



Sex Ratio in Arunachal Pradesh: A Case Study

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Introduction

The knowledge of sex ratio is essential for understanding the employment and consumption patterns, social needs etc. of a community. Trewartha (1953) rightly pointed out that the proportion of two sexes is fundamental to the geographic analysis of an area. It is not only an important feature of the landscape but it also influences the other demographic elements significantly and as such provides an additional means for analyzing the regional landscape. Similarly, social scientists have a special interest in the study of sex composition as social relations within a community are affected considerably by the sex and age composition of a population. The most desirable ratio of female in relation to male should be 50: 50. This ratio is also most expected biologically. But in our practical life we observe a reverse situation. This is so, because sex ratio is influenced by many factors like genetic factors, climatic conditions, unfavourable fertility and mortality rates, physical deficiency, socio-economic prejudices, physical infrastructure and access to health amenities, in-migration and out-migration of either sex. Sex ratio assessments also need to be studied with reference to the mortality of female. A question thus arises: will 1,000 newly born-girls give birth to 1,000 girls in the course of their entire reproductive span? Hence, it becomes necessary also to first ascertain based on mortality, how many out of 1,000 new-born girls reach child-bearing age, i.e., 15 years; how many reach 16 years, and so on, finally how many pass through the entire child-bearing age, that is 50 years.

The unbalanced sex ratio bears many socio-economic implications like work structure of a population, sex crimes, gender disparity, livelihood pattern and gender discrimination etc., which have its own impact upon a social system. The two sexes play partly contrasting and partly complementary roles in an economy or in a society. In the absence of ideal sex ratio, the fabric of socio-cultural milieu of a society is bound to fall in danger and the growth of population is thus affected (Mandal and Bhattacharjee, 2009). The objectives of the study are: to compare the sex ratio of Arunachal Pradesh with that of India and to search the probable reasons lying behind for high sex ratio in the tribal society of East Kameng and Kurung Kumey districts of Arunachal Pradesh.

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Method and Materials

Study Area: (1) Arunachal Pradesh formed on February 20, 1987 is the 13th geographically largest State consisting of 20 districts. There are 110 tribes. The State is predominantly mountainous. The land and topography is hilly beginning from foothills to snow-clad zones of alpine region. It has peculiar characteristics for its environmental conditions and socio economic parameters due to its situation on the globe. It is situated near the tropic of cancer, lying between 26^o28'N and 29^o30'N latitude and between 91^o30'E and 97^o30'E longitude. The area falls in the climatic transition between torrid and temperate zones of the Northern Hemisphere. It is greenery than the other parts of the world situated on the same latitudes where the dry deserts of the Thar, the Syrian and Nafud deserts of Arabian sub-continent of south west Asia, the eastern deserts of Egypt and the Nubian and Libyan deserts of the Great Sahara are lying. The regional setting has great political importance as it is considered to be "Frontier Area" bounded by China, Myanmar, Bhutan along with State boundaries of Assam and Nagaland. It has 83,743 Sq. km. area covering around 2.5% of the total geographical area of the country and 13.83 lakhs of population bearing only 0.11 per cent of the country's population with population density 17 per sq. kilometer as per 2011 census. Socio-culturally, the state incorporates an extremely diverse population of local tribes and sub tribes constituting 68.78 % of the State's population, which have been scheduled by the Government (SC/ST Order Amendment Act, 1967), and non tribal comprising of people from almost all the Indian States with diverse cultural/religious composition.

(2) East Kameng and Kurung Kumey districts of the state are considered to study where the sex ratio is more than 1000.

Sample Study Area: Ngoleka village of East Kameng district having 48 households and Dul village of Kurung Kumey having 37 households have been selected to study.

Type of Study and Sources of Data: The proposed study is basically empirical in nature. The facts and figures in view of sex ratio in the districts along with the State will be collected from primary as well as secondary sources.

The Secondary Source: Secondary data has been collected from relevant articles, reports, books, journals, different Govt. institutions, and various census series published by the Governments of India and Arunachal Pradesh.

The Primary Source: Simple random sampling method has been adopted for selection of respondents of each household from the remote villages of two districts for the study. 50 respondents of each village have been selected for interview. Respondents of age group (30-45) years has been selected for interview with the help of a pre-tested and pre-designed questionnaire for the information about children's death within 5 years age, literacy, family size, food habit, traditional health care practices and income.

Analysis of Data: The data collected from the study area has been scrutinized, verified and tabulated systematically under appropriate head in rows and columns of statistical

tables in such a way to get the requisite result. Simple numerical calculation and graphical representation have been used to analyse the data.

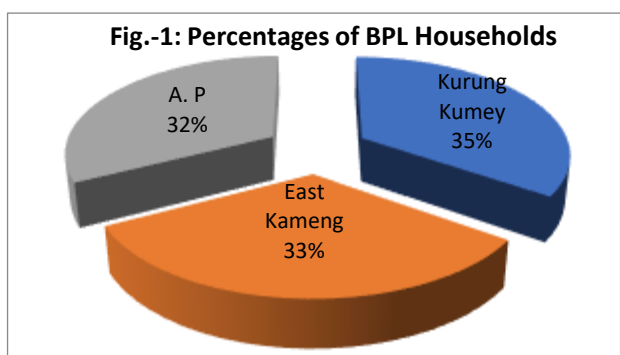
Results and Discussion

Study on the basis of Secondary Data

Before discussion about sex ratio, it is necessary to see the socio-economic status including percentages of BPL households, different indices, demographic features and literacy, etc. We have collected the different indices from Arunachal Pradesh Human Development Report 2005. The percentages of BPL households of the districts and the state as per BPL Census, 2002 so as to get a common idea about their socio-economic conditions are shown in Table-1. After 2002, Economic and Caste Census has been undertaken in 2012 but the final data is under process.

Table-1: Percentages of BPL Households	
District/ State	Percentage of BPL Households
East Kameng	66.01
Kurung Kumey	70.03
Arunachal Pradesh (A P)	65.82

Source: Rural Development Department



As per Table-1 and Fig.-1, the percentages of BPL households in Kurung Kumey and East Kameng are 70.03 and 66.01 respectively while that of the State is 65.82%. The different indices are shown in Table-2.

Table-2: Different Indices for East Kameng and Kurung Kumey and Arunachal Pradesh

District/ State	Education index	Life expectancy 2000-2001	Health Index	Income Index	HDI Index	GDI Index
East Kameng	0.489	43.36	0.306	0.291	0.362	0.400
Kurung Kumey	N A	42.50	-	-	-	-
A P	0.566	54.05	0.484	0.495	0.515	0.529

Source: Arunachal Pradesh Human Development Report 2005, p.38, 47, 85, 92, 98

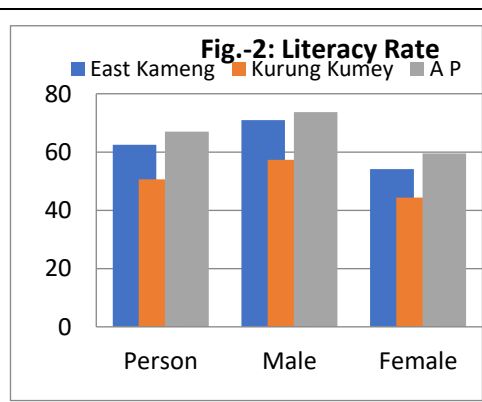
Table-3: Demographical Information as per 2011 Census

District/State	East Kameng	Kurung Kumey	A P
Area in Sq. Km.	4134	6040	83743
No. of Villages	384	737	5589
No. of Households	14508	15037	270577
Population	78690	92076	1383727
No. of family members per Household*	5.42	6.12	5.11
Percentage of Decadal Growth rate 2001-11	37.62	16.56	26
Sex Ratio	1029	1031	938
Population Density	19	15	17
S T population	72400	90764	951821
Percentage of S T Population	92.01	98.58	68.79
Population Density	19	15	17

Source: Directorate of Economics and Statistics, Govt. of A. P., Itanagar. *= Self calculated.

Literacy is also important factor which influences the sex ratio. It is shown in Table-4 and Fig.-2.

Table-4: Literacy Rate for Person, Male and Female as per 2011 Census			
District/State	Person	Male	Female
East Kameng	62.48	70.95	54.18
Kurung Kumey	50.67	57.28	44.31
A P	66.95	73.69	59.57



We have not seen the data in the vacant rooms in the Table-2, as because the district was born latter but the Kurung Kumey district is much below the averages of the state for all indices because of remoteness, low literacy rate and more households are living under below poverty line. The overall demographical information is shown in Table-3, which affects the sex ratio of the tribal people.

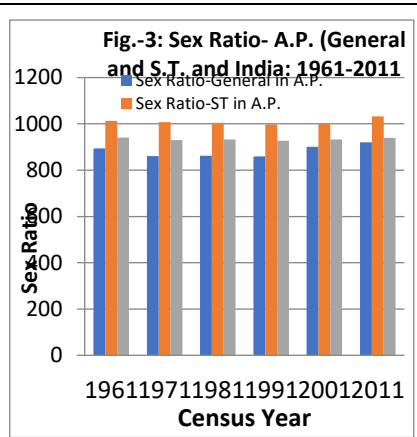
From the Table-4 and Fig.-2, it is shown that female literacy is very lower than that of male. It is 54.18% and 44.31% in East Kameng and Kurung Kumey districts respectively while that of the state is 59.57. It is observed that the good fruit of education in the state has been achieved due to increase in literacy rate though the females are lagging much behind the males. This may be significant to mention here that the first population census in the State was taken in the year 1961, and then the literacy rates were 7.13%, 12.25% and 1.42% for person, male and female respectively.

Pattern of Sex Ratio in the State and Country

Table-5 and Figure-3 given below highlight the detail about the sex ratio from 1961 to 2011 Census for Arunachal Pradesh and for India. We have shown sex ratio of general and of ST in the State and general sex ratio in India.

Table-5: Sex Ratio of Arunachal Pradesh(AP) (General and ST) and India			
Census	Sex Ratio: General in AP	Sex Ratio: ST in AP	Sex Ratio: General in India
1961	894	1013	941
1971	861	1007	930
1981	862	1004	933
1991	859	998	927
2001	893	1003	933
2011	938	1032	940

Source: Census Report 1961, 1971, 1981, 1991, 2001 and 2011



The overall trend of general sex ratio in the State as well as for the country as a whole shows a continuous decline, except for a marginal improvement in 1981. In 2001, there is an improvement in the proportion of females to 893 in the State and to 933 for India as compared to 1991 Census. If we look at the change in sex ratio for India as a whole in the period flanked by 1991-2001, then it is observed that there is an addition of +6 for all India in contrast to the substantial addition in case of the State to +34. In 2011 Census the State as well as the country as a whole maintained almost the same trend. We find there is an addition of +27 and that of +7 for the State and India respectively. It is a good sign for both the State and the Country. The comparison of sex ratio in context of General population and ST population in the State and the Country has been represented in Fig.-3, with the help of bar a diagram.

Pattern of Sex Ratio in the Study Area

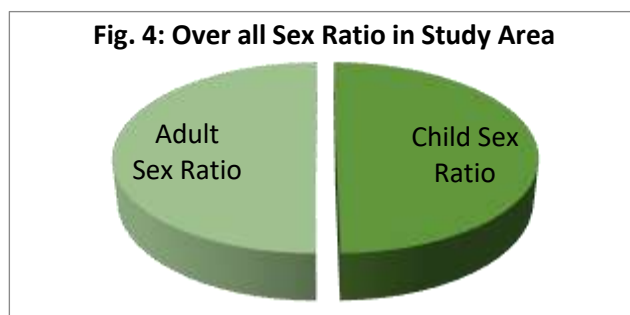
Table-6: Child Sex Ratio up to Six Years and Adults Sex Ratio

District	Village	HH	P06	M 06	F06	Child Sex Ratio*	PST	MST	FST	Adult Sex Ratio*
East Kameng	Ngoleka	48	76	33	43	1303	293	124	169	1362
Kurung Kumey	Dul	37	49	22	27	1227	259	118	141	1194
Average Sex Ratio						1272				1281

Source: Population Census, 2011

*N.B: * means self calculated. HH= Household, P06= Population of children up to 6 years, M06= Population of Male children up to 6 years, F06= Population of Female children up to 6 years, PST= Population of Schedule Tribe, MST= Population of Male Schedule Tribe, FST= Population of Female Schedule Tribe.*

As per Table-6 and Fig.-4, in the villages under study namely Ngoleka in East Kameng district and Dul in Kurung Kumey district, the sex ratios for child are 1303 and 1227 respectively while the sex ratios for adult are 1362 and 1194 respectively. Again adult Sex ratio is 1362 for Ngoleka and 1194 for Dul. If we calculate average sex ratio for both the villages, we get 1272 for child and 1281 for adult. In all the cases the sex ratio is more than 1000.



Analysis on the Pattern of Sex Ratio in Arunachal Pradesh and in India

The findings of the study are elaborated below based on secondary data from 1961 to 2011 Censuses with help of Table-5 and Fig.-3. Though all the aspects of the study do not provide a very clear picture about why female population in the State are lower

than that of male population in general but certain inferences have opened a new vista to go for further studies on the lines of population genetics.

A comparative analysis of sex ratio of Arunachal Pradesh and All India in respect of the general population reflects that the sex ratio of Arunachal Pradesh in general was much lower than All India level. The general sex ratio in Arunachal has been steadily declining over the central periods. In 1961 Census, the figures of females were 894 in Arunachal Pradesh, as compared to 941 females for all India i.e., less by 47 numbers. The sex ratio of Arunachal Pradesh shows a paucity of females in general which was always lower than that of all India since 1961.

The comparative analysis of sex ratio in general of Arunachal Pradesh in different census years reflects that it is more or less declining continuously since 1961, with an exception in the 2001 census. It has decreased by 33 numbers during 1961-71, but increased by 1 number during 1971-81, again decreased by 3 numbers during 1981-91, during 1991-2001, it has increased by 34 numbers and finally during 2001-2011 it has increased by 27 numbers of females. The decade of 2001 to 2011 has been very significant in the State from the point of sex ratio as the number of females per 1,000 males has increased remarkably. Thus it follows from the above discussion that general paucity in the number of females per thousand males in the State of Arunachal Pradesh is no exception as compared to All India sex ratio statistics.

In India, 108 females are born per 100 males. There are genetic evidences to prove that during the gestation period more males are eliminated than the females because of recessive X-linked lethal genes eliminating males while having little or no effect on the viability of the heterogeneous females. This could be the valid reason for the state of Arunachal Pradesh also where female population composition is higher than that of male population for all the ethnic groups in general (Thompson and Lewis, 1965, p.74).

However, considering the fact of geographical isolation and inhospitable terrain, low level of development in the State, as well as lack of modern facility and technology in the health service sector, the general paucity of females in the State may be attributed to the following reasons:

Reasons for Paucity of Females in the State

Arunachal Pradesh is characterized by backwardness, underdevelopment, and underutilization of its human resources. Very large segment of population in the State is residing in small and very small villages. The uneven distribution of population in the State follows a linear pattern mainly in the central part of the State and uniform pattern in the gentle slope area of upper Brahmaputra river. In the hill and mountain parts, population is concentrated along the streams and bank of the rivers. There is a considerable deficiency of females in its general population. Although more males are born than the females in every part of the world, yet that alone does not explain the general deficiency of females in Arunachal Pradesh. The following discussions help us to understand the general paucity of females in the State.

- (i) This needs to be emphasized here that the sex ratio in case of depicting a change may be attributed to reorganization of State during the administration of NEFA and Union Territory to the Statehood in the late 1980's, when number of districts were delineated out of the then existing ones and new districts came into effect. This has influenced the workforce structure of the State due to large scale immigration of workforce mainly from the other states of India and the head counts have also been bearing on the inflated population count in general and sex ratio in particular. The male workforce leaving the family at the place of origin certainly and living alone in this State inflates the sex composition in this instant case.
- (ii) The loss of more females in case of general population is due to insufficient attention and health-care to them during the entire conception period as well as after birth. Women in general suffer from a low status in the society which is an undisputed fact and generally considered with regard to all the states in India. Above all, the females are considered as social and economic liability while the males are credited as an asset to the family and more weightage is given on son in all respects. All these together affect the health of the females and result in relatively high female mortality in all ages and all groups whether tribe or non-tribe population. In case of Arunachal Pradesh, there are hardly any separate maternity cares in the State's Health Service system. In addition to the above mentioned points, the continued paucity of females may be attributed to recurrence of environmentally afflicted diseases which are endemic in nature such as malaria, diarrhoea, asthma, hepatitis, tuberculosis and other respiratory ailments.
- (iii) Women in tribal society, lead a very busy life helping the men folk in all walks of life. Tribal society enjoys an egalitarian status and women are considered as assets as the bride price is paid by the groom's family at the time of marriage. This is one of the valid reasons why females are better off in tribal society in contrast to the general population of the country as a whole.
- (iv) A large number of women are living below poverty line; they suffer also from nutritional deficiency. Lack of alertness and access to balanced diet and right foods during pregnancy, insufficient intake of irons, proteins and micro nutrients such as iodine and vitamins is the principal cause of very high incidence of nutritional deficiency diseases like anemia, diarrhoea, night blindness, goiter, etc. Low body resistance due to malnutrition farther may complicate minor ailments and make it a health hazard. As a result, females' death rates in villages of the State are much more than males.
- (v) A high death rate during puberty due to functional derangement and in the reproductive age bracket 11-19 on account of early marriage or child marriage among females could be one of the major reasons. Child marriage is very much

prevalent in Arunachal Pradesh on account of socio-economic and cultural set up.

- (vi) The practice of polygamy is in vogue. A man can take as many wives as he wants and can afford. More the number of wives, higher are the status of the husband in the society. This may also have adverse effect on favorable sex ratio. But this mentality is decreasing slowly due to development of education.
- (vii) In Arunachal Pradesh where 76 per cent of the population live in rural areas, 38 per cent households live below poverty line and there are poor medical facilities, extremely unhygienic living conditions, high infant mortality and absence of pre-natal and post-natal care, high death rate among women, all give adverse effect on favorable sex ratio.
- (viii) The son is considered to be the insurance against old age. This enforces preference in allotment of good diet and medical care in favour of males. That is why, infant mortality rates below 1 year of age is very high in the case of females as against of males in India.
- (ix) High mortality rates among women in reproductive ages are also responsible for declining sex ratio. Death rate among women in the reproductive age group (15 – 44) years was about 30 per cent higher than that of the males as revealed by National Sample Survey.
- (x) Sex determination tests are very rare in the State as a strategy to ensure desired family sex composition. Dowry system are also nil in the system. Both have positive impact on favorable sex ratio of the State (Mandal and Bhattacharjee, 2009).

Reasons for High Sex Ratio in East Kameng and Kurung Kumey Districts on the Basis of Field Study

It is generally considered that the female foetus is biologically stronger than the male foetus. Since the natural sex ratio in itself is governed by the differences in the prenatal mortality and since more males die before birth than females, it is often said that those countries with low prenatal losses show more masculinity in natural sex ratio and less masculine where the prenatal losses are great (Thompson and Lewis, 1965, p.74).

The tribes in the state have distinct health problems, mainly governed by multidimensional factors such as habitat, difficult terrains, varied ecological niches, illiteracy, poverty, isolation, superstitions and deforestation. The tribal people in state have their own life styles, food habits, beliefs, traditions and socio-cultural activities.

Most of the rural people living in the two districts depend mostly on self produced crops and wild foods collected from own or community forests. Majority of the tribes living in remote areas have no awareness about health as a prerequisite for human development. Much of this can be attributed to their culture; a cumulative deposit of

knowledge transferred from generation to generation which are intrinsic to their social existence. Their way of thinking is considered one such mode, which is believed in the supernatural with manifestation as good and evil. Fear of the evil spirit is embedded in their belief system so much so that diseases are attributed to its wrath which can cause immense misery. Such evil spirit is believed to be residing in any natural space and punish a person with disease and death. The quacks are presumed to have control over such spirit and manipulate its power to cause physical harm. Diseases are believed to be cured by propitiating the spirit through rituals as per convention. Therefore, health related problems are not referred to service providers trained in modern methods of treatment. The local priest has the power and ability to diagnose and cure the sickness or distress of a person. The local tribal people believe that the priests possess knowledge of the supernatural world and therefore they hold a very special position in a Society. They are regarded as experts in finding out the spirit that has harmed a particular man and are also expert in chanting hymns. Primary health centres located in some villages do provide free health care but limit it to some common and virulent diseases. Complicated cases are referred to better equipped hospitals where services are expensive.

It is interesting to find that the female population of scheduled tribes has always been higher than that of male population. This case needs to be answered through systemic study of population genetics. This could be supported by the evidence and the fact that in the advanced western countries, the proportion of women in total population is higher than that of males. Similarly, the female population in the scheduled tribe population of Arunachal Pradesh has always been higher than that of the general population. While prenatal mortality could be a valid factor in general, but lack of maternity care, access to medical services in general and absence of the same in the interior areas, low awareness among females, hesitation to visit male gynaecologist, superstitions during pregnancy, lack of care at home lead to increasing chances of infant mortality in the instant case. Availability of data in this regard is the limitation of the study. The infant mortality below one year and child mortality during (1-5) years through field survey is shown below in Table-7.

Table-7: Death of Children up to Five Years Old

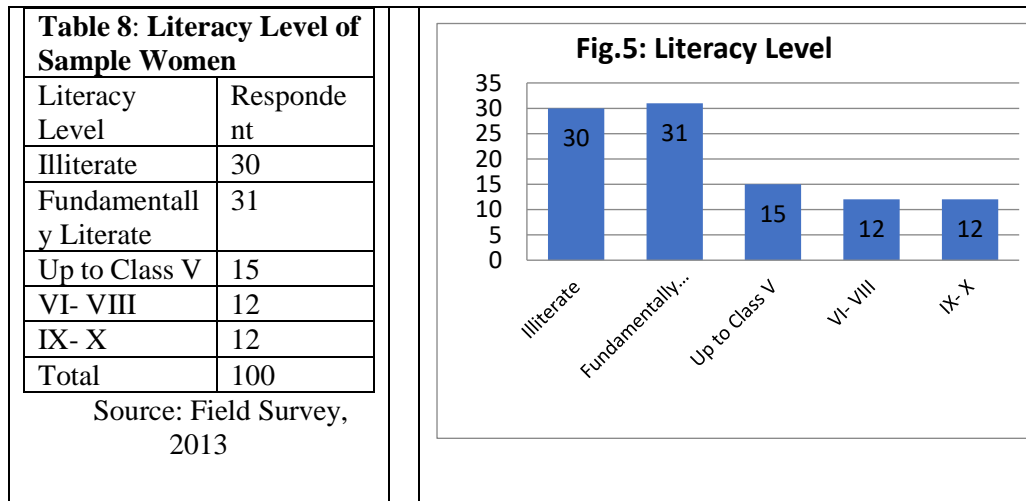
District	Study Area	Sample Size of Women of 30-45 Years	Death of Infant below 1 Years		Death of Children during (1-5) Years	
			Male	Female	Male	Female
East Kameng	Ngoleka	50	6	5	4	3
Kurung Kumey	Dul	50	7	7	5	4
Total		100	13	12	9	7

Source: Field Survey from January to March, 2016

As per Table-7, if we consider the death case of children in the study area, we see that for the age group of below one year, 13 males and 12 females died out of 25 infants taking 100 sample mothers in Ngoleka village of East Kameng district and in Dul village of Kurung Kumey district considering 50 from each of two villages. Again, for the age group of (1-5) years, 9 males and 7 females died out of 16 children. In every case females died less.

Now we examine their literacy level and livelihood pattern one by one which may affect the sex ratio.

Literacy Level: We have investigated the literacy level of the sample women. As per Table-8 and Fig.-5, literacy is low. There are only 12 women having literacy from Class-IX to Class-X. Others are below Class-IX and 30 are quite illiterate. 31 are fundamentally literate only read and write their name and address, 15 have read up to class-V, there are 12 women of class VI-VIII.



Livelihood: Natural property resources (NPRs) such as forests, trees, water bodies, etc. sustain their livelihood. Livelihood depends on local natural resources, which can diverse from making of leaf plates to hunting of wildlife etc. Such livelihoods vary with seasons. While forests and natural resources sustain the livelihood of the rural poor, the poor contribute to the degeneration process of their natural environment because of the system of their occupation and growing population. Their livelihoods depending on natural property resources (NPRs) are shown below in table-9.

From the Table-9, we see that all the people in the study area depend directly and indirectly on NCPRs. The respondents are collecting almost all of the items from NCPRs. In addition to the other vegetables, the local people make shoot of bamboo and

use it in almost of all menus of dish. They also preserve the shoot and use it throughout the year and more or less take every day. Health management practice forms a part of their culture. They have a close and symbiotic relation with the nature. Their health management system has two parts: (a) propitiation of spirits—good or bad –responsible for causing diseases and (b) use of curative medicines prescribed by herbiest from local herbs. Nature not only provides food and shelter but even today most of the tribes depend on forest for herbal medicine to keep them fit and healthy. They mostly depend on the local herbiest (local doctor) for their common ailment. The modern medical facilities are yet to reach in such interior villages and they are delighted and keep themselves fit and fine with traditional method. For common diseases like cough and cold, indigestion, skin diseases, etc., their older folk of the family treats them from the surrounding herbs. The herbiest does treat jaundice, piles, bone fracture, cardiovascular diseases, gynaecological disorder etc. Before going for modern medical treatment, even today most of them consult and take permission from the local herbiest in the villages. The community possesses good health and their health management is purely nature based and environment friendly (Mandal, 2013). **The food and herbs collected from the forest are full of medicinal value which may function as antibiotic medicine and may act as favorable factor to strengthen the biological power of females to survive against adverse impact in comparison to the male counterpart in the study area. This is not proved but may be sought to find out one of reasons for which high sex ratio in the study area prevails. To prove and get concrete conclusion, it needs further study.**

Table-9: Collected Items from NPRs for Livelihood of Local Community

Food		Constructi on/ Furniture	Health- Care Medicine	Fuel	Other minor forest produces
Vegetables	Protein				
Edible fruits, Edible seeds, Mushroom, Leaves, Branches, Roots, Flowers, Stems, Tender Bamboo	Edible insects, Dear, Fowl, Rabbits, Monkey, Wild Goat, Wild Pig, snake, Bear, Wild Cat, Mongoose, Fishes, Squirrel,Rat, snake, Birds (all types)	Stone, Mud, Wood, Bamboo, Leaves, Cane	Root Leaves Branch Bark Flower Bud Honey	wood Leaves Straw Bark Bamboo oil	Grazing land for the livestock, Grass, Leaves, Animal Fodder, Wood for furniture and capital equipmen t for agricultur e and tools

Source: Field Survey from January to March, 2016 as listed by the local community

The local people way of perceiving environment is very much distinct from that of the plain people. The rites, culture and tradition of tribal people are still today interlinked with forests and forest resources. The festivals are celebrated with variety of beautiful leaves, flowers and branches. In the performance of rites specific and variety of plants and animals are prescribed by their priests to be used in rites to make please the unseen spirit for their well-being and healing diseases of ailing persons. Thus, flora and fauna are inseparable part and parcel of the tribal people and hence their socio-economic life solely depends on forests and they have age long respect for forests.

The local people believe that every creature or thing in the forest, river and land is created as well as is owned by certain deities or spirits. So as they fear spirits and deities, they respect and also fear the nature. The age long interactions with the ecosystem have been helping them acquiring a way of life adjusted to the eco-system. This constant interaction of the tribal people of the study area with their ecosystem has helped them to know many unknown of nature. Thus, a system of belief based on tradition have been developed and nourished through generation to generation and these beliefs have been acting as a guiding principle of their day to day life.

Conclusion:

In some districts of the state and the overall sex ratio is very low. To improve sex ratio in the State, the sociological factors like attitude towards females such as forced marriage, child marriage, female illiteracy, improvement in the condition of females in the society, gender bias against women, etc. must have to be considered for favourable sex ratio. In order to have a favourable sex ratio in the State, it needs in-depth study by sociologists, economists and demographers, as well as a deep insight into population genetics. It is imperative that in order to save the state from negative impact of declaiming sex ratio, all segments of society of the state, all political parties and other stake holders together shall have to find out the solution to this problem.

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