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Jabalpur-482 003 (M.P.), India.
Ph. : +91-761-2370800, 2370818
Email : bulletin_rmrct@yahoo.com
Website: www.nirth.res.in

Self-reported morbidities among mineworkers and non-mineworkers residing adjacent the Turamdih uranium mine and mill in Jharkhand, India.

Ashwani Kumar[1] and K. C. Das[2]

Abstract: *The study was conducted among tribal communities residing in the areas surrounding the Turamdih Uranium mine and mill in the Indian state of Jharkhand. The objective of the study was to explore the differential morbidities among mineworkers (high exposure group) and non-mineworkers (low exposure group), and the association of the morbidities with various socio-demographic factors. A cross-sectional survey was conducted among 411 workers, aged 15-59 years, between January and June 2016. Bivariate analysis, chi-square test, and binary logistic regression were used for data analysis. Fifty-eight workers, aged 15-59 years, had died during five years preceding the survey. The results indicate that the prevalence of digestive problems, skin diseases, cancerous diseases, and urinary dysfunction was significantly higher among the Uranium mineworkers than the non-mineworkers. The distance of residence from the tailing pond had a significant effect on the prevalence of digestive problems and respiratory illnesses, with workers living within a range of 2 km from the tailing pond being more likely to suffer digestive problems (OR = 1.57; 95% CI, 0.94 – 2.60) and respiratory illnesses (OR = 1.89; 95% CI, 1.06 – 3.37) than those living further away. The findings have important program and policy implications related to safety measures, nuclear regulation acts, resettlement of tribal groups, and compensation to the victims' families.*

Keywords: uranium mining, radiation, mineworkers, morbidities, tailing pond, drinking water, safety

INTRODUCTION

In view of alternate sources of efficient energy generation, Uranium has gained enormous global importance driven by its medical, military and civil applications, albeit with potential safety and environmental legacies.[1] In India, Uranium Corporation of India (UCIL), founded in 1967 under the Department of Atomic Energy, is responsible for the mining and milling of uranium ore. Jaduguda in the East Singhbhum district of Jharkhand is the first uranium mine and mill (processing plant) of India, which started its operations in 1967. Jharkhand accounted for 30% (50,978 metric tonnes) of the total Uranium (U3O8) reserves (171672 metric tonnes) in India as on 30 June 2011. Three states namely,

[1]Monitoring and Evaluation Specialist, Family Planning Track20 Project, Care India, Patna, India-800013, © Email: ashwaniips17@gmail.com, Contact No: 91+9969789292

[2]Professor, Department of Migration and Urban Studies,International Institute for Population Sciences, Mumbai, India – 400088, Email: kcdas@iips.net

Andhra Pradesh, Jharkhand, and Meghalaya, hold more than 90% of the country's uranium resources.[2]

Keeping in view the nation's endeavour to expand nuclear energy infrastructure (20,000 MWe by 2020 from the present capacity of 2770 MWe), new uranium mines are being opened by UCIL in several parts of the country including in the Singhbhum Thrust Belt of Jharkhand.[3] In this context, a new uranium mine and mill was commissioned in 2003 at Turamdih, 24kms west of Jaduguda and 5kms south of the Tatanagar railway station. The Turamdih Processing Plant has been set up to treat the ore from the Turamdih, Banduharang, and Mohuldih mines.[4]

Uranium mining, which is highly sensitive, and the most dangerous for nature, the environment, human beings, and all the living creatures exposed to its radioactivity, is not taken more concern among Indian scholars and research scientist. The Adivasis of Jharkhand has already faced painful experiences due to activities of Jaduguda uranium mining, milling and waste disposal at tailing dam by UCIL. Past experiences of physical health problems and disease pattern in Jaduguda in the form of disabilities, congenital defects in new-born, cancer and other diseases drives to study the present quantum of health related issues among the displaced tribal people residing nearby newly established uranium mine and mill at Turamdih and surrounding villages.

Uranium mining and environment

Uranium, a highly radioactive element, is extracted from both underground and open-pit mines. Alkali and acid washes isolate the uranium, to yield the more refined and uranium rich ore called ***yellowcake***. The remaining 80% to 99.6% of the processed ore, which may be in the form of solid or liquid effluents, is referred to as ***tailings*** and is stored or dumped in ***tailings ponds*** or containment fields to prevent wind and water erosion.[5]

An epidemiologic study was conducted among 5,801 radiation workers of Rocketdyne/Atomics International to ascertain organ specific doses from lifetime exposure and intake of radionuclides including isotopes of uranium, plutonium, americium, calcium, cesium, cerium, zirconium, thorium, polonium, promethium, iodine, zinc, strontium, and hydrogen (tritium).[6] Traces of these decay metals and harmful radiations from uranium mining activities contaminate adjacent water resources, soil, air, and agricultural products and expose the human beings to the risk of fatal consequences.[7] Considering the public health risk of uranium mining, the Portuguese government approved a study of old uranium mines and tailing ponds to monitor the quality of underground water and soil with the purpose of evaluating the health risks.8 The results of the study revealed higher radionuclide concentrations in some agricultural fields due to surface runoff and mixture of tailings materials with soils. Water from wells and small fountains were found to be the main sources of exposure for the local human populations. Transport of radioactive dust by wind and emission of radon from the tailings were also identified as additional pathways.[9–11]

Uranium mining exposure and human health

Several studies have found a statistically significant correlation between exposure to radon, uranium, and decay elements of uranium and health complications like bronchial and lung cancer, leukaemia and other blood diseases, cancers of the bone marrow, lung, stomach, liver, intestine, gall bladder, skin, and kidney, psychological disorders, and birth defects.[12,13]

Several studies done among the Navajo uranium mineworkers of the United States have demonstrated the prevalence of a broad spectrum of morbidities including lung cancer, respiratory illnesses, tuberculosis, digestive dysfunction, and other cancerous diseases among the mineworkers. The studies have also established these diseases to be the cause of death of around 800 workers between 1960 and 1990.[14–17] An epidemiological review of eighteen cohort and 5 nested case-control studies of uranium mine workers elucidate that workers occupationally exposed to uranium seem to be at increased risk of fatal diseases from neoplasms of the lung and the larynx and the lymphatic and haematopoietic tissue.[18] Morbidities among workers and teenagers in the heavily uranium decay contaminated territories of Ukraine increased fourfold between 1987 and 2004.[19]

Systematic literature review searched on the PubMed and the Scopus databases provide evidence of increased lung cancer risk and mortalities among uranium-processing workers.[20,21] Studies conducted in villages surrounding the Jaduguda uranium mine and mill too have documented the severe health consequences suffered by the native tribal people, including premature deaths.[22]

We performed a statistical analysis to determine the association between mortalities as well as prevalent morbidities among mineworkers, aged 15-59 years, in the study area and their occupational exposure and various socio-demographic factors. In so doing, we aimed to answer the following three questions:

1) Is there a difference in the prevalence of various morbidities between uranium mineworkers (high exposure group) and non-uranium mineworkers (low exposure group) in the study area?
2) Does the occupational exposure have a dose-response relationship and a significant effect on prevalent morbidities?
3) To what extent do the distance of residence from the tailing pond and the different sources of drinking water in the Turamdih uranium mining area determine the association with self-reported morbidities among workers aged 15-59 years?

METHODS AND MATERIALS

The survey was conducted between January and June 2016 at UCIL, Turamdih Mine and Mill area, located north-west of the Jaduguda mine in Jamshedpur city of Jharkhand, India. (Figure 1) The study population belongs to Ho and Santhal communities (Schedule Tribes, Constitution of India.). They have a low level of education, live in poor socioeconomic conditions, and follow unique customs and culture.

The tailing pond for dumping hazardous

nuclear wastes at Turamdih had been considered as the central point, and 31 villages within the distance of 5kms of the pond were identified to be at risk of exposure to radiation. Based on the proportion of the tribal population and the female literacy rate, 411 households from 10 villages were selected for the study using the Probability Proportion to Size (PPS) sampling method. Inclusion criteria of the respondents from each household were – one economically active mineworker aged 15-59 years residing for at least five years in the study area. The total population in the age group 15-59 years was 1291, constituting approximately 60% of the total sample population.

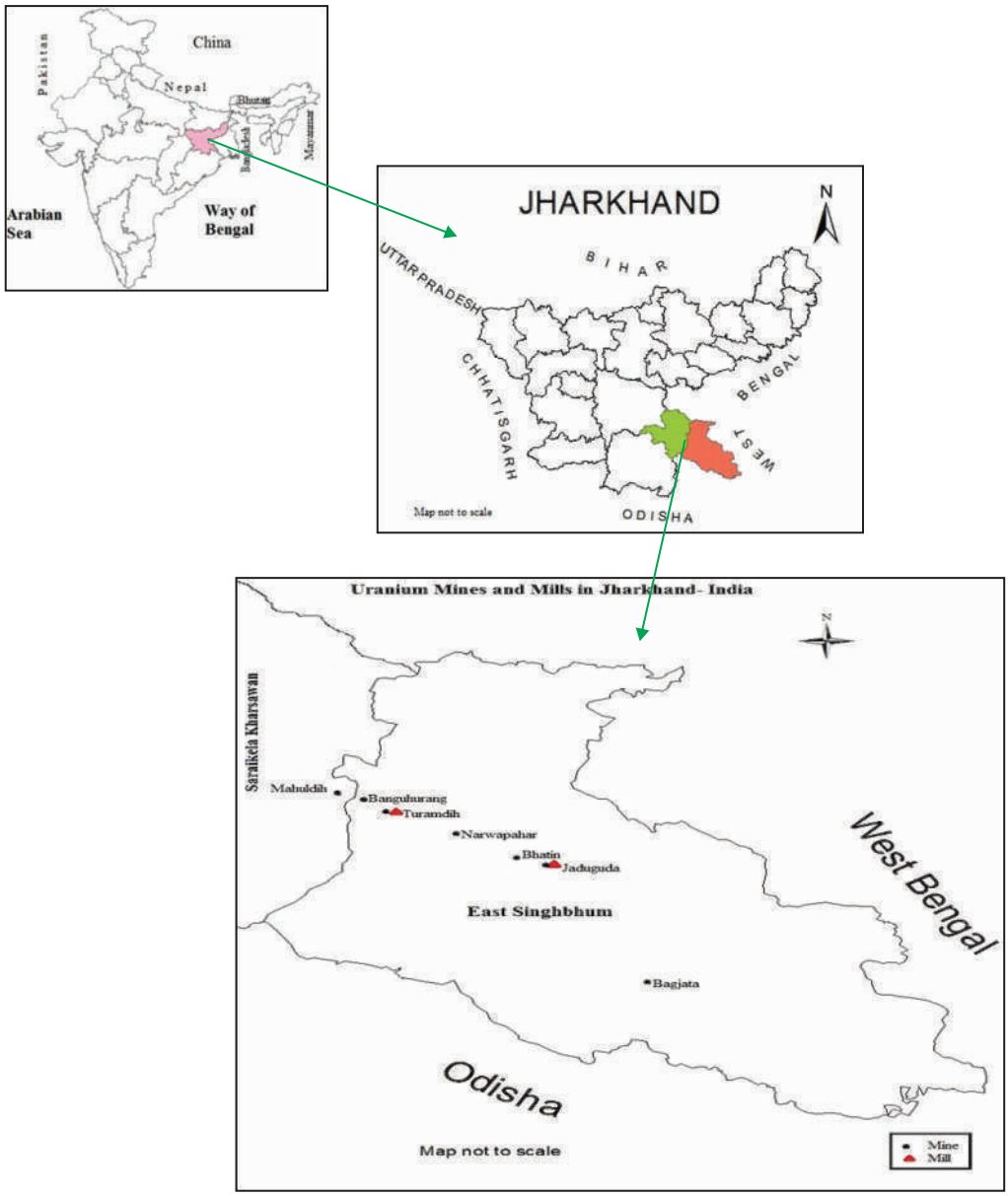


Figure 1. Location Map of Study Area

Outcome variables

To identify the morbidity pattern in the study area, the study asked the respondents, "Have you suffered one or more illnesses, diseases, symptoms, and health problems in the last one year?" The respondents were given open opportunities to name the illnesses or diseases and describe their symptoms. The age and sex of the victims and the frequency and duration of each health issue were listed and coded. The study was conducted using an interviewer-administered questionnaire in the native language of the respondents using local, commonly understood terms. The languages used in the survey were Hindi and Santhali.

The events of different types of morbidities were counted based on self-reporting by the interviewees, and no efforts were made to verify the events. In the tribal areas of India, where data on morbidity and mortality are mostly unavailable or weak, these self-reported responses of the tribal interviewees living adjacent to a uranium mine and mill provide a unique opportunity to examine the morbidity scenario as well as the determining factors associated with it. Morbidities among mineworkers aged 15-59 years, like digestive problems, respiratory illnesses, urinary dysfunction, cancerous diseases, and skin diseases, (defined in Table 2) were taken as the outcome variables in the study.

Predictor variables

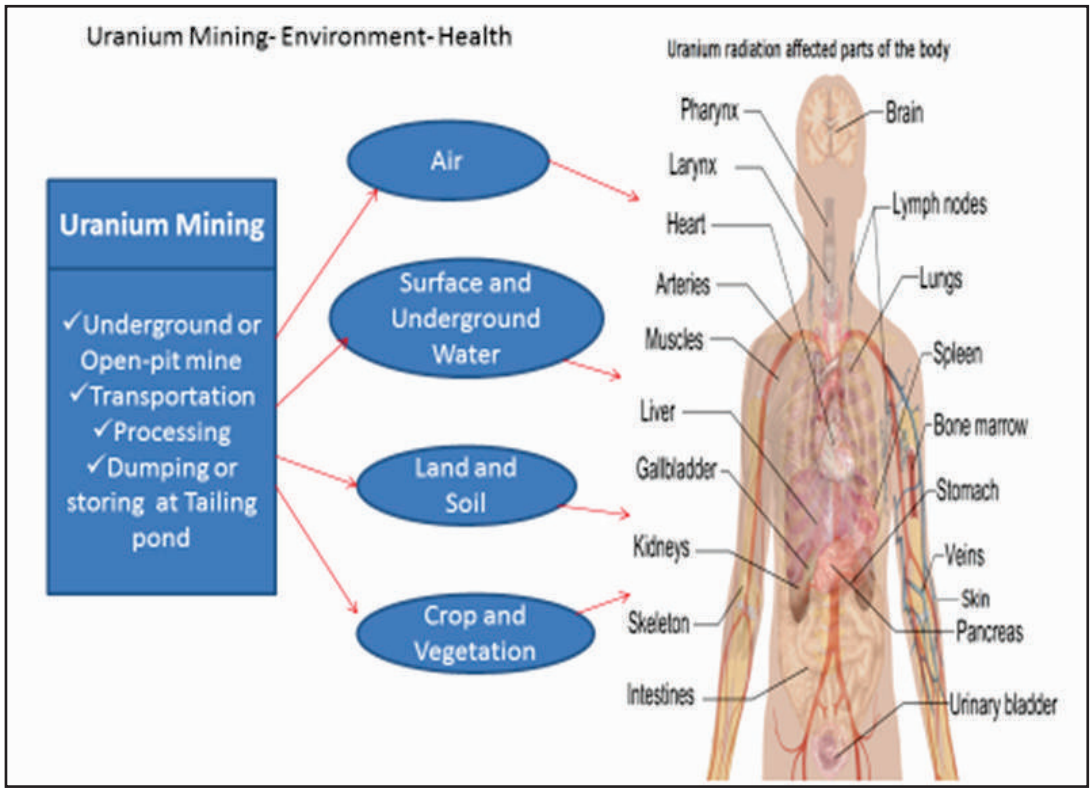
The study collected information about the occupation of each respondent. We used this information to group respondents into two categories representing the extent of exposure to radioactive metals and its radiation – high exposure group (respondents working in the uranium mine or mill, Turamdih) and low exposure group (respondents working elsewhere). Further, exposure to radioactive metal and toxic radiation from uranium mine and mill have ascertained indirectly by closeness/distance of tailing pond, mill (uranium processing unit) and minefield from the respondent resides. Distances recorded in Kilometre and meter. We used information from this question to group households into two categories representing the extent of exposure to radioactive metals and its radiation – high exposure group (households within range of 2Kms. from tailing pond, mill and uranium mining field) and low exposure group (households more than 2Kms. from tailing pond, mill and uranium minefield). This two-category classification of closeness/ distance is the main predictor variable.

The survey also collected information on the household's main source of drinking water as it is considered an important and natural pathway of radiation to reach or penetrate into the human body. The survey used a 9-item classification of the source of drinking water: Own/community well-covered, own/community well-uncovered, own/community hand-pump, piped water supply, mobile water tank, river, canal, pond, and rain-water. We used collected information on the main source of drinking water to group households into three categories. These

three categories are representing the extent of exposure to ingestion of radioactive elements into human body – high exposure group (households using source of drinking water: own/community well (covered/uncovered), river, canal, pond, or rain-water), medium-exposure group (own/community hand-pump, own/community well-covered) and low-exposure group (households using source of drinking water: piped water supply, or mobile water tank). This three-category classification of the principal source of drinking water is the second most principal predictor variable.

Other socio-demographic variables such as the age of the respondents, household density, religion, education, etc. were taken as independent variables. 'Sex' was excluded from the list of predictor variables as more than 90% of the respondent workers were male. 'Cooking fuel used' in the respondents' household and 'respondents' smoking' were also excluded from the predictor variables because of confounding effect and multicollinearity with other independent variables. The analysis emphasized on the pattern of differential morbidities among miners (high exposure group) and non-miners (low exposure group) and the relationship of the morbidities with the proximity of the house to the tailing pond (the major source of radioactive radiation), main sources of drinking water, and other socio-demographic factors.

Figure 2. Conceptual Framework: Uranium mining, environment and human health relationship



Kumar, Ashwani 2017

Data were analysed using Statistical Package for Social Sciences (SPSS) version 20.0. Chi-square test was used to evaluate the association between mortality as well as various types of morbidities among respondent workers with occupational exposure and socio-demographic factors. Association between factors was considered statistically significant at $p < 0.05$.

We used logistic regression to estimate unadjusted and adjusted effects of occupational exposure, closeness/distance of houses to/from the tailing pond (up to 2kms relative to more than 2 km) and household's major source of drinking water (unimproved sources relative to improved sources) on the prevalent morbidities and other household environmental and socioeconomic variables mentioned above as controls. Results were presented in the form of odds ratios (ORs) with 95 confidence intervals (95 CI). The logistic regression models were estimated using the IBM SPSS Statistics, version 20, and the Arc GIS 10.1 statistical software package.

We tested for the likelihood of multi-collinearity between the predictor variables before carrying out the multivariate models. We found a high degree of co-linearity between the distance of houses from the tailing pond and the distance of houses from the mill (uranium processing unit) and mining field. Therefore, we removed 'distance of houses from the mill and mining field' as a variable before carrying out the multivariate models. In the correlation matrix of predictor variables, we kept only those variables that had pairwise Pearson correlation coefficient values < 0.4 to ensure that multi-collinearity was not a problem.

RESULTS

Profile of the respondent workers

Among the respondent workers, around 40% were below 35 years of age and only 9% were females. More than half of the respondent workers were residing less than 2kms away from the hazardous tailing pond and the uranium-processing unit. Forty-four per cent respondent workers were using hand pump/borewell as the main source of drinking water. More than 80%of the respondent workers did not have the toilet facility on their premises and were using solid unclean fuels for cooking food.

A little less than 50% of all the respondents were illiterate and almost two-thirds of the respondent workers had a poor standard of living. Almost 86% of all the respondents consumed alcohol (made of rotten boiled rice and called 'Hadia' in the local language) more than once a week. Other socioeconomic characteristics and the distribution of the respondent workers have been defined in Table 1.

Table 1: Socioeconomic characteristics of worker respondents (N=411) aged between 15 and 59 years.

Background Characteristics		Respondents aged (15 - 59)				
		Mine-workers		Non Mine-workers		Total Workers
		n	n%	n	n%	
Workers Age						
	Below 35	73	44.0%	93	56.0%	166
	35 and above	122	49.8%	123	50.2%	245
Distance from tailing pond						
	More than 2Km	88	45.8%	104	54.2%	192
	Upto 2Km	107	48.9%	112	51.1%	219
Source of drinking water						
	Piped/Mobile water tank supply	77	46.1%	90	53.9%	167
	Own/community Hand-pump	89	49.2%	92	50.8%	181
	Others@	29	46.0%	34	54.0%	63
Distance from Processing Unit						
	More than 2Km	93	47.7%	102	52.3%	195
	Upto 2Km	102	47.2%	114	52.8%	216
No. of persons per room						
	3 or more	54	35.5%	98	64.5%	152
	less than 3	141	54.4%	118	45.6%	259
Sub-caste						
	Santhal	54	45.4%	65	54.6%	119
	Ho & others	141	48.3%	151	51.7%	292
Religion						
	Hindu & others	135	49.3%	139	50.7%	274
	Sarna	60	43.8%	77	56.2%	137
Wealth Index						
	Poor	103	37.7%	170	62.3%	273
	Non-poor	92	66.7%	46	33.3%	138
HH Head Education level						
	Illiterate	78	41.1%	112	58.9%	190
	Primary/Middle	83	51.6%	78	48.4%	161
	High School & Above	34	56.7%	26	43.3%	60

@Other sources of drinking water: river, pond, canal, stream, and rainwater

Prevalence of various types of morbidities among respondent workers in the study area

Several studies have found a statistically significant correlation between several human health complications and the exposure to radon, uranium, and decay elements of uranium. In this context, the present study collected information on the illnesses, disease patterns, health problems, and symptoms of health problems in the study population in the one year preceding the survey based on the respondents' self-reported morbidities. More than 30 types of health problems were recorded among the respondent workers (including mineworkers and non-mineworkers) in the Turamdih uranium mining area. A person could have one, two or more diseases/health problems.

The survey found that digestion-related health problems like indigestion, bloating, stomach pain, nausea, pancreas dysfunction, vomiting and diarrhea were very common, and, that almost one in four persons suffered from them. This was followed by respiratory infections like pneumonia, lung infection, chest pain, and tuberculosis (TB). Cancer, kidney and urinary dysfunction, itching, redness of the skin, spots on the skin, and swelling were found to be major health consequences among the tribal people of the Turamdih uranium mining area. The study also found a high prevalence of vector-borne diseases like malaria, chikungunya, dengue, etc. (Table 2)

The prevailing illnesses, diseases, and symptoms were grouped into seven morbidity categories for further investigation. Digestive problems (22.9%) were the leading morbidities among the tribal communities residing in the areas surrounding the Turamdih Uranium mine and mill, followed by respiratory infections (17.5%) and other diseases (15.3%). Vector-borne diseases and other diseases like malaria, chikungunya, dengue, jaundice, sinus infections, etc. were also highly prevalent (15.3%) among the respondent workers. (Table 2)

Table 2 Prevalence of various types of morbidities and differences among respondent workers (N=411) in the Turamdih uranium mining area, 2016.

Morbidity Categories	Prevalence (%)			Pearson χ2 value
	Mine Workers	Non-Mine Workers	Total	
Digestive Problems	29.74	16.67	22.87	(9.935, df(1), p= 0.002)
Respiratory Illness	20.00	15.28	17.52	(1.158, df(1), p= 0.209)
Urinary Diseases	6.67	2.78	4.62	(3.515, df(1), p= 0.061)
Cancerous Diseases	6.15	1.85	3.89	(5.069, df(1), p=0.024)
Skin Diseases	19.49	7.41	13.14	(13.103, df(1), p= 0.001)
Other Diseases	15.38	15.28	15.33	(0.001, df(1), p= 0.976)

The study aimed also to examine the differential morbidities between mineworkers (n_m = 195) and non-mineworkers (n_n = 216) in the study area and to determine the demographic and socioeconomic factors associated with these morbidities. The mineworkers represented the high exposure group to the radioactive radiation due uranium mining activities, whereas the non-mineworkers represented the low exposure group.

Prevalence of differential morbidities among mineworkers and non-mineworkers

Table 2 shows that at around 30%, the prevalence of digestive problems was much higher among the Uranium mineworkers compared to the non-mineworkers, among whom it was only 17%. These differences were significant ($\chi 2$ =9.935, df(1), p= 0.002). One out of five mineworkers was suffering from skin diseases (redness or spots on the skin, itching, and swelling), whereas only 7% of the non-mineworkers had such symptoms. These differences were highly significant ($\chi 2$ =13.103, df(1), $p \leqslant 0.001$). The prevalence of urinary dysfunction, including kidney stone, kidney failure, and gallbladder infections (6.7%) and of cancer disease (6.2%) was also significantly higher among mineworkers than among non-mineworkers (2.8% and 1.9%).

Effects of occupational exposure on selected morbidities

Table 3 shows the estimated effects of the type of occupational activities and selected demographic and socioeconomic variables on the prevalence of digestive problems, respiratory illnesses, urinary dysfunction, skin diseases, and cancer among the sampled mineworkers in alternative models. Model 1 in Table 3 shows that the unadjusted odds of suffering from digestive problems (OR = 1.89; 95% CI, 1.18–3.01), cancerous diseases (OR = 3.48; 95% CI, 1.10-10.96), and skin diseases (OR = 3.03; 95% CI, 1.63–5.63) were much higher among the mineworkers than among the non-mineworkers. The prevalence of respiratory illnesses and urinary dysfunction was also more likely among the mineworkers compared with the non-mineworkers of UCIL, Turamdih area; however the result was insignificant.

Controlling for exposure to the demographic and socioeconomic variables in Model 2 (Table 3) increased the effect of radioactive radiation from uranium mining activities on the prevalence of skin diseases and digestive problems marginally. By contrast, the effect of radiation on the prevalence of cancerous diseases (OR = 4.47; 95% CI, 1.52 – 17.96) and urinary dysfunction (OR = 2.48; 95% CI, 0.90 – 6.85) among mineworkers increased significantly. The effect of radiation on the prevalence of respiratory illnesses reduced somewhat when demographic and socioeconomic variables were controlled in Model 2, and it remained insignificant.

Table 3: Unadjusted and adjusted effects (OR, 95% CI) of occupational characteristics and other predictors on selected morbidities in the last one year.

	Digestion Problems		Respiratory Illnesses	
Background Variables	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Occupation				
Non mine Worker®				
Mine Worker	1.89***(1.18 – 3.01)	1.94**(1.18 – 3.18)	1.39(0.83 – 2.31)	1.22(0.71 – 2.12)
Age				
Below 35®				
35 and above		1.15(0.70 – 1.89)		1.85**(1.04 – 3.30)
Distance from tailing pond				
More than 2Km®				
Upto 2Km		1.57*(0.94 – 2.60)		1.89**(1.06 – 3.37)
Main Source of drinking water				
Piped/Mobile water tank®				
Hand-pump (Own/community)		2.07**(1.15-3.71)		1.73*(0.93-3.22)
Others#		2.63**(1.29-5.38)		0.79(0.32-1.96)
Household density				
3 or more per room®				
Less than 3 per room		0.79(0.48 – 1.39)		1.71*(0.94 – 3.12)
Religion				
Hindu & others®				
Sarna		1.38(0.84 – 2.27)		2.90***(1.68 – 5.02)
Education				
Illiterate®				
Literate		1.23(0.75 – 2.01)		1.25(0.72 – 2.16)

Continued…

Background Variables	Urinary Dysfunction		Cancerous Disease		Skin Disease	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Occupation						
Non mine Worker®						
Mine Worker	1.96(0.76 – 5.08)	2.48*(0.90-6.85)	3.48**(1.10 – 10.96)	4.47**(1.26 – 16.06)	3.03***(1.62 – 5.63)	3.35***(1.75 – 6.41)
Age						
Below 35®						
35 and above		1.15(0.43-3.08)		2.10(0.60 – 7.32)		1.49(0.79 – 2.80)
Distance from tailing pond						
More than 2Km®						
Upto 2Km		1.60(0.59-4.32)		0.86(0.27 – 2.71)		0.83(0.44 – 1.57)
Main Source of drinking water						
Piped/Mobile water tank®						
Hand-pump (Own/community)		1.93(0.60-6.23)		3.57(0.70 - 18.09)		1.13(0.57 - 2.25)
Others#		1.48(0.32-6.77)		0.71(0.06 - 8.65)		0.64(0.27 - 1.76)
Household density						
3 or more per room®						
Less than 3 per room		0.37*(0.14-1.01)		0.12***(0.03 – 0.45)		0.68(0.36 – 1.27)
Religion						
Hindu & others®						
Sarna		1.28(0.48-3.39)		2.70*(0.85 – 8.55)		1.33(0.71 – 2.46)
Education						
Illiterate®						
Literate		0.77(0.30 – 2.00)		3.05(0.78 – 11.90)		0.81(0.44 – 1.49)

® Reference Category; ***p? 0.01; **p?0.05; *p?0.1
#River, canal, pond, rainwater, and streams

Effects of the control variables on the selected morbidities

Model 2 in Table 3 discusses the adjusted effects of the control variables on the selected morbidities. With other variables controlled, age had a positive effect on the prevalence of respiratory illnesses, with workers aged 35 and above having a significantly higher prevalence of respiratory illnesses (OR = 1.85; 95% CI, 1.04 - 3.30) than workers aged below 35 years. Distance of residence from the tailing pond had a significant effect on the prevalence of digestive problems and respiratory illnesses such that workers living within 2kms of the tailing pond were more likely to suffer digestive problems (OR = 1.57; 95% CI, 0.94 - 2.60) and respiratory illnesses (OR = 1.89; 95% CI, 1.06 - 3.37). The main source of drinking water too had a significant effect on the prevalence of digestive problems, with workers using hand pumps being two times more likely (OR = 2.07; 95% CI, 1.15 - 3.71) and those using other unimproved sources (e.g. well, river, pond, rainwater, and streams) being more than two times more likely (OR = 2.63; 95% CI, 1.29 - 5.38) to suffer digestive problems than those using piped water supply and mobile water tank for drinking water.

As far as the household environment is concerned, respondent workers living in relatively less dense houses (fewer than 3 persons per room) were significantly less likely to suffer from cancerous diseases (OR = 0.12; 95% CI, 0.03 - 0.45) and urinary dysfunction (0.37; 95% CI, 0.14 - 1.01) than respondent workers living in high-density houses. Unexpectedly, the result shows that respiratory illnesses were higher among respondent workers living in low density houses. The findings of the study also revealed that respondent workers of the *Sarna* community had a significantly higher susceptibility to respiratory illnesses (OR = 2.90, 95% CI, 1.68 - 5.02) and cancerous diseases (OR = 3.34; 95% CI, 1.10 - 10.17) than those of the Hindu and other communities. Other socioeconomic variables like education of respondents had no significant effect on any type of morbidities.

DISCUSSION

The purpose of this study was to document disease patterns and health problems and their determinants in the study area and to differentiate the risk between high exposure group (mineworkers of UCIL, Turamdih) and low exposure group (non-miners). Another objective of this study was to assess the differential level of morbidities between mineworkers and non-mineworkers and the association of the morbidities with socio-demographic factors. The findings of the study indicate that the prevalence of digestive problems, skin diseases, cancerous diseases, and urinary dysfunction was significantly higher among the mineworkers of UCIL, Turamdih than among the non-mineworkers. The findings of the study are in conformity with those of [23-25] Mapel et al. (1997) Jones BA, (2014) Tirmarche et al. (2004) have established differential health risks related to lung and liver cancer, digestive problems, respiratory disorders, and urinary dysfunction among uranium mineworkers and non-mineworkers.

Being poor, unskilled and less educated (mostly illiterate), as well as having a strong attachment to their native land, indigenous language and culture, the tribal people displaced by UCIL were forced to resettle in the region of the tailing pond and uranium processing unit. Unaware of the inherent risks of uranium mining, the natives had no clue as to the hazardous environmental impact of living in close proximity to the mining area, nor the knowledge to deal effectively with the unknown situation. For example, the Turamdih workers have low addiction to cigarette/bidi/tobacco smoking; consequently, when they developed chest pain, lung cancer or other respiratory problems, they could rule out smoking as a cause. As the findings of the study established, proximity of residence to the uranium tailing pond was significantly related to the risk of respiratory illnesses and digestive problems.

Another finding of the study suggests that proximity of residence to the uranium mine, mill and tailing pond has a significant effect on the morbidities. Workers residing up to 2kms of the tailing pond or the uranium mill were more likely to suffer digestive, respiratory, cancerous and skin diseases and to die prematurely than those living more than 2kms away from the tailing pond or the uranium processing unit. The findings resonate with several previous studies conducted in the surroundings of uranium mining (open-cast/underground) and nuclear plants across the world.[26-30] When asked for the "reason to reside in close proximity to the uranium mine and mill", one of the respondents, Ghasia Ho (46 years) stated, *"After displacement by the UCIL Authority, a small, one-room house was provided to each household without considering the number of household members. No electricity, separate kitchen, bathroom, and drinking water were provided. The house was also far from our working place. Therefore, we were compelled to resettle close to the UCIL, Turamdih Mine and Mill*.

The main source of drinking water was also found to have a statistically significant effect on workers' (15-59 years) morbidities irrespective of their occupational orientation. The study makes it evident that respondent workers using hand pump/borewell, well (covered/uncovered), river, pond, canal, and rainwater as sources of drinking water had three to four times more risk of dying prematurely than those using a piped water supply or a mobile water tank as the main sources of drinking water in their households. The findings conforms to the previous studies that suggest that the radioactive element of decayed uranium from the tailing pond seeps into the ground water, surface water, and aquifers through porous land structure and soil, making the water contaminated.[7,31,32] Previous studies on uranium mining areas have also reported groundwater samples to have uranium concentration above the drinking water standard level of 30 ppb set by the USEPA.[33]

The tailing pond at UCIL, Turamdih, receives uranium ore wastage and effluents from the processing mill. The tailings have too little of the uranium to be of use; but the uranium is still radioactive and may contain toxic heavy

metals that seep and penetrate into the ground water. As *Laxman Diggi, a native of the Nandup village adjacent to UCIL, Turamdih, states, "During the monsoon season, the tailing pond is often inundated and overflows. The contaminated water from the tailing pond spreads into our cultivable lands, pond, and houses."* Therefore, the drinking water from the surface runoff or the underground sources becomes severely contaminated with the lethal radiation, causing slow, unbearable suffering to and premature deaths of the poor native tribal people. An earlier study done in the UCIL, Jaduguda mining region (24kms away from UCIL, Turamdih) also offered evidence of high concentrations of ^{238}U, ^{232}Th, ^{40}K in the soil and the drinking water, posing a significant radiological threat to the native tribal population.[34]

Limitations of the study

A cross-sectional study cannot determine causal relationships between variables. Since the respondents were tribal people - mostly illiterate and unaware of health problems - the study is prone to reporting bias; in most cases, respondent workers tend to under-report their problems.

CONCLUSION

These findings contribute to the thin empirical literature on uranium mining and the associated loss of life, health consequences, environmental justice, and public health in developing countries. The Government of India is increasing its strength and coverage in uranium mining and the nuclear energy sector rapidly. This makes it important that the health and safety of the workers of the uranium mines (underground and open-pit) and the residents of the nearby areas be protected.

The findings of the study have important program and policy implications related to safe drinking water, environmental impact assessment, safety measures, nuclear regulation acts, and compensation to and resettlement of tribal families. Based on the findings of the study, the authors have following recommendations to make:

- Check urban residential expansion towards the uranium mining area,
- Resettle the poor tribal families away (at least 5 km) from the uranium mining areas,
- Establish a water treatment plant and supply safe drinking water to the local people living in the surroundings of the tailing pond, mines or mills,
- Monitor the tailing pond and the nearby water bodies to ensure that the radioactive elements do not penetrate into the groundwater,
- Provide compensation and jobs to the victim families to ensure sustained livelihood, health and education,
- Bring all the existing uranium mines and mills under the international nuclear safety guidelines, and
- Educate the local people on the health hazards of radiation and develop a program to create awareness on hygiene and security measures.

Ethics approval and consent to participate:

The "Student Research Ethical Committee" (SREC) at the International

Institute for Population Sciences, Mumbai, approved the study. Since the study was undertaken in a tribal dominated area, informed consent of the respective tribal community heads was obtained before administering the survey. Individual respondents' consent was taken before the interviews, and freedom of withdrawal anytime from the study was assured. The purpose of the survey was explained to the community as a whole and to the individuals before conducting the survey, and the participants were assured that the information collected from them would be used for academic research purposes only.

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Scheduled Tribes and Tribal Communities of Uttarakhand State, India: An Analysis of 2001 and 2011 Censuses

Manju Rani[1], Binod Kumar Singh[2], Ravendra K Sharma[3*]

Abstract: *This paper discusses the social, economical and demographic aspects of Scheduled Tribes of Uttarakhand state and examines the socioeconomic differences among different tribal communities and also brought out some insights of existing disparities. There are five different notified scheduled tribes of Uttarakhand and all these tribes were enumerated in Census 2001 and 2011. The total population of Uttarakhand state was 100.89 lakhs and out of which 2.92 lakhs (2.9%) was tribal population as per Census 2011. The Tharu is the largest tribe of Uttarakhand, which account for one-third of total tribal population, followed by Jannsari (32.5%), Buksa (18.3%), Bhotia tribes (14.2%). Ranji tribe is the least in numbers. Most of the tribes are residing in rural areas; however, about one-fourth of Bhotia's tribal population resides in urban areas. Majority of tribal population inhabit in four districts, viz. Udham Singh Nagar (43%), Dehradun (38.8%), Pithoragarh (7.5%) and Chamoli (4.1%) only. The sex ratio among scheduled tribes of Uttarakhand (950) is considerably poor as compared to the national average of Scheduled Tribes (978) in India. However, Bhotias registered more females than males (1049) and Ranjis have least females (833). In year 2001, about 63 percent of tribal population of Uttarakhand state was literate as compared to 72.0 percent of state average. However, literacy was relatively higher among Bhotia (86.4 percent) and Tharu (82.3 percent) tribes. Overall, Bhotias are comparatively better-off and Ranjis are the most deprived tribe of the state.*

KEYWORDS: Scheduled Tribes, Tribal Communities, Tribal Demography, Spatio-temporal analysis, Uttarakhand

INTRODUCTION

Thirteen hilly districts of the Uttar Pradesh state were curved out on 9th November 2000 as a new state Uttaranchal (now renamed as Uttarakhand). The Uttarakhand state is heavily forested and extremely hilly region in Central Himalayan zone. It is located between latitudes 28°43´N - 31°27´N and longitudes 77°34´E - 81°02´E covering a geographical area of 53,483 km^2 (Government of Uttarakhand, 2016,

[1]Associate Professor, SMP Government Girls PG College, Meerut (U.P.)
[2]Senior Geographer, Directorate of Census Operations, UP, ORGI New Delhi.
[3]Scientist 'D', ICMR-National Institute for Research in Tribal Health, Jabalpur.
*Corresponding Author: Dr. Ravendra K. Sharma, Scientist 'E'
ICMR-National Institute for Research in Tribal Health, PO-Garha, Jabalpur (M.P.)
E-mail: ravendra_s@yahoo.com

2017). The Tons river separates the region from Himachal Pradesh in the north-west, while Kali river separates it from Nepal in the east. Starting from the foothills in the south the region extends up to the snow-clad peaks of the Himadri, marking the Indo-Tibetan boundary (Rao & Nandy, 2001). The region being situated centrally in the long sweep of the Himalaya forms a transitional zone between the per-humid eastern and the dry to sub-humid western Himalaya. The region comprises of two administrative units viz., Garhwal (North-West portion) and Kumaon (South-East portion).

Agriculture sector plays an important role in the economy of Uttarakhand in terms of production and supply of off-session vegetables, temperate fruits, forest products and several other resources including tourisum and manpower resources. Uttarakhand with its vast natural resource base, large forest cover and enormous power potential holds the potential of being one of the most prosperous states in the country. While looking at economic indicators such as per capita gross state domestic product, Uttarakhand has relatively higher income than national average. Rate of unemployment is relatively low in Uttarakhand in comparison to national average (Mamgain. 2007, GoUK, 2016, 2017). As per Government of Uttarakhand (GoUK) estimates, the size of the economy i.e. GSDP at current prices is estimated Rs 195,192 Crore for the year 2016-17 with 10.8% growth rate with respect to previous year. The per capita income is estimated Rs 160,795 for the year 2016-17. In terms of share of the economy, the primary sector contributes about 10.3%, secondary sector contributes 46.38% and the tertiary sector contributes 35.3% in the year 2016-17 (GoUK, 2017a).

The Uttarakhand had a population of 10.08 million as of March 2011, accounted for about 0.83% of the Indian population and population density of 189 persons per Sq Km. According to 2011 Population Census, nearly three-fourths of Uttarakhand's population was living in its rural areas. The state has comparatively higher ratio of urban population as compared to its neighbouring states. Similar to the national pattern, the population growth rate of the state has slow down over the period and is now lower than the national average. The state has achieved adequate success in attaining relatively high level of literacy in comparison to many other states of the country. More than 78% of population of the state is literate and thus it ranked at 9th place in India. Similarly, Uttarakhand is relatively better off in attaining higher enrolment in primary and elementary level of education in comparison of the national average. The state also has relatively better social indicators such as infant mortality rate (Mangaim, 2007). The high level of literacy and existence of large number of good quality educational institutions, research and training institutes and institutes of excellence indicate the abundant availability of quality human resource base (IBEF, 2010, Sharma, Kumar & Giri, 2015).

Out of total state population enumerated in 2011 census, about 2.9

lakhs (2.92%) were classified as Scheduled Tribes (ST) and 18.93 lakhs (18.9%) as Scheduled Castes (SC). The tribes are the most underprivileged section of our society, which have been subjected to economic exploitation and social discrimination for ages. The age-old exploitation and repression of the tribal have cut them from the mainstream of the socio-economic development. Different tribal groups are living in different geographical regions and in different degree of economic and social backwardness. However, limited information is available about social, economic and demographic inequalities among tribal communities of the state. Hence, it depicts a need to study the distribution of tribal population and tribal communities from regional perspective. With this background, an attempt has been made in this paper to examine the differences among the tribal communities of the state.

MATERIAL AND METHODS

In the present paper, we tried to examine the socio-economic and demographic characteristics of the tribal population and tribal communities of Uttarakhand state. The data for present analyses have been taken from tribe specific tables of 2001 & 2011 censuses (Census of India, 2011, 2011a, Census of India, 2001) and other Govt. of India Publications (GoI, 2013). While discussing regional trends, the state is divided into two major regions, viz. Kumaon and Garhwal (Figure -1). The base map for the study area is reproduced using the raster image published in the Administrative Atlas of India, Census of India 2011 (Figure 1). The raster map image is digitized, edited and modified by ArcGIS 10.0 software. Tribal communities and their distribution at district level were mapped for both 2001 and 2011 censuses. The data is analysed with MS-Excel and SPSS 20 software.

Figure 1: Location map of Uttarakhand and geographical regional distribution of districts.

On the basis of a composite index, which incorporated 16 different indicators like - Urbanization; Sex ratio, Child sex ratio (0-6 years), % Child population, Male and Female Literacy rates, Male and Female Work participation rates, Proportion of male and female Main Workers, Proportion of male and female workers engaged in Cultivations, Household industries and other jobs, the tribes are compared. All indicators were standardized before computing the composite index. All 16 selected indicators were positive indicators and hence standardized as:-

$$Xi = \frac{Vi - V\ \min}{V\ \max - V\ \min} * 100$$

Where *Vi* is the value of a indicator for i^{th} tribal community and V_{max} and V_{min} are the maximum and minimum value of that particular indicator. Further, each indicator was assigned a weight and the weight for each indicator was computed as: -

$$Wi = \frac{\frac{1}{\sqrt{Var(Xi)}}}{\sum \frac{1}{\sqrt{Var(Xi)}}}$$

Finally, using these weights the composite index was computed as

$$Ci = \sum_{i=1}^{n} Wi * Xi$$

Where *Xi* is the standardized value of an indicator and Wi is the weight assigned to that particular indicator and n is the number of indicators included in the composite index.

RESULTS

Tribal Population in Uttarakhand state

In the last population census 2011, total population of Uttarakhand was enumerated as about 10.1 million. In absolute numbers, about 1.6 million persons were added during the last decade (2001-11). As per census 2001, out of 8.49 million state population, 3.56 (42 %) was recorded in Kumaon region and 4.92 million (58 %) in Garhwal region. However, in 2011 census, out of 10.1 million total enumerated population, 4.2 million (41.6%) were enumerated in Kumaon and 5.9 million (58.4%) population in Garhwal regions respectively. About 3% of total population in the state was classified as scheduled tribe (STs) and the proportion of STs in total state popuation remained almost unchanged during 2001-11. However, the number of tribal population had increased from 2.56 lakhs in 2001 to 2.91 lakhs in 2011 census. The overall decadal growth rate during 2001-11 for total and scheduled tribe population was 18.8% and 14.0% respectively. However, the decadal growth rates were slightly higher in Gharwal region compared to Kumaon region.

Table 1: Population, Tribal Population by Regions and Districts, Uttarakhand, 2001 & 2011

State/Region/ District Name	Population		% w.r.t. Population		Tribal Population		% w.r.t. Tribal Population		% Tribal Population		Population Growth Rate	
											T. Pop	Tribal Pop.
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Kumaon Region	**3565383**	**4228998**	**42.0**	**41.9**	**138021**	**154669**	**53.9**	**53.0**	**3.9**	**3.7**	**18.6**	**12.1**
Almora	630567	622506	7.4	6.2	878	1281	0.3	0.4	0.1	0.2	-1.3	45.9
Bageshwar	249462	259898	2.9	2.6	1943	1982	0.8	0.7	0.8	0.8	4.2	2.0
Champawat	224542	259648	2.6	2.6	740	1339	0.3	0.5	0.3	0.5	15.6	80.9
Nainital	762909	954605	9.0	9.5	4961	7495	1.9	2.6	0.7	0.8	25.1	51.1
Pithoragarh	462289	483439	5.4	4.8	19279	19535	7.5	6.7	4.2	4.0	4.6	1.3
Udham Singh Nagar	1235614	1648902	14.6	16.3	110220	123037	43.0	42.1	8.9	7.5	33.4	11.6
Garhwal Region	**4923966**	**5857294**	**58.0**	**58.1**	**118108**	**137234**	**46.1**	**47.0**	**2.4**	**2.3**	**19.0**	**16.2**
Chamoli	370359	391605	4.4	3.9	10484	12260	4.1	4.2	2.8	3.1	5.7	16.9
Dehradun	1282143	1696694	15.1	16.8	99329	111663	38.8	38.3	7.7	6.6	32.3	12.4
Garhwal	697078	687271	8.2	6.8	1594	2215	0.6	0.8	0.2	0.3	-1.4	39.0
Hardwar	1447187	1890422	17.0	18.7	3139	6323	1.2	2.2	0.2	0.3	30.6	101.4
Rudraprayag	227439	242285	2.7	2.4	186	386	0.1	0.1	0.1	0.2	6.5	107.5
Tehri Garhwal	604747	618931	7.1	6.1	691	875	0.3	0.3	0.1	0.1	2.3	26.6
Uttarkashi	295013	330086	3.5	3.3	2685	3512	1.0	1.2	0.9	1.1	11.9	30.8
Uttarakhand	**8489349**	**10086292**	**100.0**	**100.0**	**256129**	**291903**	**100.0**	**100.0**	**3.0**	**2.9**	**18.8**	**14.0**

Source: Author's calculation based on Census Data, 2001 & 2011

Among the districts of the state, Haridwar (18.7%), Dehradun (16.8%), and Udham Singh Nagar (16.3%) constitute maximum population in 2011, whereas maximum tribal population was enumerated in the Udham Singh Nagar (43%) and Dehradun (38%) districts (Figure 2). The proportion of tribal population residing in these districts remain unchanged during 2001 and 2011 censuses. Though the total population in the state increased by 18.8% during 2001-11, at higher rate than the increase in scheduled tribe population (14.0%) during this period, but there was considerable variability in the decadal growth among the districts of the state. In case of total population, Udham Singh Nagar (33.4%), Dehradun (32.3%), and Nainital (25.1%) districts recorded higher growth than state average during 2001-11 decade, whereas, a negative growth rate was observed in Garhwal (-1.4%) and Almora (-1.3%) districts during this period. In case of scheduled tribe population, districts with relatively smaller tribal population recoded very high growth rate, for instance, the ST population in Rudraprayag district increased by 107% during last decade followed by Haridwar (101%), Champawat (81%), Almora (46%), Garhwal (39%), Uttar kashi (31%) and Teri Garhwal (27%) districts (Table 1).

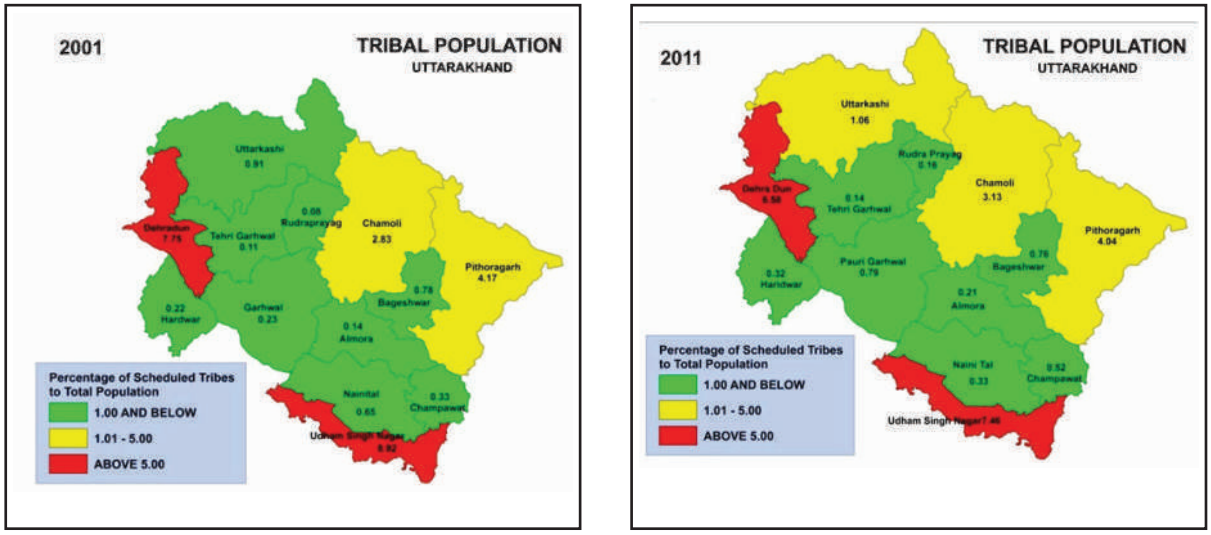

Figure 2: Distribution of tribal population in Uttarakhand state, 2001 & 2011

Table 2: Villages by Population Size of Scheduled Tribes in Uttarakhand state, 2001 & 2011

Scheduled Tribe Population Size	Total number of inhabited villages				Total Population				Scheduled Tribe Population			
	2001		2011		2001		2011		2001		2011	
	Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
No ST Population	14278	90.6	13763	87.4	4841630	76.7	4610912	65.5	0	0.0	0	0.0
01-09	476	3.0	828	5.3	475850	7.5	889375	12.6	1739	0.7	2797	1.1
10-49	254	1.6	377	2.4	238562	3.8	552121	7.8	6060	2.5	8830	3.3
50-99	152	1.0	166	1.1	96370	1.5	161731	2.3	11371	4.7	12275	4.6
100-199	236	1.5	239	1.5	143595	2.3	228338	3.2	33194	13.8	34917	13.2
200-499	236	1.5	235	1.5	183176	2.9	216985	3.1	73594	30.6	73128	27.6
500-999	100	0.6	91	0.6	206712	3.3	197229	2.8	72360	30.1	66104	25.0
1000 and above	29	0.2	46	0.3	124380	2.0	180263	2.6	41891	17.4	66768	25.2
Total	**15761**	**100.0**	**15745**	**100.0**	**6310275**	**100.0**	**7036954**	**100.0**	**240209**	**100.0**	**264819**	**100.0**

In 2011 census, a total of 16793 villages were enlishted in the state and out of these 15,745 villages were inhabited. But in 2011 census relatively lesser 15,745 inhabited villages were documented against 15,761 villages in 2001 census in the state. However, no tribal population was recorded in 13,763 inhabited villages (87.4%, Census, 2011) in comparison of 14278 villages (90.6%, Census 2001) (Table 2). Whereas, only 29 villages in 2001 census and 46 villages in 2011 census had more than 1000 tribal population in the state. According to

2001census, about 76.7% of total state population inhabited in the villages and no tribal population was present, this declined to 65.5% in 2011. This indicates the movement of rural tribal population migrating from tribal villages to non-tribal villages. In 2011 census, villages with 500-999 tribal population had 91 inhabited villages, while villages with 200-499 tribal population covered 235 villages and villages with tribal population size of 100-199 included 239 villages. Whereas, 828 villages had only less than 10 ST persons and another 377 villages had 10-49 ST persons. More than 90% of tribal population was concentrated in villages having at least 100 ST populations.

Further, the village level analysis of 2011 census data revealed that 42 and 35 inhabited villages of the Uttarakhand state had 100% tribal population in 2001 and 2011 census. The villages constituting 2.8% and 1.8% of enlisted inhabited villages respectively. These villages comprised only 2.2% and 1.6% of ST population of state respectively in 2001 and 2011 census. More than 50% rural ST population was enumerated from villages having 40-80% ST population in 2001, whereas in 2011 census, more than 50% ST population was enumerated in villages having 20-70% ST population. This also reflects that rural tribal population in migrating from tribal dominated villages to non-tribal villages. About 41% and 53% villages in 2001 and 2011 census had less than 5% ST tribal population (Table 3).

Table 3: Distribution of tribal villages and population by percent of tribal population in the village in Uttarakhand, 2001-2011

Percentage of ST Population to Total Population	Total number of inhabited villages				Scheduled Tribe Population			
	2001		2011		2001		2011	
	Nos.	%	Nos.	%	Nos.	%	Nos.	%
100%	42	2.8	35	1.8	5356	2.2	4143	1.6
90.01-99.99	59	4.0	50	2.5	11965	5.0	9616	3.6
80.01-90.00	80	5.4	53	2.7	19948	8.3	16017	6.0
70.01-80.00	98	6.6	82	4.1	28397	11.8	22188	8.4
60.01-70.00	97	6.5	89	4.5	34377	14.3	27549	10.4
50.01-60.00	83	5.6	107	5.4	28712	12.0	45843	17.3
40.01-50.00	92	6.2	93	4.7	37693	15.7	35873	13.5
30.01-40.00	62	4.2	80	4.0	20144	8.4	32271	12.2
20.01-30.00	75	5.1	88	4.4	20999	8.7	28274	10.7
10.01-20.01	122	8.2	134	6.8	19110	8.0	21698	8.2
5.01-10.01	69	4.7	121	6.1	6372	2.7	10081	3.8
5.00 and Below	604	40.7	1050	53.0	7136	3.0	11266	4.3
Total	**1483**	**100.0**	**1982**	**100.0**	**240209**	**100.0**	**264819**	**100.0**

In urban areas, 2.2 million persons (25.7% of total population) were enumerated in 2011 census as compared to 3.0 million (30.2%) persons in 2001 census. Around 70% of urban population of the state was enumerated from small-small towns. Among large cities, Dehradun city had about 19% of state urban population. But in case of ST population, about 16 thousand ST population (6.2% of total ST population) was residing in urban areas in 2001, which increased to about 27 thousand (9.3%) in 2011. The proportion of urban ST population residing in small towns of the state increased to 62.1% in 2011 from to 52.2% in 2001. About 16% urban ST population was enumerated in Dehradun city followed Dharchula city (7%) and Joshimath (6%) in 2011. During 2001-11, the ST population of Dehradun has increased considerable from 1930 to 4392 respectively in 2001 and 2011 census, but ST population of Dharchula city declined from 2204 in 2001 to 1920 in 2011 (Table 4)

Table 4: Tribal Population in urban towns in Uttarakhand, 2001 & 2011

Towns	Population		% w.r.t. Population		Tribal Population		% w.r.t. Tribal Population	
	2001	2011	2001	2011	2001	2011	2001	2011
Dharchula (NP)	6324	7039	0.3	0.2	2204	1920	13.8	7.1
Dehradun (M.Corp)	426674	574840	19.6	18.9	1930	4392	12.1	16.2
Joshimath (MB)	13204	16709	0.6	0.5	1266	1711	8.0	6.3
Chamoli Gopeshwar (MB)	19833	21447	0.9	0.7	1141	1199	7.2	4.4
Pithoragarh (MB)	44964	56044	2.1	1.8	1067	1051	6.7	3.9
Other Towns	1493725	2200471	68.5	72.2	8312	16811	52.2	62.1
Towns with No ST Pop	174350	172788	8.0	5.7	0	0	0.0	0.0
Total Urban	**2179074**	**3049338**	**100.0**	**100.0**	**15920**	**27084**	**100.0**	**100.0**

Source: Author's calculation based on Census Data, 2001 & 2011

TRIBAL COMMUNITIES IN UTTARAKHAND STATE

Population of Tribal Communities

In Uttrakhad state five scheduled tribes were notified and enumerated in the 2001 and 2011 censuses, theses tribes are Bhotia, Buksa, Jannsari, Raji and Tharu. Out of these five scheduled tribes of the state, Buksas and Rajis are being classified as particular vulnerable tribal groups (PVTG). These PVTGs are classified based on their primitive tribes most backward tribes having a declining or stagnant population, low level of literacy, pre-agricultural level of technology and are economically backward. They become the most vulnerable sections among the scheduled tribes and priority is required to be accorded for their protection, checking the declining trend of their population and their development (Govt. of India, 2007,

2013). A brief ethnographical description about these tribes is given elsewhere (Rani & Sharma, 2007; Sharma, Jain, Rani, 2013).Among these five tribes enumerated in the state, Tharus were the most populous tribe with a population of 91342 (31.3% of state ST population) in 2011 census followed by Jannsari tribe 88664 (30.4%). Raji is smallest tribe with only 690 persons. About 4314 ST persons in 2011 and 3476 ST persons in 2001 census could not be classified by tribal community, hence presented as Generic tribes in Table 5.

Table 5: Basic demographic indicators of Scheduled Tribes, 2001-2011

Tribes	Population		Decadal Growth Rate (%)	Child Population (%)		Sex ratio		Child sex ratio	
	2011	2001	2001-11	2011	2001	2011	2001	2011	2001
All Schedule Tribes	**291,903**	**256129**	**14.0**	**11.8**	**16.7**	**963**	**950**	**929**	**955**
Bhotia	39,106	36438	7.3	10.7	12.8	1040	1049	891	939
Buksa	54,037	46771	15.5	14.0	19.1	941	928	928	958
Jannsari	88,664	83262	6.5	13.0	18.1	927	918	933	962
Raji	690	517	33.5	20.3	23.8	885	833	728	757
Tharu	91,342	85665	6.6	9.7	15.6	991	963	940	958
Generic Tribes etc.	4,314	3476	24.1	12.5	16.2	923	775	961	861

The tribal population in the state increased by 14.0% during last two censuses and this growth was quite lower than the national average of 35.5%. However, this growth was not uniform across the tribal communities, where it was very high in few communities; nominal growth was observed in the case of others. Among all tribal communities, the Rajis – the smallest tribe had recoded the highest decadal growth rate of 33.5%, followed by Buksa (15.5%) whereas the Jannsari and Tharu tribes recoded a decadal growth rate of only 6.5% and 6.6% respectively. Bhotias recoded a decadal growth of 7.3% during last one decade.

Distribution of Tribal Communities

Figure 3 show the ST population and its proportionate distribution of tribal communities in each district of Uttarakhand as per 2011 census. The most of the tribal population of the state belongs to Tharu and Jannsari tribal communities and wereresiding in the Udham Singh Nagar and Dehradun districts. The district wise distribution of tribes shows that Bhotias were predominating tribes in Almora, Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi districts. Tharus were predominating in Champawat, Teri Garhwal, and Udham Singh Nagar districts. Similarly, Buksa was a leading tribe in the districts Garhwal, Hardwar and Nainital. The Jannsari was the predominant tribe of Dehradun district in 2011.

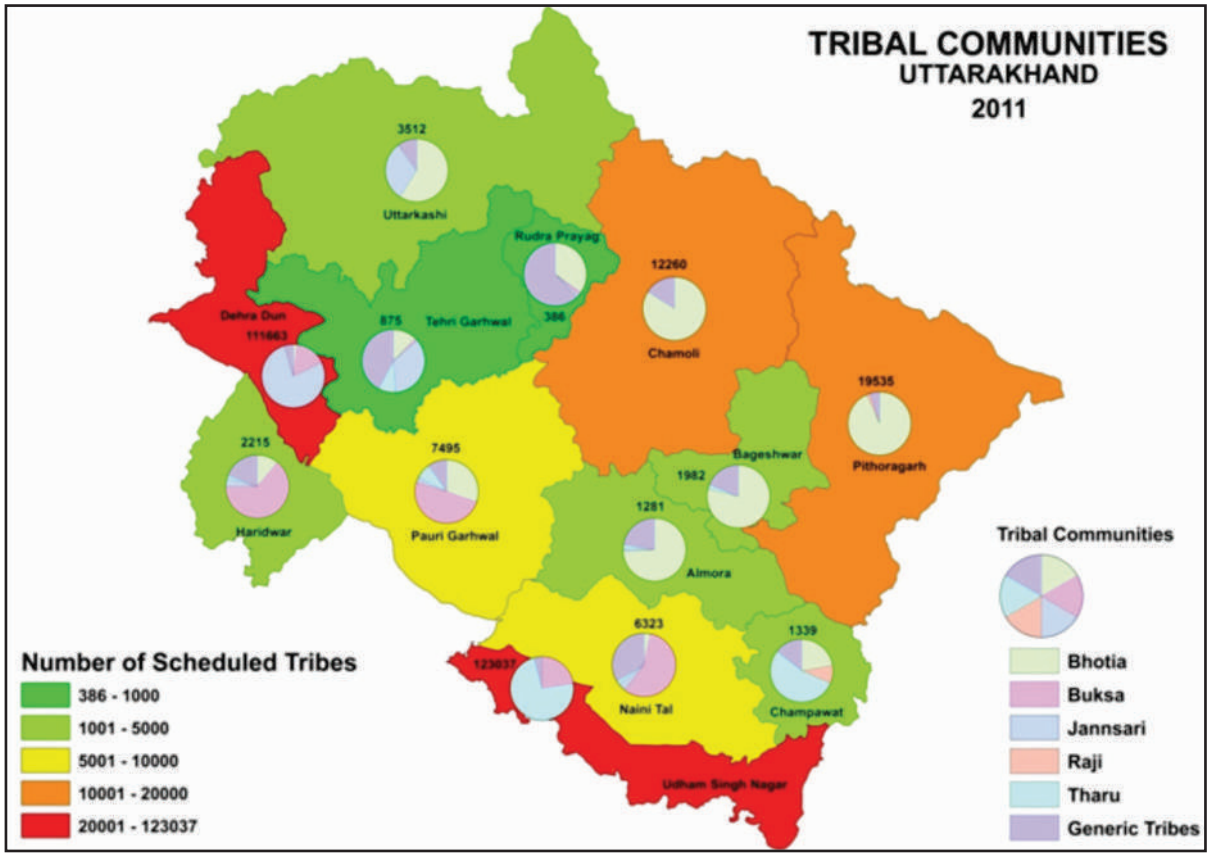

Figure 4: Distribution of ST communities in Uttarakhand, 2011

Sex Ratio (Number of females per 1,000 males)

In 2011 census, the overall sex ratio was recorded as 963 females per 1000 males in the state's ST population, which was lower than the national average of 990 for STs population. Overall sex ratio of ST population had increased by 13 points during 2001-11. Tribe specific, more females than males were enumerated in Bhotia tribe in 2001 and 2011 censuses. The sex ratio has improved in all tribes of the state, except Bhotia tribe where the overall sex ratio was 1049 in 2001 and 1040 in 2011 census. The overall sex ratio for other tribal communities was at par or lower than the national average for STs. The lowest sex ratio was recorded among Raji tribe (885). During 2001-11, the sex ratio among Generic tribes had gone up from 775 in 2001 to 923 in 2011 (Table 5).

Child Sex Ratio (0-6 years): Tribal girls per thousand tribal boys

The sex ratio among Scheduled Tribes of the state in the age group 0-6 years was 929 in 2011. This was considerably lower than the national average for STs. Census 2011 marked a considerable decline (-26% points) in child sex ratio from 955 in 2001 to 929 in 2011 and this was considerably higher than that recorded for all STs at national level (-15% points) during 2001-2011.

Among the tribal communities, Tharus recorded highest sex ratio among children (940) followed by Jannsari (933), whereas Raji PVTG recorded lowest sex ratio (728), which was lower than the national and state averages for STs. Though all tribal communities recorded a decline in child sex ratio during 2001-11, but maximum decline was observed in Bhotia tribe. However, the child sex ratio among Generic tribes had improved considerably (100 points) during this period (Table 5).

Proportion of (0-6) child Population

Since census data does not provide community specific fertility and mortality indicators, the proportion of child population aged 0-6 years can be taken as a proxy of fertility. Table 5 provides proportion of tribal population in the age group (0-6 years) for all tribal communities of the state from 2001 and 2011 censuses. As per 2011 census, the proportion of tribal population in the age group (0-6 years) to the total tribal population was 11.8%, which is about 5% points lower than the national average of 16.0%. A decline of about 5% points in the tribal population aged 0-6 years was also observed during 2001-2011. The Rajis recorded the highest child population (20.3%) in the age group 0-6 years, while Tharus recorded the lowest (9.7%). However, all the tribal communities of the state recorded a decline in the population in the age group (0-6 years) during last two censuses.

Urbanization of Tribal Communities

Tribe-wise urban population of Uttarakhand from year 2001 to 2011. As per 2011 census, 90.7% tribal population reside in rural areas, and only 9.3% of total tribal population was enumerated in the urban areas. Among all tribal communities of the state, Bhotias was the most urbanized (27.8%) and Buksa was the least urbanized (2.1%) in 2011 census. The proportion of tribal population living in urban areas improved from 6.2% in 2001 to 9.3% in 2011. The maximum improvement in the population residing in urban areas was recorded among Raji and Jannsari tribes, where the proportion of Rajis residing in urban areas increased to 12.2% in 2011 from 8.9% in 2001, and among Jannsaris it increased to 6.8% in 2011 from 3.8% in 2001. Only two percent of Buksas were counted in urban areas in 2011 compared to 0.8% in 2001). Similarly, the proportion of Bhotias residing in urban areas had gone up from 25.8% to 27.8% during 2001-11 (Table 6).

Literacy and Educational Level

The overall literacy rate among STs of the state was 73.9% in 2011, which was considerably higher than the national level (59.0%). The overall literacy rate increased from 63.2% in 2001 census to 73.9% in 2011 census, i.e. an increment of 10.7%. Among the tribal communities of UK, Bhotia registered an overall literacy of 86.5%, whereas Buksa and Rajis registered literacy rate 64.2% and 65.6% respectively in 2011. Nevertheless, the increment in the literacy during 2001-11 was highest in Rajis (29.2%), followed by Buksa tribe (14.3%). The most educated tribe Bhotia observed lowest improvement in the literacy during last decade (Table 6).

Table 6: Socio-economic indicators of tribes of Uttarakhand state, 2001-11

Tribes	Urbanization (%)		Literacy Rates		Work Participation Rates		Main Workers		Marginal Workers	
	2011	**2001**	2011	2001	2011	2001	2011	2001	2011	2001
All Schedule Tribes	**9.3**	**6.2**	**73.9**	**63.2**	**45.4**	**41.1**	**68.2**	**73.1**	**31.8**	**26.9**
Bhotia	27.8	25.8	86.5	79.9	47.0	43.1	71.6	70.8	28.4	29.2
Buksa	2.1	0.8	64.2	49.9	39.3	34.9	62.1	69.7	37.9	30.3
Jannsari	6.8	3.8	71.2	58.9	44.7	42.6	76.6	82.7	23.4	17.3
Raji	12.2	8.9	65.6	35.8	41.6	41.6	73.9	38.6	26.1	61.4
Tharu	4.8	1.9	76.2	67.0	49.2	42.2	62.5	66.4	37.5	33.6
Generic Tribes etc.	25.4	38.0	75.5	66.6	44.3	41.2	67.2	71.3	32.8	28.7

Source: Author's calculation based on Census Data, 2001 & 2011

Work Participation Rates

The work participation rate (WPR) among the STs in the state was 45.5% in 2011, which was lower than the national average of 48.7% for STs. The WPR was highest among Tharu tribe (49.2%), followed by Bhotia tribe (47%) in 2011 census, but Buksa (39.3%) and Raji (41.6%) tribes were having comparatively lower WPR. An increase of 4.3% in the overall WPR was recorded in STs of the state during 2001-11. The increase in the WPR was recorded among all tribal communities of the state, except among Rajis where remain unchanged during last one decade (Table 6). A maximum improvement in the WPR was observed among Tharu tribe (7% points) during 2001-11. Among the total workers, 68.2% were main workers, which were considerably higher than at national level average for STs (64.8%) in 2011. Moreover, a decline of about 5% points in the proportion of main workers to total workers was observed during 2001-2011, which is slightly higher compared to the national level for all STs (4.2%). The maximum decline in the proportion of main worker was recoded in Buksa (7.6% points) followed by Jannsari (6.1% points) during 2001-11. But on the hand, the proportion of main workers to total workers improved by 35.3% points, i.e. from 38.6% in 2001 to 73.9% in 2011 in Raji tribe. As the proportion of main workers to total workers declined during 2001-11 most of the tribes, except the Raji and Bhotia tribe, on contrast the proportion of marginal workers improved in all tribes except these two tribes (Table 6).

Categories of workers

In the population census, workers are broadly categorized into four categories, viz. Cultivators (CL), Agricultural Labourers (AL), working in Household Industries (HHI) and Other Workers (OW). The cultivators and agricultural labourers broadly represented the workers engaged in the agricultural sector, except for those engaged in plantation activities, which over the censuses have been considered as a part of 'other workers'. Table 7

presents the distribution of tribal workers by occupational categories as per 2001 and 2011 censuses in the state.

In 2011 census, more than half of the total workers (54.5%) were classified as 'Cultivators' in the Uttarakhand. This proportion of cultivators was appreciably higher than the national average of 34.5% for STs. However, the proportion of cultivators among all tribal communities was not comparatively better than the national average. The proportion of cultivators to total workers among Raji (25.1%) and Buksa (27.4%) tribes was quite lower than national and state average proportion of cultivators. Whereas, about three-fourth of workers among Jannsari tribe were cultivators in 2011. The share of tribal cultivators to total tribal workers reduced from 63% in 2001 to 54.5% in 2011 and accordingly the proportion of cultivators declined in all tribes, except Bhotia tribe. Among Bhotia, the proportion of cultivators had improved from 30.4% in 2001 to 38.7% in 2011.

In Uttarakhand tribes, agricultural labourers accounted for 19% which was significantly lower than the national STs average of 44.5% in 2011 suggesting that most of the tribals in the state own some agriculture land and only few worked on others lands as labourer. However, the percentage share of tribal agricultural labourers to the total tribal workers had increased by 5.8% points (13.2% in 2001 to 19% in 2011). As per 2011 census, the Bhotia (3%) and Jannsari (4.6%) had lowest proportion of agriculture labourers. Wheras on the other hand, 51.6% of total workers in Buksa tribe were recoded as agriculture labourer. The share of agriculture workers had increased in all tribes during last decade. This shows that though the proportion of agrciultre labourers in total workers in the Uttarakhand state in low compared to national average but it is increasing over the period.

Table 7: Proportion of tribal workers engaged in different economic sectors, 2001-11

Tribes	Cultivators		Agricultural labourers		Household Industry		Other Work	
	2011	2001	2011	2001	2011	2001	2011	2001
All Schedule Tribes	**54.5**	**63.0**	**19.0**	**13.2**	**4.4**	**6.2**	**22.1**	**17.6**
Bhotia	38.7	30.4	3.0	0.9	17.8	34.0	40.6	34.7
Buksa	27.4	43.5	51.6	40.5	2.0	1.7	19.0	14.3
Jannsari	74.6	78.9	4.6	3.8	1.6	1.6	19.3	15.8
Raji	25.1	34.4	28.2	8.4	7.7	2.3	39.0	54.9
Tharu	58.4	71.8	23.5	15.7	2.8	0.9	15.3	11.6
Generic Tribes etc.	42.4	34.8	15.4	5.8	3.1	4.8	39.2	54.6

Other than agriculture, 4.4% of tribal workers in UK state were engaged in the 'Household Industry' (HHI) in 2011, which was comparatively higher for all STs at national level (1.8%). Among tribes, Bhotia had the highest proportion of workers engaged in household industries (17.8%) in 2011, and it was less than 3% in Tharu, Buksa and Jannsari tribes. During 2001-11, the percentage share of tribal workers engaged in 'Household Industries' declined from 6.2% in 2001 to 4.4% in 2011. But the decline was not uniform across the tribes of the state. Here the proportion of HHI workers declined from 34% in 2001 to 17.8% in 2011 census among Bhotia. The proportion of HHI workers increased from 2.3% to 7.7% in Raji, 0.9% to 2.8% in Tharu and 1.7% to 2% in Buksa tribe during last decade 2001-11.

Other than agriculture and household industries, 22.1% workers were engaged in other economic activities (mainly government and private jobs) in 2011 which was higher in the state compared to national average of 19.2% for STs. In 2011, more than 40% workers were classified as 'Other Workers' in Bhotia tribe and 39% in Raji tribe. On the hand, 19% workers in Jannsari and Buksa tribes, and 15% in Tharu tribe were engaged in other activities. The proportion of workers engaged in other activities increased about 4% points during i.e. from 17.6% in 2001 to 22.1% in 2011. The proportion of improvement in the 'other workers' varied from 3.5% point in Jannsari to 5.9% in Bhotia during last decade. However, on the other hand, it declined in Raji tribe from 54.9% in 2001 to 39% in 2011 (Table 7).

Ranking of tribes

All five tribes were ranked according to the value of the overall socio-economic development composite index. The composite index was computed separately for 2001 and 2011 census data sets. Table 8 describes the index values and ranking of all five tribes enumerated in 2001 and 2011 censuses. The value of composite index varied from 0.18 (lowest) in Buksa to 0.74 (highest) in Bhotia tribe during 2001 census and 0.29 (lowest) in Raji to 0.67 (highest) in Bhotia tribe during 2011 census. Bhotias has been the relatively more developed and best perforating tribe and ranked first among all five tribes of the state. In 2001 census, the best performing tribe was Bhotia (0.74) followed by Jannsari (0.46), and Buksa tribe (0.18) was the most backward tribe and placed at the bottom among all tribes. In 2011 census, though the score of composite index for Bhotia (0.67) declined but remained at first position, i.e. the most socially and economically developed tribe of the state followed by Jannsari (0.55) tribe. Whereas, Raji tribe (0.29) slipped to bottom and ranked fifth position in the state, but Buksa tribe improved its score from 0.18 in 2001 to 0.33 in 2011 and ranked at fourth position. Overall, Bhotia is relatively more socially and economically developed tribe and both particularly vulnerable tribal groups Raji and Buksa are the most backward and deprived tribes of the Uttarakhand state.

Table 8: Overall ranking of tribal communities based on their demographic, socioeconomic indicators, 2001-11

Tribes	2001		2011	
	Index	Rank	Index	Rank
Bhotia	0.74	1	0.67	1
Buksa	0.18	5	0.33	4
Jannsari	0.46	2	0.55	2
Raji	0.36	4	0.29	5
Tharu	0.43	3	0.49	3

SUMMARY & CONCLUSION

The Uttarakhand states encompass an area of 53,483 sq km, and 86% of its area are under hills and only 14% area are under plains. Total population 10.08 million persons were enumerated on 1st March 2011, accounted for about 0.83% of the Indian total population. According to 2011 Population Census, nearly three-fourths of Uttarakhand's population lives in its rural areas.

The above analyses explored that tribal population are not uniformly distributed in Uttarakhand state, most of the tribal population is concentrated in Udham Singh Nagar & Dehradun districts only. Bhotias are mostly scattered throughout the state, while Ranjis and Jaunsaris are concentrated in few pockets. As expected, the proportion of younger cohorts is higher among tribal population as compared to that in total state population. However, Bhotias have lowest proportion of younger population among tribes. Though the overall sex ratio among tribes is low, but it was favorable for females in Bhotias (1049) and was worst in Ranjis. Moreover, the Ranjis who have 25 percent of its population in age group 0-6 years have meager child sex ratio (757). Though there is no major difference in literacy between tribal and non-tribal population, but within tribal communities a vast gap exists. Similarly a considerable gender gap prevails in education among different tribes. Literacy both for males and females was relatively much higher among Bhotias and even it was higher than the overall state average. However, literacy rates were relatively very poor for primitive tribes, i.e. Buksa Ranjis. Buksas have had highest work participation rate (WPR) for males but had least WPR for females. The Jannsaris and Tharus are two major landholding tribes in the state, but Bhotias - another landholding tribe, have had highest participation in non-agricultural sectors. Conclusively, Bhotias are socially, economically and demographically more advantageous among five different tribal groups of the state. But overall, poor sex ratio among tribal population, especially child sex ratio is a matter of serious concern and needs immediate interventions. Vast differences among tribes in respect to literacy, WPR, and occupational distribution show the need of tribe specific development plan strategies, such as establishment of tribe specific development authorities. The tribal communities call for special attention in general for maintaining their pace of development at par non-tribal communities, but backward tribal communities necessitate more focused interventions.

Overall, Bhotia is relatively more socially and economically developed tribe and both particularly vulnerable tribal groups Raji and Buksa are the most backward and deprived tribes of the Uttarakhand state.

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Health Seeking Behaviour of Calculi Patients among the *Kom* of Lalumbung Village Manipur: Report of Case Studies

Grace Leivon*, Dr. Pinak Tarafdar**

Abstract: *Health seeking behaviour is a very important tool for understanding how one experiences the health care system in the social and cultural domain. This paper highlights the health seeking behaviour among the calculi patients (Stone) from the Kom of Lalumbung village which is a small hillock, situated at the southern part of Manipur. Detailed case studies were conducted on the efficacy and difficulties of various health care systems used by the calculi patients. The health seeking behaviour may find modalities in both traditional and biomedical treatments. It also highlights the role of religion in the health care system. A kind of 'secret treatment' is observed among the Kom calculi patients to keep a balance between the age old practices and the influence of western religion. Communication and distance to health institutions are the prime positive factors observed for better efficacy of biomedical treatment.*

INTRODUCTION

"Health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity"[1]. According to Huber 2011[2], health is defined as "In humans, it is the ability of individuals or communities to adapt and self manage when facing physical, mental or social challenges." To maintain a healthy life, the health care practices should be intervened in health status of an individual or community. Various factors influencing health status of an individual includes lifestyle, economic, social condition and spirituality[3].

The health status can be enhanced and sustained through advancement of medical science, traditional healers, efforts and lifestyle of the individual and community. 'Health seeking behaviour is associated with maintaining and the establishment of a healthy physical and mental state. It also deals with any digression from health state which includes control as secondary prevention, reduction of impact and progression of an illness as the tertiary prevention[4].

Individual or community undertake certain health seeking behaviour at the onset of illness and acquire contact with a health care practitioner to get rid of their particular infirmities. Health seeking behaviour could be termed as seeking treatment by individual, family or community depending on various ailments where cultural values and

*Rajiv Gandhi National Senior Research Fellow, Department of Anthropology, University of North Bengal. Email: graceleivon@gmail.com
**Assistant Professor, Department of Anthropology, University of North Bengal. (Communicating author) Email: pinaknbu@gmail.com

gender differences play significant roles[5]. Health seeking behaviour has been defined as any action undertaken by individuals who perceive them to be having a health problem or to be ill for the purpose of finding an appropriate remedy[6]. This article aims to explore the health seeking behaviour of calculi patients from the Koms of Lalumbung village in Churachandpur district of Manipur.

People and the Area of the Study

The *'Kom'* is one of the scheduled tribe (as per the constitution of India) of north-eastern India, predominantly found in Churachandpur, Senapati and Chandel districts of Manipur. The word *Kom* is derived from the word *Lukakom* with a series of modifications initially from *Lukakom* to *Kakom* and finally to *Kom* which means the turban people[7]. However, Roselyn states that the Meitei`s (the dominant community of the state) Kom community originated as wanders and settlers[8]. from *Khurpui*, which means cave. The word *Khurpui* in Meitei is called *Kom* and from thereon they are known as *Kom*[9]. The later idea of origin is more acceptable as far as their traditional song *Khurpui Hla* is concerned. Linguistically, they belong to Tibeto- Burman group and use Roman alphabet as script and are racially affiliated with mongoloid stock and have a migration history from Afghanistan, Northeast Frontier Agency China Tibet through Chittagong (Bangladesh) to Manipur[10]. *Kom* families are mostly nuclear with patriarchal society that follows patrilineal inheritance pattern. The *Koms* are predominantly agriculturist. They have their own socio-political administrative body known as council authority (*Pachong*) headed by the hereditary chief (*Sawang*). All the Koms have converted to Christianity[11].

Lalumbung village, a small hillock around 55.25 acres situated south of Manipur is 63 kms away from the state capital Imphal. The nearest Primary Health Center (PHC), market and school are 3 kms away. The nearest hospital and town are about 25 km away from the village. The village was established in 1949. The reason for establishment of this village was due to conversion of traditional religion, *khovel bekna* (animism) into Christianity. The people embracing Christianity have stayed in the village of Sagang, situated 3 kms away from the south eastern side of the village under the study. Initially, Christianity was not accepted by the Kom community or the village members. If anyone converted into Christianity, they were not allowed to stay in the village. The first settlers of Lalumbung village are the ostracized converted Christian people from Sagang village.

Techniques used for Data collection

The primary data was gathered by the first author during her Ph.D. field work during 2015-2016. Besides primary data, secondary data was collected from internet, books, articles and journals. Intensive interviews were conducted with different individuals and key villagers, case studies were conducted among the calculi patients, telephonic conversation for cross checking of data was also done due to distance of research area. Data were also collected from PHC, nurses, doctors and hospital administrative

personal to get additional information required data.

The present study was carried out on stone (also known as calculi) patients. During the field work many cases were recorded which generated more curiosity to find out why *Kom* frequently had stone related problems? To find out the reasons regarding any cultural behaviour related with calculi patients and the stone in human body? How is it possible to cope up the situation? Moreover, the article is primarily intended to find out health seeking behaviour among *Kom* calculi patients.

This study was performed among the *Kom* community of Lalumbung village of Churachandpur district of Manipur. There were 48 households in total of which 7 households inhabit outside the village temporarily due to their occupation and children's education. The people who stay outside the village generally visit the village during festivals, marriage, and other social occasions.

In this article, only calculi or stone case patients were chosen due to certain factors. During the Ph.D. fieldwork, almost every family has one or two individuals complaining about stomach ailment. Further, stone case patients were also found in good number as compared to other diseases or sickness. This prompted us to find out the reasons behind stomach ailment and stone case problems. Efforts were made to find out disease etiology and the cultural factors that might be responsible for such outcome

Personal or community health care practices and beliefs

Health care is all about protection and improvement of human physical and mental health. Health care can be enhanced by treatment and diagnosis of different ailments on time to prevent diseases. Optimum health can be acquired by maintaining personal hygiene and understanding that the person is actually experiencing physical discomfort or illness. Moreover, medical records would help in maintaining personal healthcare practices and easy assessment of medical records for future treatment, in case if a person is suffering from serious ailments.

During the field investigation, some participants maintained their medical records while others were unable to narrate their health problems. Community persons play an important part during sickness in the village by helping them through monetary or social support. In general, anyone falls sick in the village, other members of the village come to visit the sick person and their family. In case of emergency, villagers find solution for necessary support. Villagers also performed social works to maintain cleanliness within the village. Health care was distributed by different health professionals like doctors, traditional healers, midwifery and others related to health programmes.

Families, neighbours and communities are the well-known sources of support that offer assistance to both the sick and aging people. Older people are integral part of the family structure along with inter and intra generation relationships. Old people are regarded as the most important part of cultural trait.

Oral cultural and traditional knowledge can be learnt through them during the rapid change of globalization. There is great diversity of cultural practices, beliefs, behaviours and attitudes toward seeking optimal health condition, which is further influenced by religious beliefs and values among different communities and nations across the world.

Etiology of Kidney stones

Kidney stones or urinary stone or calcium oxalate is the common mineral formed in the kidney. The most common stone found in the kidney is made up of excess calcium, when urine is highly acidic. Uric acid stones could be formed in kidney when meat and shellfish are consumed in excess[11].The size and shape of stone varies as in some of the cases stones flush out through urine without any knowledge of the patient while others need to visit hospitals for surgical removal. Kidney stones may be formed due to diet and life style. Obesity or weight gain is one of the risk factor when the uric acid is high which may lead to formation of stones[12]. The chances of kidney stone are higher for the people having family history of stones such as parent and siblings[13]. An excessively acidic environment in the kidneys leads to the formation of kidney stones. Intake of calcium and vitamin D food supplements could increase the risk of developing kidney stones because it raises the levels of calcium in blood and urine [14].

Case studies on kidney stone patients

Case-1 (Modern to Traditional treatment)

29 years old woman Kikip weighed about 40kg and reported milky color urine. Later, she experienced stomach ache with no appetite and experienced weakness. She went to Moirang about 25 kms for medical treatment, where she was diagnosed to have kidney stones. Medication did not help her. She went to *Maipi* (female Meitei traditional healer) at Ningthoukhong about 50 kms away from the village. The *Maipi* gave traditional medicine which was fluid like water for drinking and advised her to return back after one week along with her urine collected during this period.

She collected the urine in bucket after one week and took the sediment portion of urine to show the *Maipi*. She went for check up every week and it continued for one month. She was fine as long as she took the medicine given by *Maipi,* but was not completely cured and had occasional stomach ache occasionally. She also spend Rs. 5000/- as *Maipi* treatment charge. She was going through the treatment at the time of writing this case study.

Case-2 (Modern treatment)

Athang 49 year old man and father of two children had very severe stomach-ache followed by vomiting, sweating and mild fever and went to Sagang PHC for treatment from certified nurse running her private medical store some medication for suspected gastric problem. With no relief, he went to Moirang (nearest hospital about 25kms) for further treatment . Doctor advised him to undergo ultrasound and X-Ray to get more accurate results. The next day, doctor told him about the stones in both the kidneys without delaying; he went to RIMS

(Regional Institutes of Medical Sciences), one of the most reputed government hospitals at Imphal for further treatment.

He was given medicines at RIMS and advised dialyses if no relief was observed in 7 days. He underwent surgery in Chamber of Commerce hospital and. After four months gap from first surgery, second surgery was performed on his right kidney. He was carrying a catheter which was inserted to his kidney to drench out waste fluids from the kidney from his first surgery. After second surgery, keyhole surgery was done every month to take out the stones. He underwent keyhole surgery six times to remove all the stones from both the kidneys. He spent around 2 lakhs and was fit and fine at the time of interviewing this case study. He could not go for final check-up because of monetary issues. He also lost his job and experiencing acute financial crunch.

Case-3 (Modern treatment)

Akhup, a 51 years old man had his first kidney stone attack in the year 2015. One night he had very severe stomach-ache and went to Sagang to visit nurse, who has medical store and obatined first-aid. Later he went to Imphal for X-ray, which showed that he was having stone in the kidney. The doctor said 'the stone is small and advised medication and repeat check up. After taking the medicines, 3 pieces of stones flushed while he was urinating. He had to spend Rs. 4000 for the entire treatment and now he is free of any pain. He did not visit doctor for repeat check up due to financial crisis and distance of health centres. Although he knew that it was necessary to undergo check to identify whether all stones were eliminated.

Case-4 (Modern treatment)

Ajang, a 58 year's old married woman weighing 30kg stays with her husband. During her young age, she had stomach problem and twinge but she could not undergo any proper treatment. At present she has back body ache, stomach ache and occasional fever. She has spent many sleepless days and nights. In 2013, she had very good treatment at Imphal with many tests including X-ray, and as per doctor advice she took medicines for some time. After the death of her elder son who took care of her treatment has stopped all the treatment processes since she did not know where to go, how to go and what to do? She is not even aware that what kind of problem she has (kidney stone or gallbladder stone). She does want to go for any further treatment as she is in trauma caused by her son's sudden death.

Etiology of Gallbladder Stone

The oldest Gallbladder stone first discovered in 4800 BC belonged to an Egyptian boy[16]. The most common symptom of gallstone is dysuria (difficult or painful urination). Cystoscopy is a technique in which thin tube with camera and lens at the end is inserted from urethra to bladder so that inside of bladder can be viewed in detail. Endoscopic Cystolithotomy is suitable treatment for gallbladder stones over 5mm. Percutataneous Cystolithotomy (surgical removal of stone from urinary bladder) and open surgery are more effective treatment to not only extract the

stone but also to know the etiology. The cause for the same must be treated otherwise reccurrence of bladder stone could occur[17].

Case study on gallstone patients

Case- 5 (Modern treatment)

Anei, a 38 year old married woman narrated about her sickness. She suffered from backache and burning around January 2016. She waited for the problem to get cured casually for few days before going to doctor as she thought it might be gas problem. To get relief from the continuous pain, she visited doctor at private clinic in Pandon, Imphal where doctor suggested going for ultrasound which detected gallbladder stone. She was scared and restless from the day she knew about gallstone as she suspected doctor might recomend for operation and she was anxious about the expenses.

Her apprehension was right as doctor suggested only surgery can get her rid of gallstone. She stated that her husband had started counselling her to not to worry about the financial problems and everything would be fine after operation, and also advised not to be scared about the operation. After one month of counselling, she agreed for the operation but due to financial crisis she could not go for further treatment. She underwent operation in government hospital and spent around Rs. 20,000. She strictly followed the advised of doctor and took the medicines on time post surgery. At present, she reported mild burning of chest and sometimes backache but overall she is in good health and has good appetite.

Case- 6 (Modern treatment)

Kim, an unmarried woman of age 41 experienced severe knee pain 22 years back on one night while she was asleep and went to Sagang for treatment. During those days there was scarcity of doctors as compared to the present day, so she started her treatment from a compounder named Yamani Meitei, who was well known in this area and treated different types of diseases and sickness. People trusted and believed him that he could heal most of the ailments. In 2013 when he was bedridden, people had come from quite far to get treatment. Even just two days before his death, a young Meitei couple brought their sick child to get treatment from him and people felt that he got a magical healing hand, and just wanted his healing touch. He treated young and old irrespective of their gender and caste or tribe, although he belonged to a Meitei community from Imphal. He came and inhabited among the Kom community when he was young and also took his last breath among them. He was not only a famous healer but was known for his goodness and kindness. He went on his old cycle that could take him far and near for treating sick people. In return, people offered him cash, vegetables, fruits and others things. He never complaint and took whatever people gave him happily.

On the first day, she was given injection and returned home. She was fine but on the third day she had blood in urine for one day and one night. In this period, she complained of severe stomach-ache. She then went to Terakhong PHC, where the doctor told

her that a stone is forming but where it is forming (kidney or gallbladder) is not known. She returned home with lots of tablets and syrups and for long period of time she was fine. At 31 years age, she suddenly had severe stomach ache along with backache and tendency of vomiting and sweating. She did not seek any treatment but instead depended on her back body massage and got relieved.

Year later, shewent to Imphal and got herself treated from a doctor at private hospital known as public hospital where she had all the medicines given by the doctor but found no relief. She resorted to body massage for the relief. Two years later, her health deteriorated and she consulted her family, relatives and decided to go for surgeryand spent around Rs 40,000/- on surgery. After the surgery she felt better.

Case-7 (Gallbladder and kidney stone, both traditional and modern treatment)

Ahui, a 31 year old female was suffering from headache for past 3-4 years. Post one year of marriage, she could not deliver a child. To know the reason, she went to Moirang, the nearest town about 25 kms from her village to get ultrasound done without doctor treatment or advise and brought the ultrasound report to Sagang PHC where she was working as a contract nurse. She showed her report to the doctor available at Sagang PHC. The ultrasound report resulted in presence of stones in both kidney and gallbladder. The reason for the ultrasound was to know that why she was not able to conceive. She heard from the relatives about a typical herbal leaves at her maternal village that can cure stone. Therefore, she went to her maternal village Tonsen about 10 kms to get those herbal leaves to cure kidney stone. She boiled the leaves and drank the water continuously for one month and went for another visit to the doctor. The kidney stones could not be traced but the gallbladder stone were still present. Few days later, she suffered from stomach-ache, backache and had fever for many days.

Some people told her that if the gallbladder is not removed than she might not be able to conceive. Following people's remarks, she decided for surgery and went to Imphal for operation with her husband. She had the surgery done at Christian Medical College hospital and spent around rupees Rs. 40,000. She strictly followed the doctor's advice and took medicines on time. At the time of the interview she was completely fine and practically recovered from stone related ailments. She was happy for her better health now but very upset too because she could not conceive even after successful treatment that ended her stone problems.

Case-8 (Modern treatment)

Kipnu, a 49 years old married woman had first gallbladder stone during 1994. She suffered from severe stomach ache, sweating, nausea and vomiting but did not go for any proper treatment. She started her proper treatment at Imphal in 1997. X-ray, ultrasound and all related tests resulted into gallbladder stone. The doctor suggested for surgery but she did not agree as her two children's were young. As she did not had any positive

thought on surgery whether it would succeed, she was ready to bear the pain for the sake of her children, she had a plan to undergo surgery after her children were grown up. She also had frequent headache for which she took medicines from nearby pharmacist and nurse.

Later, when her two children's grow up, she planned for surgery but came to know about her new pregnancy. She again postponed the surgery and after the birth of her third baby and waiting for three long years she planned for surgery but again she became pregnant and postponed the surgery. After 21 long years of postponing gallbladder stone surgery, in February 2016, finally she was admitted to Advance Hospital non-governmental hospital at Imphal and the gallbladder stone was removed through laparoscopic surgery. She stayed in hospital for 15 days and it took many days for her to recover. She went for normal check up too. She has backache, body ache and mild pain at the laparoscopic areas and was planning for another routine check-up at the time of taking this case study. She spent about Rs 70000.

Traditional Medicines for Kidney stone or Urinary tract stone

Local name	Common name	Parts used	Habitation	How to use
1.Samtekoipa and *Kangngaoyen*	Hoopoe (*Upupaepops*) *Tinosporacordifolia*	All the parts or gallbladder and leaves	Hills and kitchen garden	Shot/kill *Samtekoipa* (bird) only on Saturday, all parts boiled in water with kangngaoyen leave and taken together.
*2.Ikaithabi (*waterplant*)* and *Sodamachi*	*Neptuniaoleracea* and Rock sugar candy	Root	Ponds and market	*Ikaithabi* root is boiled in water, add *sodamachi* and drink.
*3.Kapokleipar (*flower*)*	Common *Gardenia jasminoides*	Root	Garden	*Kapokleipar* root is boiled in water and drink.
*4.Omphokpar(*flower*)*	-	Leaves	Hills and garden	*Omphokpar* leaves is boiled in water and drink
5.Kangngaoyen, Aivom/Aidum and *Aikenik*	*Tinosporacordifolia*	Leaves and Rhizomes	Hills and kitchen gardens	Boil the leaves of *kangngaoyen* with rhizomes of *Aidum* and *Aikenik*
*6.Chikpathur (*shrub*)*	*Phlogacanthus jenkinsii*	Leaves	Kitchen garden	Leaves are boiled in water and drink
*7.Mangarongbi*and *Sodamachi*	*Potentialla Canadensis Rock sugar candy*	Leaves	Garden	Leaves are boiled in water with *sodamachi* and drink
8.Sakanap abi and *Sodamachi*	*Rock sugar candy*	Leaves	Garden	Leaves are boiled in water with *sodamachi* and drink
9.Parinjak and *Sodamachi*	Touch - me-not *Rock sugar candy*	Leaves	Garden	Leaves are boiled in water with *sodamachi* and drink

Source: Field Data 2013 - 2016

CONCLUSION

Health seeking behaviour is one of the important means for understanding people's engagement in taking care of health through various treatment modalities. People of Lalumbung village sought different forms of treatment according to the specific diseases. Sometimes it depends on the areas inhabited, treatments available near to them and, therefore the patients are limited by treatment access available near to them. The distance from the hospitals and health centres make most patients delay seeking treatments while some patients deliberately avoid. Some of them visit the town to access health institutions but cannot meet the purpose due poor communication and/or financial problems. Many delay their routine health check-up even after surgery or other medications for the above reasons.

On the other hand, some individuals don't seek treatment openly and consider it shameful in case where person suffers from dreaded diseases and are afraid if their friends or family may avoid them due to their diseases. Being a community person (first author) and as a medical anthropologist (second author), we think that it is necessary to relieve ourselves of the stigmata in order to explore better health seeking behaviour. After conversion into Christianity, the traditional healers became less known and stopped treating patients and avoided using their *Doi leh Ai* (typical *Kom* magico-religious performances for sickness and to cure). It is also noted that some of the patients did not want to disclose their health seeking behaviour to any unknown person.

The entire process is known as 'secret treatment' both for the patients and also for the healers as Christianity does not permit them to continue with the traditional method of treatment modalities. Despite of these constraints, some of the traditional healers still perform *Doi Leh Ai* (typical *Kom* magico religious performance) to heal the ailing persons who seek treatment conspicuously for psychological support to get rid of their ailments. The patients visit to the traditional healers both in case of preliminary measures and also if they fail to recover after availing biomedical treatment. The secret treatment by the traditional healer may get disclosed through one person to another. However, it still continues as a secret practice in spite of opposition from Christianity.

This article highlights the health seeking behaviour of the calculi patients among the *Kom* of *Lalumbung* village in Manipur. Case studies on the stone case patients suggested that some of them have undergone surgeries and are fit and fine, while in some cases with no surgery, the stones were flushed out through urine. In other, cases,modern medicines could not heal them and therefore opted for the traditional medicines. According to the studies made by some scholars, it was found that chances of urinary tract or kidney stone increases with increase in high protein foods and salty diets intake.

Moreover, the food habits and life style of the people have changed drastically as a result of rapid modernization. Almost in every household, television set is available and most of them watch televisions and avoid

outdoor games and other works. Generally the *Kom* of Lalumbung village are 100% non vegetarian and their staple food is rice and other foods include fish, pork, beef, duck, chicken, egg, birds along with different seasonal vegetables and mushrooms. Non vegetarian foods are frequently found in their meals; during festivals meats are abundantly available in every house. Pork and beef are usually bought from the markets whereas fish, snail and clams are collected from stream within the village.

Obesity is among one of the risk factor for the formation of stones in human body. Family history of stone presents higher chance for the risk of stone related cases. Gallbladder stones are formed due to hard deposits of cholesterol and bile. It was found that few patients keep and maintain their personal health records from time to time. The patient families seek the help from pastor and deacon for prayer to be healed from their ailments. Church elders, pastor and deacons or any individual visits the ailing person's home and pray for their family and the sick person even if they are not invited. Neighbours, friends, relatives, villagers, church elders and other members also visit the sick people and help them by their encouraging words, advising them about the treatments if required, giving cash or goods and pray for the sick person and family members.

This study revealed that social and cultural factors play important role in maintaining optimal health. Good health helps to perform routine household works and other day to day activities. However, some patients have lost their job due to poor health as they could not continue their work and moreover, it becomes hard for them to do various household work etc. To maintain good health and to get rid of their ailments, they visit different places like health institutions at town and traditional healers outside the community. Most of the patients pursue self-medication especially for stomach ache assuming it to be a gastric problem while many don't take treatment thinking that it would cure by itself and some of them visit medical stores and obtain medication from pharmacies without any proper advice from the doctor.

Some patients opt for traditional healers within the *Kom* community (both Traditional healers and Christian healer) or either among the Meitei Muslim and Meitei Hindu community. Some traditional or Christian healers do not disclose the medicine names and details on preparation of medicines as they believe that giving information about the medicine would decrease its efficacy as they are gifts of God through dreams. Some patients don't want to disclose their visit to traditional healers mostly to non-Christian healers of other communities because after their conversion into Christianity, they have to leave their old concept of 'personalistic belief system'[18] which has undergone a significant change as they no more believe on various factors related to supernatural phenomena. To avoid social humiliation, they don't disclose about being treated from traditional healers because people may ask for clarification for not visiting allopathic doctors. Conversion to Christianity has

belief system'[19], but the cultural values embedded deep in their mind would indulge some of them to still hold the perception on 'personalistic belief system' on disease causation and treatment by traditional healers for better psychological support. Stone cases and stomach ailment are among one of the fastest growing health problems in the population which requires urgent intervention by the health workers to reduce the morbidity.

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Body Mass Index Relates to Blood Pressure among Three Rural Female Population Groups of Assam

Dali Dutta and Sarthak Sengupta

Abstract: *Hypertension is believed as a significant risk factor of adulthood diseases and is rapidly increasing among several population groups. In North East India, elderly populations in the rural of, hypertension and is emerging as one of the major health problems. The present studies attempts to find out the pattern of blood pressure as well as to evaluate frequency of hypertensive cases more particularly among the overweight and obese individuals of the adult Mishing, Deori and Chutiya females of Upper Assam. A cross sectional study was conducted among Mishing (340), Deori (167) and Chutiya (377) females of 20 to 59 years of age Upper Assam. Blood pressure was measured with mercury sphygmomanometer and stethoscope was used. Both Systolic blood pressure (SBP) and Diastolic blood pressure (DBP) continue to increase with age. The incidence of hypertensive females are highest among the Chutiya (10.08%) followed by Mishing (9.12%) and Deori (8.38%). It has been found that there is significant relationship between the overweight and obese cases with hypertension, more particularly in the higher age group. The present paper provides evidence that hypertension is strongly related with the age.*

Keywords: Cross sectional, Systolic blood pressure, Diastolic blood pressure, obese and overweight.

INTRODUCTION

Hypertension is believed as a significant risk factor of adulthood diseases and is getting more prevalent rapidly. Hypertension is associated with the incidence of stroke, coronary heart disease, congestive heart failure and renal insufficiency.[1] It has been shown that high BP in adults can be originate from childhood.[2] Blood pressure level shows considerable inter and intra-population variation in relation to various factors like sex, age, body build, altitude, socio-economic condition, ethnicity, hematological values and several others. A number of studies have revealed that the prevalence of hypertension has been increasing in India, both in rural and urban regions. Currently, in the rural elderly populations of North East India, hypertension is emerging as one of the major health problems. The relevance of hypertension and overweight/ obesity, as an important public health challenges, is increasing worldwide. The increasing occurrence of overweight and obesity is progressively more recognized as one of the most important risk factors for the development of hypertension. The present study attempts to find out the pattern of blood pressure with age among the adult Mishing, Deori and Chutiya females living in the rural areas of upper

* Department of Anthropology, Dibrugarh University, Assam, 786 004
Corresponding Author: Dr Dali Dutta, Mail Id: dali_47@yahoo.in, Telephone: +919954146291

Assam. Further, the question of the relationship between overweight and hypertension is also the subject of this study

MATERIAL AND METHODS

A cross sectional study was conducted among three ethnic groups i.e. Mishing (340), Deori (167) and Chutiya (377) females of Upper Assam. The Mishing and the Deori are two numerically dominant scheduled tribes, whereas the Chutiyas are a populous Other Backward Communities (OBC) of Assam.

The Mishing, earlier known as 'Miri', are one of the major Indo-Mongoloid Plains Scheduled Tribe of Assam. The term Mishing derives from the two words *Mi* and *Yashing*. Men are termed as *Mi* while *Yashing* means fair or worthy. The people migrated and started building their colonies in Assam as early as the 16th century. They inhabit in 11 districts of Assam. These are Dhemaji, Lakhimpur, Biswanath Chariali, Sonitpur, Tinsukia, Dibrugarh, Sibsagar, Majuli, Charaidew, Jorhat and Golaghat. The Mishing are primarily agriculturist and they live in pile dwellings. They are monogamous and allow marriage between cross cousins.

The Chutiyaa are one of the very old populations of Assam. At present they are confined to the upper Assam districts of Dibrugarh, Tinsukia, Sibsagar, Jorhat, Golaghat, Lakhimpur, Dhemaji etc and are one of the numerically dominant Other Backward Communities (OBC) of Assam. The Chutiyas had their own kingdom in upper Assam region before the advent of Ahoms. The Chutiyas are Indo Mongoloid. Linguistically, although they belong to the Assam-Burmese group of the Tibeto-Burman family, however, long back they accepted Assamese language. The Chutiyas are Hindus.

The Deori is one of the major indigenous communities of Assam and Arunachal Pradesh. They live in Brahmaputra valley. The community belongs to the Sino-Tibetan family of Mongoloid stock. They belong to Tibeto-Mongoloid tribal group and are Hindu by religion. The Deori is a numerically dominant plain schedule tribe of Assam. In Assam, the concentration of Deori population can be traced from various districts of upper Assam namely, Lakhimpur, Dhemaji, Dibrugarh, Golaghat, Jorhat, Majuli, Sibsagar and Tinsukia.

The present study attempts to find out the pattern of blood pressure as well as to evaluate frequency of hypertensive cases more particularly among the overweight and obese individuals. The age group of the subjects considered for this study was 20 to 59 years. The blood pressure was measured in the morning in sitting posture on the left arm of the subject. For the measurement, the mercury sphygmomanometer and stethoscope was used. It is still uncertain whether hypertension is better defined as a systolic blood pressure (SBP) more or equal to 140 mmHg, a diastolic blood pressure (DBP) more or equal to 90 mm Hg, either or both. In the present study, hypertension was defined as systolic blood pressure (SBP) $\geq$140 mmHg and diastolic blood pressure (DBP) $\geq$ 90 mm Hg. The subjects were categorized in to

three groups - Normotensive (SBP < 120 - 129; DBP < 80 - 84), High Normal Blood Pressure (SBP 130 - 139; DBP 85 - 89) and Hypertensive (SBP 140 - ≥180; and DBP 90 - ≥ 110) according to JNC-VI (1997).[3] When SBP and DBP fell into different categories, the higher category was selected to classify the individuals' blood pressure status. To assess the overweight and obese subjects Body Mass Index is used.

RESULTS

Table 1 represents the statistical constants of SBP and DBP among the females of the populations under study. It is apparent from the table 1 that both SBP and DBP continue to increase with age. Blood Pressure (both systolic and diastolic) was found to be lowest among the youngest age groups. Blood Pressure increased steadily with age and the highest was found among the oldest age group.

Incidence rate of hypertension in different age groups of the females are shown in table 2. Highest hypertensive females are seen in age group 40-49 years of age of Mishings (9.46%), in case of Deori and Chutiya the highest value is found in the age groups 50-59 years of age i.e. 27.27% and 13.16% respectively. Following the guidelines of JNC-VI (1997),[3] incidence of Normotensive, High Normal Blood Pressure and Hypertensive cases are worked out (Table 3). There is not much population variation in this regard. However, the incidence of hypertensive females are highest among the Chutiya (10.08%) followed by Mishing (9.12%) and Deori (8.38%).

Table 1 : Statistical constants of the Systolic and Diastolic Blood Pressure (mmHg)

Age group (in years)	No	Systolic		Diastolic	
		Mean	SD	Mean	SD
Mishing					
20-29	117	111.47±1.17	12.63	73.15±0.78	8.44
30-39	117	116.89±1.34	14.45	73.96±0.73	7.87
40-49	74	116.30±1.97	16.92	76.70±0.97	8.36
50-59	32	120.06±3.21	18.47	77.31±1.67	9.47
Chutia					
20-29	40	106.25±1.68	10.64	71.40±1.27	8.01
30-39	76	105.37±1.54	13.43	71.95±1.13	9.88
40-49	40	110.20±2.52	15.91	75.66±1.87	11.81
50-59	11	120.18±3.78	12.54	83.64±3.02	10.03
	Deori				
20-29	122	113.09±0.95	10.46	73.82±0.69	7.57
30-39	124	117.07±1.23	13.73	75.33±0.71	7.93
40-49	93	119.76±1.70	16.42	76.26±0.86	8.25
50-59	38	123.34±2.72	16.73	78.34±1.50	9.24

Table 2 : Incidence rate of hypertension in different age groups

Age group (in years)	MISHING		DEORI		CHUTIYA	
	No	Incidence	No	Incidence	No	Incidence
20-29	117		40		122	2 (1.64)
30-39	117	6 (3.41)	76	2 (2.63)	124	3 (2.42)
40-49	74	7 (9.46)	40	1 (2.50)	93	7 (7.53)
50-59	32	2 (6.25)	11	3 (27.27)	38	5 (13.16)
Total	340	15 (4.41)	167	6 (3.59)	377	17 (4.51)

Values in parentheses indicate percentages.

Table 3 : Categorization of females according to blood pressure among three studied populations

Category	MISHING	DEORI	CHUTIYA
Normotensive (SBP < 120- 129; DBP < 80- 84)	272 (80.00)	139 (83.23)	296 (78.51)
High Normal Blood Pressure (SBP 130- 139; DBP 85 - 89)	37 (10.88)	14 (8.38)	43 (11.41)
Hypertensive (SBP 140- >180; DBP 90 - >110)	31 (9.12)	14 (8.38)	38 (10.08)
Total	340	167	377

Values in parentheses indicate percentages. Categorization made as per JNC-VI (1997) Criteria

Table 4 : Age wise distribution of females as per Body Mass Index (WHO, 1995)

Population	Age group (in years)	Underweight <18.50	Normal 18.50-24.90	Overweight 25.00-29.99	Obese >=30.00
MISHING (N=340)	20-29	23 (19.66)	92 (78.63)	2 (1.71)	
	30-39	17 (14.53)	91 (7.78)	8 (6.84)	1 (0.85)
	40-49	13 (17.57)	53 (71.62	8 (10.81)	
	50-59	4 (12.50)	26 (81.25)	2 (6.25)	
	All ages	57 (16.76)	262 (77.06)	20 (5.88)	1 (0.29)
DEORI (N = 167)	20-29	7 (17.50)	31 (77.50)	2 (5.00)	
	30-39	6 (7.89)	63 (82.89)	6 (7.89)	1 (1.32)
	40-49	4 (10.00)	28 (70.00)	8 (20.00)	
	50-59	1 (9.09)	7 (63.64)	2 (18.18)	1 (9.09)
	All ages	18 (10.78)	129 (77.25)	18 (10.78)	2 (1.20)
CHUTIYA (N = 377)	20-29	24 (19.67)	84 (68.85)	13 (10.66)	1 (0.82)
	30-39	20 (16.13)	85 (68.55)	19 (15.32)	
	40-49	14 (15.03)	65 (69.89)	12 (12.90)	2 (2.15)
	50-59	4 (10.53)	27 (71.05)	7 (18.42)	
	All ages	62 (16.45)	261 (69.23)	51 (13.53)	3 (0.80)

Values in parentheses indicate percentages.

Nutritional status of the populations as per Body Mass Index is shown in Table 4. In the present study, it has been observed that incidence of overweight and obese women were marginally higher among the Chutiya (14.33%), which is closely followed by the Deori (11.98%) women. However, such incidence is relatively less among the Mishings (6.17%). Attempt has also been made to find out the relationship of the overweight and obese cases with hypertension (Table 5). It has been found that there is significant relationship between the overweight and obese cases with hypertension, more particularly in the higher age group.

Table 5 : Age wise distribution of the overweight cases and hypertension

	MISHING			DEORI			CHUTIYA		
Age group (in years)	No	Over-weight	Hypertensive	No	Over-weight	Hyper-tensive	No	Over-weight	Hyper-tensive
20-29	117	2 (1.71)	-	40	2 (5.00)		122	13 (10.66)	2 (1.64)
30-39	117	8 (6.84)	6 (5.13)	76	6 (7.89)	2 (2.63)	124	19 (15.32)	3 (2.42)
40-49	74	8 (10.81)	7 (9.46)	40	8 (20.00)	1 (2.50)	93	12 (12.90)	7 (7.53)
50-59	32	2 (6.25)	2 (6.25)	11	3 (27.27)	2 (18.18)	38	7 (18.42)	5 (13.16)

Values in parentheses indicate percentages.

DISCUSSION

Age is known risk factor for high blood pressure. Our study showed that Blood Pressure increased steadily with age and was highest among the oldest age group. The increase in the prevalence of blood pressure with ageing has been observed in earlier studies also Sambasiva Rao (1983)[4] Sidhu and Kumari, (1992)[5] Joyee and Kapoor (1995)[6] Babu et al, (1998)[7] Tungdim and Kapoor(2003) [8] and Mungreiphy et al, (2011).[9] Various studies suggest a strong relationship between blood pressure and nutritional status Bose et al, (2003)[10] Mufunda et al, (2006)[11] and many others. This similarity of the relationship is also noted in our studies.

CONCLUSION

The present study provides evidence that hypertension is strongly related with the age. Further, overweight and obesity is closely associated with increased risk of higher blood pressure level particularly in advancing age groups in rural female folks of Assam. The study also demonstrated that body mass index is closely associated with both systolic and diastolic blood pressure among the females of Mishing, Deori and Chutiya. Blood Pressure is also associated with rising age independently.

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Scheduled Tribes and Tribal Communities of Himachal Pradesh, India: An Analysis of 2001 and 2011 Censuses

Binod Kumar Singh[1], Ravendra K Sharma[2*]

Abstract: *Himachal Pradesh (HP), home to about 0.4 million Scheduled Tribe (ST) population constitutes 5.7% of the total state's population, and encompass 10 tribal communities mostly inhabiting rural areas (95.5%) which spread among all the three different regions viz. Trans-Himalayan, Central and Southern region. Tribal communities are at different stages of social, economic and educational development with an uneven distribution in all the districts of the state. Among the tribal communities, Gaddi is the most populated tribal group constituting 45.4% of the tribal population followed by Gujjar (23.6%) and Kanaura/Kinnara (13.0%), while Beta/Beda is the smallest tribal group preceded by Domba/Gara/Zoba (0.1% each). The tribal population increased by 60% against 12.9% growth rate of overall population during 2001-11. Gujjars had the highest growth rate of 160% while a negative growth of 17% was observed among Kanaura/Kinnara tribal community during 2001-11. The sex ratio among tribes of HP was healthier in comparison to most of the northern states of India. An increase in sex ratio was marked among many tribal groups but a decline in sex ratio, especially child sex ratio among few tribal communities was also observed during last decade.*

The literacy rate among tribal population of the state was much better than the national average for tribal population which increased by 8.1% points during 2001-11. Among tribal groups, Gaddis (13.5%) showed the highest while Swangla (4.1%) displayed lowest improvement in literacy rate. The work participation rate (WPR) among tribal population of the state was also higher compared to the national average for tribals, but it showed marginal decrease during last decade. The highest decline in WPR was found among Swangla and lowest in Gujjar. However, the WPR improved among Pangwala, Kanaura/Kinnara, Lahaula and Bhot/Bodh during this period. The proportion of Cultivators among tribal workers declined by 14% points during last decade but their proportion was still much higher in comparison to the national average for STs. The proportion of tribal workers engaged in 'Other work' increased by 9% points which was considerably higher than national average for STs.

[1] Senior Geographer, Directorate of Census Operations, UP, ORGI New Delhi.
[2] Scientist 'E', ICMR-National Institute for Research in Tribal Health, Jabalpur.
*Corresponding Author: Dr. Ravendra K. Sharma, Scientist 'D', ICMR-National Institute for Research in Tribal Health, PO-Garha, Jabalpur (M.P.), E-mail: ravendra_s@yahoo.com *Corresponding Author: Dr. Ravendra K. Sharma, Scientist 'D', ICMR-National Institute for Research in Tribal Health, PO-Garha, Jabalpur (M.P.), E-mail: ravendra_s@yahoo.com

Though, the inter-tribal inequalities in socio-economic development are much lower in Himachal Pradesh but the analysis revealed that the differences among socio-economic indicators persist in tribal communities of the state. Overall, the present analysis showed that the Kinnaura and Kinnara tribes are relatively best performing tribal communities while Pangwala is the most backward tribe of the state. The communities which showed a negative decadal growth, declination in child sex ratio needs immediate attention and the cause of unfavourable growth should be explored and rectified by intriguing all necessary preventive measures by the government. The tribal communities need special attention in general for maintaining their pace of development at par non-tribal communites, but backward tribal communities need more focused interventions.

Keywords: Scheduled Tribes, Tribal Communities, Tribal Demography, Spatio-temporal analysis, Himachal Pradesh

INTRODUCTION

The Himachal Pradesh state of India is located between 30° 22' 40" and 33° 12' 40" north latitudes and 75° 47' 55" and 79° 04' 22" east longitudes and bordered by Indian states namely Jammu & Kashmir in the north, Punjab in the west, Haryana in the southwest, Uttarakhand in the southeast and other nation viz. China in the east. HP mountainous elevation ranges from about 350 m to 6,000 m above the sea level (GoHP) and presents a complicated topography with intricate mosaic of mountains ranges, hills and valleys. HP is divided into four regions, i.e., (i) Northern Himachal Pradesh, (ii) Trans-Himalayan Zone, (iii) Central Himachal Pradesh and (iv) Southern Himachal Pradesh. Ravi and Chandra Bhaga or Chenab are the main rivers which duct this region. Being a hilly state of Himalayan system, HP face various types of natural hazards like the geological hazards, earthquake and landslide; hydrological hazards of river floods, flash floods and glacial lake outburst floods; meteorological hazards of droughts, hailstorms and cloudbursts; and climatologically hazards of cold wave, frosts and avalanche (HPSDMA.2017).

HP with an area of 55,673 sq. km. is one of the smallest state accounting for 1.6% of total geographical area of the country and ranks 17th among Indian states and union territories according to geographical area (SDR) while it stands at 21st position with a population of 68.64 lakhs among Indian states and union territories (Census of India, 2011; GoHP, 2017). HP recorded 12 districts, 117 Sub-districts, 59 towns (56 Statutory Towns and 3 Census Towns) and 20,690 Villages (17,882 inhabited and 2,808 un-inhabited villages) in 2011 census. With no change in the number of districts; there was an increase of 8 sub-districts and 3 towns whereas 572 villages increased as compared to 2001 census. The State registered a ST population of 3,92,126

constituting 8.6% of the total population and in total 10 STs were enumerated in 2011 census. The decennial growth of ST population was 60.3% which is about five times higher than the growth of total population (12.9%) during 2001-2011.

Inclusive growth has been recognized as the essence of developmental strategy across the economies. Since the introduction of economic reforms in early nineties, there has been greater focus on development and planning towards enhancement of human well-being and reduction in inequalities along with growth of per capita income especially targeting vulnerable social groups, viz. Scheduled Castes (SCs) and STs etc. HP is an stable, inclusive, cohesive and well-governed state that stands apart in many respects from its neighbouring states in northern India. It has additionally achieved remarkable growth, especially in the last two decades accompanied by excellent human development outcome. Inter-group disparities are low in a state with traditionally underprivileged group such as the SCs and STs (Das, Mehta, Žumbytė, 2015). 64.2% of tribal women and 83.2% of tribal men were literate in HP according to 2011 census. However, modest information is available about social, economic and demographic disparities among tribal communities of the state. Hence, it presents a unique situation to study the distribution of tribal population and tribal communities from regional perspective. With this background, an attempt was made in this paper to explore whether the effect of inclusive growth has reached the poorest section preferably, STs and if it is uniform across different tribal communities.

MATERIAL AND METHODS

In the present paper, we tried to discuss the socio-economic and demographic characteristics of the tribal population and tribal communities of HP on one hand and regional variations, size, growth and distribution patterns and trends on the other. The data for present analyses was taken from tribe specific tables of 2001 & 2011 censuses (Census of India, 2011, 2011a, Census of India, 200) and Govt. of India Publications (GoI, 2013). While discussing regional trends, the state has been divided into two regions (Figure -1). However, all 12 districts of the state are distributed into three natural regions: Trans-Himalayan (03 districts), Southern (04 districts) and Central region (5 districts). The base map for the study area was reproduced using the raster image published in the Administrative Atlas of India, Census of India 2011 (Figure 1). The raster map image was digitized, edited and modified by ArcGIS 10.0 software and NSS regionalisation scheme was adopted as published in Sample Registration System Statistical Report 2010 and the decennial census data (census 2001 and census 2011) were used for the descriptive analysis of the indicators of population for the purpose of this study. Tribal communities and their distribution at district level were mapped for both 2001 and 2011 censuses. The data was analysed with MS-Excel and SPSS 20 software.

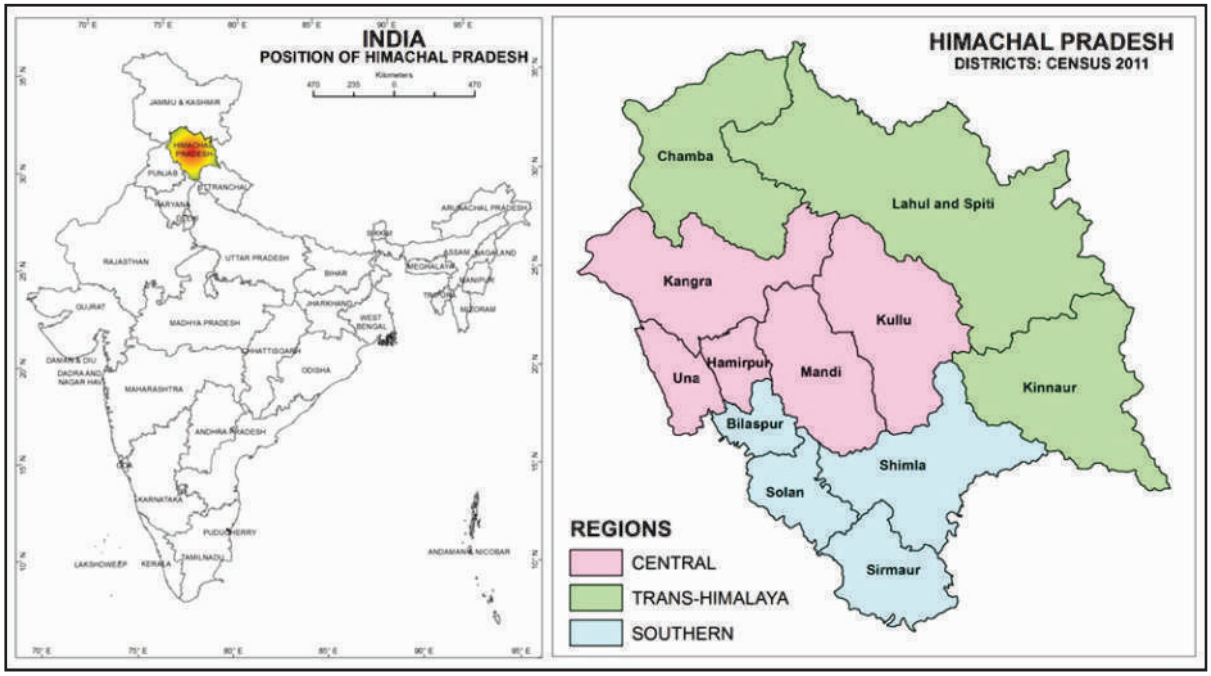

Figure 1: Location map of Himachal Pradesh and geographical regional distribution of districts.

The socio-economic and demographic status of tribal communities of the state were also compared on the basis of composite index which incorporated 16 different indicators like - Urbanization; Sex ratio, Child sex ratio (0-6 years), % Child population, Male and Female Literacy rates, Male and Female Work participation rates, Proportion of male and female Main Workers, Proportion of male and female workers engaged in Cultivations, Household industries and other jobs. However, all indicators were standardized before computing the composite index. All 16 selected indicators were positive indicators and hence standardized as:-

$$Xi = \frac{Vi - V\ \min}{V\ \max - V\ \min} * 100$$

Where *Vi* is the value of a indicator for i^{th} tribal community and V_{max} and V_{min} are the maximum and minimum value of that particular indicator. Further, each indicator was assigned a weight and the weight for each indicator was computed as:-

$$Wi = \frac{\frac{1}{\sqrt{Var(Xi)}}}{\sum \frac{1}{\sqrt{Var(Xi)}}}$$

Finally, using these weights composite index was computed as

$$Ci = \sum_{i=1}^{n} Wi * Xi$$

Where *Xi* is the standardized value of an indicator and *Wi* is the weight assigned to that particular indicator and n is the number of indicators included in the composite index.

RESULTS

Tribal Population in Himachal Pradesh

The total population of HP was enumerated as 6.9 million in the last

population census 2011. In absolute numbers, a total of 786,702 persons were added during the last decade of which 147,539 were tribal persons. As per Census 2011, the total tribal population of HP was 392,126 of which 374 392 (95.5%) inhabited rural areas and 17,734 (4.5%) resided in urban areas. Trans-Himalayan region of HP has the largest concentration of tribal population (81.0% of the state's tribal population) whereas Central and Southern region have 9.7% and 9.3% of state's tribal population respectively.

Table 1: Population, Tribal Population by Regions and Districts, Himachal Pradesh, 2001 & 2011

State/Region/ District	Population		Tribal Population		Growth Rate (%) 2001-2011		% of Tribal Population to Population		% w.r.t. total Tribal Population		Density of Tribal Population
					Population	Tribal Population					
Name	2011	2001	2011	2001			2011	2001	2011	2001	2011
Himachal Pradesh	**6864602**	**6077900**	**392126**	**244587**	**12.9**	**60.3**	**5.7**	**4.0**	**100.0**	**100.0**	**7.0**
Trans Himalayan	**634765**	**572445**	**209953**	**198075**	**10.9**	**6.0**	**33.1**	**34.6**	**53.5**	**81.0**	**7.8**
Chamba	519080	460887	135500	117569	12.6	15.3	26.1	25.5	34.6	48.1	21
Lahul & Spiti	31564	33224	25707	24238	-5.0	6.1	81.4	73.0	6.6	9.9	2.0
Kinnaur	84121	78334	48746	56268	7.4	-13.4	57.9	71.8	12.4	23.0	8.0
Central Himachal Pradesh	***3923696***	***3482918***	***125818***	***23718***	**12.7**	**430.5**	**3.2**	**0.7**	**32.1**	**9.7**	**7.0**
Kangra	1510075	1339030	84564	1597	12.8	5195.2	5.6	0.1	21.6	0.7	15
Kullu	437903	381571	16822	11351	14.8	48.2	3.8	3.0	4.3	4.6	3.0
Mandi	999777	901344	12787	10564	10.9	21.0	1.3	1.2	3.3	4.3	3.0
Hamirpur	454768	412700	3044	155	10.2	1863.9	0.7	0.0	0.8	0.1	3.0
Una	521173	448273	8601	51	16.3	16764.7	1.7	0.0	2.2	0.0	6.0
Southern	**2306141**	**2022537**	**56355**	**22794**	**14.0**	**147.2**	**2.4**	**1.1**	**14.4**	**9.3**	**5.1**
Bilaspur	381956	340885	10693	9180	12.0	16.5	2.8	2.7	2.7	3.8	9.0
Solan	580320	500557	25645	3542	15.9	624.0	4.4	0.7	6.5	1.4	13
Sirmaur	529855	458593	11262	5960	15.5	89.0	2.1	1.3	2.9	2.4	4.0
Shimla	814010	722502	8755	4112	12.7	112.9	1.1	0.6	2.2	1.7	2.0

Source: Author's calculation based on Census Data, 2001 & 2011

Table 1 lists the distribution of population, tribal population by regions and districts of HP from 2001-2011. The tribal population constituted 5.7% of the total population, 6.1% of the rural population and 2.6% of the urban population in the state. There was a decadal increase of 60.3% in the trial population against 12.9% total population during 2001-11. Among districts, Chamba has the largest tribal population (34.6% of state's tribal population), followed by Kangra (21.6%) and Kinnaur (12.4%) while Hamirpur district has the lowest tribal population (0.8% of state's tribal population). More than two-third (68.6%) of the total tribal population is concentrated in three districts namely Chamba, Kangra and Kinnaur. Lahul & Spiti district (81.4%) has the largest proportion of tribal population followed by Kinnaur (57.9%) and Chamba (26.1%), while Hamirpur district (0.7%) recorded the lowest proportion of tribal population.

Figure 2 depicts the number of STs and percentage distribution of tribal population to total population at district level for 2001 and 2011 censuses. Table 1 and figure 2 indicated migration of tribal population from Trans Himalayan districts to central and southern districts of the state. There was a considerable increase in the tribal population in Una, Kangra, Hamirpur, and Solan districts during the last decade. The proportion of tribal population was only 0.1% in Kangra in 2001 which increased to 5.6% in 2011 census. Lahaul & Spiti district recoded negative population growth while Kinnaur recoded a negative decadal growth of -13.4% in case of tribal population during last two censuses. Tribal Population density (Tribal persons per square kilometre) of HP in Census 2011 was 7 tribal persons per Sq. Km. Chamba district (21) was most densely populated by tribes followed by Kangra (15) and Solan (13) in 2011 Census. The minimum tribal population density was noticed in Shimla and Lahul & Spiti districts (2 tribal persons per Sq.Km).

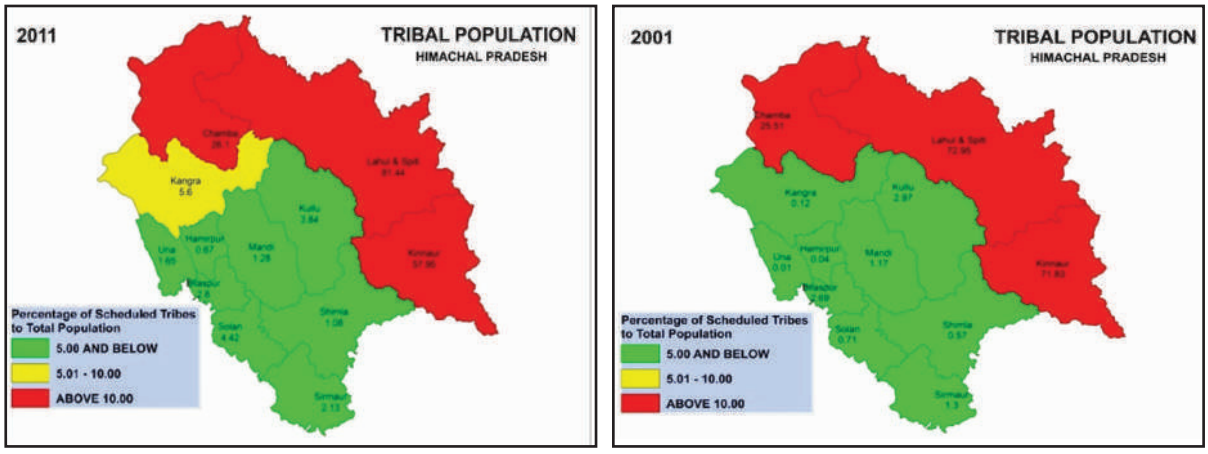

Figure 2: Distribution of tribal population in Himachal Pradesh, 2001 & 2011

Table 2: Villages by Population Size of Scheduled Tribes, Himachal Pradesh, 2001 & 2011

Scheduled Tribe Population Size	Total number of inhabited villages				Total Population				Scheduled Tribe Population			
	2001		2011		2001		2011		2001		2011	
	Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
No ST Population	15411	88.1	13874	77.6	4349899	79.3	3775150	61.1	0	0.0	0	0.0
01-09	583	3.3	1179	6.6	334630	6.1	698895	11.3	2473	1.0	4784	1.3
10-49	541	3.1	1176	6.6	236988	4.3	635552	10.3	13664	5.8	29836	8.0
50-99	261	1.5	559	3.1	122170	2.2	299046	4.8	18761	7.9	39849	10.6
100-199	296	1.7	506	2.8	137255	2.5	283784	4.6	42027	17.7	72086	19.3
200-499	319	1.8	470	2.6	204795	3.7	336512	5.4	101256	42.7	145263	38.8
500-999	75	0.4	111	0.6	79087	1.4	133326	2.2	47851	20.2	73626	19.7
1000 and above	9	0.1	7	0.0	17495	0.3	13785	0.2	11028	4.7	8948	2.4
Total	**17495**	**100.0**	**17882**	**100.0**	**5482319**	**100.0**	**6176050**	**100.0**	**237060**	**100.0**	**374392**	**100.0**

A total of 17,882 inhabited villages (2011 census) were documented against 17,495 villages (2001 census) in the state while no tribal population was recorded in 13,874 inhabited villages (77.6%, 2011 census) in comparison to 15411 villages (88.1%, 2001 census) (Table 2). In 2001, about 79.3% of total state population inhabited the villages without any tribal population, but in 2011, only 61.1% of the state population resided in villages with no tribal population suggesting movement of tribal population from tribal villages to non-tribal villages. Table 2 revealed that seven villages comprised of more than 1,000 tribal persons. Bitan (528) village of Una district had largest tribal population of 1,917 (64.4% of total population) and Sangla village of Kinnaur district recorded second largest tribal population of 1,393 (62.1% of total population). Villages with 500-999 tribal population occupied 111 inhabited villages while villages with 200-499 tribal population covered 470 villages and villages with tribal population size of 100-199 included 506 villages. These four categories together computed 1,094 inhabited villages (27.3% of the total villages with tribal population) and covered 80.1% of the total tribal population inhabiting villages of the HP.

Village level analysis of 2011 census data revealed that 230 inhabited villages (5.7% of villages with tribal population) of HP had 100% tribal population constituting 4.6% of the total rural tribal population while in 2001 census 248 villages (11.9%) had 100% tribal population, constituting 8.4% of state's tribal population. In 2011 census, about 24% villages with 0% or more tribal population comprised about 56% of total tribal population. However, in 2001, about 39% villages with 50% or more tribal population inhabited 70% tribal population (Table 3).

Table 3: Distribution of tribal villages and population by percent of tribal population in the village, Himachal Pradesh, 2001-2011

Percentage of ST Population to Total Population	Total number of inhabited villages				Scheduled Tribe Population			
	2001		2011		2001		2011	
	Nos.	%	Nos.	%	Nos.	%	Nos.	%
100%	248	11.9	230	5.7	20000	8.4	17037	4.6
90.01-99.99	196	9.4	257	6.4	56190	23.7	64840	17.3
80.01-90.00	123	5.9	139	3.5	33132	14.0	38502	10.3
70.01-80.00	78	3.7	117	2.9	19940	8.4	31784	8.5
60.01-70.00	87	4.2	99	2.5	20028	8.4	29455	7.9
50.01-60.00	73	3.5	114	2.8	17504	7.4	23351	6.2
40.01-50.00	73	3.5	142	3.5	14457	6.1	28725	7.7
30.01-40.00	88	4.2	191	4.8	11316	4.8	28284	7.6
20.01-30.00	118	5.7	273	6.8	12775	5.4	35105	9.4
10.01-20.01	188	9.0	490	12.2	16952	7.2	39639	10.6
5.01-10.01	153	7.3	432	10.8	7286	3.1	20584	5.5
5.00 and Below	659	31.6	1524	38.0	7480	3.2	17086	4.6
Total	**2084**	**100.0**	**4008**	**100.0**	**237060**	**100.0**	**374392**	**100.0**

Table 4: Tribal Population in urban towns in Himachal Pradesh, 2001 & 2011

Towns	Population		% w.r.t. Population		Tribal Population		% w.r.t. Tribal Population	
	2001	2011	2001	2011	2001	2011	2001	2011
Dharmsala (M Cl + OG)	19124	30764	3.2	4.5	99	2799	1.3	17.4
Shimla (M Corp.)	142555	169578	23.9	24.9	1706	2765	22.7	17.2
Kullu (M Cl)	18306	18536	3.1	2.7	1191	1512	15.8	9.4
Chamba (M Cl)	20327	19933	3.4	2.9	914	1098	12.1	6.8
Manali (M Cl)	6265	8096	1.1	1.2	656	922	8.7	5.7
Other Towns	336361	424504	56.5	62.5	2961	6948	39.3	43.3
Towns with No ST Pop	52643	8271	8.8	1.2	0	0	0.0	0.0
Total Urban	**595581**	**679682**	**100.0**	**100.0**	**7527**	**16044**	**100.0**	**100.0**

Source: Author's calculation based on Census Data, 2001 & 2011

In urban areas, 16,044 tribal persons were enumerated in 2011 census as compared to 7,527 tribal persons in 2001 census. No tribal population was enumerated from 4 towns in 2011 census, and thus, tribal population was reported only from 55 out of 59 towns of HP. Table 4 revealed that only five towns had a tribal population of 1000 or more, constituting 55.6% of the total urban tribal population. Four towns with 500-999 tribal population constituted about one-fifth of the urban tribal population and another seven towns with tribal population of 200-499 covered 12.3% of the total tribal population in urban areas. Remaining 39 towns of the state occupied only 11.9% of the total tribal population residing in urban areas.

TRIBAL COMMUNITIES IN HIMACHAL PRADESH

Population Size by Tribal Communities

Eight STs were enumerated in 2001 census. Two new tribal communities namely Beta/Beda and Domba/ Gara/ Zoba were included in this list and enumerated for first time in 2011 census. Out of these ten STs, Gaddi was the most populous tribe with a population of 178,130, constituting 45.5% of the total ST population in 2011 census. Gujjar, Kanaura/Kinnara, Bhot/Bodh and Pangwala were four other major tribes in descending order of the total ST population. These five tribal communities constituted 93.4% of state tribal population while remaining five tribal communities namely Swangla, Lahaula, Jad/Lamba/Khampa, Domba/Gara/Zoba and Beta/Beda along with the generic tribes constituted 6.6% of the total ST population of the State (Table 5).

Table 5: Basic demographic indicators of Scheduled Tribes, 2001-2011

Tribes	Population		% of total ST Population		Decadal Growth Rate (%)	Child Population (%)		Sex ratio		Child sex ratio	
	2011	2001	2011	2001	2001-11	2011	2001	2011	2001	2011	2001
All ST	**392126**	**244587**	100.0	100.0	**60.3**	**12.2**	**13.7**	**999**	**996**	**930**	**955**
Bhot, Bodh	27191	25228	6.9	10.3	7.8	9.2	10.9	1028	998	975	953
Gaddi	178130	92569	45.4	37.8	92.4	12.4	15.3	1014	1005	930	957
Gujjar	92547	35538	23.6	14.5	160.4	14.9	16.2	945	939	907	907
Jad, lamba, Khampa	1974	1474	0.5	0.6	33.9	8.8	10.5	871	897	933	1067
Kanaura, Kinnara	50994	61660	13.0	25.2	-17.3	9.2	11.4	1062	1023	971	982
Lahaula	2886	1733	0.7	0.7	66.5	8.2	9.6	1028	978	829	886
Pangwala	17562	16230	4.5	6.6	8.2	12.1	13.9	985	989	913	1004
Swangla	9630	9026	2.5	3.7	6.7	9.5	11.7	994	1015	1002	961
Beta, Beda	226	--	0.1	--	--	17.3	--	852	--	1438	–
Domba, Gara, Zoba	231	--	0.1	--	--	13.9	--	662	--	455	–
Generic Tribes etc.	10755	1129	2.7	0.5	852.6	12.1	15.9	947	756	958	705

In terms of proportion, the ST population constituted 5.7% of the total population of the state that increased from 4.0% as recorded during 2001 census. The tribal population recorded a decadal growth of 60.3% during last two censuses. It is apparent that tribal growth rate was quite higher than the national average of 35.5%. However, this growth was not uniform across the tribal communities where it was very high in few communities, while a negative growth rate could be observed in case of others,. Among all tribal communities, Gujjar recorded the highest decadal growth rate of 160.4%, followed by Gaddi (92.4%) and Lahaula (66.5%) whereas the Kanaura/Kinnara tribe declined by 17.3% during last one decade. The Swangla, Bhot/Bodh and Pangwala tribes registered decadal growth rate below 10.0% during 2001-2011. Generic tribes (unclassified tribal population) accounted for 2.7% of the total tribes of HP where the population increased from 1129 in 2001 to 10755 in 2011, i.e. a decadal growth of more than 852%.

Distribution of Tribal Communities

Figure 3 shows the number of ST population and proportionate distribution of tribal communities in each district of HP as per 2011 census. Among the varied regions of the state, Lahaula and Jad/Lamba/Khampa tribes were found to be highly concentrated in Outer Hills. Bot/Boto, Balti, Purigpa, Garra, Changpa, Tue and Beda were outstandingly concentrated in Central HP. In 2011 census, the Gaddi tribe mainly inhabited Chamba (58.98%) and Kangra (40.14%) districts, whereas Gujjars were mainly enumerated from Solan, Kangra, Mandi, Sirmaur, Bilaspur and Chamba districts. Kanaura/Kinnara mainly occupied the Kinnaur district

(85.8%). Bhot/Bodh (65.6%), Swangla (71.2%), and Domba/Gara/Zoba (57.6%) were mainly found in Lahaul & Spiti district. Pangwala inhabited Chamba (97.2%), whereas Lahaula (65.2%) and Jad/Lamba/Khampa (59.4%) were recorded from Kullu district. Generic tribes tribes were dispersed in all the districts of the state and the highest percentage of these tribes was recorded from Kinnaur district (41.9%) followed by Chamba (24.0%) and Kangra districts (8.1%) during 2011 census (Figure 3).

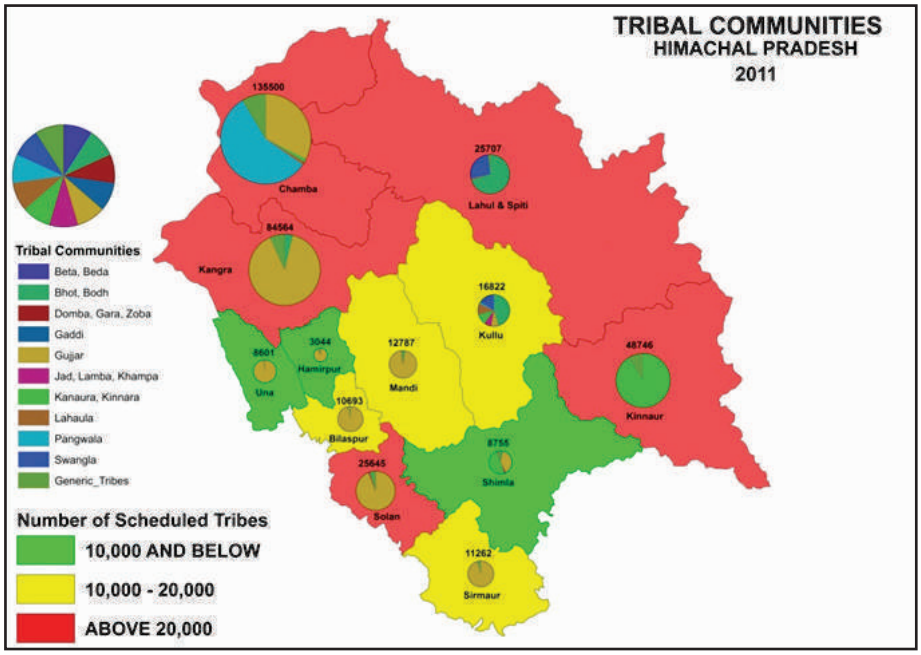

Figure 1: Distribution of ST communities in Himachal Pradesh, 2011

Sex Ratio (Number of females per 1,000 males)

In 2011 census, the overall sex ratio recorded among state's ST population was 999 females per 1000 males which was higher than the national average of 990 for STs. The sex ratio of ST population has increased by 3 points in 2001. Individually, females outnumbered the males in Gaddi, Kanaura/Kinnara and Bhot/Bodh tribes. The overall sex ratio for other tribal communities was lower than the national average for STs. The lowest sex ratio was recorded for Domba/Gara/Zoba tribe (662) preceded by Beta/Beda (852) and Jad/Lamba/Khampa (871). Three tribal communities namely Pangwala, Swangla, and Jad/Lamba/Khampa showed a decline in overall sex ratio during 2001-11 (Table 5).

Child Sex Ratio (0-6 years): Tribal Girls per thousand Tribal Boys

The sex ratio among STs in the age group of 0-6 years was 930 which were considerably lower than that recorded for all STs at the national level. Census 2011 marked a considerable decline in child sex ratio from 955 to 930 (-25 points), which was considerably higher than that recorded for all STs at national level (-15) during 2001-2011.

Among the tribal communities, Beta/Beda and Swangla had prevalence of girl children followed by Bhot/Bodh and Kanaura/Kinnara, who had child sex ratio higher than the national average. Other six tribes Jad/Lamba/Khampa, Gaddi, Pangwala, Gujjar, Lahaula and Domba/Gara/Zoba had sex ratio lower than national and state average. The lowest child sex ratio was recorded among Domba/Gara/Zoba tribe (445) and preceded by Lahaula (829). Two tribal communities namely Swangla and Bhot/Bodh along with generic tribes recorded a fall in the child sex ratio during 2001-11 (Table 5).

Proportion of (0-6) child Population

Table 5 lists the tribe-wise proportion of tribal population in the age group (0-6 years) for each tribal communities of HP, during 2001 and 2011 censuses. As per 2011 census, the proportion of tribal population in the age group (0-6 years) to the total tribal population was 12.2%, which is about 4% points lower than the national average of 16.0%. There was a decline of 1.5% points in the proportion of tribal population in the age group (0-6 years) during 2001-2011. The Beta/Beda recorded the highest proportion of tribal population (17.3%) in the age group 0-6 years while Lahaula tribe (8.2%) recorded the lowest. All the tribal communities of HP recorded a decline in the proportion of tribal population in the age group (0-6 years) during last two censuses.

Rural-Urban Distribution

Table 6 presents tribe wise urban population among tribal population and tribal communities of HP from 2001 to 2011. As per 2011 census, 95.5% tribal population inhabited rural areas and only 4.5% of total tribal population occupied urban areas. The proportion of tribal population living in urban areas improved from 3.1% in 2001 to 4.5% in 2011. The highest improvement in the proportion of urban population was recorded among Bhot/Bodh where it increased to 25.9% in 2011 from 16.1% in 2001, followed by Swangla (18.6% in 2011 from 11.9% in 2001), and Gaddi (11.6% in 2011 from 7.8% in 2001).

Literacy and Educational Level

The literacy among STs of the state was 73.6% in 2011 which was considerably higher compared to the national level (59.0%) (table 6). The overall literacy rate increased from 65.5% in 2001 census to 73.6% in 2011 census, with an increment of 8.1%. Male literacy increased from 77.7 % in 2001 to 83.2% in 2011, while female literacy enhanced from 53.3% to 64.2% in the same period. Among the tribal communities of HP, Lahaula and Kanaura/Kinnara registered an overall literacy above 80%, whereas Bhot/Bodh, Jad/Lamba/Khampa, Domba/Gara/Zoba and Swangla registered literacy rate between 75-80%. Gujjar recorded the lowest overall literacy rate among the tribal communities in 2011, but the overall literacy rate among Gujjar improved by12.4% points during last two censuses. The Gaddis registered the highest increase in literacy rate by 13.5% points (from 59.8% in 2001 to 73.3% in 2011), whereas the lowest improvement was recorded for Swangla tribe (78.5% in 2011 compared to 74.4% in 2001) with 4.1% point.

Table 6: Socio-economic indicators of tribes of Himachal Pradesh, 2001-11

Tribes	Urban Pop. (%)		Literacy Rates		Work Participation Rates		Main Workers		Marginal Workers	
Year	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001
All STs (HP)	4.5	3.1	**73.6**	**65.5**	**53.5**	**54.6**	**53.4**	**67.7**	**46.6**	**32.3**
Gaddi	11.6	7.8	73.3	59.8	52.3	54.4	38.3	54.9	61.7	45.1
Gujjar	3.7	1.8	66.7	54.3	49.7	50.8	56.8	61.8	43.2	38.2
Kanaura, Kinnara	2.5	1.5	81.8	75.8	63.4	58.4	79.4	81.0	20.6	19.0
Bhot, Bodh	25.9	16.1	79.9	74.2	55.1	54.6	76.8	86.7	23.2	13.3
Pangwala	5.3	3.2	72.0	61.0	54.7	49.6	28.9	54.0	71.1	46.0
Swangla	18.6	11.9	78.5	74.4	52.9	56.8	80.5	86.9	19.5	13.1
Lahaula	3.0	2.4	83.4	75.4	51.5	51.3	71.0	73.7	29.0	26.3
Jad, Lamba, Khampa	7.6	3.3	79.4	72.2	48.5	51.3	73.6	82.8	26.4	17.2
Domba, Gara, Zoba	4.9	--	79.4	60.9	55.4	48.1	68.8	73.8	31.2	26.2
Beta, Beda	13.9	--	73.8	--	63.7	--	42.4	--	57.6	--
Generic Tribes etc.	6.7	28.1	75.3	--	55.5	--	71.5	--	28.5	--

Source: Author's calculation based on Census Data, 2001 & 2011

Work Participation Rates

The work participation rate (WPR) among the STs in the state was 53.5% in 2011, which was higher than the national average of 48.7% for STs. A marginal decline of 1.0% in the overall WPR was recorded during 2001-11. An increase in the WPR for male was observed from 56.5% in 2001 to 59.4% in 2011, but female WPR decreased by 5.0% points during 2001-2011. Among the total workers, 53.4% were main workers, which were considerably lower than that recorded for all STs at national level (64.8%) in 2011. Moreover, a sharp decline of 14.3% points in the proportion of main workers to total workers was registered during 2001-2011, which is significantly higher compared to the national level for all STs (-4.2%).

Though, a decline in WPR was recorded during 2001-11, but individually almost all tribal communities of the state, except Jad/Lamba/Khampa recorded an overall WPR higher than the national average for all STs (Table 6). Beta/Beda and Kanaura, Kinnara tribes recorded highest WPR in the state. Among the tribal communities, four tribal communities namely Pangwala, Kanaura/ Kinnara, Bhot/Bodh and Lahaula registered an increase in the WPR whereas all other tribal communities registered a decline in the WPR during last decade (2001-11). The highest decline in WPR (3.9% points) was reported from the Swanglas, while the lowest decline was among the Gujjars (1.0% points) during 2001-11 (Table 6).

Categories of workers

All workers were broadly categorized into four categories, viz. Cultivators (CL), Agricultural Labourers (AL), working in Household Industries (HHI) and Other Workers (OW). The cultivators and agricultural labourers

broadly represented the workers engaged in the agricultural sector, except for those engaged in plantation activities, which over the censuses have been considered as a part of 'other workers'. Table 7 depicts the distribution of tribal workers by occupational categories as per 2001 and 2011 censuses in the state.

In 2011 census, more than three-fifth (62.4%) of the tribal workers were classified as 'Cultivators' in HP. This proportion of cultivators was appreciably higher than the national average of 34.5% for STs. The share of tribal cultivators to total tribal workers reduced from 76.1% in 2001 to 62.4% in 2011. However, the proportion of cultivators among tribal communities was comparatively better than the national average, The proportion of cultivators to total workers among Kanaura/Kinnara and Swangla tribes was above 70.0%; Lahaula and Gaddi tribes about 60%; Pangwala, Gujjar, Bhot/Bodh and Beta/Beda tribes about 50-60% and less than 40.0% among Jad/Lamba/ Khampa and Domba/Gara/Zoba tribes. The proportion of cultivators to total workers declined in all tribal communities except Jad/Lamba/ Khampa tribe, where it increased slightly. Agricultural Labourers accounted for 4.8% which was significantly lower than the national STs average of 44.5% in 2011 suggesting that most of the tribals in the state own agriculture land and only few were working in others lands. The percentage share of tribal agricultural labourers to the total tribal workers had increased by 3.8% points (1.0% in 2001 to 4.8% in 2011). As per 2011 census, the Pangwala tribe had maximum proportion of agricultural labourers while it was lowest among Kanaura/Kinnara tribe (1.2%). The proportion of agriculture labourer was more than 5% among Pangwala, Jad/Lamba/Khampa, Domba/Gara/Zoba, Beta/Beda, Gaddi and Gujjar tribes and less than 5% among Bhot/Bodh, Lahaula, Swangla and Kanaura/Kinnara tribes. However, the proportion of tribal agricultural labourers increased among all the tribal communities during the last decade.

Table 7: Proportion of tribal workers engaged in different economic sectors, 2001-11

	Cultivators		Agricultural Labourers		Household industry		Other Work	
	2011	2001	2011	2001	2011	2001	2011	2001
All STs (HP)	**62.4**	**76.1**	**4.8**	**1.0**	**2.3**	**1.4**	**30.5**	**21.5**
Gaddi	60.3	81.9	5.5	0.5	2.6	0.8	31.5	16.8
Gujjar	58.4	70.4	5.2	1.0	2.7	2.0	33.7	26.6
Kanaura, Kinnara	77.2	79.1	1.2	1.0	1.3	1.9	20.2	18.1
Bhot, Bodh	57.4	58.8	3.4	2.4	1.2	1.6	38.0	37.1
Pangwala	59.4	75.5	9.7	1.6	2.5	0.6	28.3	22.3
Swangla	71.7	77.8	1.6	0.8	0.7	0.9	26.1	20.5
Lahaula	61.5	68.3	2.8	2.6	1.1	1.9	34.5	27.2
Jad, Lamba, Khampa	37.0	34.4	7.9	5.7	1.9	2.4	53.2	57.5
Domba, Gara, Zoba	34.4	39.4	7.0	1.5	4.7	3.1	53.9	56.0
Beta, Beda	52.8	--	5.6	--	0.0	--	41.7	--
Generic Tribes etc.	60.3	--	8.0	--	2.3	--	29.3	--

Other than agriculture, 2.3% tribal workers in HP were engaged in the 'Household Industry' (HHI) in 2011, which was comparatively higher for all STs at national level (1.8%). Among tribes, Domba, Gara, Zoba had the highest proportion of workers engaged in household industries (4.7%) in 2011, and it was less than 1% in Swangla and Beta, Beda tribes while it varied from 1 - 3% in rest of the tribes. During 2001-11, the percentage share of tribal workers engaged in 'Household Industries' increased by 66% and the increment was considerably higher in Gaddis and Pongwalas tribes while it decreased among five tribal communities namely Lahaula, Kanaura/ Kinnara/ Jad/Lamba/ Khampa, Bhot/Bodh and Swangla during last decade. In census 2011, 30.5% workers were engaged in other economic activities (other than agriculture and household industries) which were considerable higher in the state compared to national average of 19.2% for STs. In 2011, more than 50% workers were classified as 'Other Workers' in Domba/Gara/Zoba (53.9%) and Jad/Lamba/Khampa (53.2%) tribes. The proportion of others workers was lowest among Kanaura, Kinnara (20.2%) in 2011 and Gaddi (16.8%) in 2001 while in rest of the tribes it varied from 26% to 42% in 2011 census. Overall, the percentage share of 'Other workers' increased from 21.5% to 30.5% during 2001-11 and all tribal communities witnessed an increase in the proportion of other workers, except among Jad/Lamba/Khampa tribes where a decrease in the proportion of 'other workers' was observed during last decade. However, the maximum increment was observed in the Gaddis (from 16.8% in 2001 to 31.5% in 2011).

Ranking of tribes

All tribes were ranked according to the value of the overall socio-economic development composite index. The composite index was computed separately for both 2001 and 2011 censuses. Table 8 describes the index values and ranking of all eight tribes enumerated in 2001 census and ten tribes enumerated in 2011 census. The value of composite index varied from 0.36 (lowest) to 0.65 (highest) in 2001 census and 0.38 (lowest) to 0.61 (highest) in 2011 census. Kanaura, Kinnara (0.65) was the best perforating tribe and ranked first among all eight tribes of HP enumerated in 2001 which was closely followed by Jad, Lamba, Khampa (0.62). In 2001 census, Kanaura, Kinnara (1st rank), Jad, Lamba, Khampa (2nd rank) and Bhot, Bodh (3rd rank) were the three best performing tribes of HP while Pangwala (8th rank) was the most backward tribal community.

Table 8: Overall ranking of tribal communities based on their demographic, socioeconomic indicators, 2001-11

Tribes	2001		2011	
	Index	Rank	Index	Rank
Bhot, Bodh	0.60	3	0.54	2
Gaddi	0.42	6	0.42	8
Gujjar	0.39	7	0.40	9
Jad, Lamba, Khampa	0.62	2	0.49	7
Kanaura, Kinnara	0.65	1	0.61	1
Lahaula	0.51	5	0.53	3
Pangwala	0.36	8	0.38	10
Swangla	0.58	4	0.50	6
Beta, Beda	--	--	0.50	5
Domba, Gara, Zoba	--	--	0.53	4

The best performing tribes were Kanaura, Kinnara (1st rank), Bhot, Bodh (2nd rank) and Lahaula (3rd rank) of the ten tribes enumerated in the 2011 census. Pangwala (0.38) was the most deprived tribal community. Lahaula tribe recorded an improvement in its ranking during the last decade. Pamgwala, Lahaula and Gujjar tribes recorded an improvement in the value of overall development index whereas, index value for all other tribes declined during 2011 census. The most considerable decline was observed among Jad, Lamba, Khampa tribe where the index value declined from 0.62 in 2001 to 0.49 in 2011.

Summary & Conclusion:

HP state in northwest India substantially shares STs in its total population. According to 2011 census, the total population of HP was 68,64,602, which was 0.57% of the country's total population, of which 3,92,126 (5.7%) were classified as STs. Among 12 districts, Chamba (34.6%) and Kangra (21.6%) districts contributed to more than half of state's tribal population. However, the concentration of tribal population was higher in Trans Himalayan districts viz. Lahul & Spiti (81.4%), Kinnaur (57.9%) and Chamba (26.1%). HP is primarily a rural state and only 4.5% of ST households are in urban areas, while remaining (95.5%) are in rural areas. Eight communities in 2001 and ten communities in 2011 were classified as STs and these were enumerated in the respective 2001 and 2011 censuses. The Gaddis and Gujjars were the predominant tribes and Beta, Beda and Domba, Gara, Zoba were the least populated tribal communities of the state. The tribal population increased by 60.3% which was much higher than the total growth rate of tribal population in the country (23.7%) during last decade. Almost all tribes showed an increasing trend during last census decade, except Kanaura, Kinnara tribe. However, the poor child sex ratio among few tribes and a declining trend in child ratio was a major concern.

HP has the reputation of being stable, inclusive, cohesive and well-governed

state which stands apart in many respects from its neighbours in northern India. The state has additionally achieved remarkable growth, especially in the last two decades accompanied by outstanding human development outcomes (Das et. al. 2015). This well-being encompass individual attainment in the areas of education, employment, health care, nutritional level and basic amenities like electricity, water supply, sanitation, housing, etc. (GoHP, 2012, GoHP, 2016). Overall, more than 73% tribal population (6 years and above) were recorded as literate in 2011 census and literacy rate was 80% or more among Lahaula, Kanaura, Kinnara and Bhot, Bodh while rest all other tribes had a literacy rate more than 70% in 2011. All tribal communities had received considerable improvement in literacy rates during 2001-11 reflecting that despite being a predominantly rural society, educational attainment in HP was among the best in the country.

The work participation rate (WPR) i.e., the proportion of workers among tribal population was 53.5% which was higher than the national average for STs. The WPR varied from being highest in Beta, Beda (63.7%) and Kanaura, Kinnara (63.4%) to lowest WPR in Jad, Lamba, Khampa (48.5%) and Gujjars (49.7%). The high rates of labour force participation in HP were largely driven by two major factors; firstly, a large public sector granting jobs to citizens as part of an implicit social contract, and secondly, the high employment rates. Agriculture is still the stronghold of large rural economy, and predominantly agricultural economies tend to have higher labour force participation rates (GoHP, 2012, GoHP, 2013). The hilly terrains of the state are prone to various natural disasters and unfavourable for agriculture (HPSDMA.2017). Despite this, agriculture and its allied animal husbandry play crucial roles in state economy (GoHP, 2015, GoHP, 2017). Our study also illustrated that though the share of the cultivators to total tribal workers reduced from 76.1% in 2001 to 62.4% in census 2011 (a similar kind of reduction was observed in all tribal communities) but proportion of cultivation among state's tribal communities was much higher in comparison to national average for STs. This was also supported by the findings from other studies which suggested that almost 80% of rural households in the state possess some land and the distribution of land across social groups was also more equal in HP compared to its neighbouring states and rest of India (Das, et.al., 2015). Similarly, in census 2011, the proportion of workers engaged in 'other work' (jobs other than in agriculture and household industries) was considerable higher in the state (30.5%) compared to national average for STs (19.2%) that varied from 20-54% among the tribal groups. During 2001-11, almost all tribal communities witnessed an increase in the proportion of other workers.

Some studies suggested a considerable inter-district variation among the districts of HP, but the inter-tribal inequalities in socio-economic development was relatively lower and persisted among tribal communities of the state. Overall, the analysis revealed that Kinnaura, Kinnara was relatively the best performing tribes of the state and Pangwala was among the backward

tribes. The communities which showed a negative decadal growth, declination in child sex ration require immediate attention and the cause of unfavourable growth ought to be explored and all necessary preventive measures must be taken by the government. The tribal communities call for special attention in general for maintaining their pace of development at par non-tribal communites, but backward tribal communities necessitate more focused interventions.

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Scheduled Tribes of Goa State, India: Some observation from Census 2011

Binod Kumar Singh[1], Ravendra K. Sharma[2]

Abstract: *The State of Goa holds the fourth lowest position in terms of the Scheduled Tribes (ST) population among all the thirty States and UTs where tribes have been scheduled. The Scheduled Tribe (ST) population of Goa as per 2011 census is about 149.3 thousand persons. As per the 2001 census the ST population was 566, which increased to 1,49,275 in 2011. Eight tribal communities enumerated in Census 2011 are almost equally distributed in rural (58.7%) and urban (41.3%) areas of the state. The analysis reveals that the proportion of tribal population in the state increased from 0.04% in 2001 to 10.2% in 2011. About 62 percent of the tribal population are concentrated in South Goa and 38 percent in North Goa. Village wise tribal population varies from a maximum of 4,321 persons in Gaodongrem village of South Goa district to less than 10 persons in about 40 villages of the state. Among the tribal communities, Gawda is the largest tribal group in the state constituting 71 percent of the tribal population followed by Velip (21%) while Dubla (Halpati) is the smallest tribal group (0.05%) preceded by Varli (0.08%). The tribal population increased by 26,273% against 8.2% growth rate of overall population of the state during 2001-11. In 2003, three communities from the other backward classes were added to the ST, which included Kunbi, Velip and Gawda, because of this the ST population has unprecedentedly increased during 2001-11. The overall sex ratio among tribal population is 1,046 and the child sex ratio is 969 2011. The overall literacy rate among tribal population is about 79 percent, male literacy rate is about 16 percentage points higher than the female literacy rate and urban literacy rate is about 2 percentage points higher than the rural literacy rate in 2011. The work participation rate among tribal population is 42.6 percent; male work participation rate is about 26 percentage points higher than the female work participation rate and work participation rate is about 3 percentage points lower in urban area than in rural area. Tribal communities are at different stages of social, economic and educational development and are unevenly distributed in villages and towns of the state. Hence an attempt is made to study the scheduled tribe populations, its distribution and socio-economic and demographic variation among the tribal communities of state using data from 2011 census.*

KEYWORDS: *Scheduled Tribes, Tribal Communities, Literary rate, Work Participation rate*

INTRODUCTION

Goa, a tiny emerald land on the west coast of India, the 25th state of the Union states of India, was liberated from Portuguese rule in 1961. It was a part of Union Territory of Goa, Daman & Diu till

[1]Senior Geographer, Directorate of Census Operations, UP, ORGI New Delhi.
Scientist 'D', ICMR-National Institute for Research in Tribal Health, Jabalpur (M.P.)

30th May 1987 when it was carved out of form a separate state. Goa covers an area of 3702 square kilometers and comprises two Revenue district viz North Goa and South Goa. Boundaries of Goa State are defined in the North Terekhol river which separates it from Maharashtra, in the East and South by Karnataka State and West by Arabian Sea. Goa lies in Western Coast of India and is 594 Kms (by road) away from Mumbai city.

Goa lies on the western coast of Indian peninsula. It extends between 14^0 53' 53" and 15^0 47' 59" north latitudes and 73^0 40' 54" and 74^0 21' 11" east longitudes. The state boundary is well defined by river Tiracol in the north which separates it from Maharashtra, on the east lies the western ghats and in west is the Arabian sea. It is surrounded by Karnataka state in the south. Goa state was formerly a district of the Union Territory of Goa, Daman & Diu. Goa, Daman & Diu was under the Portuguese control for about 450 years. On 19th December, 1961 it was liberated from the erstwhile Portuguese Regime and integrated with India vide the Constitution's (Twelfth Amendment) Act, 1962 dated March 27, 1961. It was the divided into three districts, viz., Goa, Daman and Diu located at distinct places. In May 1987 Goa, Daman and Diu was split into two administrative divisions. Goa attained statehood and the other two parts remained a Union Territory (RGI, 2004). According to the Census 2011, Goa state is divided into two districts namely, North Goa and South Goa. The state has 11 talukas. North Goa district has six talukas while South Goa district has five talukas. According to Census 2011, there are 71 towns (15 Statutory Towns and 56 Census Towns) and 334 Villages (320 inhabited and 14 un-inhabited villages). The total area of the state is 3702 km^2 divided into 1966 km^2 to South Goa and 1736 km^2 to North Goa.

Goa has recorded 14,58,545 population in Census 2011. During the Census 2001 Goa's population was 13,47,668 hence registering an increase 8.2 percent during 2001-11. Among the districts, the total population of North Goa district and South Goa district is 8,18,008 and 6,40,537 respectively. Out of the total population 7,39,140 are males and 7,19,405 females. The sex ratio thus works out to be 973. At the district level North Goa has registered sex ratio as 963 whereas South Goa's sex ratio is 986. The density of population of Goa is 394 persons per km^2. Density of population in North Goa district is comparatively higher than the South Goa district. Former district has recorded 471 persons per km^2 and later has recorded only 326 persons per km^2 showing pressure of population more in North Goa district.

In Goa state, five communities- Dhodia (Halpati), Dubla (Talavia), Naikda (Nayaka), Siddi and Varli vide the Constitution (Goa, Daman and Diu) Scheduled Tribes Order, 1968 and as inserted by act 18 of 1987 and three communities, namely Kunbi, Velip and Gawda were notified as the Scheduled Tribes in the state of Goa vide the Notification No: 13/14/90-SWD (Vol. II)

dated, 22/04/2003. Eight Scheduled Tribes (STs) were enumerated officially for the first time during the 2011 census and recorded a population of 1,49,275. The tribal population constitutes 8.6 percent at all India level whereas it constitutes about 10.2 percent in Goa.

Inclusive growth is the essence of developmental strategy across all social and economic uplift policy and programme in India. The tribal communities remain in isolated from the main stream due to their differing social and cultural backgrounds in Goa. Goa, in the post- liberation period, has witnessed rapid socio-economic changes bringing significant changes in the state's economic situation. The boom in mining in 1970's and further boom in tourism in the post globalization era have made Goa as a top ranked state in the country. However within the state, there are regional disparities in the level of development. The coastal talukas show very high level of development whereas interior talukas show low socio-economic development. There are variable factors contributing to skewed pattern of development and backwardness of population is one of them. Prior to 2003, Goa, the smallest state in Indian union had negligible tribal population. Many of the communities like Gawdas, Kunbis and Velips were listed as OBC"s. It was the special tribunal of constitution of India that denoted this community as Scheduled Tribe in February 2003. However, dismally the government has no authentic data of their size, distribution and status prior to 2011 Census. Very few studies on tribes of Goa have been carried out. D'Souza Tetonia (1990) focuses on the various tribal groups there, socio-cultural characteristics, occupational structure and the impact of urbanization and development on the backward classes in Goa. At local level Sawant and Gaonkar (2008) have studied the socio-economic status of Velips in Morpila village. This necessitates a prompt research on tribal population. Thus, it offers a unique situation to study the distribution of tribal population in the villages and towns of Goa. Hence, in the present paper, we have tried to examine the socio-economic and demographic characteristics of the tribal population and tribal communities of Goa on the one hand and regional variations, size, growth and distribution patterns and trends on the other.

MATERIAL AND METHODS

The most of data used in the study have been taken from the 2011 population census. The general primary census abstract (PCA) are used to map the tribal population distributed in the villages and towns of Goa. The primary census abstract (PCA) for scheduled tribes are used to compute socio-economic indicators within tribal communities from 2011 census. While discussing regional distribution, all 320 inhabited villages and 71 towns of the state are considered for analysis and interpretation of results.

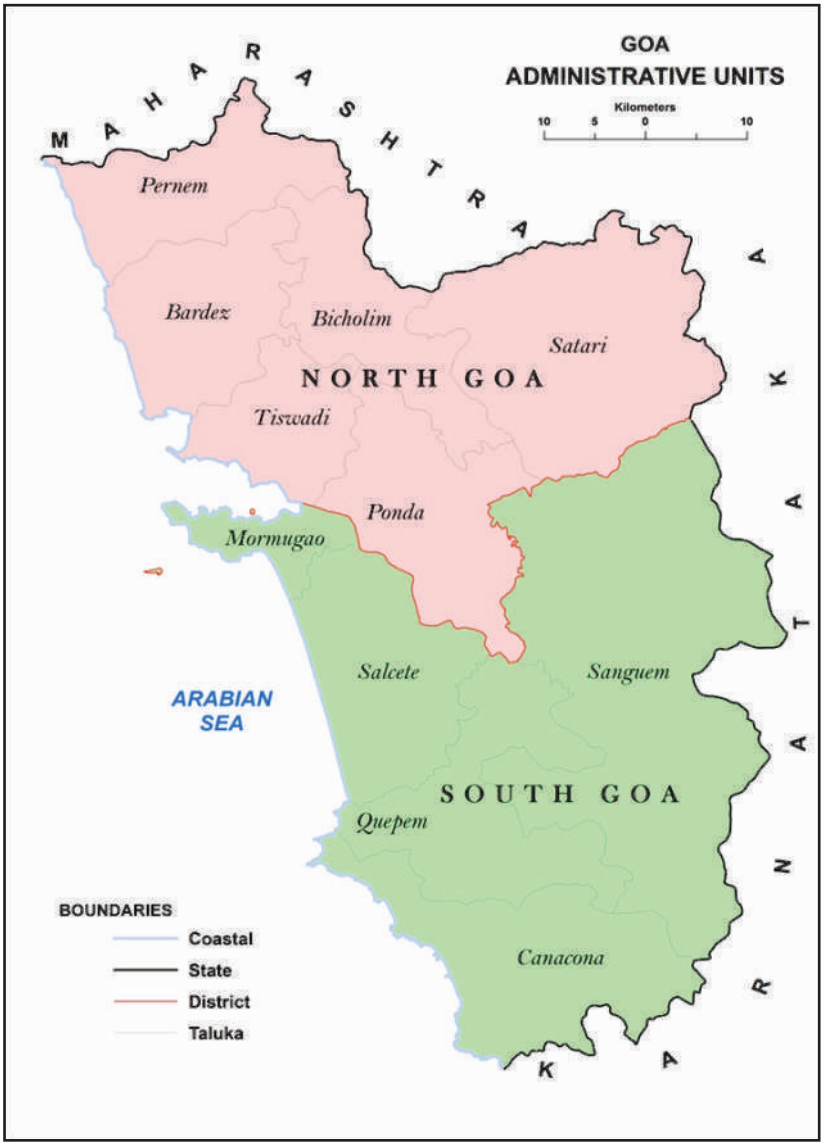

Figure 1: Administrative Divisions of Goa State, 2011

Villages/towns having tribal population are mapped by choropleth technique using ArcGIS 10.0 software. Base maps (Tahsil showing village/town boundary) are obtained from Administrative Atlas of Goa, Census 2011. All tahsil maps are georeferenced and digitised for linking the PCA data of census 2011. The base map for the study area is reproduced using the raster image published in the Administrative Atlas of India, Census of India 2011 (Figure 1). The raster map image is digitized, edited and modified by ArcGIS 10.0 software. The data is analysed with the help of MS-Excel and SPSS 20 software.

RESULTS

Tribal Population in Goa: Size, Growth and Distribution

As per the Census of India 2011, of the total population of 14,58,545 of the State of Goa, as many as 1,49,275 have been enumerated as belonging to the Scheduled Tribes constituting 10.23 per cent of the total population of the State. It is observed that 58.70 percent of Scheduled Tribe population is rural, while 41.29 percent is urban. There is a

preponderance of Scheduled Tribe population in the district of south Goa. As per the 2011 Census of India, 37.92 percent (56,606 persons) of Scheduled Tribe population is found in the district of North Goa, whereas 62.07 percent (92,669 persons) is found in the district of South Goa. The table 1 presents the distribution of Scheduled Tribe population across the talukas in the State. Among the talukas, Salcete of the South Goa district has the largest tribal population of 32,562 persons (21.8% of the state's tribal population) whereas Pernem of the North Goa district has the lowest tribal population of 46 persons (0.03% of state's tribal population) in the state. In percentage terms, the tribal population constitutes 10.2 percent of the total population, 15.9 percent of the rural population and 6.8 percent of the urban population. The tribal population constitutes 6.9 percent of the total population of North Goa district and 14.5 percent of the total population of South Goa district.

Table 1: Distribution of Total and Tribal Population across the talukas in Goa, 2011

State/ District/ Taluka	Population	% w.r.t. Population	Tribal Population	% w.r.t. Tribal Population	% of Tribal Population w.r.t. Population
Goa	**1458545**	**100.0**	**149275**	**100.0**	**10.2**
I. North Goa	**818008**	**56.1**	**56606**	**37.9**	**6.9**
1. Pernem	75747	5.2	46	0.03	0.1
2. Bardez	237440	16.3	1654	1.1	0.7
3. Tiswadi	177219	12.2	18785	12.6	10.6
4. Bicholim	97955	6.7	4492	3.0	4.6
5. Satari	63817	4.4	4030	2.7	6.3
6. Ponda	165830	11.4	27599	18.5	16.6
II. South Goa	**640537**	**43.9**	**92669**	**62.1**	**14.5**
7. Mormugao	154561	10.6	6870	4.6	4.4
8. Salcete	294464	20.2	32562	21.8	11.1
9. Quepem	81193	5.6	25290	16.9	31.1
10. Sanguem	65147	4.5	14290	9.6	21.9
11. Canacona	45172	3.1	13657	9.1	30.2

Source: Author's calculation based on Census Data, 2011

In census 2011, 334 villages (320 inhabited and 14 uninhabited) were enumerated in the state. Among 320 inhabited villages of Goa, no tribal population was reported from 112 villages (35.0%) during 2011 census. Table 2 presents the distribution of villages by tribal population size in Goa as per 2011 census. Table reveals that 12 villages in the state recorded more than 2,000 tribal persons, covers 35.3 percent of the state's total tribal population. Gaodongrem village of South Goa district was the village with largest tribal population of 4,321 (87.4% tribal population). Cola village of South Goa district recorded the second largest tribal

population of 2,977 (55.3% of total population). Tribal population size of 1000-1999 was recoded in 14 inhabited villages (covers 20.0% of tribal population), tribal population size 500-999 in 31 villages (covers 23.6% of tribal population), tribal population 200-499 was enumerated in 40 villages and tribal population 100-199 was enumerated in 18 villages. Overall, villages with 500 or more tribal population comprised about 30.4% of the total rural population and 79% tribal population in rural areas.

Table 2: Villages by Tribal Population Size, Goa, 2011

Scheduled Tribe Population Size	Total Number of Inhabited Villages		Total Population		Scheduled Tribe Population	
	Nos.	%	Nos.	%	Nos.	%
2000 and above	12	3.8	60814	11.0	30941	35.3
1000-1999	14	4.4	45378	8.2	17556	20.0
500-999	31	9.7	61523	11.2	20724	23.6
200-499	40	12.5	71975	13.0	13695	15.6
100-199	18	5.6	27096	4.9	2721	3.1
50-99	10	3.1	17128	3.1	739	0.8
Less than 50	83	25.9	153232	27.8	1263	1.4
No ST Population	112	35.0	114585	20.8	0	0.0
Total	**320**	**100.0**	**551731**	**100.0**	**87639**	**100.0**

Source: Author's calculation based on Census Data, 2011

Table 3: Distribution of tribal villages by number and percent of tribal population, Goa, 2011

Scheduled Tribe Population Size	Total Number of Inhabited Villages		Scheduled Tribe Population	
	Nos.	%	Nos.	%
100%	2	1.0	535	0.6
90.01-99.99	9	4.3	11670	13.3
80.01-90.00	7	3.4	8939	10.2
70.01-80.00	3	1.4	1727	2.0
60.01-70.00	6	2.9	2673	3.1
50.01-60.00	11	5.3	11886	13.6
25.01-50.00	40	19.2	29369	33.5
5.01-25.00	52	25.0	19060	21.7
1.01-5.00	33	15.9	1395	1.6
1.00 and Below	45	21.6	385	0.4
Total	**208**	**65.0**	**87639**	**100.0**

Source: Author's calculation based on Census Data, 2011

Table 3 show the distribution of tribal village by the percentage of tribal population in the villages. Out of 208 villages with at least some tribal population, 2 (1.0%) villages of Goa had 100% tribal population in 2011. But these two villages comprised only 0.6% of total tribal population. Nine villages (4.3%) had 90.01-99.99% tribal population and consist of 13.3% of tribal population. About 21 villages or 10.1% villages had more than one-fourth of the tribal population. Whereas 78 (37.5%) out of 208 villages had less than 5% tribal population and covers only 2.0 percent of the rural tribal population.

About 62.2% of total population of Goa was enumerated in urban areas during 2011 census. However, 41.3% of the tribal population of the state was residing in urban areas during this period. Out of 70 towns enumerated in 2011 census, no tribal population was reported from 3 towns and tribal population was found in 67 towns of Goa. Table 4 presents the distribution of towns by tribal population in Goa for 2011 census. Margao (M Cl) recorded the largest tribal population of 4,857 (7.9% of total tribal population) followed by Panaji (M Corp.), Nuvem (CT), Quepem (M Cl), Priol (CT), Raia (CT), Chimbel (CT), Verna (CT), Sao Jose de Areal (CT) and Cortalim (CT), which together accounts for 50 percent of the total tribal population 22.4 percent of the total urban population residing in urban areas of Goa. Remaining 57 towns of the state cover 50 percent of the total tribal population residing in urban areas.

Table 4: Towns by number and percent of tribal population, Goa, 2011

Towns	Population		Tribal Population	
	Nos.	%	Nos.	%
Margao (M Cl)	87,650	9.7	4,857	7.9
Panaji (M Corp.)	30,974	3.4	3,246	5.3
Nuvem (CT)	9,288	1.0	3,634	5.9
Quepem (M Cl)	14,795	1.6	3,286	5.3
Priol (CT)	8,164	0.9	3,142	5.1
Raia (CT)	10,706	1.2	2,968	4.8
Chimbel (CT)	15,289	1.7	2,592	4.2
Verna (CT)	6,632	0.7	2,516	4.1
Sao Jose de Areal (CT)	10,229	1.1	2,321	3.8
Cortalim (CT)	9,080	1.0	2,255	3.7
All Other Urban Centres	**7,04,007**	**77.6**	**30,819**	**50.0**
Total Urban	**9,06,814**	**100.0**	**61,636**	**100.0**

Source: Author's calculation based on Census Data, 2011

Mapping of Villages by Tribal Population in Goa

The table 7 gives the number of villages/towns by districts and talukas of Goa according to percentage range of tribal population to total population as per 2011 census. It is evident from the map (Figure 2) that the tribal population is distributed in varying degrees across villages and towns of Goa. The first

percentage range (75.00 and above) of scheduled tribes cover 19 villages of the state. These villages are mostly concentrated in Quepem (13) Sanguem (3) and Canacona (2) talukas of South Goa district. A lone village is found to be located in Satari taluka of North Goa district. The second percentage range (50.01-75.00) of scheduled tribes covers 19 villages. Of these, 14 are concentrated in South Goa district and distributed across all five talukas-Sanguem (7), Quepem (4), Canacona, Salcete, Mormugao (1 each). Rest five villages are found to be distributed in Satari (3), Tiswadi and Ponda (1 each) talukas of North Goa district. The third percentage range (25.01-25.00) of scheduled tribe population covers 40 villages and five towns of the state. Of these, 25 villages and three towns are found to be located in South Goa district and distributed across all five talukas. Maximum number of villages are concentrated in Sanguem (11), Quepem (9), Salcete (3 villages + 3 towns), Mormugao and Canacona (1 each). The fourth percentage range (5.01-25.00) of schedule tribe population covers 50 villages and 28 towns of the state as shown in the map. In this range, the maximum number of villages/towns are found to be located in Ponda taluka (17) followed by Tiswadi (15) of North Goa district while Sangem and Salcete talukas of South Goa district has also recorded the significant number of villages/towns. The fifth percentage range (5.00 percent and below) of schedule tribe population covers 80 villages and 35 towns of the state. Of these villages/towns, 71 are located in North Goa district and 44 are found to be located in South Goa district.

Table 5: Number of Villages/Towns by Districts and Talukas of Goa according to percentage range of tribal population to total population, 2011

District	Tahsil	No. of Villages/Towns by Percentage Range Distribution of Tribal Population to Total Population					
		75.01-100.00	50.01-75.00	25.01-50.00	5.01-25.00	5.00 and Below	No ST Population
North Goa		**1**	**5**	**17 (2)**	**42 (16)**	**71 (27)**	**100 (3)**
1	Pernem	0	0	0	0	7 (3)	21 (2)
2	Bardez	0	0	0	1	37 (15)	6 (1)
3	Tiswadi	0	1	3	15 (7)	8 (4)	6
4	Bicholim	0	0	2	4 (2)	8 (2)	12
5	Satari	1	3	3	5	8 (2)	53
6	Ponda	0	1	9 (2)	17 (7)	3 (1)	2
South Goa		**18**	**14**	**28 (3)**	**36 (12)**	**44 (8)**	**15**
1	Mormugao	0	1	1	3 (1)	7 (3)	2
2	Salcete	0	1	6 (3)	12 (7)	21 (3)	8
3	Quepem	13	4	9	6 (3)	4	2
4	Sanguem	3	7	11	13 (1)	10 (1)	3
5	Canacona	2	1	1	2	2 (1)	0
Goa	**Total**	**19**	**19**	**45 (5)**	**78 (28)**	**115 (35)**	**115 (3)**

Source: Author's calculation based on Census Data, 2011
Note: Figures given in parentheses represent the number of towns.

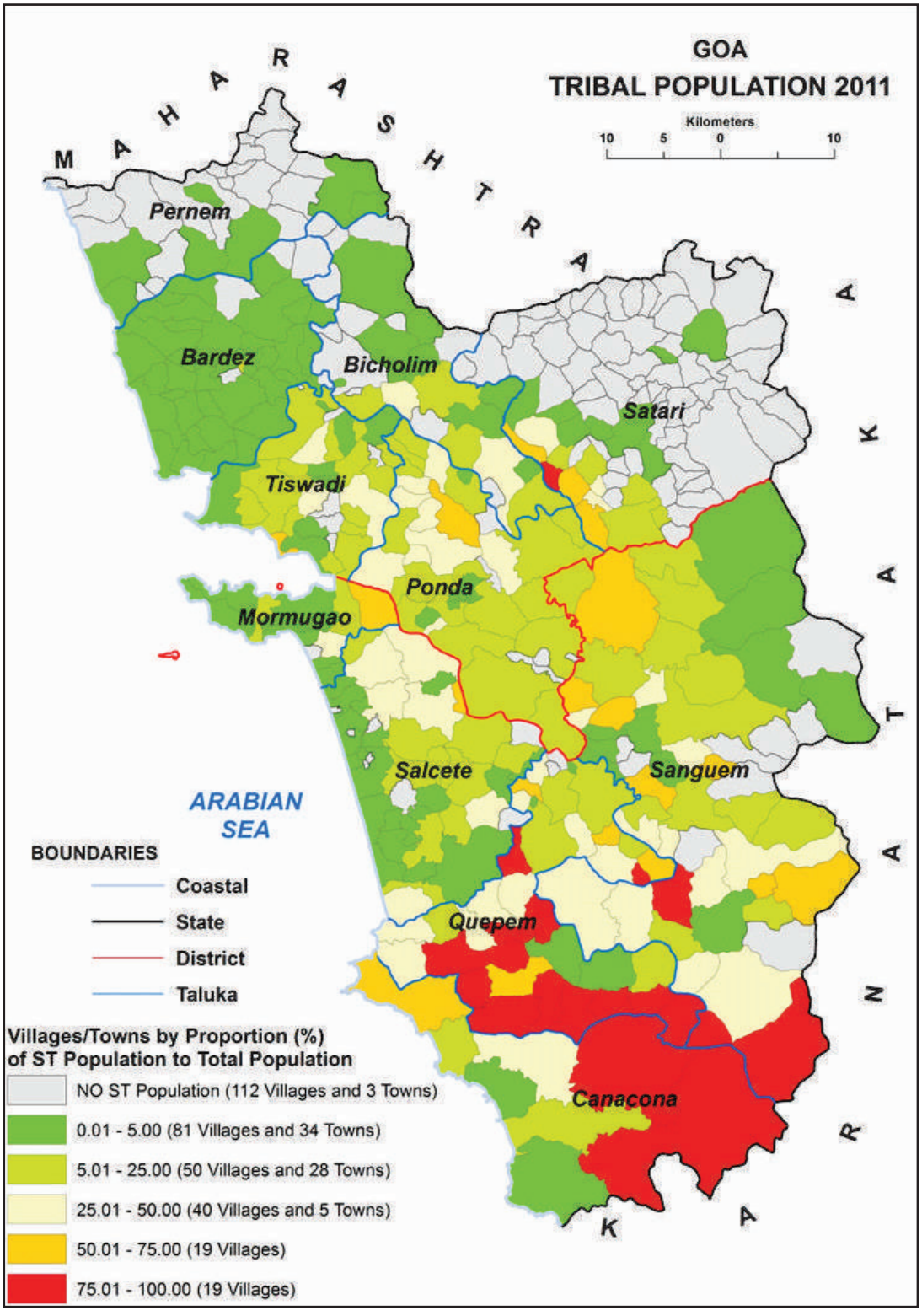

Figure 2: percentage of scheduled tribe population to total population by villages/towns of Goa, using data from the 2011 census of India.

Tribal Communities in Goa

In the erstwhile Union Territory of Goa, Daman and Diu five communities namely Dhodia, Dubla, Nayaka, Siddi and Varli were notified as Scheduled Tribes in the year 1968. Presently, the people of these communities are found in Daman and Diu. The Government of Goa in the year 2003 declared Gawda, Kunbi, and Velip as Scheduled Tribes in the State. The share of Scheduled Tribe population of Goa to the total Scheduled Tribe population of India is just 0.14 per cent. A tribe wise study of size, growth trends and distribution of their population is important to comprehend the comparative status of tribal communities. Goa has 12 different scheduled tribes enumerated in 2011 census. The tribes which could not categorized for a specific tribe are classified as generic or unknown tribes in the censuses. Generic tribes are those who returned as Anusuchit jan-jati, Girijan, Adivasi, etc. in the census but the tribal specific information is missing. The different demographic and socioeconomic characteristics of these tribes are herewith discussed.

Population Size

Gawda tribe is the most populous tribe in the state. In 2011 census, Gawda tribe population was counted as 1,06,659, thus forming 71.5 percent of the state's total ST population. Velip is the second major tribe with a population of 32,032, followed by Kunbi (4,486. These three numerically significant tribal communities constitute 95.9 percent of the total state's tribal population. Remaining five tribes, Naikda (Talavia), Dhodia, Siddi (Nayaka), Varli, Dubla (Halpati) constituted to only 0.7 percent of tribal population. Generic tribes constitute 3.4 percent of the state's total tribal population. Among the tribes, Dubla (Halpati) is the smallest tribal community with a population of 74 persons (Table 6).

Table 6: Distribution of tribals by tribal communities across the districts of Goa, 2011

Tribes	Tribal Population			% w.r.t. Goa State	
	Goa	North Goa	South Goa	North Goa	South Goa
All Schedule Tribes	1,49,275	56,606	92,669	37.9	62.1
Gawda	1,06,659	52,123	54,536	48.9	51.1
Velip	32,032	575	31,457	1.8	98.2
Kunbi	4,486	208	4,278	4.6	95.4
Naikda (Talavia)	382	150	232	39.3	60.7
Dhodia	273	113	160	41.4	58.6
Siddi (Nayaka)	183	105	78	57.4	42.6
Varli	118	33	85	28.0	72.0
Dubla (Halpati)	74	23	51	31.1	68.9
Generic Tribes	5,068	3,276	1,792	64.6	35.4

Source: Author's calculation based on Census Data, 2011

Distribution of tribal communities

In terms of proportion, the Scheduled Tribe population constitutes 10.2% of the total population of Goa state. District-wise distribution of tribes within the state shows that Gawda community is fairly distributed in North Goa and South Goa districts. Velip, Kunbi, Naikda

(Talavia), Dhodia, Varli and Dubla (Halpati) tribal communities are vastly concentrated in South Goa district. 'Siddi (Nayaka) tribe along with generic tribes is highly concentrated in the North Goa district (Table 6).

Urbanization

In percentage terms, 58.7% of tribal population was residing in rural areas and 41.3% of the total tribal population was residing in urban areas of Goa in 2011. Dubla (Halpati) community is 100% urbanised (Table 7). Five tribal communities namely Dhodia, Varli, Naikda (Talavia), Siddi (Nayaka) and Gawda have more than 50% urban population. Velip tribe (4.2%) has the smallest proportion residing in urban areas followed by Kunbi (38.5%) and generic tribes (41.9%).

Sex Ratio (Females per 1,000 Males)

The Sex Ratio among tribal population in the state was 1,046 in 2011. The Gawda (1,083) Kunbi (1,049), Generic Tribes (1,006) and Dubla or Halpati (1,000) recorded sex ratio thousand and above marks in 2011. The lowest sex ratio was recorded for Varli tribe (616). In census 2011, the Dhodia, Naikda (Talavia), Siddi (Nayaka), Varli and Velip tribal communities had lower sex ratio than state average for total tribal population (Table 7).

Child Population (0-6 years)

As per Census 2011, the tribal child population in the age group of 0-6 years enumerated as 14,908, of this, 8943 (60%) was counted in rural areas and 5965 (40%) in urban areas of Goa. Overall, the proportion of child population was 10.0 percent in 2011 census. In census 2011, the Dubla (Halpati) has recorded the highest proportion of child population (16.2%) to the total Dubla (Halpati). The lowest proportion was recorded among Varli tribe (6.8%) and preceded by Gawda and Generic tribes (9.6% each). Five tribal communities namely Dubla (Halpati), Dhodia, Naikda (Talavia), Velip and Kunbi were having higher proportion of child population compared to total scheduled tribe population in the state (Table 7).

Table 7: Population and demographic indicators of tribes of Goa, 2011

Tribes	Population	Urbanisation	Child Population (%)	Sex Ratio	Child Sex Ratio
All Schedule Tribes	**1,49,275**	**41.3**	**10.0**	**1,046**	**969**
Dhodia	273	71.1	13.9	784	1000
Dubla (Halpati)	74	100.0	16.2	1,000	1000
Naikda (Talavia)	382	63.4	12.0	900	840
Siddi (Nayaka)	183	62.8	9.8	989	2000
Varli	118	70.3	6.8	616	0
Kunbi	4,486	38.5	10.9	1,049	1113
Gawda	1,06,659	52.3	9.6	1,083	980
Velip	32,032	4.2	11.2	944	916
Generic Tribes	5,068	41.9	9.6	1,006	1004

Source: Author's calculation based on Census Data, 2011

Child Sex Ratio (0-6 years) (Girls per thousand Boys)

Table 7 provides tribe wise child sex ratio for 2011 census. The Child Sex Ratio among tribal population in the state was 969 in 2011. The Siddi (Nayaka), Kunbi, Generic Tribes, Dubla (Halpati) and Dhodia recorded child sex ratio thousand and above marks in 2011. The lowest child sex ratio was recorded for Naikda (Talavia) tribe (840). In census 2011, the Varli tribal community had no girl child (Table 7).

Literates (Age 7 years and above)

The literacy rate among tribal population of Goa was recorded 79.1% (Rural-78.4%; Urban- 80.2%) in 2011 (Table 8). The highest literacy rate was recorded in Siddi (Nayaka) (89.7%) followed by Dubla (Halpati) and Varli (85.5% each), while lowest was in Velip (75.3%) preceded by Kunbi (79.0%) Naikda (Talavia) (79.2%) and Gawda (80.1%).

Educational Level

Among all ST literates, 27.8 percent of ST literates are either without any educational level or have attained below primary level of education. The proportion of literates who have attained education up to primary and middle levels constitute 19.1 percent and 22.2 percent respectively. Literates, who are educated up to matric/higher secondary, constitute 24.4 percent. This implies that every 5th tribal literate is a matriculate. Graduates & above are 3.8 percent while non-technical & technical diploma holders have shown a meagre 2.1 per cent only. At the individual level, Dubla (Halpati) have 37.7 percent literate person is a matriculate followed by Naikda who have 34.2 percent literate, a matriculate. Dublas have least graduate whereas the proportion of graduates among Siddi is 10.8 percent (Table 8).

Table 8: Educational Level among scheduled tribes of Goa, 2011

Names of STs	Educational level						
	Literate without educational level	Below primary	Primary	Middle	Matric/ Secondary/ Higher Secondary/ Intermediate etc.	Technical and Non-Technical diploma etc.	Graduate and above
All Schedule Tribes	**10.3**	**17.5**	**19.1**	**22.2**	**24.4**	**2.1**	**3.8**
Dhodia	10.2	21.8	17.8	13.2	24.4	3.6	8.6
Dubla (Halpati)	9.4	20.8	20.8	7.5	37.7	1.9	1.9
Naikda (Talavia)	11.3	14.3	15.4	15.8	34.2	2.3	5.6
Siddi (Nayaka)	5.4	15.5	22.3	13.5	27.0	5.4	10.8
Varli	6.4	12.8	33.0	11.7	29.8	2.1	3.2
Kunbi	9.9	19.3	19.9	23.0	22.0	1.7	3.2
Gawda	10.1	16.1	18.5	21.6	26.6	2.4	3.9
Velip	11.3	22.5	21.1	24.5	15.9	1.0	2.8
Generic Tribes etc.	7.6	15.7	19.1	21.2	28.4	1.8	5.6

Source: Author's calculation based on Census Data, 2011

Marital Status

Table 9 shows that about 45.4 percent of ST population of Goa is 'never married'. The 'married' persons constitute 46.4 percent. While 8.0 percent persons are 'Widowed', less than half per cent STs (0.24 per cent) are 'Divorced and separated'. Among the tribal communities, more than half (51.4%) of the Dubla (Halpati) tribe is never married. More than half of the 'Naikda (Talavia) tribe is married and about 9.0 percent of Gawda tribe is widowed or separated. Divorced rate (0.05%) is highest among Gawda tribe followed by Velip.

Religion

Hinduism is the predominant religion of the STs of the State. The tribal communities professing Hinduism form 66.85 per cent. Remaining tribes are Christians (32.68 %), Muslims (0.36 per cent) and Buddhist (0.4 per cent). Among the tribal communities, about 99.54 percent of the Velip tribe is Hindu. About 14.75 percent of the Siddi (Nayaka) tribe is Muslims. However, about 43.0 percent of Gawda tribe is Christians (Table 10).

Table 9: Marital Status among scheduled tribes of Goa, 2011

Name of STs	Marital Status				
	Never Married	Married	Widowed	Separated	Divorced
All Schedule Tribes	45.4	46.4	8.0	0.2	0.04
Dhodia	46.5	49.8	3.7	0.0	0.00
Dubla (Halpati)	51.4	48.6	0.0	0.0	0.00
Naikda (Talavia)	44.0	51.8	4.2	0.0	0.00
Siddi (Nayaka)	44.8	49.7	4.9	0.5	0.00
Varli	44.1	52.5	3.4	0.0	0.00
Kunbi	44.3	47.2	8.2	0.3	0.00
Gawda	45.3	45.7	8.7	0.2	0.05
Velip	46.1	48.0	5.6	0.3	0.03
Generic Tribes etc.	45.4	47.3	7.0	0.2	0.06

Source: Author's calculation based on Census Data, 2011

Table 10: Religious Status among scheduled tribes of Goa, 2011

Religion Name	All Schedule Tribes	Name of STs								
		Dhodia	Dubla (Halpati)	Naikda (Talavia)	Siddi (Nayaka)	Varli	Kunbi	Gawda	Velip	Generic Tribes etc.
1. Hindus	66.85	81.32	90.54	95.29	82.51	96.61	69.17	56.75	99.54	66.10
2. Muslims	0.36	2.93	8.11	0.79	14.75	2.54	0.18	0.24	0.24	2.72
3. Christians	32.68	15.75	1.35	3.66	2.73	0.00	30.54	42.89	0.14	30.80
4. Sikhs	0.01	0.00	0.00	0.26	0.00	0.00	0.00	0.01	0.01	0.10
5. Buddhists	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.01	0.08
6. Jains	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.08
7. Other religions and persuasions	0.01	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.02	0.06
8. Religion not stated	0.04	0.00	0.00	0.00	0.00	0.00	0.07	0.04	0.03	0.06

Work Participation Rates

The Work Participation Rate (WPR), i.e. the proportion of workers among total population, among tribal population was 42.6 percent in Goa in Census 2001. Velip tribe (50.7%) had highest WPR followed by Naikda (Talavia), Kunbi and Dhodia, while lowest WPR was reported from the Gawda tribe (40.2%) preceded by Siddi (Nayaka) (Table 11).

Main and Marginal Workers

As per 2011 Census, the total numbers of tribal main workers (who have worked for at least six months or 180 days during the reference year) in Goa was 46,779. The proportion of tribal main workers to total tribal workers worked out to 73.5 percent. The highest number of main workers has been recorded among Gawda tribe (31,823) which accounts for 68.0% of the total tribal main workers in the state. The proportion of tribal main workers to total tribal workers varies among tribal communities from a maximum of 90.6% in 'Dubla (Halpati) tribe followed by Naikda (Talavia) (88.8%) and Siddi (Nayaka) (86.7%) to a minimum of 72.0% in Velip tribe preceded by Kunbi (72.1%), Dhodia (72.7%) tribes.

The total numbers of tribal marginal workers who worked for at least one day but less than 180 days in the reference year in Goa was 16,864 in 2011 census. The highest numbers of marginal workers recorded among Gawda tribe (11,042) which accounts for 65.5% of the total tribal marginal workers in the state. Table 11 reveals that the proportion of tribal marginal workers to total tribal workers varied among tribal communities from a maximum of 31.0% in Generic tribes followed by Velip tribe (28.0%) to a minimum of 9.4% in Dubla (Halpati) tribe preceded by Naikda (Talavia) (11.2%).

Table 11: Socio-economic indicators of tribes of Goa, 2011

Tribes	Literacy Rate	Work Participation Rate	Main Workers	Marginal Workers
All Schedule Tribes	**79.1**	**42.6**	**73.5**	**26.5**
Dhodia	83.8	44.3	72.7	27.3
Dubla (Halpati)	85.5	43.2	90.6	9.4
Naikda (Talavia)	79.2	46.6	88.8	11.2
Siddi (Nayaka)	89.7	41.0	86.7	13.3
Varli	85.5	44.1	84.6	15.4
Kunbi	79.0	45.0	72.1	27.9
Gawda	80.1	40.2	74.2	25.8
Velip	75.3	50.7	72.0	28.0
Generic Tribes	82.3	40.4	69.0	31.0

Source: Author's calculation based on Census Data, 2011

Categories of economic activities of the workers

The broad categories of economic activities, also known as a four-fold classification of the workers, are Cultivators (CL), Agricultural Labourers (AL), working in Household Industries (HHI) and Other Workers (OW). The cultivators and agricultural labourers broadly show the workers engaged in the agricultural sector, except those engaged in plantation activities, which, over the Censuses, have been considered as a part of 'other workers'. Table 12 provides the distribution of total tribal workers by occupational categories as per 2011 census for Goa.

Out of total 63,643 tribal workers numerated in 2011 census in the state, 10,078 (15.8%) were cultivators. The proportion of cultivators to total tribal workers varied considerably among tribal communities from a maximum of 42.2% in Velip tribe followed by Kunbi tribe (16.9%) to a minimum of 2.7% in Siddi (Nayaka) tribe preceded by Dhodia (4.1%).

The percentage share of Agricultural Labourers to total tribal workers was 15.4 percent in Census 2011. The proportion of agricultural labourers to total tribal workers varied from a maximum of 22.5% in Kunbi tribe followed by Velip tribe (22.3%) to a minimum of 1.3% in Siddi (Nayaka) tribe preceded by Naikda (Talavia) (1.7%).

The share of tribal workers engaged in Household Industries to total tribal workers was 2.1 percent during 2011. The proportion of workers engaged in household industries to total tribal workers varied from a maximum of 12.5% in Dubla (Halpati) tribe followed by Siddi (Nayaka) tribe (4.0%) to a minimum of 0.8% in 'Dhodia tribe preceded by Varli and Gawda (1.9%) in 2011 census.

The proportion of workers engaged in non-agriculture sector is an important indicator of economic development. Of the total tribal workers in the state, 42,405 (66.6% of the total workers) were recorded as 'Other Workers' during 2011 census (Table 9). The proportion of 'other workers' varied from a maximum of 92.6% in Dhodia tribe followed by Varli tribe (92.3%) to a minimum of 33.2% in Velip tribe preceded by Kunbi (57.5%).

Table 12: Proportion of tribal workers in different economic sectors, 2011

Tribes	Cultivators	Agricultural labourers	Household industry	Other Work
All Schedule Tribes	**15.8**	**15.4**	**2.1**	**66.6**
Dhodia	4.1	2.5	0.8	92.6
Dubla (Halpati)	0.0	9.4	12.5	78.1
Naikda (Talavia)	4.5	1.7	3.4	90.4
Siddi (Nayaka)	2.7	1.3	4.0	92.0
Varli	5.8	0.0	1.9	92.3
Kunbi	16.9	22.5	3.2	57.5
Gawda	6.4	12.9	1.9	78.7
Velip	42.2	22.3	2.3	33.2
Generic Tribes	5.9	9.4	2.1	82.6

Source: Author's calculation based on Census Data, 2011

SUMMARY & CONCLUSION

The State of Goa holds the third lowest position in terms of the Scheduled Tribes (ST) population among all the thirty States and UTs where tribes have been scheduled. The Scheduled Tribe (ST) population of Goa as per 2001 census was only 566, constituting a negligible 0.04 per cent of the total population of the State. According to the Census 2011, the total tribal population of Goa state was 1,49,275 which is 10.2 percent of the total population of the State. The decennial growth of ST population has been 26,273.6 percent with an increase of 1,48,709 persons. This increase is attributed due to the inclusion of three backward communities in the list of Scheduled Tribes of Goa in 2003. The Scheduled Tribes are fairly distributed in rural and urban areas (58.7% Rural and 41.3% Urban) unlike in majority of the states. Both the districts of Goa have unequal population of STs, i.e. 56606 (37.9%) in North Goa, and 92669 (62.1%) in South Goa. Out of eight (8) tribes scheduled for the State, Gawda is numerically the largest tribe having a population of 1,06,659 followed by Velip (32,032) and Kunbi (4486). These three STs together constitute 95.9 percent of the total tribal population. Dhodia and Varli are very small tribal groups having a number of 74 & 118 respectively and along with the generic tribes, form the residual 4.1 percent of the total ST population.

The overall sex ratio of the ST population in Goa is 1,046 females per 1000 males which is considerably higher than the national average of 990 for the total tribal population. Among the individual tribes, Dubla (Halpati) have equal number of both male and female in their total population. Varli preceded by Dhodia have registered the lowest overall sex ratio. Females outnumber males among Gawda and Kunbi along with generic tribes in their total population. The sex ratio among the STs in the age group 0-6 years (969) is higher than that of the STs at the national level (957). The overall literacy rate of the STs is 79.1 percent at 2011 census which is higher than the national average of 59.0 per cent aggregated for all STs. At the level of individual tribe, only Kunbi and Velip have shown literacy rate lower than the state average. The other four tribes have literacy rate higher than the state as well as the national averages. Among all ST literates, 27.8 percent of ST literates are either without any educational level or have attained below primary level of education. The proportion of literates who have attained education up to primary and middle levels constitute 19.1 percent and 22.2 percent respectively. Literates, who are educated up to matric/higher secondary, constitute 24.4 percent. This implies that every 5th tribal literate is a matriculate. Graduates & above are 3.8 percent while non-technical & technical diploma holders have shown a meagre 2.1 per cent only. About 45.4 percent of ST population of Goa is 'never married'. The 'married' persons constitute 46.4 percent. While 8.0 percent persons are 'Widowed', less than half per cent STs (0.24 per cent) are 'Divorced and separated'. Hinduism is the predominant religion of the STs of the State. The tribal communities professing Hinduism form 66.85 per cent. Remaining tribes are Christians (32.68 %), Muslims (0.36 per cent) and Buddhist (0.4 per cent).

The work participation rate (WPR) - the proportion of workers among tribal

population was 42.6 percent in Goa, it varied from highest in Velip tribe (50.7%) to lowest WPR in Gawda tribe (40.2%). The share of Cultivators to total tribal workers is 15.8 percent in Census 2011 whereas the share of Agricultural Labourers is 15.4 percent. About tow-thirds of the tribal workers are engaged in tertiary sector. The analysis revealed that a vast difference among socio-economic indicators existed among eight tribal communities of the state. The tribal communities need special attention in general for their overall improvement, but the communities with poorest socio-economic indicators need more focused interventions. Overall, state should take tribe specific approach to deal and address the tribal issues, a general policy or programme may not be equally beneficially to all tribal communities.

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