indian J Econ Dev, 7:1-8
16. ParweenR, Marchant R (2022) Traditional knowledge and practices, sacred spaces and protected areas, technological progress: Their success in conserving biodiversity. Conserv. sci. pract., 4, e12643.https://doi.org/10.1111/csp2.12643
17. Kandari P, Bahuguna U, Rukmani (2018) Gender Based Comparative Analysis of Workers Participationin Agriculture in Rural Areas of Uttarakhand: A Study ofSahaspur

Development Block, Econ. 63:119-127, https://doi.org/10.30954/0424-2513.2018.00150.15
18. Anthwal A, Gupta N, Sharma A, Anthwal S, Kim KH (2010) Conserving Biodiversity through Traditional Beliefs in Sacred Groves in Uttarakhand Himalaya, India. ResourConservRecycl . 54:962-971. https://doi.org/10.1016/j.resconrec.2010.02.003
19. Bargali H, Kumar A, Singh P (2022) Plant studies in Uttarakhand, Western Himalaya–A comprehensive review, Trees, Forests and People, 8, https://doi.org/10.1016/j.tfp.2022.100203.
20. Ojha SN, Tiwari D, Anand A et al.(2020)Ethnomedicinal knowledge of a marginal hill community of Central Himalaya: diversity, usage pattern, and conservation concerns. J. Ethnobiol. 16:29. https://doi.org/10.1186/s13002-020-00381-5
21. Semwal DK, Kumar A, Chauhan A, Semwal RB, Semwal R, Joshi SK (2021). Ethnomedicinal knowledge on the precise use of herbal medicine - An interview-based study on traditional healers from Jaunsar-Bawar region of Uttarakhand. Ethnobot. Res. Appl. 21:1–17.
22. Dobhal P, Sawan S, Sharma N (2007) Studies on medicinal plants of two villages of Chakrata Forest Division (Uttarakhand), Ann. For. Sci.15: 351-357.
23. Bhat JA, Kumar M, Bussmann RW (2013). Ecological status and traditional knowledge of medicinal plants in Kedarnath Wildlife Sanctuary of Garhwal Himalaya, India. J. Ethnobiol9:1. https://doi.org/10.1186/1746-4269-9-1
24. Gairola SU (2013) Traditional Ecological Knowledge Of Uttarakhand (India)-A Futuristic Approach, Ecol. Environ. Conserv., 19:801-804.
25. Tiwari H, Upadhayaya ML (2020) Ethno medicinal plants used for dental health care in Almora district, Uttarakhand, J. Med. Plants Stud., 8(6): 117-122
26. Bartwal M, Chandra V, Rajwar GS (2011) Ethnomedicinal Plant Diversity among the Jaunsaries in Tons Valley, Uttarakhand, National Conference on Forest Biodiversity : Earth's Living Treasure 22 May , 2011
27. Finn S, Herne M, Castille D (2017). The Value of Traditional Ecological Knowledge for the Environmental Health Sciences and Biomedical Research. Environ. Health Perspect.., 125: 085006. https://doi.org/10.1289/EHP858
28. Srivastava V, Srivastava A (2017) Determinants of Women Empowerment in Uttarakhand. Int. J. Res. Economics Soc. Sci. 7:303-314, http://dx.doi.org/10.2139/ssrn.3436019
29. Vohra S, Bahukhandi KD (2021)Women Empowerment and Sustainable Development in Uttarakhand: Challenges and Strategies—A Case Study of Selected Villages of Dehradun. In: Siddiqui NA, Bahukhandi KD, Tauseef SM, Koranga N. (eds) Advances in Environment Engineering and Management. Springer Proceedings in Earth and Environmental Sciences. Springer, Cham. https://doi.org/10.1007/978-3-030-79065-3_23
30. Malyadri P (2020) Income generation schemes for sustainable development of tribal women, Humanit. Soc. Sci. Rev., 8, https://doi.org/10.18510/hssr.2020.8176
31. Thapliyal NM, Sati HC (2014) A Study on Informal Women Leaders of Uttarakhand, J. Int. Women's Stud., 2: 247-256