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CHILDHOOD IMMUNIZATION PRACTICES AMONG KHASI TRIBES OF MEGHALAYA IN NORTH EAST INDIA

Roumi Deb[1]

Abstract: *Childhood immunization is a key method to reduce mortality and morbidity among infants and children, however, there have been persistent fears regarding the safety and efficacy of the immunizations, which led to refusal of many parents to get their child vaccinated. The present study was conducted to assess the immunization status of children between the ages of 12 and 23 months in the Khasi Tribes of Meghalaya. The sample consisted of 1678 children through data from 1782 mothers, surveying 35 villages from 7 blocks of East Khasi Hill district of Meghalaya. Partial immunization coverage was high in the study population, but complete immunization was low. The results were still far behind the goals of universal immunization program. Economical constraints, lack of awareness, location and temporary after effects of vaccines like fever, etc for variability in immunization coverage in this area.*

Keywords: Immunization, Children, Mothers, Focus Group Discussion (FGD) Khasi Tribes, Meghalaya

INTRODUCTION

Immunization provides a true public health benefit; it not only protects individuals from infectious disease, but their communities as well. It has been one of the most significant and cost-effective interventions to decrease childhood morbidity and mortality. It has saved millions of life, and is a major component of child survival programmes throughout the world and has proved to be the major public health achievement in the modern times; yet, nearly 3 million children die each year of vaccine preventable diseases (VPDs) with a disproportionate number of these children residing in developing countries.[1] Despite the free supply of vaccines for 6 VPDs under Universal Immunization Program, diverse survey results show glaring gaps between the target and achievement even after several years of its launch in 1985. According to WHO-Universal Immunization Program national review report, 18 million children did not receive any VPD coverage during 2001-2002 in India.

The National Family Health Survey (NFHS).[3] shows that only 43.5% of children, aged 12–23 months, were fully vaccinated (57.5% in urban areas and 38.6% in rural areas).[2] The variations across regions, states and strata's of society depend upon socio-economic factors, parental education and availability of health care services.[3-6] These factors suggest the need for further investigation into specific populations and the identification of barriers within subgroups.[6] Laxity in coverage may lead to the resurgence of disease as observed in the Russian Federation, Ukraine and

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other countries of former USSR, where an epidemic of diphtheria was reported.[7] The result of low coverage among inner-city children of USA was illustrated by the measles resurgence in the early 1990s.[8]

After putting up a good show in its first decade (1985-95) with coverage of Routine Immunization (RI) reaching 70-85%, there has been deterioration in the performance of Universal Immunization Programme (UIP).[9] The coverage of different vaccines has decreased by 15 to 20%. Surveys carried out during National Family Health Survey (NFHS) I, II and III and by independent agencies such as UNICEF, have revealed that the coverage levels may be lower by as much as 15-40% compared to reported levels of coverage in the UIP.[9-10] Indeed, there are a few states in India that have efficiently running UIP and several that do not. According to the most recent Coverage Evaluation Survey (CES), a nationwide survey covering all States and Union Territories of India, conducted during November 2009 to January 2010 by UNICEF, the National Fully Immunized (FI) coverage against the 6 vaccines included in UIP in the age-group of 12-23 month old children is 61% whereas it was 54.1% and 47.3% as reported by District Level Household and Facility Survey (DLHS-3) (2007-08) and NFHS-III (2005-06), respectively.[10-12] Regarding coverage of individual antigens in the similar age group, the CES 2009 reported BCG, OPV and DTP3 doses coverage, and measles first dose coverage as 86.9%, 70.4%, 71.5%, and 74.1%, respectively.[11] The corresponding figures cited by DLHS-3 and NFHS-3 were 86.7%, 66%, 63.5%, and 69.5%, and 78.1%, 78.2%, 55.3%, and 58.8%, respectively.[10-12] As far as newer antigens are concerned, the 3 doses of Hepatitis B vaccine coverage among children 12-23 months in 16 States/UT where it is part of UIP evaluated to be 58.9% by CES 2009.[11] However, birth dose administration is still a challenge in all these states. About 7.6% of children between the ages of 12-23 months have not received any vaccine.[11] There is a large inter-state variation in the coverage of RI. As per CES 2009, there are 4 states (Goa, Sikkim, Punjab and Kerala) >80% of children between 12-23 months of age are fully immunized. This percentage is < 50% for another 5 states (Bihar, Madhya Pradesh, UP, Nagaland and Arunachal Pradesh).[11] Six states with high population contribute to 80% of 8.1 million unimmunized children in the country, 52% of the total unimmunized children reside in Uttar Pradesh and Bihar alone.[13]

A number of previous studies have explored the reasons for non-immunization.[14-18] Reasons for lack of coverage vary from logistic ones to those dependent on human behavior. Economic constraints, partial awareness and temporary after effects of vaccines like fever, have further led to variability in immunization coverage rates between geographic areas. The presence of an urban health center (UHC) in proximity to a slum was positively associated with immunization status of children.[19] Moreover, there is wide disparity with regard to the coverage, among different populations, indicating the influence of

various social, economic and cultural factors.[20] Though a number of studies are available, conducted at the national and state levels and also in different regions of the country, there has been a paucity of work in this part of the country. So, the exclusive emphasis of the study was on rural population in East Khasi Hills of Meghalaya, who face serious health problems and access to health services. Vaccination and immunization of infants and children are inadequate among these tribal groups, hence, the present study was undertaken to assess the status of immunization and to analyze the various factors responsible for the suboptimal coverage of immunization among the tribes of East Khasi Hills District of Meghalaya.

MATERIALS AND METHODS

The present study was conducted from June 2005 to January 2007. The sample consisted of 1678 children by collecting data from 1782 mothers and surveying 35 villages from the 7 blocks of East Khasi Hill district of Meghalaya. From each block, at least two villages were surveyed. All the villages selected for the study had more than 1000 population. A two-stage systematic random- sampling procedure was used to select respondents. At the first stage, villages were selected for the study which, was followed by the selection of households. Mother was the primary respondent in the study. Demographic and socioeconomic data were recorded using an Interview Schedule. Besides quantitative data, qualitative data was also collected through Focus Group Discussions (FGDs). The aim of this qualitative study was to understand the behavior of mothers and to know various myths and misconceptions in the community.

Relevant information on immunization status was gathered on the basis of documentary proof (immunization card) and if card was not available, immunization status was ascertained by enquiring about vaccines received. For the purpose of study, a child was classified as 'fully immunized' if he/she had taken all 6 expanded programme on immunization vaccines on time and a child who received none of the above doses was considered 'not immunized' and in between 'partially immunized'. The data focused on childhood immunization coverage, the location impact on the likelihood of immunization, the awareness and perception of the women regarding the immunization and the infrastructure available. The role of different government and private institutions in providing immunization facilities to the population was also covered in the study.

RESULTS

Table 1 shows the socio-demographic profile of the mothers. In the study population the total male and female heads of households were 74.19 and 25.81 percent respectively, though Khasis are tribal people with ancient matrilineal culture that swept away the subservient Indian womanhood. Majority of the Khasi women surveyed were Christians (79.6%) and rest were Hindus (20.4%). The household's monthly income were less than Rs.5,000, in nearly all the villages, only small proportions of population (19%) were in the income

range between Rs.5,000 to Rs.10,000/-. Majority of the population (81.4%) in the rural areas were dependent on the traditional mode of agriculture – the *jhum* cultivation. Among the women surveyed 56.2% were illiterate or had only primary education, and only 3.6% were Graduates or above. The general age at marriage of females ranged between 17 to 25 years. The present study shows that 19% of the women got married at the age less than 18 years. There were quite a few teenage marriages at the age of 15 or 16 years (FGD). The numbers of early marriages were found to be high because many of them did not pursue their education after primary level. Moreover, there is no dowry system among the Khasis and both the sexes are free to choose their own partners. The children born belong to the mother's family who are responsible for their support and making all important decisions pertaining to their upbringing and future. Whether married or unmarried their children are always cherished as lineage 'seeds and flowers' and are raised in maternal ancestral home (FGD). Majority of the women (67%) had their first conception between the age 18 and 24 years, 12.8 percent conceived their first child before they were 18 years. The females generally conceived within a year or so after marriage, it was generally assumed that delay in conception beyond two years or so after marriage was considered to be due to health problems of the females (FGD).

Mothers were asked about immunizations received by each of their eligible children, and the information was verified by cross-checking against the child's vaccination card (if available). Specifically, the survey enquired whether the child received BCG, DPT (all doses), polio (all doses) and measles vaccinations.

It was observed that 97.5 to 100 % of children between the ages of 12 and 23 months received one or the other vaccine in the study area. Vaccination card was not available with 77.4 % of mothers. It was reported that the card was with the dispensary/PHC/CHC or wherever they went for immunization. The percentage of immunization with BCG was the highest (78.8%) in all the blocks of the study population. 99% among them had the scar. The next in order was the DPT vaccination (65.6%). Out of 65.6% children who received DPT vaccination, 79.5% received it thrice, rest 10.3% received it twice and 9.6 % received it only once (Figure-1). The OPV drops were received by 63.6 % of children, 78 percent children received OPV drops 3 times (Figure -2). It was found that around 42% children had not received vaccination for measles. Overall, 37.3 percent drop-out was observed from BCG to Measles vaccination (Table-1).

One of the most consistent and significant findings in public heath literature is the strong association between place of residence.[21-26] However, in the present study when Chi-Square test was applied for the location impact on child immunization, it was not found to be statistically significant at 5% probability level ($\chi^2 = 2.896$, df = 18; $p > 0.05$).

Table 1: Socio demographic characteristics of the study population

Characteristics	Frequency	(Percentage %)
Head of Household		
Female	460	25.81
Male	1322	74.19
Total	**1782**	**100**
Religion		
Presbyterian	706	39.61
Catholic	548	30.76
Khasi Hindu	364	20.43
Church of God	101	5.67
Others	63	3.53
Total	**1782**	**100**
Household monthly income (Rs)		
<5000	1443	81.00
5000-10000	339	19.00
Total	**1782**	**100**
Level of education		
Illiterate	406	20.8
Up to 6th Standard	621	35.4
7th to 9th Standard	407	22.8
Secondary & Higher Secondary	287	17.4
Graduate & above	61	3.6
Total	**1782**	**100**
Age at marriage		
<18	339	19.0
18-24	1197	67.2
25-30	213	12.0
31-35	23	1.3
>35	10	0.5
Total	**1782**	**100**
Age at first conception		
<18	228	12.79
18-24	1211	67.96
25-30	257	14.42
31-35	25	1.42
>35	16	0.89
Not conceived	45	2.52
Total	**1782**	**100**

Figure 1: Number of times DPT Vaccination received children between the ages of 12 and 23 months

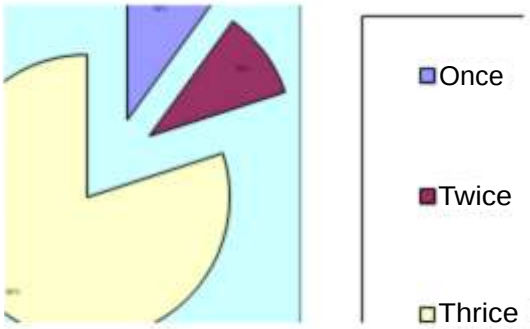
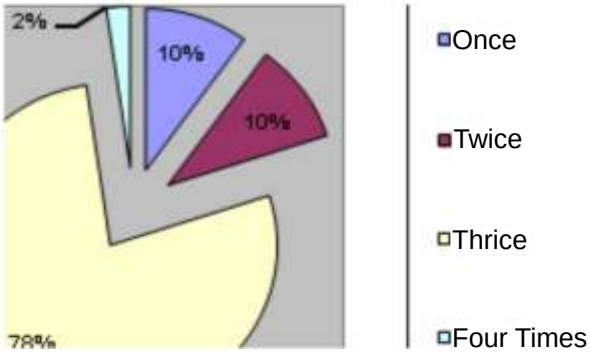


Figure 2 : Number of times OPV Drops received children between the ages of 12 and 23 months.



Different views were reported about immunization depending on the perception of the women surveyed (FGD).Partial awareness was there among the women regarding immunization, but the importance of immunization was unclear in the minds of the majority of respondents. Only a small section of the respondents believed that immunization was important and should be given to children to avoid further sickness whereas for some immunization was not required. They were scared to take their children for immunization as they believed that after giving any injections the child may suffer from fever. They felt that it becomes difficult for the child to regain his / her health if he /she fall sick after immunization. Those who took their children for immunization, they either approached a private or government hospital. In government hospitals immunization was free but in private hospitals they had to pay for the same. Due to lack of health centers many could not provide immunization to their children. Sometimes, the health care providers came and gave vaccines at home. It was also found that the doctors from the subcentres /PHCs occasionally came to the village community hall to provide immunization.

Figure 3: Women and Children waiting in the health centre to receive immunization

DISCUSSIONS

According to NFHS-2 report, 99% children aged 12-23 months in India had received one or the other vaccination but very few were fully vaccinated (42 percent). Of these 52.5 % were female child and 47.8 % were male. NFHS-3 data shows a slight increase in number of

Table 2: Frequency and Percentage Distribution of immunization coverage of children of 12 and 23 months

Characteristics	Frequency (N=1678)	Percentage (%)
Immunization		
Immunized	1662	99.0
Not immunized	16	1.0
BCG		
Received	1323	78.8
Not received	355	21.2
SCAR		
Scar visible	1313	78.25
No scar	365	21.75
DPT		
Received	1100	65.6
Not received	578	34.4
OPV		
Received	1067	63.6
Not received	611	36.4
Measles		
Received	696	41.5
Not received	982	58.5

children (44 %) who are fully vaccinated. However, the vaccination coverage varies widely among states; nearly 20 % in Nagaland to nearly 80 % in Tamil Nadu. Less than one-third of children are fully vaccinated in Nagaland, Uttar Pradesh, Rajasthan, Arunachal Pradesh, and Assam. At the other end of the spectrum, at least three-quarters of children have received all the recommended vaccinations in Tamil Nadu, Goa, and Kerala. In Meghalaya, only one third children of 12-23 months were reported to be fully immunized. Whereas according to DLHS-RCH 2002-2004 survey report, 46 % children aged 12-23 month are fully vaccinated nationwide, with only 14 % in Meghalaya. The overall trend remained same with lowest coverage reported in Nagaland and the highest was reported in Tamil Nadu. Our results have shown slight increase in partial immunization coverage among the children of East Khasi Hill district of Meghalaya as compared to NFHS-3 data. According to NFHS-3, the BCG was received by 66.3 percent, 47.6 % received all 3 doses of DPT, 56.9 % received all 3 doses of OPV and 43.8 % a dose of measles. The difference of the coverage might be due the difference in the techniques used for evaluation of immunization coverage. In NFHS 3 survey, last 5 births in past 5 years were considered whereas in present study last birth was considered. This may also point towards the change in attitudes over time towards the immunization of their younger ones.

Various surveys conducted by IRMS, NFHS 2, UNICEF and studies from India and other developing countries have reported close association between parental education, especially maternal education with the low immunization coverage.[27-32] In the present study nearly one fourth of female respondents were reported to be illiterates and among literate respondents majority had primary level education. Lack of information among parents was reported to be the major reason for non-immunization in a study conducted in Assam.[32] Lack of awareness on the need for immunization, non availability of health facilities, fear of side effects and no faith in immunization are few of the reported reasons found to be associated with the low intake of immunization in other parts of India.[33] However in this study lack of awareness regarding the importance of immunization was found to be the common cause for the partial immunization. Holding of Immunization card among less than one third of respondents also indicate that the parents do not understand the need of immunization for their children. Besides, limited accessibility to the health care facilities was also found to be one of the reasons for non immunization. Fear of side effects was the reason given for not immunizing their children. Thus, much variation in the views for low immunization coverage in the study area was not reported.

CONCLUSION

Although partial immunization coverage was high in the East Khasi Hill District of Meghalaya, complete immunization is found to be low. The results are still far behind the goals of universal immunization program. Complete primary immunization i.e. BCG, DPT, OPV and Measles are lacking and different views were reported about immunization depending on the perception of the women as revealed by focus group discussion (FGD). The importance of immunization was not very clear in the minds of the majority.

The district under study has only one government maternity hospital that cannot meet the demands of the poor rural people for Reproductive and Child Health (RCH) services. In spite a chain of CHCs, PHCs, Sub-Centres, and the private hospitals, there is a big gap of as the hospital facility for meeting the needs of poor people. This gap can be bridged by NGOs by opening hospitals/ providing primary health services

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REFERENCES

1. Kane M, Lasher H. The case for childhood immunization. Occasional paper, No.5. Children's Vaccine Program at Path. Seattle, WA. 2002.
2. National family health survey-3 (2005–06) Mumbai: International Institute for Population Sciences. 2007.
3. Ray SK, Dasgupta S, Dobe M, Biswas R, Mehta P, Baishya AC. An evaluation of routine immunization coverage in some districts of West Bengal and Assam. Indian J Public Health. 2004; 48:82-85.
4. Bhatia V, Swami HM, Rai SR, Gulati S, Verma A, Parashar A, Kumari R. Immunization status in children. Indian J Pediatr. 2004; 71(4):313-5.
5. Roberts KA, Dixon-Woods M, Fitzpatrick R, Abrams KR, Jones DR. Factors affecting uptake of childhood immunization: a Bayesian synthesis of qualitative and quantitative evidence. Lancet. 2002; 360:1596-9.
6. Pruitt R, Kline P, Kovaz R. Perceived barriers to childhood immunizations among rural populations. J Commun Health Nurs, 1995; 12:65–72.
7. Park K. Health Programmes in India. In: Park's Text Book of Preventive and Social Medicine. 15th ed. M/s Banarsidas Bhanot, 1167, Premnagar, Jabalpur, 1997; 126-9.
8. Guyer B, Hughart N, Holt E, Rose A, Stanton B, Keane V, Bonner N, Dwyer DM, Cwi JS. Immunization coverage and its relationship to preventive health care visits among inner-city children in Baltimore. Pediatrics. 1994; 94:53-8.
9. Universal Immunization Programme (UIP) Review. World Health Organization. Available from: http://www.whoindia.org/EN/Section6/Section284/Section286 _507.htm. Accessed on December 12, 2011.
10. National Family Health Survey (NFHS-3), 2005-06: Key Indicators for India from NFHS-3. Available from: http://www.nfhsindia.org/pdf/India.pdf. Accessed on December 12, 2011.
11. UNICEF Coverage Evaluation survey, 2009 National Fact Sheet. Available from:http://www.unicef.org/india/National_Fact_Sheet_CES_2009.pdf. Accessed on September 14, 2012.
12. District Level Household and Facility Survey 2007-08. Available from: http://www.rchiips.org/pdf/rch3/state/India.pdf. Accessed on September 14, 2012.
13. Vashishtha VM. Routine immunization in India: A reappraisal of the system and its performance. Indian Pediatr. 2009;46:991-2.
14. Saxena P, Prakash D, Saxena V, Kansal S. Assessment of routine immunization in urban slum of Agra district. Indian J Prev Soc Med. 2008; 39:60–2.
15. Manjunath U, Pareek RP. Maternal knowledge and perception about the routine immunization programme - a study in semiurban area in Rajasthan. Indian J Med. Sci. 2003; 57:158–63.
16. Kumar C, Singh PK, Rai RK. Under-five mortality in high focus states in India: a district level geospatial analysis. PLoS One. 2012; 7(5):e37515. doi: 10.1371/journal.pone.0037515
17. Farahani M, Subramanian S V, Canning D. Effects of state-level public spending on health on the mortality probability in India. Health Economics. 2010 (19): 1361–76. doi: 10.1002/hec.1557.
18. Subramanian S V, Selvaraj S. Social analysis of sex imbalance in India: before and after the implementation of

the Pre-Natal Diagnostic Techniques (PNDT) Act. Journal of Epidemiology and Community Health. 2009 (63): 245–52. doi: 10.1136/jech.2008. 078477.

19. Ghei K, Agarwal S, Subramanyam MA, Subramanian SV. Association Between Child Immunization and Availability of Health Infrastructure in Slums in India. Arch Pediatr Adolesc Med. 2010; 164(3).
20. Mathew JL. Inequity in childhood immunization in India: a systemic review. Indian Pediatr. 2012; 49: 203–23.
21. Siddiqi A, Irwin LG, Hertzman C. The Region as a Sphere of Influence. Total environment assessment model for early child development: Evidence report World Health Organization's Commission on the Social Determinants of Health, Geneva. 2007.
22. Kravdal Ø .Child mortality in India: the community-level effect of education. Population Studies. 2004; 58: 177–92. doi: 10.1080/0032472042000213721.
23. Fotso JC. Urban–rural differentials in child malnutrition: trends and socioeconomic correlates in sub-Saharan Africa. Health and Place. 2007 13: 205–223. doi: 10.1016/j. healthplace.2006.01.004.
24. Khokhar A, Chitkara A, Talwar R, Sachdev TR, Rasania SK. A study of reasons for partial immunization and non-immunization among children aged 12–23 months from an urban community of Delhi. Indian J Prev Soc Med. 2005; 36:83–6.
25. Nath B, Singh JV, Awasthi S, Bhushan V, Kumar V, Singh SK. A study on determinants of immunization coverage among 12–23 months old children in urban slums of Lucknow district, India. Indian J Med Sci. 2007; 61:598–606.
26. Mathew JL, Babber H, Yadav S. Reasons for non-immunization of children in an urban, low income group in North India. Trop Doct. 2002; 32:135–8.
27. International Institute of Population Sciences. National Family Welfare Survey-2, 1998–99. Mumbai, India:, 2000.
28. International Institute of Population Sciences. District Level Household Survey-2, Reproductive and Child Health, 2002-04. Mumbai, India.
29. Suresh K, Saxena D. Trends and determinants of immunization coverage in India. J Indian Med Assoc. 2000; 98:10-14.
30. Perry H, Weierbach R, Hossain I, Islam Rafiq-ul. Childhood immunization coverage in Zone 3 of Dhaka city: the challenge of reaching improvised households in urban Bangladesh. Bull World Health Organ. 1998; 76:565-73.
31. Luman ET, McCauley MM, Shefer A, Chu SY. Maternal characteristics associated with vaccination of young children. Pediatrics. 2003; 111(2): 1215-8.
32. Dalal A, Silveira MP. Immunization status of children in Goa. Indian Pediatr.2005; 42:401-2.
33. Phukan RK, Barman MP, Mahanta J. Factors Associated with Immunization Coverage of Children in Assam, India: Over the First Year of Life. Journal of Tropical Pediatrics. 2008. 55 (4): 249-52.

A STUDY ON FRAME SIZE BY ELBOW BREADTH AMONG THE KHASI TRIBAL ADOLESCENTS OF MEGHALAYA

Debashis Basu[1]

Abstract**:** *The Khasi tribal population living in the state of Meghalaya in the North-eastern India belongs to the Indo-Mongoloid racial Group and they speak Austro-Asiatic language. Their social structure centers on matriarchy and the lineage they follow is matrilineal. In the present paper an attempt has been made to explore the status of frame size resorting to elbow breadth measured anthropometrically by cross-sectional method among the Khasi adolescents numbering 281 boys and 293 girls aged 11+ years to 17+ years living in the Nongpoh, Ri-Bhoi districts of Meghalaya. The data were treated statistically for mean and standard deviation of the same measurement and thereby the children of the same population by age and sex is categorized in to small, medium, and large frame resorting to the formula- frame index 2 after Frisancho (1990). The proportion of small frame size category in both the sexes being 85.05% and 86.35 respectively as compared to those other two frame size categories calculated based on the z-scores with reference to the NHANES 1 (National Health and Nutrition Examination Survey).*

Keywords: Elbow breadth, Frame size, Khasi adolescents, Meghalaya,

INTRODUCTION

Anthropometric measurements have become an indispensable approach for the evaluation of nutritional status of children and adults. Based on those measurements a good number of standards drawing reference values have been framed. However, weight and body composition do vary not only with age, sex, and height but also influenced by factors like frame size, an appropriate evaluation of individual variability in anthropometric nutritional status should include measurement of frame size.[1] Frisancho and Flegel (1983) also showed that elbow breadth is less affected by degree of adiposity than other anthropometric dimensions, and it can be used as an indicator of frame size since it measures skeletal breadth.[2] Frame size is a descriptive term for skeletal size and robustness that together comprise the body's supportive structure.[3, 4] Frame size is commonly estimated by measuring externally the breadth of a bone or of sets of bones at the shoulders, hips, wrists, elbows, knees, and ankles.[3] Distributions or summations of the values of these bony breadths are used to categorize individuals as having small, medium, or large frames or to calculate indexes of frame size.[5] Despite the large number of possible bone measurements, categorization of frame size is most frequently made by using measures of elbow breadth alone in relation to national

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reference data. These data consist of selected percentiles for elbow breadth within stature ranges for children and adults.[2,3]

In this paper an attempt has been made to assess the frame size of the Khasi tribal adolescents based on the anthropometric measurement – elbow breadth; and has been compared with the sample of NHANES 1.[6]

MATERIALS AND METHODS

Elbow breadth

The participant was instructed to stand erect with feet together in the standard position, and the right arm was extended forward perpendicular to the body. With the arm bent so the angle at the elbow forms 90^0 with the fingers pointing up and the dorsal part of the wrist toward the examiner, the greatest breadth across the elbow joint was measured with a sliding caliper along the axis of the upper arm.[7] This cross-sectional study sample included 281 boys and 293 girls aged 11+ to 17+ years. The children aged between 11.00 years and 11.99 years, 12.00 years and 12.99 years, and so on were grouped as 11+ years, 12+years, etc. according to Eveleth and Tanner (1990).[8] The study was carried out district town-Nongpoh, Ri-Bhoi district of Meghalaya. The anthropometric data analyzed were frame size was measured with the use of a sliding caliper. The data on elbow breadth were analyzed for frame size resorting to z-score analysis with reference to NHANES 1.[6] The categorization in to small, medium, and large were carried out based on the Z-score values for Small being <-1.036, Medium being -1.036 <Z<+1.640, and Large being Z>+1.645.[6]

RESULTS

Table 1 describes the mean, SD values of elbow breadth–anthropometric measurement collected among the Khasi adolescents of Meghalaya. The mean values of the same measurement in both of the sexes increase along with the increase of age by age and sex. The mean values of the elbow breadth measurement among the boys as compared to those of their girls-counterpart are observed to be higher- thereby indicating sexual dimorphism of the same measurement. The mean values of the same measurement as observed among the present Khasi sample of boys and girls respectively, are observed to be lagging far behind of mean values of the same measurement as observed among the NHANES-1 children of both sexes (Fig.1). Maximum per year increment of the same measurement among the boys is 3.18mm at the age of 14+ yrs; while among the

girls same increment is 1.81 mm at the age of 14+ yrs. The increments/year of the same measurement among the study children both by age and sex were observed to be lower than those of the NHANES-1 children. The phenomenon of higher increment/year among the children of NHANES-1 as compared to those of the study children may have the reflection of impacts-may be of racial origin, environmental factors like nutrition, socio-economic factors, etc.

Table 2 shows the proportions of the children aged 11+ yrs through 17+ yrs falling under three categories of small, medium, and large frame size, and the z-score values of frame size with reference to the NHANES-1 for both the sexes. The proportional distribution of the three categories of small, medium, and large frame size of both sexes are also graphically presented in Figures 2 and 3 respectively. Among the boys while calculating z-score with reference to the sample of NHANES the larger proportion being 95.00% at the age of 12+ yrs and the lower proportion being 70.00% at the

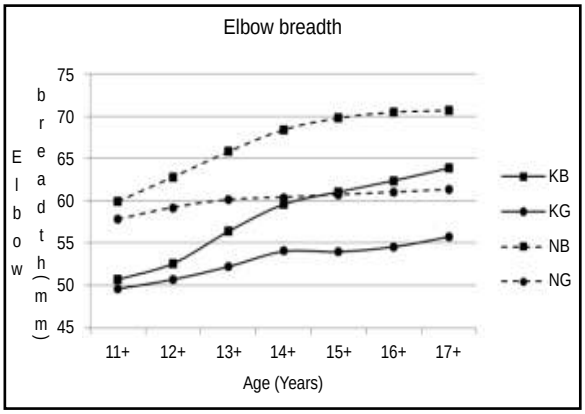

Figure 1: Mean growth curve of Elbow breadth for Khasi boys and girls with reference to NHANES (K: Khasi; B: Boys; G: Girls; N: NHANES)

Table 1: Means and standard deviation of Elbow breadth (mm) by age and sex for Khasi adolescents aged 11+ to 17+ years

Age (yrs)	Elbow Breadth (mm)					
	Total		Boys		Girls	
	Boys (N)	Girls (N)	Mean	SD	Mean	SD
11+	40	42	50.75	0.31	49.67	0.35
12+	40	41	52.63	0.34	50.76	0.33
13+	40	42	56.38	0.49	52.26	0.27
14+	40	42	59.55	0.49	54.07	0.31
15+	41	43	61.02	0.41	54.02	0.29
16+	40	43	62.35	0.32	54.60	0.28
17+	40	40	63.83	0.42	55.80	0.37

age of 17+ yrs fall under the category of small (<-1.036) respectively; the higher proportion of boys fall under the category of medium (-1.036 <Z<+1.640) is 30.00% at the age of 17+ yrs and the lower proportion of boys fall under the category of medium is 5.00% at the age of 12+ yrs. In the boys' sample 14.95% of the boys fall under the category of medium. Overall the proportion of boys fall under the category of small is 85.05%. Among the girls while calculating z-score with reference to the sample of NHANES the larger proportion being 97.62% at the age of 13+ yrs and the lower proportion being 70.00% at the age of 17+ yrs fall under the category of small (<-1.036) respectively; the higher proportion of girls fall under the category of medium (-1.036 <Z<+1.640) is 27.50% at the age of 17+ yrs and the lower proportion of girls fall under the category of medium is 2.38% at the age of 13+ yrs. Only 0.34% of the girls fall under the category of medium. Overall in combined sample of the girls the proportions being 86.35% and 13.31% fall under the categories small of medium respectively.

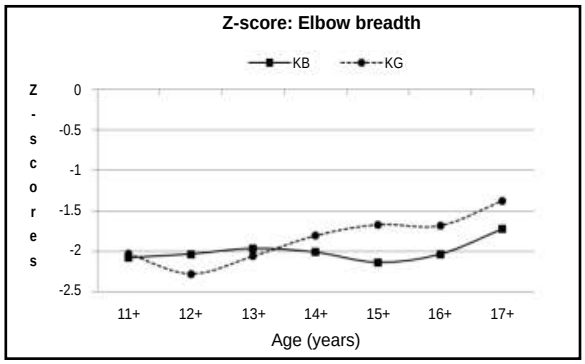

Figure 2: Z-score curve for Khasi boys and girls with reference to NHANES (K: Khasi; B: Boys; G: Girls)

Table 2: Percentage distribution of categories of frame size by elbow breadth (mm) by age and sex for Khasi adolescents aged 11+ to 17+ years

Age (years)	Categories of frame size by elbow breadth					
	Boys (%)			Girls (%)		
	Small <-1.036	Medium -1.036 <Z<+1.640	Large Z>+1.645	Small <-1.036	Medium -1.036 <Z<+1.640	Large Z>+1.645
11+	92.50	7.50	0.00	88.10	11.90	0.00
12+	95.00	5.00	0.00	95.12	4.88	0.00
13+	80.00	20.00	0.00	97.62	2.38	0.00
14+	77.50	22.50	0.00	85.71	14.29	0.00
15+	87.80	12.20	0.00	81.40	18.60	0.00
16+	92.50	7.50	0.00	86.05	13.95	0.00
17+	70.00	30.00	0.00	70.00	27.50	2.50
Total	85.05	14.95	0.00	86.35	13.31	0.34

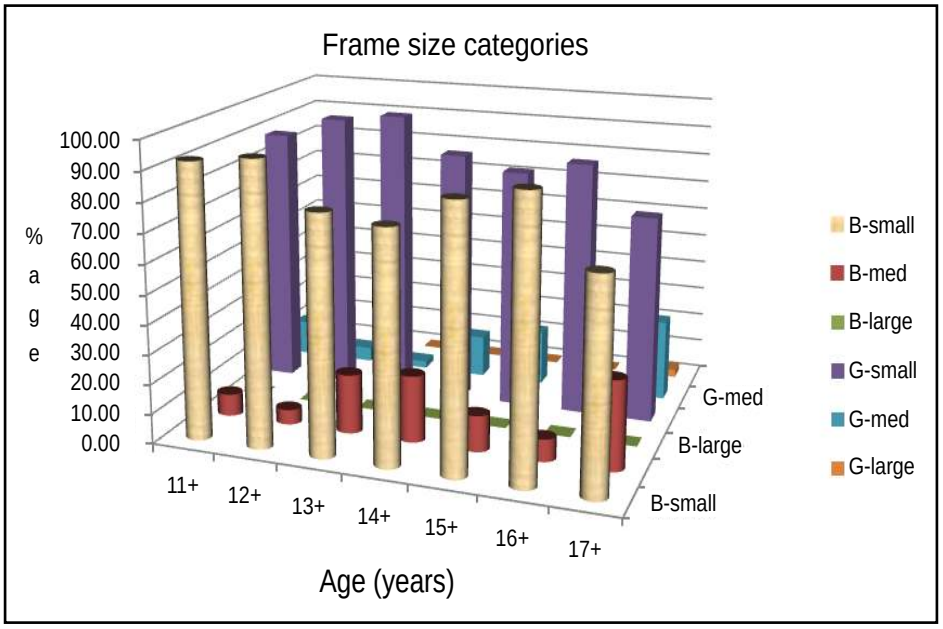

Figure 3: Proportional distribution for frame size categories for Khasi boys and girls (B: Boys; G: Girls)

DISCUSSION

So far the mean values of the elbow breadth for both the sexes are concerned the same values are lagging far behind of the NHANES-1-this phenomenon may be due to different racial origin, poor nutritional environment, comparatively lower socio-economic situation, etc. The higher increment/year among the children of NHANES-1 by age and sex as compared to those of the present children are substantially higher-the phenomenon of higher increment/year among the children of NHANES-1 as compared to those of the study children may have the reflection of impacts - may be of racial origin, environmental factors like nutrition, socio-economic factors, etc.

In the present paper the difference of values between the lower mean value and higher mean value among the boys is higher than the value of the same among the girls aged between the age 11+ yrs and 17+ yrs- indicating the bisexual dimorphism in elbow breadth; and at the same time higher values of the same may be due to higher extent of stress of muscle activity and the mechanical loading effects of gravity.[9] As reported by Chumlea et al (2002), the children with small frame size seems to have lower bone mineral content (BMC) than those with large frames irrespective of age and stature.[10] In the present sample of Khasi adolescent children, higher proportions of small frame size category as compared to other two categories being 85.08% and 86.35% for both boys and girls respectively were observed; and it was also observed that the higher proportions of the same small frame size category is

consistent through 11+ yrs and 17+ yrs in both the sexes – indicating that the small frame at arm carries poor amount of muscles. This poor amount of muscles may be, due to the poor consumption of required amounts of nutrients that helps in muscle development for maintenance and growth. Since the larger proportions of Khasi tribal children falling under the category of small frame size as compared to those other two categories viz., medium and large, it indicates that all the children tended to have lower BMC (bone mineral content) than in those with larger frames since Chumlea et al, (2002) opines that 'the frame-size measures explained a greater proportion of the variance in BMC than in BMD (bone mineral density) and also opined that large frames are associated slightly with greater absolute amounts of bone than are small frames but are not associated with the amount of bone per unit area'.[10]

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REFERENCES

1. Frisancho AR.New standards of weight and body composition by frame size and height for assessment of nutritional status of adults and elderly. Am J Clin Nutr. 1984;808-819.
2. Frisancho AR, Flegel PN. Elbow breadth as a measure of frame size for US males and females. Am J Clin Nutr. 1983; 37: 311-314.
3. Himes JH, Frisancho RA. Estimating frame size. In: Lohman TG, Roche AF, Martorell R, editors. Anthropometric standardization reference manual. Champaign, IL: Human Kinetics Books; 1988.121–4.
4. Himes JH. Considering frame size in nutritional assessment. New York: Wiley Liss. 1991.
5. Peters DM, Eston R. Prediction and measurement of frame size in young adult males. J Sports Sci. 1993. 11:9–15.
6. Frisancho AR. Anthropometric Standards for the Assessment of Growth and Nutritional Status. Ann Arbor, The University of Michigan Press. 1990.
7. Johnson CL, Fulwood R, Abraham S, Bryner JD. Basic data on anthropometric measurements and angular measurements of hip and

knee joints for selected age groups 1-74 years of age: United States, 1971-1975. Vital and Health Statistics, series 11, no 219. National Centre for Health and Statistics, DHHS Publication no (PHS); 1981: 81-1669. Hyattsville, MD.

8. Eveleth PB,Tanner JM. Worldwide Variation in Human Growth–2nd Edition. Cambridge University Press, Cambridge 1990.

9. Glauber H, Vollmer W, Nevitt M, Ensrud K, Orwoll E. Body weight versus body fat distribution, adiposity, and frame size as predictors of bone density. J Clin Endocrinol Metab. 1995; 80: 1118–23.

10. Chumlea WC, Wisemandale W, Guo SS, Siervogel RM. Relations between frame size and body composition and bone mineral status. Am J Clin Nutr. 2002; 75: 1012-1016.

IMPACT OF CONSANGUINITY AND INBREEDING ON HOMOZYGOSIS OF RECESSIVELY INHERITED GENETIC DISORDERS AMONG TRIBES OF CENTRAL INDIA: THE MOST DETRIMENTAL AND WIDELY PRACTICED EVIL

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Abstract: *Recessively inherited genetic disorders such as sickle cell anemia and β-thalassemia syndromes are commonly encountered in heterozygous and homozygous form in India. These hemolytic hematological disorders cause a high degree of reproductive wastage in vulnerable communities especially among the scheduled castes and tribes, and other backward people. Inbreeding is usually the mating between two blood related individuals. Homozygosis is antagonistic process of the advantageous heterosis. Relatively small population size of a community clubbed with small marital distance of two mating partners leads to inbreeding resulting in homozygosity which increases chances of affected offspring by recessive or deleterious traits and contributes to decreased fitness of a couple or population in Central India. In addition, since many recessive alleles present in natural populations have harmful effects on the organism, consanguinity and inbreeding usually leads to detrimental disorders, a decrease in community size, human vigor, virility, vitality and reproductive fitness.*

Key words: *Sickle cell disease, β-thalassemia major, Homozygosis, Reproductive wastage, Community inbreeding, Marital distance.*

INTRODUCTION

It is a well known fact that man is a gregarious animal. It lives in groups. During the evolutionary history of man, it is evident that men used to have a group, named as family, living together with women and children as nomadic (later on pastoral) people. With the expansion of families or herds (commonly known as a tribe) and after the depletion of resources at one place, some herds (families) also used to move from one place to another in search of food, shelter and safety depending upon the better resources available to them. This process of migration and, subsequently, isolation from the common blood relatives with the passage of time, gave rise to an independent isolate or the village, which led to the emergence or formation of other related villages, towns or the cities. Their survival at new places was subject to conducive / favorable or harsh environmental and climatic conditions, resulting in adaptive-adjustments or genetic modifications/variations/ mutations to cope with the surrounding environment.[1-4]

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Consanguinity and Inbreeding

At the initial stages of human development and expansion, mating with the available blood related men/women was permissible because of limited number of available mates, but subsequently, as the tribe grew, some social systems evolved and restrictions were imposed by the elders to control the incest mating. This might had been realized after observing some harmful effects leading to some illness or disease in the offspring of the incest parents. Ever since this realization, the practice of prohibition for incest union, except in some aberrant, occasional, and rare cases, continued generation after generation till this date. However, in some communities the marriage among blood relatives is still preferred match, for example, in South India.

Inbreeding is usually defined as the mating between relatives and the progeny that result from a consanguineous mating between two related individuals is said to be inbred.[5-7] As a result of inheriting the same chromosomal segment through both parents, who inherited it from a common ancestor, the individuals born of consanguineous unions have a number of segments of their chromosomes that are homozygous. Therefore, inbreeding increases the amount of homozygosity and, consequently, recessive alleles hidden by heterozygosity with dominant alleles are expressed through inbreeding. On this basis, it is expected that recessive traits including many human genetic disorders such as sickle cell disease, β-thalassemia, etc. occur with increased frequency in the progeny of consanguineous couples. In addition, since many recessive alleles present in natural populations have harmful effects on the organism, inbreeding usually leads to a decrease in size, vigor and reproductive fitness.[8]

Calculation of Coefficient of Inbreeding (Relationship)

The inbreeding is computed as a percentage of chances for two alleles to be identical by descent. This percentage is called "coefficient of inbreeding". There are several methods to compute this percentage. Typical inbreeding coefficient percentages are as follows, assuming no previous inbreeding between any parents:

- Father/daughter, mother/son or brother/sister →25% ($^1/_4$)
- Grandfather/granddaughter or grandmother/grandson →12.5% ($^1/_8$)
- Half-brother/half-sister →12.5% ($^1/_8$)
- Uncle/niece or aunt/nephew →12.5% ($^1/_8$)
- Great-grandfather/great-granddaughter or great-grandmother/great-grandson →6.25% ($^1/_{16}$)
- Half-uncle/niece or half-aunt/nephew →6.25% ($^1/_{16}$)
- First cousins →6.25% ($^1/_{16}$)
- First cousins once removed or half-first cousins →3.125% ($^1/_{32}$)

- Second cousins or first cousins twice removed →1.56% ($^1/_{64}$)
- Second cousins once removed or half-second cousins →0.78% ($^1/_{128}$)
- Third cousins or second cousins twice removed →0.39% ($^1/_{256}$)
- Third cousins once removed or half-third cousins →0.20% ($^1/_{512}$)

An inbreeding calculation may be used to determine the general genetic distance among relatives by multiplying by two, because any progeny would have a 1 in 2 risk of actually inheriting the identical alleles from both parents. For instance, the parent/child or sibling/ sibling relationships have 50% identical genetics.[9-10]

In human societies, consanguineous marriage is practiced frequently in many populations.[11] In fact, it has been recently estimated that consanguineous couples and their progeny supposed to be about 10.4 % of the 6.7 billion global populations of the world.[12] First-cousin marriage and other types of consanguineous unions are frequent in a number of current populations from different parts of the world. The extent of inbreeding of an individual is usually measured in terms of his or her inbreeding coefficient. The coefficient of inbreeding (F) is the probability that an individual receives at a given autosomal locus two alleles that are identical by descent or, equivalently, the proportion of the individual´s autosomal genome expected to be homozygous by descent (autozygous).[5,7]

If genealogical information is available for a given individual, his or her inbreeding coefficient can be computed from pedigree analysis. The computation of the genealogical inbreeding coefficient assumes neutrality with respect to natural selection so that the transmission probabilities of alleles can be calculated from Mendelian ratios. In humans, the most extreme cases of inbreeding corresponds to incestuous unions defined as mating between biological first-degree relatives; that is father-daughter, mother-son, and brother-sister. The progeny from an incestuous union will have an inbreeding coefficient of ¼ (0.25) in these cases. Offspring of uncle-niece, first-cousin, and second-cousin marriages will have F = 1/8 (0.125), 1/16 (0.0625) and 1/64 (0.0156), respectively. In complex genealogies, the depth of the pedigree is very important for the computation of the inbreeding coefficient. In some cases, genealogical data from the most recent four or five generations seem to be sufficient to capture most of the information relevant to the calculation of the inbreeding coefficient.[13] This is due to the fact that recent inbreeding events have a disproportionately large influence on an individual´s inbreeding coefficient relative to events deeper in the pedigree. However, in some large and complex pedigrees, ancestral or remote consanguinity can make a substantial contribution to the inbreeding of a given individual and the exploration of pedigrees limited to a shallow depth carries the risk of underestimating the degree to which individuals are inbred.[14-16] Computation of inbreeding coefficients from extended pedigrees will be

necessary in order to obtain an accurate measure of the inbreeding level in those situations in which remote consanguinity is important for evaluation.

Why People prefer Consanguineous over Non-consanguineous Marriages ?

There are some advantages of consanguineous marriages over randomly non-consanguineous arranged love marriages to mention a few: (i). Easy and quick familiarity of behavior, habits, eating liking and disliking manners with the already known faces of relatives, which helps in expeditious mingling with the members of the family and boosts value based moral support. (ii). There is no hitch, reluctancy or shyness in adapting/ following the family customs and traditions. Social environment is quite favorable with "we" feeling rather than "you or he" feeling and cordial relationships. (iii). Economical benefits. Movable and non-movable assets and landed property remain intact and there is no division of such assets, (iv). United reliable manpower (many hands) availability to start any work/business, etc. To mention a few communities in whom the consanguineous marriages and inbreeding is quite common practice are: Agharia, Arora, Barman, Bhil, Gond, Jharia, Kol, Kulita, Mahar/Meher, Pradhan, Punjabi Khatri, Sindhi, and many more communities in South India.

It is surprising that as the physical marital distance between the two carrier partners of sickle cell disease or β-thalassemia major decreases the number of abortions, still-births, neonatal mortality, infant mortality, and mortality below 10 years of age go on increasing in the population of Central India.[17,18] This is because of the fact that the inbreeding is reproduction from the mating of parents who are genetically closely related to each other, but the illiterate rural people in India are not aware of this fact. Inbreeding results in increased , which can increase the chances of offspring being affected by recessive or deleterious traits. This generally leads to a decreased fitness of a couple or population. The inbreeding can also occur sometimes, when in a widely spread/scattered endogamous community in a larger area, prefer to marry within a short or limited physical distance for interactive convenience without knowing the fact that they are going to marry to a blood relative; although, how remote that relationship might be!

It must be kept in mind that those villagers concentrated in particular surrounding area who have settled there in the distant past, are the ultimately blood relatives and belong to same original genetic stock and share the common normal or abnormal gene pool of a community. Therefore, those communities who have small population size and marry randomly within physically small area by practicing community endogamy do have some degree of inbreeding that results in homozygosity of recessively inherited genetic disorders such as sickle cell anemia or β-thalassemia in the

population, which is probably the case in Central India. The random marriage within a short physical marital distance is an additional dimension of inbreeding to the previously two situations described earlier.[8] In short, small population size clubbed with small marital distance leads to inbreeding resulting in homozygosity which increases chances of offspring being affected by recessive or deleterious traits and decreases fitness of a couple or population.

Studies on genome-wide homozygosity through the genome scan technology have opened new avenues for inbreeding research. Thus, genome-wide homozygosity may be used to estimate the inbreeding coefficient for a given individual when genealogical information is not available. Furthermore, the study of genome-wide homozygosity is very important for the identification of recessive disease genes through homozygosity mapping as well as for the investigation of homozygosity effects on traits of biomedical importance. Long homozygous chromosomal segments have been detected in human chromosomes from the analysis of polymorphic markers in whole-genome scans.[19,20] These long tracts where homozygous markers occur in an uninterrupted sequence are often termed runs of homozygosity (ROH) and can arise in the genome through a number of mechanisms.[19,21] The most obvious explanation for such tracts is autozygosity, where the same chromosomal segment has been passed to a child from parents who inherit it from a common ancestor. The length of an autozygous segment reflects its age since haplotypes are broken up by recombination at meiosis in such a way that long tracts are expected to occur by close inbreeding whereas a short autozygous segment is likely to be the result of the mating of very distantly related individuals. Homozygous tracts are significantly more common in chromosome regions with high linkage disequilibrium and low recombination but since linkage disequilibrium is a local phenomenon would cause only short homozygous segments.[19,21]

Autozygosity has practical implications for the identification of human disease genes. Homozygosity mapping is the method of choice for mapping human genes that cause rare recessive Mendelian diseases.[22,23] The method consists of searching for a region of the genome that is autozygous in individuals affected by a given disease from consanguineous families. Thus, the disease locus is detected on the basis that the adjacent region will be homozygous by descent in such inbred individuals. The method is also known as autozygosity or consanguinity mapping and has the advantage that relatively few individuals are required. Homozygosity mapping became practical with the discovery of multiple highly polymorphic markers. The first polymorphic markers used were restriction length poly-

morphisms, subsequently, short sequence repeats and more recently single nucleotide polymorphisms (SNPs).[24] Since the year 1995 until 2003, nearly 200 studies were published in which homozygosity mapping was used to map human genes causing rare recessive disease phenotypes.[23]

CONCLUSION

It is not only the small population size or consanguineous mating (among blood relatives) of the parents that results in inbreeding or increased homozygosity and, consequently, leads to lower fitness of the offspring or as such of the population. Contrary to this notion, when the marital distance is small between two mating parents, although random mating takes place practicing community endogamy, that also leads to some degree of inbreeding and increased homozygosity of recessively inherited genetic disorders such as sickle cell anemia or β-thalassemia affecting reproductive outcome in the vulnerable couples or population especially in Central India.

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REFERENCES

1. Balgir RS. Serogenetic studies in the Gypsy Sikligars of North-western India. Hum Biol 1986; 58:171-87.
2. Balgir RS, Sharma JC. Genetic markers in the Hindu and Muslim Gujjars of North-western India. Am J Phys Anthropol 1988; 75: 391-403.
3. Balgir RS. Environmental constraints, health and population trends among the Muslim Gujjars of Himachal Pradesh, India. J Hum Ecol 1995; 6:191-96.
4. Balgir RS. The spectrum of hemoglobin variants in two scheduled tribes of Sundargarh district in North-western Orissa, India. Ann Hum Biol 2005; 32: 560-73.
5. Cavalli-Sforza, LL, Bodmer WF. The Genetics of Human Populations. San Francisco: Freeman and Company, 1971. ISBN 0-7167-1018-8.
6. Vogel F, Motulsky AG. Human Genetics. Berlin: Springer Verlag, 1997. ISBN 3-540-60290-9.
7. Hedrick PW. Genetics of Populations. Sudbury (Massachusetts): Jones & Bartlett Publishers, 2005. ISBN 0-7637-4772-6.
8. Alvarez G, Quinteiro CC, Ceballos FC. Inbreeding and Genetic Disorder. In: Advances in the Study of Genetic Disorders, Ikehara Kenji (Ed.) 2011. In Tech. ISBN: 978-953-307-305-7. or http://www.intechopen.com/books/advances-in-the-study-of-genetic-disorders/ inbreeding-andgenetic-disorder .
9. Balgir RS. A monozygotic twin pair with β-thalassemia carrier status in a Dudh Kharia tribal family of Orissa. Indian J Hum Genet 2007; 13:21-25.
10. Balgir RS. A pair of dizygotic twins born to two carrier families of sickle

cell disease in scheduled caste communities of rural Orissa, India. Int J Child Health Hum Develop 2009; 2: 209-215.

11. Balgir RS. Sickle cell disease and community health issues in Orissa. Indian Practr 1993; 46: 427-431.
12. Bittles AH, Black ML. Consanguinity, Human Evolution, and Complex Diseases. Proc Natl Acad Sci USA, 2010; 107(Suppl 1):1779-1786.
13. Balloux F, Amos W, Coulson T. Does heterozygosity estimate inbreeding in real populations? Mol Ecol 2004; 13:3021-3031.
14. Boyce AJ. Computation of inbreeding and kinship coefficients on extended pedigrees. J Hered 1983; 74: 400-404.
15. MacCluer JW, Boyce AJ, Dyke B, Weitkamp LR, Pfennig DW et al. Inbreeding and pedigree structure in standard bred horses. J Hered 1983; 74:394-399.
16. Alvarez G, Ceballos FC, Quinteiro C. The role of inbreeding in the extinction of a European Royal Dynasty. *PLoS ONE*, 2009;4(4): e5174.doi:10.1371 /journal.pone.0005174 www. intechopen.com Advances in the Study 42 of Genetic Disorders.
17. Balgir RS, V K Kachhi VK, Khare Shashi, Patel P. Tribal health and laboratory diagnosis of red cell inherited hemoglobin disorders in Central India: A case study of three typical families. Tribal Health Bull 2012; 18 (1&2):14-21.
18. Balgir RS. Contribution of marital distance to community inbreeding, homozygosis, and reproductive wastage for recessively inherited genetic disorders in Madhya Pradesh, India. Mediterr J Hematol Infect Dis 2013;5(1):5.
19. Broman KW, Weber JL. Long homozygous chromosomal segments in reference families from the Centre d´Étude du Polymorphisme Humain. Am J Hum Genet 1999; 65:1493-1500.
20. McQuillan R, Leutenegger AL, Abdel-Rahman R, Franklin CS, Pericic M et al. Runs of homozygosity in European populations. Am J Hum Genet 2008; 83:359-372.
21. Gibson J, Morton NE, Collins A. Extended tracts of homozygosity in outbred human populations. Hum Mol Genet 2006; 15:789-795.
22. Lander ES, Botstein D. Homozygosity Mapping: A way to map human recessive traits with the DNA of inbred children. Science 1987; 236: 1567-1570.
23. Botstein D, Risch N. Discovering genotypes underlying human phenotypes: Past successes for Mendelian disease, future approaches for complex disease. Nature Genetics, 2003; 33: 228-237.
24. Woods CG, Cox J, Springell K, Hampshire DJ, Mohamed MD et al. Quantification of homozygosity in consanguineous individuals with autosomal recessive disease. Am J Hum Genet 2006; 78: 889-896.

HEALTH STATUS OF TRIBAL WOMEN IN RAJASTHAN

Alok Kumar Meena[1]

Abstract: *Social transformation and change is an ongoing process and all the societies of the world are undergoing change since time immemorial and tribal groups are no exception to this process. In general, tribals are socially and economically backward groups living in geographical isolation all over world. The dependency of the tribes on nature and their impoverished economy affects the population growth, sex ratio, pregnancy procedure and health care practices.*

The present study reveals that health status of tribal women is extremely poor as compared to the other social groups. The study is based on primary and secondary data sources. Total 75 women were selected for study; several government officers and elected representatives of gram panchayats were also interviewed. The Study was aimed to provide a comprehensive view of the drawbacks and to analyze the vulnerable conditions of Tribal women in the public sphere. Three villages in Alwar district in Rajasthan were selected for the study. The study reveals the Tribal women's issues and the government's attitude and plans to mitigate the concerns. The study aims to contribute to the understanding of health problem of tribal women and their communities.

Keywords: Social transformation, health care practices, health status, geographical isolation, socially excluded.

INTRODUCTION

India is a native-land of different tribal groups living widely in varying environmental and ecological conditions in different parts of the country. Tribal community originates from one of the oldest ethnological sections of population, usually known as aboriginal people or 'indigenous inhabitants' of a region. They are generally socially, educationally and economically deprived groups for centuries, living in geo-graphical isolation all over world. Historically the tribals lived in hills and forests.

According to the article 342 of the Indian Constitution, the Schedule Tribes are the tribes or tribal communities, which may be notified by the President of India. India has the largest tribal population in the world. There are 705 ethnic tribes (170 sub groups/ segments and 74 primitive tribes) as recognized in Indian constitution. As per 2011 census total 104281034 [93819162 (11.3%) rural and 10461872 (2.8%) urban] people were classified as schedule tribes, which constitute 8.6% of the total population, spread over 26 states and union territories. Most of the tribal population in

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India is concentrated in the central and in the North-Eastern parts of the country.

Schedule tribes constitute one of the socially excluded sections of Indian society for centuries.

The most excluded and under-developed among them are the numerically small primitive tribal groups. Although the major concentration of the tribal population is generally poor and concentrated in rural India, due to this also the knowledge about population dynamics, health and nutrition status among different tribal groups and community in India is very insignificant and insufficient. Social transformation and change is an ongoing process and all the societies of the world are undergoing change since time immemorial and tribal groups are no exception to this process.

Health status of the Tribals

Health of the people is the most important indicator of development of any nation and society. Health care system is a major constituent towards the better quality of life of the people and access to health care is considered as one of the significant components of social inclusion. It is often construed as one of the basic needs and one of the components of human development. Even though India has developed sufficient health infrastructure and manpower at primary, secondary and tertiary level in government, voluntary and private sectors it continues to face several health challenges, and requires strengthening the primary health care in the rural areas. There is an urgent need to ensure the improvement, efficiency and acceptability of health and medical system in rural India.

Health status of the tribals in India has been studied and documented by several social scientists from various theoretical perspectives and methodo-logical orientations. The National Family Health Survey and Census of India also provide information regarding the living conditions and health status of tribes.

Despite rapid strides in the field of diagnostics and therapeutics, adequate health care is not within the reach of tribals. The health conditions and the quality of health care services available to the tribes in most of the states in India is very poor and calls for urgent attention in order to improve from a number of fronts. There is a consensus among various governmental programs to pay special attention to the Scheduled tribe population. Sometimes despite sufficient modern equipment and medical supplies, due to scattered population, societal attitude, unstable belief systems, the ineffectiveness of doctors, the tribal population have been deprived of basic health care. However, the actual state of health and medical care in Tribal areas has not been adequately documented.

Majority of tribal community make use of ancient traditional medical knowledge for the treatment of diseases. The medicines are procured from the

plants, animals and other raw materials available in their surroundings. Generally they prefer their traditional medicines like roots, barks, stems, branches, leaves, flowers, fruits and seeds etc. In case of insignificant result very few people approach modern medical treatment. Tribals also consider that interference of supernatural agency is particularly strong in context of health and disease. They believe that different deities and spirits are connected with different types of diseases. Traditional medicines are based on superstitions for illness caused by ghosts, evil sprits etc.

Health Status of Tribals in Rajasthan

Rajasthan has vast physical, geographical, demographical and socio-economical diversity. There are 12 categories (several sub-categories) of schedule tribes in Rajasthan, and constitute. 13.5 % (2011) of the total population of the state. Among the total tribal population 94.09% are rural and 5.90% are urban. The southern part of state includes 5 tribal dominated districts i.e. Dungarpur, Banswara, Pratapgarh, Udaipur and Rajsamand. These areas are hilly and covered by thin forest, and population is scattered. The tribal houses are spread on hillocks and on its base. This physical terrain and living style of tribal, causes health hazards, and modern health and medical services are difficult to reach. Whereas the eastern part of Rajasthan (Alwar, Sawai Madhopur, Karoli, Dausa and Jaipur) carry big villages, with concentrated population, rapid growth of urbanization and industrialization and favors of better health indicators.

Tribals are aware of modern health facilities, but are bound by superstitions and resort to religious remedies. Due to poor economic status the tribals cannot afford high costs of treatment and home remedies are used, except in case of seriousness of health ailment. In general other health providers in this area are traditional men, private medical practitioners, trained/untrained mid-wives, depot holders, anganwadi workers, registered medical practitioners, jhola chap doctors or Bengali doctors etc. Traditional healers (*Baba*) occupy a prominent place in tribal community for the treatment of various diseases.

Health Status of Tribal women in Rajasthan

Rural tribal women are among the most underprivileged and disadvantaged group in terms of their health status. Access to appropriate health care information, an ample, satisfactory and affordable health services are still to be achieved for the tribal women. Majority of Tribal women suffer from malnutrition, infections, early and repeated child bearing. Lack of access of health care with poor quality of delivery system and its responsiveness of women's need exacerbate the reproductive health status. Due to lack of care and nutritious diet, the total mortality rate in the tribal population is higher than the total

mortality rate in the non-tribal population. Usually the pregnant women are not given appropriate and optimal care during gestation and delivery. There is not much difference between home and hospital deliveries in terms of quality of care. Use of tobacco and alcohol, spousal violence (Physical, emotional or sexual), and search for cheep treatment by Tribal women also create serious health problem among them.

Goal of the study

To improve the health status of the Schedule tribe population in Thanagazi tehsil and bring it on a par with other population, by suggesting ways to improve the health care system through government programs and from other alternative sources.

OBJECTIVES

1. To examine the health services in the region.
2. To asses the performances of health agencies in the region.
3. To bring the awareness among the tribe regarding the diseases prevalent.
4. To give the relevant information and counseling regarding the treatment as well as precaution from the diseases.
5. To identify both the positive aspects and the lacunae in the health care.
6. To find ways and means to improve the condition of tribal women already infected from communicable and non communicable diseases.

Significance of the study

Studies on tribal health are many, yet only little focus essentially on health status of tribal women. An attempt has been made to analyze the health status of Tribal women of District Alwar. Our study can contribute to the understanding of health status of Tribal community of Rajasthan in particular and Indian tribal health in general.

METHODOLOGY

The present study had been made to know about the women health care practices among Tribal tribe of Alwar district in Rajasthan. Some important factors like health care centers, government and private health staff, place of deliveries, knowledge of family planning, HIV, use of contraceptives, sterilization, free medicines, etc have been studied. As the present study was done exclusively among the tribes, so the 3 Tribal dominated villages, namely Bhopala (Tribal population is nearly 400 out of total 700, and the distance from nearest PHC i.e. only 4 km from Thanagazi), Kabligarh (Tribal population is nearly 700 out of total 900, and the distance from tehsil headquarter Thanagazi is 16 km. and nearest PHC is in Guddha which is 9 km), and Kaled (a very interior and underdeveloped village, lack of communication and transport, Tribal population is nearly 900 out of total 1200. The distance from tehsil Thanagazi is 48 km and nearest PHC is Pratapgarh which is 19 km) were selected from Thanagazi tehsil in Alwar district of Rajasthan.

Tool for data collection

The present study is based on both the primary and secondary data collected through field survey with structured interview schedule. The primary data consists of various responses from Tribal women, Doctors and ANM. The quantitative data collected was supplemented with qualitative data collected through key informant interviews with knowledgeable and experienced persons of the tribe (Though qualitative data is used, the present study is by and large quantitative in its orientation). Whereas, the secondary data was collected from the source book on tribal health, state health documents (CMHO), Census report, journals, relevant references and research papers related to the vision, aims, objectives, policies, strategies, projects, facilities and achievements on this particular subject were also consulted.

Criteria for Selection of Villages and Respondents

Considering the scope and objectives of the proposed study, taking many criteria for selection i.e. population of the village, girls school, health facilities in village, distance from tehsil and district hospital, means of communication etc above 3 villages were selected.

For the study 75 tribal women of (all married, 18 to 45 years old) were selected from 3 villages (few women from hamlets were also interviewed). The respondents were selected on the basis of family type and size, education as well as income of the family.

Findings

Of total respondents, 72.30% women were between 35 to 45 years of age, 24.61% were between 25 to 35 years and only 3.07% were between 18 to 25 years. Majority of respondents i.e. 81.53% women were illiterate, 16.92% were educated up to primary and only 1.53% were educated up to secondary level. Major concentration of respondents i.e. 86.15% women were from poor families whereas only 13.84% were from middle class. No respondent was from upper class. (Criteria: The family having the annual income below one lakh is considered as poor, income between 1 lakh to 5 lakh is middle class and income above 5 lakh is upper class). Majority of women respondents i.e. 64.61% were from joint family, whereas 35.38% were from nuclear family. Among the total deliveries, 21.53% women delivered their child at government health institutions, 13.84% at private health institutions and majority i.e. 64.61% delivered by traditional method at home. Nearly all the women knew at least one method of contraception either modern or traditional. Twenty one percent women use the family planning after 3 children, 7.69% women have only one child, 70.76% women were not interested in family planning. About 41.53% women reported the vaginal discharge. Thirty-eight percent women reported the health complications during the deliveries. About

89.23% women never seen the CHC in their life as well as 66.15% women had not seen PHC. Eighty-six percent women reported health ailments they preferred either cheap treatment or traditional methods. Ninety percent women were given less nutritious food in their childhood as comparison to their brothers.

Suggestions

1. Counseling should be given to them in their local language, keeping in mind the educational and economical background of people we are studying.
2. More and more voluntary and welfare organizations, NGOs, educational institutions should be encouraged for giving the relevant information to the concerned people.
3. The tribal women should be educated regarding the adequate diet especially during pregnancy.
4. There is a need for promoting indigenous medicine systems among tribes.
5. Awareness programs need to be strengthened in the ST areas for HIV and Tuberculosis.
6. Community based health insurance plans need to be popularized in the ST areas, linking them with the micro credit schemes.
7. Providing local staff from among the ST for working in ST areas needs to be seriously considered. The health staffs need to have periodic skill up gradation training.
8. Communication facilities between the community, the ANM and ambulance need improvement.
9. The regular monitoring should be done by team of CMHO, Pradhan, Sarpanch and Panchayat members, elders in the village, educated members of the community etc.
10. The government programmes require frequent inspection, assessments and monitoring.

CONCLUSION

The health and health related problems of Tribal women of Alwar District Rajasthan are immense. Majority of Tribal women suffer from malnutrition, infections, early and repeated child bearing. Lack of access of health care with poor quality of delivery system and its responsiveness of women's need exacerbate the reproductive health status.

BIBLIOGRAPHY

Mohammad Akram “Tribal Health”, Rawat Publications, Jaipur, 2008.

Chaudhary, S.N., (ed.) “Tribal Health and Nutrition”, Rawat Publications, Jaipur, 2012.

Basu, S.K., (ed.) “Tribal health in India” New Delhi, Manak Publishers. 1993.

Bose, N.K., “Tribal life in India”, National Book Trust, New Delhi, 1971.

Verma, R.C., “Indian Tribes through the Ages”, Publications division, Ministry of information and broadcasting, New Delhi, 1995.

Vidhyarthi, L.P., “The Tribal culture of India”, Concept Publishing Company, New Delhi, 2000.

Swami Vivekananda Youth Movement in collaboration with Ministry of Health & Family Welfare & WHO Country Office for India. To Understand the Health Status and Healthcare Systems in Selected Tribal Areas of India, 2009 June.

Adivasi Swasthya Patrika 2007.

Census of India- 2011.

National Family Health Survey-3.

Rajasthan Journal of Sociology 2010.

Social Welfare, July 2011.

Tribal Health Bulletin 2006, 2007, 2008.

Tribe, Vol. 44, No.1-4, TRI, Udaipur, 2012.

HAEMOGLOBIN DISORDERS AMONG SCHEDULED CASTE AND SCHEDULED TRIBE POPULATIONS OF TWO ADJOINING DISTRICTS OF MADHYA PRADESH

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Abstract: *A total of 502 blood samples from Seoni and 530 from Balaghat district of Madhya Pradesh were screened for sickle haemoglobin, beta thalassaemia and G6PD deficiency. Among SC populations of 2 districts,the sickle cell trait was found in 21.3% (Seoni) and 17.3% (Balaghat). Sickle Cell trait among Scheduled tribe populations was 18.5% (Seoni) and 14.8% (Balaghat). Frequency of sickle cell disease (homozygous) ranged from 0.4% in ST (Seoni) to 0.9% among SCs (Balaghat). The beta thalassaemia trait varied from 1.0% among ST (Seoni) to 2.2% in STs (Balaghat). No β-thalassemia was found among studied SC population of Balaghat district. When tested for G6PD deficiency, it was found to vary from 1.3% among ST of Balaghat to 1.8% among SC population of Seoni district. Frequency of sickle cell gene was higher among SC population of Seoni district (0.111) followed by ST of Seoni (0.096), SC of Balaghat (0.096) and ST of Balaghat district (0.080). All populations were in equilibrium state for sickle cell haemoglobin and beta thalassaemia gene as per Hardy-Weinberg's law (p>0.05). No significant (p>0.05) values of Chi-square for inter-group comparison in between ST populations and in between SC populations of both districts with regard to sickle cell distribution indicates homogeneity in these adjoining districts of the state for studied haemoglobinopathies distribution.*

INTRODUCTION

Haemoglobin disorders (sickle cell haemoglobin and thalassaemias) are autosomal recessive inherited disorders and important from clinical point of view as homozygosity causes life threatening crisis. G6PD is an enzyme of red blood cells deficiency of which results in hemolysis during the administration of some anti-malarial or other oxidant drugs. In presence of malaria environmental factors have lead to selection resulting in persistence of heterozygotes of haemoglobin variants due to their advantage against malarial infection[1-2] and the concept of balanced polymorphism may be contributory to the maintenance of high allele frequency in a particular area. The sickle cell gene is widely distributed throughout sub-Saharan Africa, the Middle East and parts of the Indian sub-continent while Thalassaemia shows a high incidence in a broad band extending from the Mediterranean basin and parts of Africa, throughout the Middle East, the Indian

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sub-continent, South-East Asia, Melanesia and into the Pacific Islands.[3] In Indian populations, the frequency of HbS allele ranges from complete absence to 0.410 with general frequency of 0.031 and is present in high frequency in Central India followed by South, West and North India.[4] Sickle haemoglobin is prevalent in various tribes of the Madhya Pradesh.[5-11] Present study was conducted during 2000 to identify the prevalence of haemoglobinopathies and G6PD deficiency among the Scheduled Tribe and Scheduled Caste populations of two adjoining districts of Madhya Pradesh i.e Seoni and Balaghat. The Seoni and Balaghat districts lie in the south central part of Madhya Pradesh bordering Maharashtra state. Gond is the main tribe in both districts. The Scheduled caste is predominantly consists of endogamous groups.

MATERIALS & METHODS

About 286 blood samples from Seoni district and 311 from Balaghat district belonging Gond tribe (ST), 216 blood samples of Scheduled caste (SC) individuals from Seoni district and 219 of SC individuals from Balaghat district were screened for sickle cell haemoglobin,-thalassaemia and G6PD deficiency. All the blood samples were collected randomly in EDTA. Sickle haemoglobin was identified by sickling test with 2% sodium metabisulphite and confirmed by electrophoresis on cellulose acetate membrane with TEB (Tris-EDTA-Borate) buffer at pH 8.6.[12] HbA_2 was quantified by column chromatography to identify the beta thalassaemia trait.[13] G6PD deficiency was detected by using DCIP decolorization method.[12] Gene frequencies were calculated by gene counting method. Statistical methods used are Chi-square test.

RESULTS

The status of haemoglobin disorders and G6PD deficiency among Scheduled Tribe (ST) and Scheduled Caste (SC) populations of Seoni and Balaghat districts is given in the Table-1.

Seoni District

Among 2 studied populations of Seoni district, Sickle cell trait (heterozygous) was found to be 21.3% in Scheduled

Table 1: Percent prevalence of haemoglobinopathies and G6PD deficiency among SC and ST populations of Seoni and Balaghat districts

Area	Group	Sample Size	Sickle cell trait (AS)	Sickle cell disease (SS)	Beta thal. trait	G6PD def.
SEONI	SC	216	21.3	0.5	1.4	1.8
	ST	286	18.5	0.4	1.0	1.7
BALAGHAT	SC	219	17.3	0.9	0	1.4
	ST	311	14.8	0.6	2.2	1.3

Caste population (SC) and 18.5% of Scheduled tribes (ST). Sickle haemoglobin as homozygous (HbSS) was found to be 0.5% of Scheduled Caste population and 0.4% of Scheduled tribe. Beta thalassaemia trait (heterozygous for beta thalassaemia gene) was found to be 1.4% among SC and 1.0 % in STs of Seoni district. The prevalence of G6PD deficiency was 1.8% and 1.7% among SC and ST populations respectively. The calculated gene frequency of sickle haemoglobin gene (β) and beta thalassaemia in the studied populations is given in Table-2. The frequency of sickle cell gene was 0.111 and 0.096 among Scheduled caste and Scheduled tribe populations of this district respectively. The frequency of beta thalassaemia gene was found to be 0.0069 and 0.0052 among SC and ST populations of Seoni district respectively.

Balaghat District

Among 2 populations in Balaghat district, Sickle cell trait (heterozygous) was found to be 17.3% in Scheduled Caste population (SC) and 14.8% in Scheduled tribe (STs). About 0.9% of Scheduled Caste population and 0.6% of Scheduled tribe were found to be homozygous for sickle haemoglobin (HbSS). No Beta thalassaemia trait was found among studied SC population of Balaghat district. In ST population of Balaghat it was 2.2%. About 1.4% of SC and 1.3% of ST populations of this district were found to be deficient in G6PD enzyme in their red cells. The calculated frequency of sickle cell gene was 0.096 among SC and it was 0.080 for Scheduled tribe population of this district (Table-2). The calculated gene frequency of beta thalassaemia gene in ST population of Balaghat district was 0.0113.

All the four populations of both districts are in equilibrium state for sickle cell haemoglobin gene and beta thalassaemia gene as per Hardy-Weinberg's law ($p>0.05$). Statistically insignificant ($p>0.05$) values of Chi-square for inter-group comparison in between ST populations and in between SC populations of both districts for sickle cell haemoglobin as well as Beta

Table 2: Calculated gene frequencies among SC and ST populations of Seoni and Balaghat districts

Area	Group	Gene freq. of 'S'	Expected frequency (per 1000 births)		Gene freq. of '?-thal.'	Expected frequency (per 1000 births)	
			AS	SS		?-thal. trait	?-thal. major
SEONI	SC	0.111	197.5	12.3	0.0069	13.8	0
	ST	0.096	173.8	9.2	0.0052	10.4	0
BALAGHAT	SC	0.096	173.5	9.2	0	0	0
	ST	0.080	147.8	6.5	0.0113	22.3	0.1

thalassaemia distribution indicates homogeneity between in populations of these adjoining districts of the state (Table-3).

DISCUSSION

The sickle cell trait occurs with highest frequency in tropical Africa (10-40%) with high frequency in India, Greece and southern Turkey (5-10%) and less than 10% among population groups living around the Mediterrenean sea.[4] Among Gond group of tribal populations of Madhya Pradesh, prevalence of Sickle cell trait generally varies from 10 to 14%.[4] In the present study, prevalence of sickle haemoglobin varies from 14.8% to 21.3% among studied populations of the 2 districts i.e Seoni and Balaghat. Prevalence of Sickle haemoglobin was higher among ST and SCs (21.3% in SC and 18.5% in ST) of Seoni district as compared to Balaghat district i.e.17.3% in SCs and 14.8% in STs. The present findings suggest that 12.3 per thousand births of Scheduled caste of Seoni district and 6.5 per 1000 births among ST population of Balaghat district may suffer from sickle cell disease (homozygous). In Scheduled tribe of Seoni as well as Scheduled caste populations of Balaghat, 9.2 per thousand births may suffer from sickle cell disease (homozygous). About 147.8 to 197.5 per 1000 are expected to be born as sickle cell trait (heterozygous) in these populations. The expected births with Betathalassaemia major (homozygous) is "zero" in all the populations of the two districts other than in ST population of Balaghat where-in about 0.1 per 1000 births may be born with Beta thalassaemia major (homozygous). However, the estimates of the present study are based on data obtained in the year 2000, therefore prevalence studies need to be carried out to identify the present day status.

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Table 3: Inter group comparison

	Population	Area	Chi-square	
For Sickle cell haemoglobin	ST	Seoni Vs Balaghat	1.726	$?^2$ = 5.99 at 5 percent level of significance at 2 d.f.
	SC	Seoni Vs Balaghat	1.362	
For ?-thalassaemia	ST	Seoni Vs Balaghat	1.307	
	SC	Seoni Vs Balaghat	3.063	

and necessary funds to carry out the study.

REFERENCES

1. Allison AC. Protection afforded by sickle cell trait agaist subtertian malarial infection. Br. Med.J1954a;290-294.
2. Allison AC. The distribution of sickle cell trait in East Africa and elsewhere and its apparent relation ship to subtetian malaria. Trans.Roy. Soc. Trop. Med. Hyg. 1954; 48: 312-318.
3. Weatherall DJ, Clegg JB. Inherited haemoglobin disorders: an increasing global health problem. Bull World Health Organ 2001;79:704-12. PMID: 11545326.
4. Bhasin MK, Walter H, Danker-Hofe H.Genetics of Castes and Tribes of India Delhi Kamla-Raj Enterprises 2001.
5. Gupta RB, Tiwary RS, Pande PL, Kultar F, Oner C, Oner R, Huisman THD: Haemoglobinopathies among the Gond tribal groups of central India. Interaction of alpha and beta thalassaemia with beta chain variants. Haemoglobin.1991; 15: 441-458.
6. Pande PL, Gupta RB, Tiwary RS. A study of sickle cell haemoglobin and glucose-6-phosphate dehydrogenase deficiency among the tribals of Madhya Pradesh. Man in India. 1992; 72: 485-490.
7. Pande PL, Singh MPSS, Tiwary RS. Prevalence of haemoglobinopathies among the Pando and Kodku tribes of Sarguja district, Madhya Pradesh. J. Hum. Ecol.1999;10(5-6):443-444.
8. Pande PL, Singh MPSS, Das Ujwala, Godbole S, Tiwary RS. Prevalence of haemoglobinopathies among different populations of Jabalpur, Madhya Pradesh. J. Hum. Ecol. 1999; 10(5-6): 439-440.
9. Singh MPSS, Gupta RB, Kumar Surendra. Status of sickle haemoglobin and anaemia among gond population of panna district, Madhya Pradesh.Tribal Health Bulletin. 2008; 14 (1&2):13-16.
10. Singh MPSS, Gupta RB, Gadge Vijay, Das Ujwala, Godbole S, Yadav Rajiv. Common haemoglobinopathies and G6PD deficiency among kol tribe of Satna district, Madhya Pradesh. Tribal Health Bulletin 2010; 16 (1&2):31-34.
11. Singh MPSS, Gupta RB, Yadav Rajiv, Gadge Vijay, Godbole S, Gwal Anil, Gupta Ashok, Vishwakarma CP, Neelkar RL, Rajasubramaniam S. Haemoglobin disorders and G6PD deficiency among some Tribals of Chhattisgarh area of undivided Madhya Pradesh. Tribal Health Bulletin 2013;19 (1&2):41-45.
12. Chanarin I. Laboratory Haematology: An account of Laboratory Techniques.1st edition London, Churchill Livingstone. 1989
13. Dacie JV. Lewis SM. Practical Haematology. Seventh Edition. London, Churchill Livingstone 1991.

TRADITIONAL HEALERS OF CHHATTISGARH, INDIA: AN ANTHROPOLOGICAL STUDY

Narendra Singh[1]

INTRODUCTION

The largest numbers of tribes are found in central India, although the tribal population in this region accounts only for around 10% of region's total population. There are nearly 573 communities recognized by the Government as Scheduled Tribes. They range in size from the Gonds being roughly around 7.4 million and the Santhals being approximately 4.2 million to only 18 Chaimals in the Andaman Islands. The central Indian states have country's largest tribes and, about 75 % of country's total tribal population lives here.

In spite of an early understanding of diverse human behaviour and social structures in context to Indian culture, anthropological research in health and illness especially of the Scheduled Tribes is very limited. The descriptive analysis of Indian Scheduled Tribes and other communities regarding their health "…has been tentative explorations, with few opportunities of communication and exchange of ideas among interested scholars…" (Scotch 1963:33). Over the centuries, the tribal communities of India have developed their own system of healthcare and treatment. Almost all the tribal societies in India have their own indigenous method of treating the illness, which are associated with religion, magic and herbs. These healers being an important resource should be employed in an effort to provide adequate health care to tribes of the area. It is important to collect information about the attitude, knowledge and practises of these traditional healers. They need be recognised and trained adequately with a view to local needs of the community.

The study of traditional medicine assumes great significance in India especially in the states where the number of indigenous healers is significant, and particularly among the Schedule Tribes and rural population. Hence, in order to develop health related communication strategies for implementing the culturally acceptable state health services, the understanding of the role and function of the traditional healers is essential. In countries where needs are great and resources are scarce, indigenous healers can play a significant role in helping the rural and indigenous communities to improve their health and quality of life.[1]

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OBJECTIVES

With a view to distinct cultural characteristics of Chhattisgarh state, present study was carried out among the indigenous healers to understand :

- the indigenous healers' perceptions and knowledge about health,
- their perception regarding causes of illness, and diagnosis,
- their credibility and effectiveness, and
- their perceptions about state's health services.

STUDY DESIGN

An ethnographic and holistic approach has been used for collecting the qualitative and descriptive data.

SAMPLE

The sample for the present study was drawn from the Chhattisgarh state, also referred to as “Rice Bowl” of the central India. The state has 16 districts with 192,000 km^2 area and over 275 million populations. The sex ratio of the state is 990 females per 1000 males – one of the few states with an almost equal number of males and females. The literacy rate of the state for the population aged seven years and above is 65%. The population of Scheduled Tribes of the state accounts for 37% whereas 39 % are Other Backward Castes and 15% are of Scheduled Castes. The rural populace is predominantly tribal in its demography and the state of Chhattisgarh is home to 42 different tribes that constitute 34 % of state's total population.

Detailed interviews of 97 indigenous healers were conducted in 13 villages. The samples were collected from each Community Development Block that had predominantly scheduled tribes from 5 districts viz. Bastar, Bilaspur, Dantewada, Jashpur and Surguja of Chhattisgarh state.

Information about the villages that have high number of indigenous healers was obtained from the health centers located at the block level of the district.

FINDINGS

Socio-economic Profile of Indigenous Healers

The indigenous healers of the Chhattisgarh state are known by different names such as *Baiga, Gunia, Sirha, Deowar* and *Vaid*. There are 3 categories of indigenous healers based on mode of treatment: religious, herbal and religio-herbal. The prevalence of religious methods to treat illnesses is vast. The use of herbal medicine is also huge.

Notably, the traditional healers are males with low level of literacy and involved in other primary and secondary occupations. They have no special status or privileges and lead an ordinary life like others in the community. They have an ability to communicate in the language of the community or patients. Almost all traditional healers are male suggesting male domination in traditional healing practices with an exception of one female traditional healer of the north-eastern district of Surguja. With regard to age, over three fourth of them belong to the age group of 31-60 years. An indigenous healer needs years of experience to gain expertise. In the present study, the least number of healers fall in the age group of 16-30 years. Nearly half of the healers are

illiterate, illiteracy is much higher among the tribal healers compared to non-tribal. The southern districts of Bastar and Dantewada are mostly tribal dominated districts followed by the northeastern districts of Jashpur and Surguja, and therefore the distribution of tribal healers is higher in these regions. Bilaspur, on the other hand, is largely a non-tribal district in the central region and most of the healers here are of the scheduled castes.

Regardless to literacy and education levels, both tribal and non-tribal healers are poor. Nearly two third of them have their household monthly income less than Rs. 500 to Rs. 1000. The proportion of healers with their income being less than Rs. 500 a month is nearly the same among tribal and non-tribal healers. A very small percentage of the healers earn more than Rs. 3000 a month. In other words, the traditional healers belong to the poor strata of the community.

A majority of the healers have been staying in the villages for over three quarters of a century or nearly three to four generations. No single healer was found living in the village for periods less than 20 years. The average household size of the indigenous healer is 5.5 members.

Concept of Health

The concept of good health relates to certain attributes associated with the conditions of human body. It can be achieved by adopting good eating habits i.e. nutritious and sufficient quantity of food and by maintaining cleanliness. All these help in achieving a good health. Tribals believe that for good health, it is necessary to perform rituals and ceremonies (*pooja path*), reduce mental strain and perform regular physical work; that too on a given time. Recovery from physical illness can be achieved through herbal medicines whereas from religious sickness through rituals and sacrifices.

Causes of Illness and Diagnosis

There are 3 major causes of illness: consumption of unhygienic food and liquor, unhealthy/dirty environment, sudden change in the weather and hostile working environment. General belief among tribals is that spirits, supernatural power and 'evil eye' can also cause illness. One can also fall ill if Gods and Goddesses are disrespected or disobeyed.

Indigenous healers believe that most of the illnesses were caused by witchcraft viz.evil eye, *jadu tona* (black magic), *bhooth-prêt* (ghost) etc. In other words, the largest number of reported illnesses is associated with spirits and supernatural powers. It could be because indigenous healers or the community members may not be in a position to identify diseases caused by physiological reasons.

Snake and scorpion bites are quite common in the state and are considered as physical illnesses to be treated by experienced indigenous healers who are known to the community. Other major reported illnesses include fever, vomiting, diarrhoea, jaundice, chicken pox and polio. Broadly, either external or physical factors or both could cause the illness or abnormal health status. In this context, the external factors largely relate to supernatural powers like *bhooth (ghost),*

prêt (evil spirit), *jadu tona* (black magic), 'evil eye' and disobedience of *Devi–Devta* (Gods and Goddesses). Physical factors are largely bodily imbalances caused by unhealthy living environment, impure water and food, indigestion and physical weakness. Consumption of excessive liquor, change in weather and heavy work in hot weather can also lead to health complications. The methods of diagnosis include identification of the cause of illness.

The traditional healers have highly individualized methods of treatment. They invoke supernatural powers, spirits, Gods and Goddesses to find out the cause of illness. It is followed by treatment through rituals, sacrifices and ceremonies and/or herbal medicines, which are procured, prepared and administered by the traditional healer. The treatment continues until the patient is cured.

Indigenous Healers' Credibility and Effectiveness

Across rural Chhattisgarh, the credibility and effectiveness of the traditional healers is high and recognized by the health workers and the State health officials. The indigenous healers are aware of their social position, credibility and effectiveness in the community, though they accept it with modesty.

The traditional healer is a major health worker for the treatment of all types of ailments. He is consulted first for any kind of health issue in the community. If he is unable to cure the patient, he either refers him/her to a modern health centre or to another indigenous healer.

The healing ability is seldom acquired through any organized training. The indigenous healers have reported that they had acquired their healing ability when they had a “visions” or “dreams”, in which they were ordained by the spiritual power to carry out the will of the God to serve the community. In some cases, they had communion with spiritual power, Gods and Goddesses through another indigenous healer, who in most cases were related to him. Traditional healers indicated that they had acquired knowledge of herbal medicine from another traditional healer, who happened to be the father, in most cases.

The traditional system of medicine has been handed down orally from generation to generation. There are no written records on this branch of medicine. The knowledge and skills are usually transmitted from father to son. The children watch their elders diagnosing and treating patients from a very young age, and are taught to prepare medicines. All the ingredients for the medicines are derived from nature. Besides herbs, seeds, roots and barks, various minerals, metals and other natural matters in their powdered form, are used for the preparations. The healers themselves gather all the necessary plants and herbs that grow wild in the forests intoning special prayers. The medicines are mostly prepared using a mortar and pestle to pound the various ingredients together.

The traditional healers do not charge a fixed rate for the treatment given. Their livelihood depends on '*dakshina*', (offerings), which they accept from patients, who give according to their wishes or means. Opinion about the

credibility and effectiveness of indigenous healers varies, but very few think that they lack credibility and are ineffective. Over 90 per cent think of them as credible and effective, though CHC and PHC doctors do not enjoy the same degree of credibility and effectiveness due to their limited availability, relatively longer waiting period, cost of treatment and monetary expectations from the patients. In addition, it is believed that doctors cannot treat the illness caused by supernatural powers.

Perceptions about State Health Services

The medical doctors and health workers are perceived as trained professionals. Often, they work as a team supported by specialized men and machines for diagnosis and treatment, which are bound by the hospital/ PHC/CHC timings. The patients are forced to purchase medicines in most cases, as they are not available in PHCs, CHCs and hospitals requiring cash in hand. By any standard, the medicines are considered costly and treatments are long drawn, often requiring several visits to other specialists before completing the treatment.

Doctors and health workers are considered greedy, ready to squeeze money from the patients. Treatment is often delayed and the entire process seems to make the patients and those who attend on them run around before getting treatment. The communicative language of the health workers, especially doctors are often at variance from the patients, leading to lack of understanding of the illness.

In spite of these problems, treatments for certain illness, especially for those who can afford it, get treated and recover from the illness except sickness caused due to evil spirits (*bhut prêt),* black magic (*jadutona*) and the 'evil eye' (*najar)*, for which it is strongly believed that there is no allopathic treatment and can only be treated by indigenous healers.

Health communication continues to be largely verbal and face-to-face for exchange of health information. In this respect, inter-personal communication remains the most dominant mode of information exchange and health advice followed by the health workers and by PHC and CHC workers including doctors. Village elders and other members of the community are the other sources of health information. Exposure to mass media, especially radio and television is low and vary between 24 to 50 per cent. It is followed by newspaper, *natak* (folk play), poster and wall paintings.

SUMMARY AND CONCLUSION

Based on the above analysis, it is suggested that a separate set of target-focused IEC communication strategy should be evolved for disseminating health messages to community and traditional healers. The indigenous healers require intensive mass media exposure, especially in the areas of health and health program related information.

Therefore, it is imperative to utilize the services of traditional healers for promoting State health service, in which they become agents of behavior change and provide an entry point to the

community by designing an effective communication strategy to reach out to the community through indigenous healers. One of the roles that communication can play is to sensitize and train indigenous healers to identify such cases in the community and report to the health workers.

A series of communication efforts would be required to dispel the strongly held belief that illness is caused by supernatural powers and that only indigenous healers were capable of treating them. The other IEC communication strategy could be to encourage the use of State health services without discouraging or preventing the community from consulting indigenous healers.

WHO: Indigenous Medicine (2003) notes that indigenous healers are significant in developing countries because they are more accessible and affordable. In addition they are more socially accepted as compared to formally trained health workers from urban areas.[2]

Traditional healers play a significant role in a health system. Indigenous healers are usually informal, unrecognised by government and don't interact with rest of the health system. Yet they can be a formal part of a system.

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REFERENCES

1. Jha N, Kannan AT. Utilizing Indigenous Healers in Primary Health Care; Regional Health Forum 1999; 5(2), Healers.
2. World Bank-Health System, Traditional Health Services.
   Available from : http://web.worldbank.org /WBSITE/EXTERNAL/TOPICS/ EXTHEALTH NUTRITION AND POPULATION/EXTH SD/OD Content MDK : 2019082.

WORK FORCE IN INDIA: EVIDENCES FROM 2001 AND 2011 CENSUSES

Binod Kumar Singh[1]

Abstract: *Changes in the size of the work force are determined by population growth and work participation rates. Population growth depends upon fertility, mortality and migration. Rapid population growth in India causes problem in the labour market. The growth of workers has not matched the population growth resulting in higher dependency ratios and sizeable unemployment or underemployment. Only a part of the entire population of the country is engaged in the production of goods and services. The labour force of a country is comprised of persons who can work and choose to do so while the work force consists of only those persons who are employed fully or partially. The present study covers only the work force of the country and not the labour force. The objective of the present study is to describe trends in the work force in India. These trends have strong implications for economic and social development planning. The study examines the population growth and changes in work force participation using the census data of 2001 and 2011 for India and its States and Union Territories. The work participation by sex and rural/urban areas are presented. Trends in the composition of workers by sectors are discussed. The study, it is believed, will have distinct practical utility.*

Keywords: Work force, work participation rate, fertility, mortality, goods, services, development, planning.

BACKGROUND

As per the Census 2011, the Indian work force is 481.7 million, which constitutes 39.8 percent of the total population of the country. The workers comprise 362.4 million main workers (i.e., those who have worked for the major part of the year (183 days or more) preceding 12 months to the census taking) and 119.3 million marginal workers (i.e., those who did not work for at least 183 days in the preceding 12 months to the census taking). Main workers constitute 75.2 percent of the total workers. The remaining are marginal workers. Sex differential among the number of male and female workers in the total work force is significant. Of the total workers, 331.9 million are males and 149.8 million females i.e. 53.3% of the total males and 25.5% of the total females are workers. The number of female workers is about less than half the number of male workers. In terms of proportion, 68.9% of the workers are males and 31.1 percent females. During 2001-2011, India witnessed an increase of 79.5 million workers, grew by 19.8%, against 88.1 million or 28.0% in the previous decade of 1991-2001. Between 2001 and 2011, India experienced a work force shortage as compared to the previous decade indicating an approach of structural and demographic shift in employment in India and around the globe. While economic conditions impact the day-to-day demand for talent, the work force challenges are expected to eclipse past labour shortages. Changes in the size of the work force are determined by population growth and

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work participation rates. Population growth depends upon fertility, mortality and migration. For the country as whole the migration factor has been quite insignificant. During the 2001-2011 decade the population of India increased by 17.7%. The annual birth rate per 1000 population dropped from 25.4 in 2001 to 21.8 in 2011 and the death rate declined from 8.4 to 7.1. The corresponding figures for the infant mortality rate were 66 and 44 respectively. It is evident from these figures that while both the birth rate and death rate have been declining, the population growth rate continues to be high.

The growth of workers has not kept pace with the population growth resulting in higher dependency ratios and sizeable unemployment or underemployment. Only a part of the entire population of the country is engaged in the production of goods and services. The labour force of a country comprises of persons who can work and choose to do so while the work force consists of only those persons who are employed partially or fully. The present study covers only the work force of the country and not the labour force. The objective of the present study is to describe trends in the work force in India. These trends have strong implications on economic and social development planning. The study examines the population growth and changes in work force participation using the census data of 2001[1,2] and 2011[3] for India and its States and Union Territories. The work participation by sex and rural/urban areas are presented. Trends in the composition of workers by occupational classification are discussed.

METHODS

The terminology such as work, work force, worker, main workers, marginal workers, non-workers, occupational structure and work participation as defined in census 2011; the same has been adopted in this study for analysis and interpretation of results. Work was defined in the 2011 census terminology as participation in any economically productive activity with or without compensation or profit (one year preceding the date of enumeration). Such participation may be physical or mental in nature. GIS software - ArcGIS 10.0 version for windows was used for thematic mapping, statistical computation and graphical presentation in relation to selected geographic areas. Statistical analyses are performed on the data which led to trend determination, and Maps are drawn to show the geographic distributions of the data associated with the "problem areas" or areas of potential growth and visual situations.

ANALYSIS AND RESULTS

1. Trend in work force and work participation rates for all India

1.1 Growth of population and workers

The decadal growth rate of population was 12.3% for rural areas, and 31.8% for urban areas. The higher growth rate observed in the urban areas is due to in-migrants searching for employment, education, and urban facilities, in addition to the natural growth. In the urban areas, males showed a growth rate of 29.8% and females of 34.0%, the corresponding figures for the rural areas being 12.1% and 12.5% respectively. The growth rate of females is higher both in rural and urban areas than males.

Table 1 shows the growth rates (%) of population, workers, main workers and marginal workers by sex and residence according to social groups for India during 2001-2011. The growth rate of workers during 2001-2011 was 20.7% for males and 17.8% for females. In fact, the growth rate of male workers is significantly higher than that of male population as greater proportions of men were inducted into the work force. This may be due to increase in male literacy, the availability of jobs for men, and expansion of service sectors. The table 1 also shows that the number of male workers increased at a higher rate than the females. However, the growth rate of female workers remained low as compared to the population growth. One reason for this may be limited employment generation and lack of desired changes in the outlook for working females. The growth rates of workers are invariably higher in urban areas than in rural areas both for males and females. In the urban areas, female workers showed a growth rate of 74.1% and male workers of 38.0%, the corresponding figures for the rural areas being 9.6% and 14.0% respectively.

The growth rate of all main workers during 2001-2011 was 15.8%, 13.7% for males and 22.6% for females. However, the growth rate of all marginal workers was 33.7%, 68.4% for males and 11.4% for females. The table 1 shows that the number of female main workers increased at higher rate than the male main workers both for rural and urban areas, while, the growth rate of male marginal workers was much higher than that of female marginal workers in rural areas of the country. The growth rates of main and marginal workers are consistently lower in rural areas than in urban areas both for males and females.

Overall the decadal growth rate of SC population is lower than the growth rate of SC workers. The decadal growth rate of SC population is substantially

Table 1: Growth Rates (%) of Population and Workers by Social Groups according to Sex and Residence, 2001-2011, India

Sex and Place of Residence	Decadal Growth Rates (%)											
	Overall				Scheduled Castes				Scheduled Tribes			
	Population	Workers	Main Workers	Marginal Workers	Population	Workers	Main Workers	Marginal Workers	Population	Workers	Main Workers	Marginal Workers
Total												
Person	17.7	19.8	15.8	33.7	20.8	22.2	18.4	32.5	23.7	22.8	15.4	39.3
Male	17.1	20.7	13.7	68.4	20.3	25.1	17.2	62.8	22.9	24.5	13.3	74.7
Female	18.3	17.8	22.6	11.4	21.5	16.9	21.9	10.8	24.4	20.7	19.2	22.5
Rural												
Person	12.3	12.5	7.2	27.3	15.7	15.4	9.8	28.7	21.3	20.4	12.1	38.2
Male	12.1	14.0	5.3	63.9	15.3	18.3	8.4	61.0	20.7	21.9	9.9	74.3
Female	12.5	9.6	12.7	6.1	16.0	10.6	13.6	7.2	21.9	18.7	16.0	21.6
Urban												
Person	31.8	44.3	39.2	94.4	41.3	58.0	55.6	72.4	49.7	61.1	58.9	71.7
Male	29.8	38.0	33.9	94.7	39.6	54.2	51.5	75.5	47.0	56.5	52.9	83.3
Female	34.0	74.1	69.0	93.9	43.2	70.5	71.5	67.7	52.6	71.6	76.0	60.5

Source: Author's calculation based on data of 2001 and 2011 censuses.

higher than the SC workers in urban areas as compared to rural areas of the country. It is interesting to note that the decadal growth of SC women is significantly higher than the SC women workers as compared to male counterparts in rural areas and reverse case is observed for urban areas. However, the decadal growth of ST population is higher that of the ST workers. The decadal growth rate of ST population in urban areas is considerably lower than the ST workers in urban areas of India.

1.2 Work participation rates

Work participation rate is defined as the number of workers per 100 people. Table 2 gives the work participation rates for main, marginal and total workers by sex and residence in the 2001 and 2011 censuses. The work participation rate for persons was 39.8%, 53.3% for males and 25.5% for females in 2011. Work participation rates are lower in urban areas than in rural areas for persons and females, while, slightly higher for males in urban areas than in rural areas. While the work participation rates for main workers showed a decreasing trend in rural areas and increasing trend in urban areas. However, the work participation rates for marginal workers showed an increasing trend both in rural and urban areas of the country. Contrary to the general trend, the work participation rates for female marginal workers showed a decreasing trend in rural area and increasing trend in urban area.

The SC work participation rate was marginally higher than the overall work participation rate during 2001. The similar pattern is also observed for the period of 2011. The SC work participation rate is marginally lower in rural areas and considerably lower in urban areas than the national average. The ST work participation rate was substantially higher than national average during both the censuses. This pattern holds true for rural and urban areas of the country. ST female work participation is substantially higher than the national average and also higher the SC female work participation rate.

1.3 Distribution of workers by sector

The classification of workers into various sectors can give an indication of the level of economic development. In other words the shift of workers from the primary sector in the economy to secondary and tertiary follows the industrialisation and development of the economy. Primary sector relates to the production of primary goods in agriculture and in allied pursuits. Workers engaged in this sector include persons engaged as cultivators; as agricultural labourers; in livestock, forestry, fishing, etc.; and in mining and quarrying. Secondary sector includes all persons engaged in manufacturing, processing, servicing and repairs in household industry and other than household industry and con-structions. Tertiary sector includes trade and commerce; transport, storage and communications; and other services. Census gives the broad classification of workers as cultivators, agricultural labourers, household industry workers and other workers. In this analysis, cultivators and agricultural labourers were included in the primary sector; household industry workers were included in secondary sector; and other workers were considered in tertiary sector.

Table 2 : Work Participation Rates (%) for Marginal, Main and Total Workers by Social Groups, India. 2001 and 2011

Place of Residence and Social Groups	Category of Workers	2001			2011		
		Persons	Males	Females	Persons	Males	Females
All Social Groups							
Total	(a) Marginal	8.7	6.6	11.0	9.9	9.4	10.3
	(b) Main	30.4	45.1	14.7	29.9	43.8	15.2
	(c) Total	39.1	51.7	25.6	39.8	53.3	25.5
Rural	(a) Marginal	10.9	7.8	14.1	12.3	11.4	13.3
	(b) Main	30.9	44.3	16.6	29.5	41.6	16.7
	(c) Total	41.7	52.1	30.8	41.8	53.0	30.0
Urban	(a) Marginal	3.0	3.4	2.5	4.4	5.1	3.5
	(b) Main	29.3	47.2	9.4	30.9	48.7	11.9
	(c) Total	32.3	50.6	11.9	35.3	53.8	15.4
Scheduled Castes							
Total	(a) Marginal	10.9	8.8	13.2	12.0	11.9	12.0
	(b) Main	29.5	41.9	16.2	28.9	40.8	16.3
	(c) Total	40.4	50.7	29.4	40.9	52.8	28.3
Rural	(a) Marginal	12.5	9.7	15.5	13.9	13.5	14.3
	(b) Main	30.0	41.9	17.4	28.5	39.3	17.0
	(c) Total	42.5	51.6	32.9	42.4	52.9	31.3
Urban	(a) Marginal	4.7	5.4	3.9	5.7	6.8	4.6
	(b) Main	27.4	42.0	11.6	30.2	45.6	13.9
	(c) Total	32.1	47.4	15.6	35.9	52.4	18.5
Scheduled Tribes							
Total	(a) Marginal	15.2	9.7	20.9	17.2	13.7	20.6
	(b) Main	33.8	43.5	23.9	31.5	40.1	22.9
	(c) Total	49.1	53.2	44.8	48.7	53.9	43.5
Rural	(a) Marginal	16.1	10.0	22.3	18.3	14.5	22.2
	(b) Main	34.3	43.7	24.6	31.7	39.8	23.4
	(c) Total	50.4	53.8	46.9	50.0	54.3	45.6
Urban	(a) Marginal	5.8	5.5	6.1	6.7	6.9	6.4
	(b) Main	28.7	41.3	15.5	30.5	42.9	17.8
	(c) Total	34.6	46.8	21.6	37.2	49.8	24.3

Source: Author's calculation based on data of 2001 and 2011 censuses.

Workers move from the primary to the secondary and tertiary sectors as the economy develops. Large proportions of India's working population are still engaged in the primary sector despite the massive investments being made under the Five Year Plans. However, this proportion continues to decline with every increase in the industrialisation of the country. The share of workers in the primary sector has decreased from 58.2% in 2001 to 54.6% in 2011 (Table 3). The share of cultivators in total workers has decreased from 31.7% in 2001 to 24.6% in 2011, while, the share of agricultural labourers has increased to 30.0% in 2011 from 26.5% in 2001. The secondary sector or share of household industry workers in total workers has decreased from 4.2% in 2001 to 3.8% in 2011. In the tertiary sector, the proportion has increased significantly from 37.6% in 2001 to 41.6% in 2011. In case of males the share in the primary sector has

Table 3: Distribution of Workers by Primary, Secondary and Tertiary Sectors according to Social Groups, India 2001 and 2011

Sector/ Workers	All Social Groups						SC Population						ST Population					
	2001			2011			2001			2011			2001			2011		
	P	M	F	P	M	F	P	M	F	P	M	F	P	M	F	P	M	F
1. Primary Sector (Cultivators + Agricultural labourers)																		
Total	58.2	51.9	71.8	54.6	49.9	65.1	65.6	60.3	75.5	60.7	56.4	69.1	81.6	77.9	86.0	79.0	75.7	83.2
Rural	73.3	69.5	80.1	72.3	69.6	77.3	75.7	72.1	81.8	73.4	70.5	78.5	85.4	82.9	88.4	84.0	81.8	86.6
Urban	7.5	6.0	14.7	8.3	7.3	12.1	12.8	9.9	22.2	12.2	10.4	17.6	18.9	14.8	28.5	19.1	16.0	25.7
1.1 Cultivators																		
Total	31.7	31.1	32.9	24.6	24.9	24.0	20.0	21.0	18.1	14.8	15.5	13.4	44.8	47.7	41.3	34.5	38.2	29.9
Rural	40.2	42.0	37.1	33.0	35.2	28.8	23.5	25.6	19.9	18.2	19.7	15.5	47.2	51.1	42.6	36.9	41.6	31.3
Urban	2.8	2.5	4.1	2.8	2.7	3.1	1.8	1.6	2.2	1.7	1.7	1.8	6.5	5.6	8.7	5.8	5.4	6.7
1.2 Agricultural Labourers																		
Total	26.5	20.8	38.9	30.0	24.9	41.1	45.6	39.2	57.4	45.9	41.0	55.7	36.8	30.2	44.7	44.5	37.5	53.3
Rural	33.0	27.5	43.0	39.3	34.4	48.5	52.2	46.5	61.8	55.2	50.8	63.0	38.3	31.9	45.7	47.1	40.3	55.3
Urban	4.7	3.4	10.7	5.5	4.6	9.0	11.0	8.3	20.1	10.5	8.7	15.8	12.4	9.2	19.8	13.3	10.6	19.0
2. Secondary Sector (Household Industry Workers)																		
Total	4.2	3.2	6.5	3.8	2.9	5.7	3.9	3.0	5.6	3.2	2.4	4.8	2.1	1.5	2.9	1.8	1.3	2.4
Rural	3.9	3.0	5.5	3.4	2.6	5.0	3.7	2.9	5.0	3.0	2.3	4.4	2.1	1.4	2.8	1.7	1.2	2.3
Urban	5.2	3.6	12.8	4.8	3.7	8.8	4.8	3.3	9.9	4.0	3.0	7.0	2.9	1.9	5.2	2.5	1.9	3.8
3. Tertiary Sector (Other Workers)																		
Total	37.6	44.9	21.7	41.6	47.2	29.2	30.5	36.7	19.0	36.1	41.1	26.1	16.3	20.6	11.0	19.2	23.0	14.5
Rural	22.8	27.5	14.4	24.3	27.8	17.7	20.6	25.0	13.2	23.6	27.2	17.1	12.5	15.6	8.8	14.3	16.9	11.2
Urban	87.3	90.4	72.5	86.9	89.0	79.1	82.4	86.8	67.8	83.8	86.6	75.4	78.2	83.4	66.3	78.3	82.1	70.4

Source: Author's calculation based on data of 2001 and 2011 censuses.

decreased from 51.9% (31.1% male cultivators and 20.8% male agricultural labourers) to 49.9% (24.6% male cultivators and 24.9% male agricultural labourers) in 2011. The share of male workers in secondary sector has also decreased from 3.2% in 2001 to 2.9% in 2011. The share of male workers in the tertiary sector has increased from 44.9% in 2001 to 47.2% in 2011. With regard to females, the primary sector share has decreased from 71.8% (32.9% female cultivators and 38.9% female agricultural labourers) to 65.1% (24.0% female cultivators and 41.1% female agricultural labourers) in 2011. The share of female workers in secondary sector has also decreased from 6.5% in 2001 to 5.7% in 2011. The share of female workers in the tertiary sector has increased from 21.7% in 2001 to 29.2% in 2011 (Table 3). The primary sector remains the dominant source of employment generation in India. Analysis of census data reveals that approximately 80 million new workers were inducted into the work force from 2001 to 2011. Of these new workers, 36.4% are found to be engaged in primary sector, 1.7% in secondary sector, and 61.9% in the tertiary sector. Primary sector employment generation is important for both sexes, but especially for women. Forty per cent of the male entrants and 27.5% of the female entrants to the work force found primary sector employment during this period.

About three-fifths of the SC workers and 79% of the ST workers were

engaged in primary sector as compared to 54.6% of workers engaged in primary sector. The proportion of SC and ST workers engaged in secondary sector is very less as compared to group of total workers. The SC and ST workers engaged in tertiary sector are also small.

2. Growth of Workers and Work Participation Rates for States/ Union Territories of India

Growth rates of workers and work participation rates in the states and union territories of India present quite a diversified pattern. We analysed the census data relating to population growth, the growth of workers, and work participation rates States and Union Territory wise.

2.1 Growth of population and workers by States/UTs

During the decade 2001-2011, the population of India increased by 17.7%. Table 4 gives the growth rates of population and workers. The population growth rate varies between 55.9% in Dadra & Nagar Haveli and -0.6% in Nagaland. Among the States/UTs, four States/UTs namely Tamil Nadu, Chhattisgarh, Manipur and Puducherry have higher population growth rates in the 2001-2011 decade as compared to the previous decade of 1991-2001. The population of those states where the growth rate has increased account for 8.4% of the total population of India. The male growth rate varies between 62.5% (Daman & Diu) and -2.1% (Nagaland). The female growth rate varies between 51.7% (Dadra & Nagar Haveli) and 1.2% (Nagaland) against the national growth of 18.3%. The growth rate of workers during 2001-2011 is 19.8% for all workers, 20.7% for males and 17.8% for females. The work force of Mizoram (4.2%), Haryana (6.4%), Punjab (8.4%), Goa (10.4%), Andaman & Nicobar Islands (11.9%), Andhra Pradesh (13.0%), Kerala (13.0%) and Nagaland (14.9%) grew relatively slow, while Daman & Diu (66.6%), Dadra & Nagar Haveli (37.7%), Puducherry (29.9%), Jharkhand (29.6%), Tripura (26.7%), Chhattisgarh (25.8%), Rajasthan (25.7%), Assam (25.5%), Bihar (24.1%) and Uttarakhand (23.6%) have high growth rate of workers. The size of the male work force is determined mainly by the demographic factors, since by convention men are expected to engage in economic activity until they reach retirement. School and college enrolment does affect the work force participation of young men. However, the changes that take place in the work participation rates are usually small. The changes that do occur reflect changes in work opportunities, unemployment and underemployment. The male workers grew at a rate of 20.7% for the country as a whole. The highest growth rate is reported for Daman & Diu (77.4%), followed by Dadra & Nagar Haveli (57.3%) and Chhattisgarh (29.0%), while lowest growth is reported for Kerala (8.8%) and preceded by Mizoram (10.5%) and Andaman & Nicobar Islands (10.7%). The regional patterns in the growth of population and work force are displayed in Figure-1 and 2 respectively.

The growth rate of female workers is appreciably lower than that of males in India. However, growth rate of female workers is considerably higher that of males in a total of 16 out of 35 states/union territories. These states/ union territories are Puducherry, Jharkhand, Tripura, Rajasthan, Assam, Bihar, Uttar Pradesh, Orissa, Delhi,

Arunachal Pradesh, Lakshadweep, Chandigarh, Nagaland, Andhra Pradesh, Andaman & Nicobar Islands and Kerala. The female work force has declined in Gujarat (-0.2%), Dadra & Nagar Haveli (-1.1%), Mizoram (-4.0%), Punjab (-15.9%) and Haryana (-20.7%). The highest growth rate of female workers is reported for Lakshadweep (59.8%), followed by Delhi (41.0%), Chandigarh (35.7%) and Jharkhand (35.5%), while lowest increase is reported for Jammu & Kashmir (5.0%), and preceded by Goa (6.8%), Daman & Diu (13.2%) and West Bengal (13.2%). The aggregate work force in India has been growing at a slightly faster rate than the total population. The work force grew slowly than the population only in Bihar, Arunachal Pradesh, Meghalaya, Jammu & Kashmir, Gujarat, Dadra & Nagar Haveli, Mizoram, Punjab and Haryana. The aggregate picture, however, masks different trends by sex. The rate of growth of male workers is about 3.6% higher than the growth rate of the male population. However, the female population has been growing more rapidly than the female workers, resulting in a higher dependency ratio. This may partially be due to changes in age composition, retirement practices, and increasing school enrolment rates. It may also partially be due to insufficient job opportunities, resulting in higher unemployment and underemployment. The male work force grew slowly than the male population only in Bihar, Arunachal Pradesh, Meghalaya, Jammu & Kashmir, Dadra & Nagar Haveli and Mizoram. The growth rate of female workers is 17.8%, while the population growth rate for women is 18.3%. Arunachal Pradesh, Chhattisgarh, Meghalaya, Madhya Pradesh, Manipur, Uttarakhand, Karnataka, West Bengal, Daman & Diu, Goa, Jammu & Kashmir, Gujarat, Dadra & Nagar Haveli, Mizoram, Punjab and Haryana are the 16 states/union territories which have female work force growing more slowly than the female population. The lower growth rate of female workers in these states/union territories is partially due to their decreased participation in the cultivation practices due to extensive use of improved agricultural implements.

2.2 Work participation rates by States/UTs

The work participation rate is defined as the percentage of workers to total population. Table 5 gives the sex-wise work participation rates for 2001 and 2011 in India and its states and union territories. The overall work participation rate for the country as a whole has marginally increased between 2001 and 2011 form 39.1% to 39.8%. The work participation rate has noticeably decreased in Jammu & Kashmir, Punjab, Haryana, Bihar, Arunachal Pradesh, Mizoram, Meghalaya, Gujarat, and Dadra & Nagar Haveli, whereas in other states and union territories it has increased. Figure-3 and 4 display the regional patterns in work participation rates by states for 2001 and 2011 respectively. The work participation rate for males for the country as a whole has marginally increased from 51.7% in 2001 to 53.3% in 2011. The work participation rate for males has conspicuously decreased in Jammu & Kashmir, Bihar, Arunachal Pradesh, Mizoram, Meghalaya, and Dadra & Nagar Haveli, whereas in the other states and union territories it has increased. Among the states there are sharp differences in male participation, as the percentage varies between 46.2% in Lakshadweep and 71.5% in Daman &

Table 4: Growth Rate (%) of Population and Workers by Sex, 2001-2011

India/States/Union Territories		Population Growth Rate, 2001 - 2011			Workers Growth Rate, 2001 - 2011		
		P	M	F	P	M	F
	India	**17.7**	**17.1**	**18.3**	**19.8**	**20.7**	**17.8**
1	Jammu & Kashmir	23.6	23.9	23.4	15.2	19.2	5.0
2	Himachal Pradesh	12.9	12.8	13.1	18.9	21.1	16.1
3	Punjab	13.9	12.7	15.2	8.4	16.0	-15.9
4	Chandigarh	17.2	14.5	20.6	18.7	15.4	35.7
5	Uttarakhand	18.8	18.8	18.9	23.6	27.8	16.0
6	Haryana	19.9	18.8	21.2	6.4	19.1	-20.7
7	Delhi	21.2	18.1	24.9	22.9	20.3	41.0
8	Rajasthan	21.3	20.8	21.8	25.7	24.5	27.8
9	Uttar Pradesh	20.2	19.3	21.2	21.9	21.6	22.8
10	Bihar	25.4	25.5	25.3	24.1	23.1	26.8
11	Sikkim	12.9	12.0	13.9	17.1	17.3	16.9
12	Arunachal Pradesh	26.0	23.1	29.3	21.7	19.3	25.4
13	Nagaland	-0.6	-2.1	1.2	14.9	11.9	18.9
14	Manipur	18.6	17.8	19.5	22.6	26.2	18.1
15	Mizoram	23.5	21.0	26.2	4.2	10.5	-4.0
16	Tripura	14.8	14.1	15.6	26.7	25.7	29.2
17	Meghalaya	27.9	26.8	29.1	22.2	23.8	20.0
18	Assam	17.1	15.7	18.5	25.5	24.3	28.5
19	West Bengal	13.8	12.9	14.9	17.9	19.3	13.3
20	Jharkhand	22.4	21.9	22.9	29.6	26.5	35.5
21	Odisha	14.0	13.7	14.4	22.9	21.4	26.0
22	Chhattisgarh	22.6	22.5	22.7	25.8	29.0	21.7
23	Madhya Pradesh	20.3	19.6	21.1	22.4	24.4	19.0
24	Gujarat	19.3	19.4	19.2	16.5	24.3	-0.2
25	Daman & Diu	53.8	62.5	41.5	66.6	77.4	13.2
26	Dadra & Nagar Haveli	55.9	59.3	51.7	37.7	57.3	-1.1
27	Maharashtra	16.0	15.6	16.5	20.0	21.5	17.4
28	Andhra Pradesh	11.0	10.2	11.8	13.0	11.6	15.2
29	Karnataka	15.6	15.1	16.1	18.4	19.9	15.7
30	Goa	8.2	7.6	8.9	10.4	11.8	6.8
31	Lakshadweep	6.3	6.4	6.2	22.1	16.0	59.8
32	Kerala	4.9	3.6	6.1	13.0	8.8	25.8
33	Tamil Nadu	15.6	15.1	16.1	18.0	18.4	17.1
34	Puducherry	28.1	25.8	30.4	29.9	28.7	33.4
35	Andaman & Nicobar Islands	6.9	5.1	8.9	11.9	10.7	16.8

Source: Author's calculation based on data of 2001 and 2011 censuses.

Diu. During 2001-11, the highest increase in the male work participation rate is reported in Nagaland, followed by Daman & Diu, Tripura, Himachal Pradesh, Lakshadweep, Assam, Odisha and Uttarakhand, while the lowest increase is reported in Haryana, followed by Chandigarh, Andhra Pradesh, and Uttar Pradesh (Table 5). Contrary to the general pattern, the work participation rate for females for the country as a whole has marginally decreased from 25.6% in 2001 to 25.5% in 2011. In a total of 15 out of 35 states/union territories have returned lower work participation rates in 2011 as compared to 2001. These

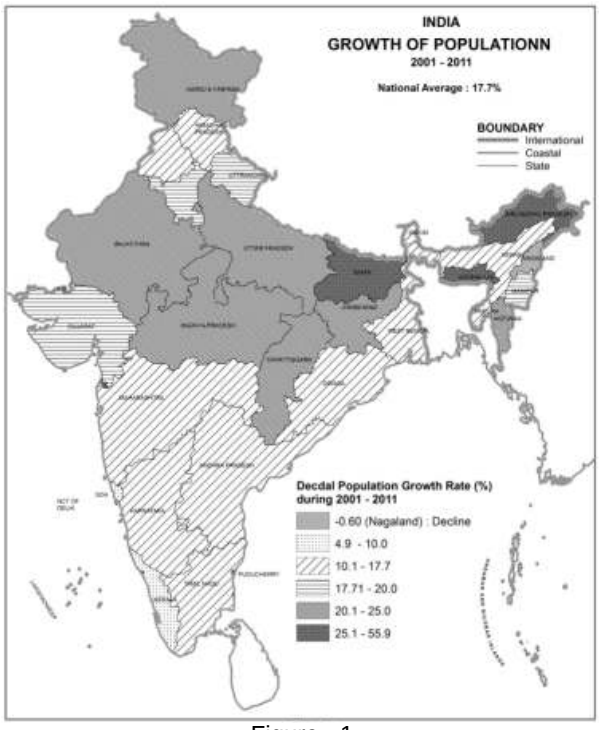

Figure - 1

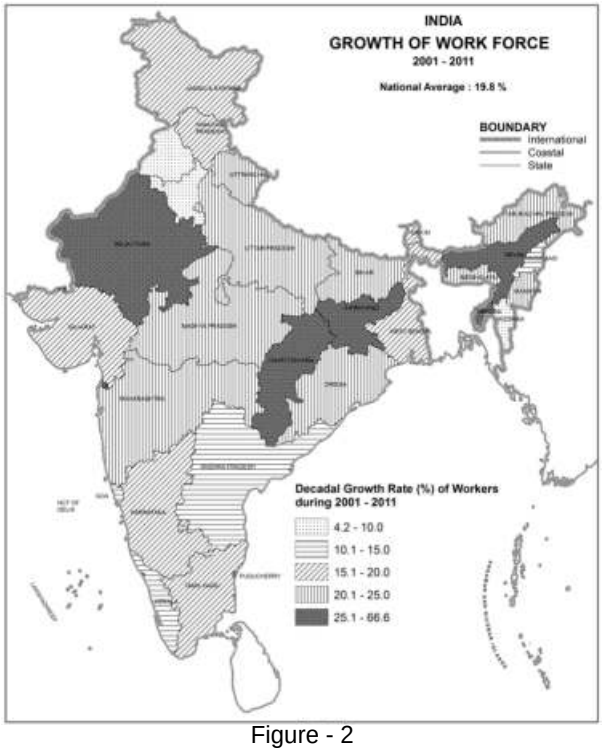

Figure - 2

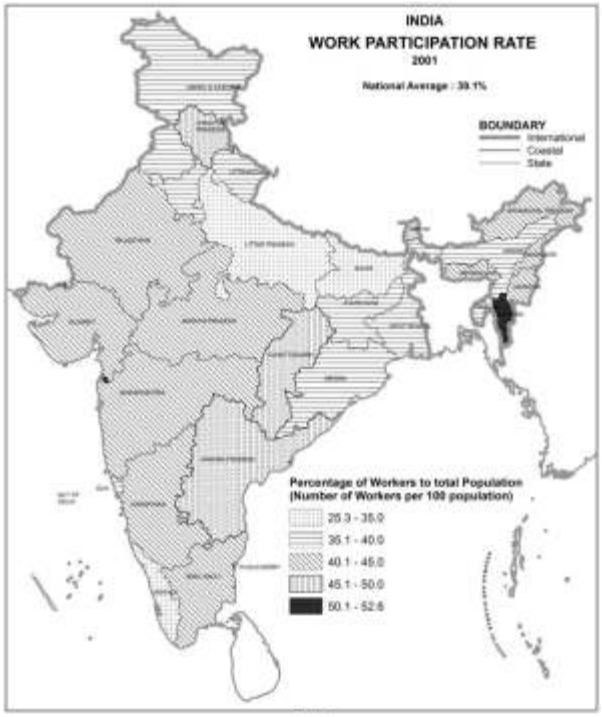

Figure - 3

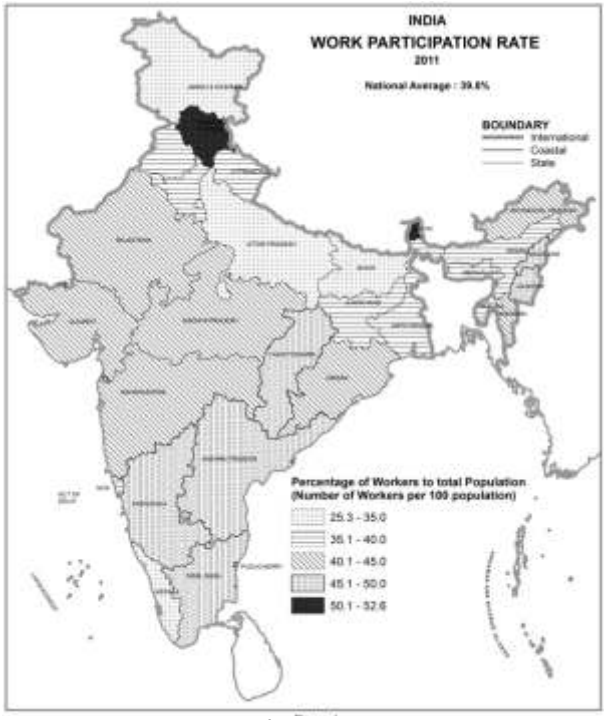

Figure - 4

States/UTs are Jammu & Kashmir, Punjab, Uttarakhand, Haryana, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, West Bengal, Chhattisgarh, Madhya Pradesh, Gujarat, Daman & Diu, Dadra & Nagar Haveli, Karnataka and Goa, whereas in the other states it has increased. Among the states there are

Table 5: Work Participation Rates (%) by Sex, 2001-2011

India/States/Union Territories		Work Participation Rate, 2001			Work Participation Rate, 2011		
		P	M	F	P	M	F
	India	39.1	51.7	25.6	39.8	53.3	25.5
1	Jammu & Kashmir	37.0	50.0	22.5	34.5	48.1	19.1
2	Himachal Pradesh	49.2	54.6	43.7	51.9	58.7	44.8
3	Punjab	37.5	53.6	19.1	35.7	55.2	13.9
4	Chandigarh	37.8	56.1	14.2	38.3	56.5	16.0
5	Uttarakhand	36.9	46.1	27.3	38.4	49.7	26.7
6	Haryana	39.6	50.3	27.2	35.2	50.4	17.8
7	Delhi	32.8	52.1	9.4	33.3	53.0	10.6
8	Rajasthan	42.1	50.0	33.5	43.6	51.5	35.1
9	Uttar Pradesh	32.5	46.8	16.5	32.9	47.7	16.7
10	Bihar	33.7	47.4	18.8	33.4	46.5	19.1
11	Sikkim	48.6	57.4	38.6	50.5	60.2	39.6
12	Arunachal Pradesh	44.0	50.6	36.5	42.5	49.1	35.4
13	Nagaland	42.6	46.7	38.1	49.2	53.4	44.7
14	Manipur	43.6	48.1	39.0	45.1	51.6	38.6
15	Mizoram	52.6	57.3	47.5	44.4	52.4	36.2
16	Tripura	36.2	50.6	21.1	40.0	55.8	23.6
17	Meghalaya	41.8	48.3	35.1	40.0	47.2	32.7
18	Assam	35.8	49.9	20.7	38.4	53.6	22.5
19	West Bengal	36.8	54.0	18.3	38.1	57.1	18.1
20	Jharkhand	37.5	48.0	26.4	39.7	49.8	29.1
21	Odisha	38.8	52.5	24.7	41.8	56.1	27.2
22	Chhattisgarh	46.5	52.8	40.0	47.7	55.6	39.7
23	Madhya Pradesh	42.7	51.5	33.2	43.5	53.6	32.6
24	Gujarat	41.9	54.9	27.9	41.0	57.2	23.4
25	Daman & Diu	46.0	65.5	18.6	49.9	71.5	14.9
26	Dadra & Nagar Haveli	51.8	62.3	38.7	45.7	61.6	25.3
27	Maharashtra	42.5	53.3	30.8	44.0	56.0	31.1
28	Andhra Pradesh	45.8	56.2	35.1	46.6	57.0	36.2
29	Karnataka	44.5	56.6	32.0	45.6	59.0	31.9
30	Goa	38.8	54.6	22.4	39.6	56.8	21.9
31	Lakshadweep	25.3	42.4	7.3	29.1	46.2	11.0
32	Kerala	32.3	50.2	15.4	34.8	52.7	18.2
33	Tamil Nadu	44.7	57.6	31.5	45.6	59.3	31.8
34	Puducherry	35.2	53.1	17.2	35.7	54.4	17.6
35	Andaman & Nicobar Islands	38.3	56.6	16.6	40.1	59.6	17.8

Source: Author's calculation based on data of 2001 and 2011 censuses.

sharp differences in female participation, as the percentage varies between 10.6% in Delhi and 44.8% in Himachal Pradesh. There are a number of possible causes for this variation in female work participation rates across states. In general, the states having high female participation rates are either comparatively more developed indus-trially like Tamil Nadu, Maharashtra, and Karnataka or are observing more females in Bihar, Rajasthan and Madhya Pradesh or having higher concentration of Scheduled Tribes in Chhattisgarh, Jharkhand and most of the north-eastern states.

2.3 Distribution of workers by sector among States/UTs

Table 6 gives the distribution of workers by sector and by sex. In 2001, 51.9% of the male workers were engaged in primary sector for the country as a whole, 3.2% in the secondary sector and 44.9% in the tertiary sector. The corresponding

figures for 2011 are 49.9, 2.9 and 47.2. The transfer of men out of the primary sector has occurred in all the states except West Bengal, Maharashtra, Chandigarh, Delhi, and Lakshadweep.

The percentage of workers in the primary sector was greater among females than males in all the states, except in Punjab, in 2001. However, the percentage of workers in the primary sector was greater among females than males in most of the states in 2011, except Punjab, Chandigarh, Assam, West Bengal and Lakshadweep, where percentage of workers in the primary sector is lower among females than males. In 2001 as much as 71.8% of the female workers had been returned from the primary sector, 6.5% from secondary sector, and 21.7% from tertiary sector. The corresponding figures for 2011 census are 65.1, 5.7 and 29.2 respectively. There are differences in the sectoral composition of workers among the states and union territories.

i. Primary Sector- The decline in the share of male workers in the primary sector ranges from 0.2 in Madhya Pradesh to 11.1 in Dadra & Nagar Haveli. The increase in the share of male workers in the primary sector is reported only in West Bengal, Maharashtra, Chandigarh, and Delhi. It is worth to mention that male workers in the primary sector are not reported in Lakshadweep. The proportion of male workers engaged in primary sector in 2011 varies among states from 72.6% in Bihar to as low as 16.6% in Kerala. The lower proportion of such male workers is reported in all the union territories ranges from 1.1% in Chandigarh to 15.9% in Puducherry. In case of females, the proportion in the primary sector has declined invariably in all the states and union territories, except Chandigarh where no change is reported. The decline in the share of female workers in the primary sector is at a faster rate than for males. The decline in the share of female workers engaged in primary sector ranges from 0.9 in Delhi to 21.5 in Dadra & Nagar Haveli. The proportion of female workers engaged in primary sector in 2011 varies among states from 85.8% in Chhattisgarh to 15.5% in Goa. However, among the union territories it varies from as low as 1.0% in Chandigarh to as high as 24.7% in Puducherry (Table 6).

ii. Secondary Sector- In case of males, the proportion in the secondary sector or male workers engaged in household industry has declined in 2011 as compared to 2001 in 21 states/union territories; no change is reported in Mizoram, Maharashtra, Uttar Pradesh and Puducherry, while increase is reported in ten states/union territories during this period. The decrease is highest in Lakshadweep (3.2%) and lowest in Goa, Tripura and Nagaland (0.1% in each), while increase is highest in Uttarakhand, Punjab, Dadra & Nagar Haveli and Assam (0.5% in each) and lowest in West Bengal and Arunachal Pradesh (0.1% each). As with males, the proportion of female workers engaged in household industry has decreased in 2011 as compared to 2001 in 24 states/union territories; no change is reported in Himachal Pradesh; while increase is reported 10 states/union territories during this period. The percentage decrease is highest in Lakshadweep (13.2) and lowest decrease is reported in Puducherry (0.2). However, the percentage increase is

Table 6: Distribution of Workers in Primary, Secondary and Tertiary Sector (%) by Sex, 2001-2011

India/States/Union Territories	Primary Sector				Secondary Sector				Tertiary Sector			
	2001		2011		2001		2011		2001		2011	
	M	F	M	F	M	F	M	F	M	F	M	F
India	**51.9**	**71.8**	**49.9**	**65.1**	**3.2**	**6.5**	**2.9**	**5.7**	**44.9**	**21.7**	**47.2**	**29.2**
1 Jammu & Kashmir	44.6	59.9	36.9	54.4	4.7	10.1	2.9	7.2	50.7	30.0	60.2	38.4
2 Himachal Pradesh	52.8	88.8	49.4	81.0	2.0	1.4	1.8	1.4	45.2	9.8	48.8	17.6
3 Punjab	41.2	31.7	37.1	29.1	2.6	7.2	3.1	7.5	56.2	61.1	59.8	63.4
4 Chandigarh	0.8	1.0	1.1	1.0	0.9	2.5	1.1	1.7	98.4	96.6	97.9	97.3
5 Uttarakhand	43.8	83.9	40.0	72.8	2.2	2.5	2.7	3.4	54.0	13.6	57.2	23.7
6 Haryana	45.0	64.8	41.6	55.9	2.3	3.1	2.7	3.6	52.7	32.1	55.7	40.6
7 Delhi	1.0	2.6	1.2	1.7	2.8	4.7	3.2	3.5	96.2	92.7	95.6	94.8
8 Rajasthan	55.2	83.2	52.7	76.9	2.9	2.8	2.4	2.5	41.9	14.0	44.9	20.7
9 Uttar Pradesh	62.8	75.7	58.8	60.6	4.7	8.3	4.7	9.7	32.5	16.0	36.5	29.7
10 Bihar	74.1	85.7	72.6	76.0	3.2	5.9	3.0	6.8	22.6	8.3	24.4	17.1
11 Sikkim	47.6	71.3	39.2	59.0	1.7	1.4	1.5	1.9	50.7	27.3	59.3	39.0
12 Arunachal Pradesh	50.0	80.0	48.9	70.6	1.1	1.5	1.2	1.8	49.0	18.5	49.9	27.6
13 Nagaland	58.7	81.6	53.2	72.5	1.9	3.5	1.7	3.1	39.4	14.9	45.0	24.4
14 Manipur	50.1	54.8	47.3	51.5	3.9	18.3	3.0	14.1	46.0	26.9	49.7	34.5
15 Mizoram	54.5	68.5	52.3	60.9	1.3	1.8	1.3	2.0	44.2	29.7	46.4	37.0
16 Tripura	46.1	62.7	42.4	48.7	1.8	6.2	1.7	5.7	52.1	31.1	56.0	45.6
17 Meghalaya	60.8	72.9	54.5	64.2	1.6	3.0	1.3	2.3	37.5	24.1	44.1	33.5
18 Assam	50.5	57.3	49.5	48.9	1.9	7.9	2.4	8.3	47.6	34.8	48.1	42.7
19 West Bengal	43.5	46.3	44.7	41.7	4.1	17.7	4.2	16.8	52.4	36.1	51.1	41.5
20 Jharkhand	58.4	82.6	55.0	77.4	3.6	5.6	2.7	4.9	38.0	11.8	42.3	17.7
21 Odisha	60.5	74.0	57.6	70.7	3.3	8.5	3.7	6.1	36.2	17.5	38.7	23.2
22 Chhattisgarh	67.4	88.6	66.8	85.8	2.1	2.0	1.6	1.5	30.5	9.4	31.6	12.8
23 Madhya Pradesh	64.2	83.7	64.0	79.9	3.2	5.4	2.5	3.9	32.6	10.9	33.4	16.1
24 Gujarat	44.3	67.1	43.9	64.9	1.7	2.7	1.2	2.0	54.0	30.2	55.0	33.1
25 Daman & Diu	3.9	24.6	1.7	8.9	0.6	6.5	0.3	2.5	95.5	68.9	98.0	88.5
26 D & N Haveli	31.0	80.1	19.9	58.7	0.6	0.9	1.1	2.2	68.4	18.9	78.9	39.2
27 Maharashtra	43.2	77.0	44.0	69.5	2.1	3.6	2.1	3.2	54.7	19.4	53.8	27.3
28 Andhra Pradesh	53.8	75.9	51.6	72.0	3.3	7.0	2.7	5.2	42.9	17.1	45.7	22.8
29 Karnataka	48.9	68.2	44.0	59.4	2.7	6.7	2.4	4.9	48.4	25.2	53.6	35.7
30 Goa	11.1	30.2	8.0	15.5	2.4	3.9	2.3	3.1	86.5	65.9	89.6	81.4
31 Lakshadweep	0.0	0.0	0.0	0.0	4.1	17.0	0.9	3.8	95.9	83.0	99.1	96.2
32 Kerala	21.6	26.4	16.6	18.6	2.5	7.1	1.9	3.4	75.9	66.5	81.4	78.0
33 Tamil Nadu	41.5	63.8	35.3	54.8	3.6	8.7	2.8	6.8	54.9	27.5	61.9	38.4
34 Puducherry	20.0	37.4	15.9	24.7	1.3	3.7	1.2	3.4	78.7	58.9	82.9	71.9
35 A & N Islands	17.4	28.2	13.6	15.6	4.3	9.0	1.9	4.6	78.3	62.8	84.6	79.8

Source: Author's calculation based on data of 2001 and 2011 censuses.

highest in Uttar Pradesh (1.3) and lowest in Mizoram (0.2).

iii. Tertiary Sector – The proportion of males and females in the tertiary sector have increased in 2011 as compared to 2001 for the country as a whole. Among the states/union territories, the proportion of males in tertiary sector has decreased only in West Bengal, Maharashtra, Delhi and Chandigarh. However, the proportion of females in tertiary sector has increased all the administrative units. During 2001-11, an improvement in participation in tertiary sector was 10.6% in case of males and 20.2% in case of females.

Overall, a shift from the primary to the secondary and tertiary sectors is visible in all the states and union territories both in respect of males and females, but in the case of females the shift to the tertiary sector is quite substantial. The employment in the primary and secondary sector is decreasing, while employment in the tertiary sector is increasing at faster rate. The country

remains heavily agricultural with the primary sector male workers constituting more than 50% of the total male workers in eight EAG states except Uttarakhand where the share is about 40%. However, female workers engaged in primary sector constituting more than 50% of the total female workers in 23 out of 35 states/union territories. The proportion of workers in the primary sector is seen vary dramatically across the states. As an economy develops, labour is transferred out of the primary sector. Therefore, the states having lower per capita incomes also have greater proportions of workers in the primary sector. The correlation between state per capita income and the proportion of workers in the primary sector is negative.

CONCLUSIONS

During the 2001-2011 decade the population of India increased at the rate of 17.7% and workers grew by 19.8%. In absolute terms, there is a net addition of about 182 million persons in India's population and workers increased by 79.5 million during 2001-2011, against 88.1 million or 28.0% in the previous decade of 1991-2001. The growth of workers has not matched the population growth resulting in higher dependency ratios and sizeable unemployment or under employment. Only a part of the entire population of the country is engaged in the production of goods and services. In fact, the growth rate of male workers is significantly higher than that of male population as greater proportions of men are observed into the work force. This may be due to increase in male literacy, the availability of jobs for men, and expansion of service sectors. The growth rate of female workers, however, has not kept pace with the growth in population. One reason for this may be limited employment generation and not desired changes in the outlook for working females. The growth rates of workers are invariably higher in urban areas than in rural areas both for males and females. The aggregate work force in India has been growing at a slightly faster rate than the total population. The work force grew slowly than the population only in Bihar, Arunachal Pradesh, Meghalaya, Jammu & Kashmir, Gujarat, Dadra & Nagar Haveli, Mizoram, Punjab and Haryana. The aggregate picture, however, masks different trends by sex. The rate of growth of male workers is about 3.6% higher than the growth rate of the male population. However, the female population has been growing more rapidly than the female workers, resulting in a higher dependency ratio. This may partially be due to changes in age composition, retirement practices, and increasing school enrolment rates. It may also partially be due to insufficient job opportunities, resulting in higher unemployment and underemployment.

The work participation rate is defined as the percentage of workers to total population. The overall work participation rate for the country as a whole has marginally increased between 2001 and 2011 form 39.1% to 39.8%. The work participation rate has noticeably decreased in Jammu & Kashmir, Punjab, Haryana, Bihar, Arunachal Pradesh, Mizoram, Meghalaya, Gujarat, and Dadra & Nagar Haveli, whereas in other states and union territories it has increased. The work participation rate for males for the country as a whole has marginally increased from 51.7% in 2001 to 53.3% in 2011. The work participation rate for males has conspicuously decreased in

Jammu & Kashmir, Bihar, Arunachal Pradesh, Mizoram, Meghalaya, and Dadra & Nagar Haveli, whereas in the other states and union territories it has increased. Among the states there are sharp differences in male participation, as the percentage varies between 46.2% in Lakshadweep and 71.5% in Daman & Diu. During 2001-11, the highest increase in the male work participation rate is reported in Nagaland, while the lowest increase is reported in Haryana. Contrary to the general pattern, the work participation rate for females for the country as a whole has marginally decreased from 25.6% in 2001 to 25.5% in 2011. In a total of 15 out of 35 states/union territories have returned lower work participation rates in 2011 as compared to 2001.

The share of workers in the primary sector has decreased from 58.2% to 54.6% during 2001-11. The share of cultivators in total workers has decreased from 31.7% to 24.6%, while, the share of agricultural labourers has increased to 30.0% from 26.5% during this period. The secondary sector or share of household industry workers in total workers has decreased from 4.2% in 2001 to 3.8% in 2011. In the tertiary sector, the proportion has increased significantly from 37.6% to 41.6% during 2001-11. The primary sector remains the dominant source of employment generation in India. Analysis of census data reveals that approximately 80 million new workers are observed into the work force from 2001 to 2011. Of these new workers, 36.4% are found to be engaged in primary sector, 1.7% in secondary sector, and 61.9% in the tertiary sector. Primary sector employment generation is important for both sexes, but especially so for women. Forty percentage male entrants and 27.5% of the female entrants to the work force found primary sector employment during this period. A shift from the primary to the secondary and tertiary sectors is visible in all the states and union territories both in respect of males and females, but in the case of females the shift to the tertiary sector is quite substantial. The employment in the primary and secondary sector is decreasing, though not at a fast rate, while employment in the tertiary sector is increasing at faster rate. The country remains heavily agricultural with the primary sector. The proportion of workers in the primary sector is seen vary dramatically across the states. As an economy develops, labour is transferred out of the primary sector. Therefore, it is the states which have lower per capita incomes that have greater proportions of workers in the primary sector. The correlation between state per capita income and the proportion of workers in the primary sector is negative.

REFERENCES

1. Census of India, 2001: Primary Census Abstracts, Series-1, India Part I.
2. Census of India, 2001: Census and You, Basic Results from Census 2001, Series-India.
3. Census of India, 2011: Primary Census Abstract, Data Highlights, India, Series 1.

TRADITION, TRANSFORMATION AND PRESERVATION OF INDIGENOUS MEDICAL SYSTEM AND THE MISSING LINKS

Sudip Bhui[1]

Abstract: *The knowledge and experiences from primitive mode of our society also have importance even in globalized era. In modern medical sciences, indigenous knowledge about etiology, epidemiology and healing procedure come in focus to explain, and utility. The elderly people still maintain intertwined system of ritual, custom as well as healing phenomena. In this study a endeavor to trace and analyze the phases of indigenous treatment system with the concerned socio-cultural milieu in respect to influences and variables through the spectacles of aged persons of Santhal and Lodhas have been made. The Bhumij, a tribe of West Bengal, more Hinduized section, sensitized to Globalization live in undulated hilly terrains with forest cladded area. The study revealed about course of changing phases of this healing system and experiences of their bygone days. In the course of time, deforestation, soil erosion, fusion of socio-cultural networks, and expanding worldview of natives break rhythm of integrated golden nexus. In forthcoming days next generation will lose traditional knowledge.*

Key Words: Indigenous medical system, Elderly population, deforestation, Ritualistic mode of preservation, cultural fusion, tribe.

INTRODUCTION

Society in its primeval isolation is with their own mechanism to mitigate the requirement on the way of solving emerged problems. Healing art in the rubric of entire socio-cultural phenomenon exists in all societies with unique perception, practices and utilization of natural resources, series of inventions, modifications, and advance technology bring cleavages in the pristine isolated life. Population get access their neighboring communities in broadening their communicative skills and views. In this connection admixture were introduced to the area of psycho-cultural life. On the verge of transformation the young energetic persons are influenced more than the elderly population. Hybrid tradition has emerged due to globalization, modernization and unification of global life. The fate of traditional treatment system cannot remain isolated from these changes. Ecological deterioration, drastic climatic hazards, create burden in survival of medicinal herbs and ancillary biological resources. Traditional medical system now reached at sliding ground to the fate of decaying. Elderly people of tribal societies make their utmost effort in the preservation of their ancestral wealth.

METHODOLOGY

The study is completely empirical exploration with anthropological methods and techniques like participant observation, interview, questionnaire, case study. After a pilot study on administrative and local population the villages were selected. Three blocks of two states of India were selected. The village Ghatiduba and Keundisole villages under Jhargram block of Paschim Medinipur are located in forest fringe

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area, Kamlatota and Kanrasole villages under Nayagram are situated inside the forest area. The Choto Botla and Dhiridih villages under Dumuria block of Jharkhand is hillocks covered by forest. This study was theoretically oriented by Gerrtzian interpretative approach as well as from an outlook of Hermeneutics. Thirty healers and sixty patients were interviewed from each of the 6 villages with an open end questionnaires. Healers with regular practices of traditional treatments, specialized with a few or many diseases were included. Patients were suffering for a long time (at least one month). Patients were under treatment with the selected healers.

Field and People

The present work is suitable to conduct in places lack or hard to access modern health care facilities. Observation and analysis of indigenous health care system in the rubric of present socio-cultural scenarios, interaction with other health care system, impact of globalization, preservation and utilization of indigenous knowledge system are considered task for this research. The Tribal people of West Bengal as well as in India are recognized as Indigenous population. Two villages of Nayagram block (22°01'55?N 87°10'41?E) of Paschim Medinipur district, In West Bengal, the Lodha is famous for their golden heritage of Ethno-medicine. They are one of the Munda speaking tribes widely spread over hill regions within Orissa, Madhya Pradesh, Andhra Pradesh, Bihar, and West Bengal, The Santal are capable of preserving their age-old cultural tradition in spite of globalization. The Bhumij is highly sensitized in social cultural transformation and grasps these influences on the local health care traditions. Still, the Lodhas practices hunting-gathering and forest collection for their subsistence. Identification and utilization of medicinal herbs are acquired with their enculturation. The santal tribe is the third largest in India after the Gond and the Bhil tribes.[1] This community extends through the states of Jharkhand, West-Bengal, and Northern part of Orissa and in West Bengal, districts of Bankura, Birbhum, Pahchim Midnapore and Purulia. The Santal possess modern education and communication as compared with other tribes, but are still oriented with the traditional lifestyles. They also have a unique religious tradition to modify their health culture. The village Ghatiduba belongs to Jhargram block of Paschim Medinipur district and a gram Samsad area combined with Kajala and Ghatiduba. This is a forest cladding and laterite soil and undulating surface. The canal and forests are the major boundary of this village. In northern side the panchyat headquarters Nedabahara is situated with versatile ethnic setup where we can find Barber caste, surname is Manna, The dominant kurmi community by the surname Mahata, Dom caste is titled by Midya and tribal Santal. The village Keundisole is in a fully forest-surrounded area. The study area is a part of a large village. The integrated villages is under Nedabahara gram panchayat, Jhargram block. It is around E 86° 58' 24.7" latitude and N- 22° 22' 05.1" longitude. In the north side of the village Kajala, Santal habitant village is present, thereafter a Kurmi community (Mahato) inhabiting village Pasro is situated. In the same side, the Guripukhur is at a distance. Southern boundary of this village is nearby covered by Chakua and Baghjhampa, a savar dominant village exists. Sonamukhi is a Mahato dominant village located at a far distance of the south side. In the eastern side of the

village, the Mahato community also populates Madhupur and Birihandi.

The Bhumij are a distinct tribe, living in and around the forest clad rugged, unfertile terrain in border area of Jharkhand, Orissa, and West Bengal. Risley (1891) identified them as a Hinduised section of Munda. In the view of Dalton (1897), they are a non-Aryan tribe of Manbhum, Singbhum and West Bengal. According to the 1891 census, their total population was 2,33906 (Census 1891). Their linguistic profile could be classified by as Kolarian, have an affinity in closeness to the Munda. The people speak 'Bhumij`. An Austro-Asiatic language at home however, of late their mother language has been influenced by the Indo-Aryan language Bengali, by which they communicate with the people of other communities.[2]

Status of elderly population in Tribal society

Tribal societies under our study area have to carry out hard labor to collect their livelihood. Due to which people with physical capacity for hard labor get more social status and get command in their family. In general, elderly people have less capacity to do hard work and face difficulty in their family. Some tribal people possess the arable land, domestic animal, residual land and a larger part of them are elderly, and therefore they earn more respect in comparison to others. This fact is true for Santal and Bhumij tribe. The Lodha tribe possess a very few quantity of property and their elderly have to go through hard fate. Elderly of all the tribal society are involved in the traditional religious and other activities like village priest, village judge etc. The elderly depend upon supernatural power to interpret unknown, health care ailments to supernatural acts. Some of them are involved in traditional healing system. Villagers respect the people with supernatural power. The healers who perform more worshipping earn larger status due to religious affiliation.

Role of elderly people in continuing the traditions

Elderly people in our society are asset to development of our species with their longtime experience in coping difficulties, generally faced in their life. They are link between different phases in socio-cultural evolution, representations of ancestral thread embedded with deterioration, fragmentations and up gradation of our life style, knowledge, feelings and worldview. In domestic sphere of life they have chances to first diagnosis of health problems, apply his/her traditional knowledge, and make decision, advice other family members. In response to the problems he/she also recommended family usages, rituals, and customs to live properly on the way to better life. As elderly people have more leisure time in comparison to other are with larger chance to nurturing the children. The

State	District	Block	Village	Tribes	Healers
Jharkhand	East Singhbhum	Dumuria	Dhiridih	Santal	5
			Choto Botla	Bhuiya	5
West Bengal	Paschim Medinipur	Nayagram	Kamlatota	Lodha	5
			Kanrasole	Lodha	5
		Jhargram	Keundisole	Bhumij	5
			Ghatiduba	Bhumij	5

children get chance to introduce their tradition. The tribal elderly generally posses large treasures of oral knowledge, that are yet to be codified. Not only the healers but also elderly in general rely, apply and disseminate traditional knowledge in quest of continue their ancestral troves. Now in our study area of West Bengal, influence of supernatural entities is gradually disappearing. Young people think elderly have some skill in control of supernatural acts related health phenomenon. The young people in spite of influence of modern clinical knowledge follow the elderly ideology, and propel tradition forward. In this context the middle aged people of the study area occupied functional traditional knowledge and young generation have some glimpses of this tradition. Tribal women play crucial role to preserve and practice traditional knowledge in indigenous form of health ideology and information. They have less chance to communicate with outer world, and grasp a strong intra community assemblage. Due to their shy behavior fail to avail modern treatment access in the centers due to long distances. They use plants in kitchen garden or medicinal herbs when in need. In Nayagram of West Bengal an elderly Lodha women with profound indigenous medicinal knowledge, practice these treatments as her profession and cater services in neighboring villages for exchange of cost of rice and food. In rural West Bengal and Jharkhand, women who know folk remedies for Children's problems; minor digestive disorder, minor injury etc. are on the verge of diminishing.

Ritualistic mode of preservation of tradition

Ritual and customs are like living fossil in life of human population, origin of these usages is hard to trace. Ritual and customs exist with oral tradition sometime are in codified in some religious texts, carry a vast body of knowledge, standard behavior of a particular community. In relation of traditional medical system, rituals are found in mode of preventive measures (especially in contagious diseases), directives in food habits during suffering to support the clinical processes, provide nutrient foods to induce immunity against diseases. Overall these provide socio-cultural support to maintain patient's psychological health. Tribal People generally follow the rituals without any clarification due to the fear of rage of Gods as well as supernatural agencies. In our field area, we found many plants and trees that are ritually preserved with and these are utilized as good source of medicine. People follow rules and regulation to collect their medicinal plants and that are essential for preserving these species. They are refrained from collecting some herbs during their reproductive periods, consume leaf at night to allow respiration of the herbs and are not picked from their alter places. All tribes are not allowed to collect herbs for medicine. In the study area of West Bengal people follow rituals without any clarification and curiosity but in Jharkhand people search their religious faith in quest for more devotion to the rituals. They also make some modification in existing rituals. Thus rigidity of rituals provides us enormous medicinal knowledge from our ancestral era. Traditional healers especially elderly generation follow ritualistic mode of treatment, sometime time even without any physical medicine as in the case of psychological disorders. They discuss more religious phenomenon with their co-healers or priests for improvement. Thus

Medicinal plants with ritual value

Sl. No.	Local Name	Scientific Name	Ritual Value	Medicinal Value	Mode of Preservation
1	Tulsi	*Occimum sanctum* Linn.	Worshipping in daily evening, Goddess	Cough and Cold, Antibiotic	Alter in every household
2	Manasa	*Euphorbia nerifolia* Linn.	With Tulsi, Goddess	Severe cough, eye problems	do
3	Jaba	*Hebiscus rosa-sinensis*	Favourite of mother goddess(especially for Kali)	In infertility problems of women	Available in front of some Household
4	Bel	*Aegle marmelos* Corr.	Almost in all Worshipping, especially for God Siva	Digestive disorder, Acidity	The place Durga temple, House garden of the Priests
5	Akando	*Calatropis gigentea*	Especially for God Siva	Burning sensation, Ear problems	Nearby Siva Temples
6	Apang	*Actiyeranthes aspera* Linn	Funeral ceremony	Seminal weaknesses	Fencing of household of priests and Healers
7	Shal	*Shorea robusta*	Funeral, Marriage	Ring worm (By Resin)	Jaher (Tribal village alter)
8	Guloncho	*Tinospora candifolia*	Worshipping	Bone injury	Nearby Siva Temples, Households
9	Haritaki	*Terminalia chebule*	Do	Digestive problems	Scarcely found
10	Mohul	*Bassis latifolia*	Sarhul festival (exclusively for tribal)	Abscess	Jaher (Tribal village alter)

prevent people from taking modern medicine.

Intertwined factors

On the way of preservation and continuation of traditional medical system elderly people have to come through several factors inside and outside his families. Healers family play a crucial role in treatment of patients, practices of supernatural powers. Generally, family members allow the patients to the healers. Healers earn for their family members in directly or indirectly in kind. Some healers make vow to his/her worshipping god/goddess, following these vow patients give worship to repay to god/goddess, through which healers receive money or in kind. The patients after recovery give many ritualistic gifts to healers. The healers with specific religious affiliation arrange a big religious ceremony on a certain day of the year, all the beneficiaries gather on that day and appraise the glory of healers, in this way healers get a special respect and status from his village and neighboring people. The patients spread the glory in their native place and thus acceptance of traditional medicine system grows.

CONCLUSION

Traditional medical system developed from the inception with origin of socio-cultural life and processes, which is capable to influence on their creator. The system adapts/ orients as per their specific needs. This age old tradition is well suited with regional weather and climatic transformation, system provide people curative services within their financial capacity with their natural resources. Especially for the world countries, traditional medical system is essential in complimentary to public health, even on the day of rapid globalization. Rapid effects of globalization create gap between

different age groups of same society, natural percolating inheritance of skills and knowledge. In the present study area, in West Bengal it is more vulnerable due to invasion of modern medical practices. On the other hand, in Jharkhand the society depends on quick relief. In both the states government makes very little efforts to preserve these traditional knowledge and practices. A number of civil societies are making efforts towards preserving tribal traditions and health care system. However, these are insufficient to revive traditions but collective and strong efforts in planning are needed.

REFERENCES

1. Basu S, Kapoor KA, Basu SK. Knowledge, attitude, and practice of family planning among tribals. The Journal of Family Welfare 2004;50 (1): 24-30.
2. Bhui, S. Ethnomedicine among the Bhumij: Data from Two villages of Paschim Medinipur,West Bengal, (Unpublished M. Phil. Theses), Sambalpur: Sambalpur University, 2008.

PATTERNS OF DISEASE AND TREATMENT AMONG THE LODHAS IN A VILLAGE OF WEST BENGAL

Santanu Panda[1] and Abhijit Guha[2]

Abstract**:** *Present article attempts to study the disease patterns and treatment among the Lodha tribe of West Bengal. The study was conducted in a multi-caste village inhabited by Sadgope (caste), Lodha and Munda tribes. The data was collected from 68 families through simple open-ended questions and case history method. The findings revealed that the occurrence of various diseases form a pattern in terms of age and sex. Study found 18 types of diseases in the village and most common were Tuberculosis, Gastric ulcers, Hypertension, Diarrhoea, Jaundice, Typhoid, Gall-bladder stone, Chicken Pox, Skin disease and Dysentery. The treatment of diseases also follows a pattern, only few families were found to apply the traditional herbal medicine in case of dysentery and skin sores. A good number of families were also found to rush to quacks whenever they were ill. Few families visited Government health centers and hospitals*

Keywords: Age-sex composition of disease, Patterns of disease, Lodha, Treatment of disease

INTRODUCTION

The total population of Scheduled Tribes in India is 84,326,240 according to the Census of 2001 which accounts for 8.2% the total population of the country. Majority of the Scheduled tribe population live in rural areas and their population is 10.4 % of the total rural population of the country. In West Bengal there are 38 Scheduled Tribes distributed mainly in the southwest and the northern parts of the state.[1] Among these 38 Scheduled Tribes the Lodhas are mainly found in the western part of the state in the districts of Purulia, Bankura and Paschim (West) Medinipur. These areas are also inhabited by tribes like Santal, Munda, Bhimij and Oraon, who are numerically and economically better adapted than the Lodhas. The Lodhas generally live in and around the forest covered areas of the southwestern districts of the state and dependent on forest for their livelihood.

In one of the pioneering anthropological study, the Lodhas were depicted as a semi-nomadic community who used to move from one place to another in search of livelihood.[2] According to Bhowmick (1963) the Lodhas of erstwhile Medinipur district relied mainly on food gathering and hunting and some were engaged in agricultural as well as non-agricultural activities as hired labourers.[2] By and large, dependence on forest produce has not sufficed their needs, therefore the Lodhas were also found to be engaged in a variety of occupations to sustain their livelihood.

According to Bhowmik, the chronic poverty and low aspiration level and lack of zeal of these people has created socio-cultural and economic constraints which,

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in turn, have made them lazy and lethargic. Further, it has also made them unresponsive to any sort of change or innovation introduced for their uplift.[3] The scenarios of development among the Lodhas has been reported by Panda and Guha (2009) who highlighted the shortcomings of the governmental approach towards the development of this marginalized community in West Bengal.[4,5]

A search in the literature through the Google and various cross references in the existing works, revealed that there is virtually no empirical research on the age-sex distribution of diseases on the Lodhas in India. Apart from social anthropological, ethnographic and nutritional studies mentioned in the previous section, no studies reported on Lodhas and other "Primitive Tribal Groups"(PTG).[6-11] The present empirical research attempts to fill in this gap in knowledge as regards the incidence and distribution of diseases and their treatment among this underprivileged scheduled tribe of West Bengal.

OBJECTIVES

The major objective of the study is to collect data on the incidence, occurrence and distribution of various diseases and ailments among the Lodhas of the selected village. The second objective of the study is to find out the incidence of various diseases among the Lodhas in the different age and sex groups. Finally to study the disease treatment behavior of the Lodhas.

METHODOLOGY AND STUDY AREA

The present study mainly relies on the direct intensive observation and interviews with the villagers affected by various types of disease and their treatment with help of World Health Organization's manual on the Lay Reporting of Health Information (1978).[12] The information on the incidence of diseases was collected through recall method for the last 5 years.

The demographic and socio-economic surveys were conducted among all the households of the Daharpur village with the help of structured and open-ended questionnaire schedules. Questionnaire included information on various type of disease and their treatment. The qualitative information on the feeling and attitude of the affected persons were collected through repeated conversations over a period of one month during September-October 2013. Occurrences of various types of disease and their treatment have been collected from individual family members by the case study method.

The survey and the fieldwork followed the typical participatory anthropological methodology. The quantitative data were analyzed by simple descriptive methods of tabulation and the qualitative data were presented with the help of some representative case studies. The age grouping for the study of the prevalence and incidence of the various diseases among the Lodhas was done by following the standardized format given in the aforementioned WHO manual as well as the standard WHO age grouping.[12] The occurrence of diseases in particular persons was recorded with the age at which the person was affected by the disease.

The present study is based on the fieldwork carried out in Daharpur village, (J.L. No.26) which comes under the jurisdiction of Makarampur Gram panchayat of Narayangarh block in Paschim (west) Medinipur district. The village is situated about 1 km away from National Highway No.64. *Bidisa,* is located near this village. Institute of Social Research and Applied Anthropology (ISRAA) is located in Bidisa. This institute works for the overall socio-economic development of the Lodhas. In addition study also included Daharpur, this village has 2 hamlets locally known as *paras*. One is *Uttar para*(North) in which live the Lodhas and the caste Hindu groups while the *Paschim para* (West) is inhabited only by the Lodhas.

SOCIO-DEMOGRAPHIC PROFILE OF THE LODHA POPULATION

Total population of the study area is 343. There are 163 males and 180 females. The sex ratio is 1104.29. The total number household is 63 and the mean household size was 5.4. Among the males 98 (28.57%) are married and 65 (18.95%) are unmarried. Among the females 113 (32.94%) were married and 52(15.16%) unmarried whereas 15(4.37%) were widow. The 2 most interesting aspects of the socio-demographic condition of the Lodhas of Daharpur village are: (i) preponderance of females in population and (ii) higher literacy rate among the females. Table 1: shows the literacy status (including child population) of the Lodha population of Daharpur.

Table 1: Literacy status of the study area

Male		Female	
Illiterate	**Literate**	**Illiterate**	**Literate**
45 (27.61)	118 (72.39)	52 (28.89)	128 (71.11)

The subsistence pattern (excluding child) of the Lodhas in the village reveals that the majority of them were engaged in cultivation as owner cultivators (32.95%) and agricultural laborers (38.76%). Forest product collection ranks fourth highest mode of subsistence. Only 3 persons were engaged in the service.

PREVALENCE AND INCIDENCE OF DISEASE AND MORTALITY

Types of Disease:

Lodhas were found to suffer from the following diseases: i) Tuberculosis ii) Diarrhoea iii) Malaria iv) Dehydration v) Chest pain vi) Tumor vii) Blood Dysentery vii) Pneumonia viii) Hypertension ix) Jaundice x) Boil xi) Leprosy xii) Skin disease xiii)Hysteria xiv)Typhoid xv) Paralysis xvi) Gastric ulcer xvii) Pox xviii) Cholera xix) Menstruation problem xx) Indigestion xxi) Common cold, cough & fever,xxii) Thyroid xxiii) Stomach ache.

Table 2: Subsistence pattern of the village

Owner Cultivator	Agriculture labor	Non-agricultural labor	Forest product collection	Service	Total
85 (32.95%)	100 (38.76%)	50 (19.38%)	20 (7.75%)	3 (1.16%)	258

Table 3: Occurrence of disease in both sexes in the study area

Type of Disease	No. of Persons affected		Total
	Male	Female	
Jaundice	07	01	08
Diarrhoea	07	05	12
Cold, Cough and Fever	06	01	07
Dysentery	05	04	09
Typhoid	03	03	06
Blood Dysentery	02	00	02
Malaria	01	01	02
Hysteria	03	01	04
Pox	02	01	03
Tumor	02	00	02
Thyroid	00	02	02
Gastric Alshar & Indigestion	02	01	03
Skin disease	01	02	03
Paralysis	01	00	01
Heart Disease	00	02	02
Mental Disorder	01	01	02
Bat	00	01	01
Hapani (bridhing problem)	01	00	01
18	**44**	**26**	**70**

Table 4: Age-Sex Variation of each disease

Age group	Male	Female
Under 7 days		
7-27 days		
28 days- under l year		
1-4 Years	Diarrhoea and cold, cough , fever	
5-14 years	Jaundice, Hysteria, Malaria, Diarrhoea, cold, cough and fever	Dysentery, Heart disease, Diarrhoea
15-44 years	Dysentery, Jaundice, Diarrhoea, Cold, cough and fever, Pox, Skin disease, Tumor, Hysteria, Malaria	Jaundice, Diarrhoea, Typhoid, Hysteria, Cold, Cough and Fever, Thyroid, Malaria, Mental disorder
45-64 years	Gastric Alshar, Diarrhoea, cold, cough and fever, Typhoid, Stone, Pox, Skin disease, Dysentery, Blood Dysentery, Mental disorder, Blood Dysentery, Indigestion	Pox, Arthritis, Typhoid, Gastric, Diarrhoea, Dysentery
65 years and over	Paralysis, Blood Dysentery, Low presser, Jaundice, Typhoid	Typhoid

The above mentioned diseases were found to occur in all the age groups of both sexes. Many of the Lodhas were affected by Dehydration, Common cough and cold, Jaundice, Diarrhoea and Dysentery. (Table 3).

Death: In this population, it was observed only 10 persons died in the last five years. Among these 10 persons, 6 were male and the rest females. The age at death ranged between 3-80 years of age. There were 3 males, who died at the age of 70.

The persons died of various diseases like TB, Cancer, Coronary diseases and Paralysis. Most of the deaths occurred in homes.

The table 4 shows that there was no report of any disease in the age group 0-1 in both sexes, in the last five years. In the age group 1-4 only males were reported to be affected by some of the common diseases. Most of the diseases occurred in the age group 5-14 as reported by villagers. The major diseases reported were Dysentery, Jaundice, Diarrhoea and Skin disease. In this connection it may be noted that the Lodhas in this village live in an unhygienic and poor environmental condition. In majority of the Lodha households, we have found that the domestic cattle and poultry birds cohabit with human beings. Moreover, the Lodhas have no source of filtered and purified drinking water and there was no proper sanitation and hygienic lavatory facility. The Lodhas of the village and their domestic animals were found to bathe in a common pond.

Table 5 shows the incidence of diseases was low in the youngest age group (5-14) and the females were not found to suffer from common cold and fever in this age group. The only case of heart disease among single females in the age group 5-14 seemed to be a congenital ailment; the parents of this girl reported to the first author that she was suffering from heart problems since her birth and a cardiologist of Cuttack, Odisha, had recently identified an anatomical disorder in her heart. In general the prevalent diseases among the Lodhas were found to occur between 5-64 years and the individuals of both sexes suffered from maximum number of diseases in the age group of 15-44.

Table 5: Age Sex distribution of the most prevalent diseases

Age-group	Male	Female
5-14 years	Jaundice, Hysteria, Malaria, Diarrhoea, cold, cough and fever	Dysentery, Heart disease, Diarrhoea
15-44 years	Dysentery, Jaundice, Diarrhoea, Cold, cough and fever, Pox, Skin disease, Tumor, Hysteria, Malaria	Jaundice, Diarrhoea, Typhoid, Hysteria, Cold, Cough and Fever, Thyroid, Malaria, Mental disorder
45-64 years	Gastric Alshar, Diarrhoea, cold, cough and fever, Typhoid, Stone, Pox, Skin disease, Dysentery, Blood Dysentery, Mental disorder, Blood Dysentery	Pox, Arthritis, Typhoid, Gastric, Diarrhoea, Dysentery

Table 6: Pattern of treatment of disease among the Lodhas of Daharpur village

Application of traditional medicine by the affected persons	Kabiraji or Herbal Medicine	Primary health centre and Hospital	Quack doctor	Private degree holder Doctor	Total
06(8.57)	11(15.71)	15(21.43)	20(28.57)	18(25.71)	70

The behaviour of the Lodhas as regards the treatment of diseases revealed medical pluralism. It was found that there were 5 types of treatment systems adopted by them. Majority of the villagers used to visit quacks (28.57%). A substantial number of patients were also found to go to the private practioners (25.71%), whereas 21.43 percent patients went to Primary health centre or Block Primary health centre. Application of traditional medicine by the patients was found among only 8.57% of the affected persons. Nearly, 16% of the patients were found to call a *Kabiraj* (traditional medicine man) to treat their ailments. Through our interviews and observation it was found that most of the villagers had a confidence on quacks as well as private practioners. A handful of Lodhas of the village were found to employ herbal medicine by themselves which were collected from the forest and surrounding areas.

CASE STUDY 1

Name: Mangal Bhakta **Age:** 66, **Education**: Illiterate, **Occupation**: Agricultural day labourer

In the month of *Baisakh* (mid April to mid may) he has been suffering from jaundice for one month in 2013 then Typhoid for 25 days. His economic condition was very poor. Intially he approached Makarampur PHC for treatment.. According to the subject after taking medicine no relief was noted. Then approached a *Kabiraj who advised him*,one guava and water, to be kept in hand and poured water on it and after a few minutes deep yellow water flowed from the hand. After he felt cured. The *Kabiraj* informed him that he was affected by Jaundice from drinking water.

The Subject further narrated in the same year his wife suffered from typhoid and Diarrhoea for one month and quack from Narayangarh cured her.

CASE STUDY 2

Name: Banchu Diger Age: 70 **Education**: IV Occupation: Owner cultivator.

Banchu began conversation by saying that their food habit was very simple. In the early morning they take boiled rice and boiled potato. In the evening they take rice with small fishes. His financial condition is very poor, although he owned some unirrigated monocrop land which was only 0.45 acre and his family of 7 persons had to depend on that land and he was the only earning person in the family. During month of July in 2013 Banchu Diger was suffering from Typhoid for 20 days. Earlier he did not go to any doctor. But this time he consulted a private degree holder doctor at Narayangar. He spent around Rs. 2000/- which included the fee of the doctor and the medicines prescribed for him by the doctor. Now he is well. In the minor cases of illness they consult with their traditional medicine man. But if the case became serious they first of all go to the quack doctor, if the quack doctor fails to cure the ill persons, then they go to degree holder doctor. Banchu said “We do not get any help from government health centre or hospital”.

CASE STUDY 3

Name: Jiten Bhakta, Age: 45 **Education**: Can sign **Occupation**: Non agricultural day labourer.

Poor laborer with a family Rs. 5000/- per month., around *Chaitra Sankranti*, suffered from stomach and chest pain for two weeks. He approached a quack at Narayangarh. After a few days his illness his younger daughter also began to suffer from the same ailment. She was taken to the same quack but even after one month of treatment they were not cured inspite of spending Rs 2000/. Then they approached a traditional magician-cum- medicine man known as '*OJha'* or '*Gunin*' who cured them and charged only Rs. 500/-.

CASE STUDY 4

Name: Subhasini Nayek, **Age:** 37, **Education:** IV, **Occupation**: Day labourer

A poor daily labourer who have no sanitary system, and drinking. The water from pond is acommon source for personal and animal drinking, bathing and washing cloths. Since 2012, the mother-in-law of the subject was suffering from gastric problem and a sore in her back. She also suffered from chronic migraine and low blood pressure. She was admitted in Medinipur Medical College and Hospital for 15 days. to the subject spent around Rs. 1500/-for her mother-in-law's treatment. The doctors recommended good nutritive food. But owing to poor economic condition of the family medicine could not be continued and the patient again started to suffer from the same ailments. Now they have decided to send her mother-in-law to a private practioner in a nearby place named Belda for better treatment at a low cost.

In the month February of 2013, subject also suffered from fever, cough, headache and muscular pain. She went to a neighboring village quack for check up and took medicines prescribed by the doctor and recovered. She spent around Rs. 200/- for the treatment.

In the month of September of 2013, Subject's husband suffered from blood dysentery and was taken to a quack doctor at Narayangarh. As per doctor's prescription Thapan had to drink warm water and 15 injections of a drug was administered to him within 5 days. After a few days of the treatment, he developed fever and was taken to the same doctor for treatment. The doctor could not diagnose the disease and referred the patient for treatment in the Medinipur Medical College and Hospital. His disease was identified and was found that he had been affected by a viral fever. Finally, after long treatment he was cured and recovered. . For person's treatment in Medinipur Medical College and Hospital cost around Rs. 1000/-.

CONCLUSION

The study revealed that the occurrence of diseases among the Lodhas have an age-sex distribution pattern which shows that Diarrhoea, Dysentry and Jaundice are the 3 most common among all the diseases which affected the population. Secondly, the females were found to be less affected by these common diseases than the males in all the age groups. Majority of the Lodhas visit quacks (28.57%). One fourth of Lodhas approach private practioners (25.71%), 21.43 % patients

went to Primary health centre or Block Primary health centre. Traditional medicine was used by 8.57% of Lodhas. Nearly, 16% patients went a *Kabiraj* for treatment.

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REFERENCES

1. Verma RC. Indian Tribes through the ages. Ministry of Information and Broadcasting. Govt. of India. 1990.
2. Bhowmick PK. The Lodhas of West Bengal. Kolkata: Institute of Social Research and Applied Anthro-pology (ISRAA) 1963.
3. Bhowmick PK. Rehabilitaion of a 'Denotified Community' the Ex-Criminal Lodhas of West Bengal. Royal Anthropological Institute Newsletter. 1981; 44: 6-8.
4. Panda S, Guha A. Development Inputs among the Lodhas in a District of West Bengal: Problems of Implementation and Recommendations. Journal of the Indian Anthro Soc. 2009; 44: 69-75.
5. Panda S, Guha A. Impact of Development initiatives on the Socio – Economic Life of the Lodhas in a Village of Paschim Medinipur District, West Bengal. In: editors Das Sarma P, Chaterjee D. Livelihood and Health-Issues and process in Rural Development, New Delhi, Serials Publication, 2013.pp. 3-11.
6. Saha BK, Saha CU. Concern for postnatal care services- usually a lesser valued service in rural areas (a study among the primitive lodha tribe of west bengal). Tribal Health Bulletin. 2004; 10: 26-32.
7. Dhargupta A, Goswami A, Sen M, Mazumder D. Study on the Effect of Socio-economic Parameters on Health Status of the Toto, Santal, Sabar and Lodha Tribes of West Bengal, India. Anthropologist. 2009; 7(1): 31-38.
8. Bisai S, Bose K, Ghosh A. Nutritional Status of Lodha Children in a Village of Paschim Medinipur District, West Bengal. Indian Journal Public Health. 2008; 52 (4): 203-206.
9. Bisai S. Bose K, Ghosh A. Prevalence *of* under nutrition of Lodha Children Aged 1-14 Years of Paschim Medinipur District, West Bengal, India. Iranian Journal of Pediatrics. 2008; 18 (4): 323-329.
10. Bose K, Bisai S, Mondal PS, Ghosh M. Body mass index and chronic energy deficiency among adult male Lodhas and Bhumijs: A comparison with other tribal populations of West Bengal. Indian Journal of Public Health. 2008; 16 (2): 117-121.
11. Kapoor S, Tyagi1 R, Saluja K, Chaturvedi A, Kapoor KA. Emerging health threats among a primitive tribal group of Central India. Journal of Public Health and Epidemiology. 2010;2(2): 13-19.
12. World Health Organization, 'Lay reporting of Health Information'. Geneva, 1978.

Corrigendum

Inadvertently a typological error has been committed in the paper entitled, "Insecticide treated nets for malaria control : Challenges and opportunities" published in Tribal Health Bulletin, Vol. 19 (1&2), January & July 2013, in the pages 1 & 2 where India's population was documented as 115 billion. It should be corrected and read as 1.15 billion. Inconveniences regretted.

Back Cover : A Baiga woman with her children