Comparing Patterns and Variations in Health Status between Tribes and Non-Tribes in Odisha of Eastern India with Special Reference to Mayurbhanj District

Narayan Chandra Jana[1], Anuradha Banerjee[2] & Prasanta Kumar Ghosh[3]

Abstract

Odisha (previously known as Orissa), being socio-economically backward but culturally sound, is one of the important states in Eastern India. Out of 30 districts 9 are considered as tribal districts (according to Location Quotient value) and of the total population (41,947,358 in 2011) a significant share (22.1%) goes to tribal people (8,145,081in 2011). In the present paper, various health-related indicators have been analyzed and compared for representing district-level patterns and variations in health status between tribes and non-tribes. In addition, Mayurbhanj has also been taken as a case study to represent the patterns and variations in health status at the block-level. It may be mentioned in this context that out of 30 districts in Odisha, according to Location Quotient value Mayurbhanj is the highest tribal concentrated district. The overall objective of this study is to obtain a better understanding of disparities and variations in health status in Odisha as well as in Mayurbhanj and also find out some remedial measures to overcome the health related problems. Maps have been prepared on the above mentioned indicators based on secondary data using Arc-GIS 9.3. From the analysis of the health-related indicators it is clear that the tribal dominated districts in Odisha as well as physically constrained and backward regions in Mayurbhanj represent low health status as compared to other areas. Although healthcare system in the state has improved significantly over the years, communicable and nutrition-related diseases continue to be a major problem mostly in tribal and backward areas. Finally, the authors have suggested some measures required for the improvement of healthcare services in the tribal areas and backward regions.

Keywords: Location Quotient, Health Status, Health Disparities, Backward Region

[1] Associate Professor & Ex-Head, Department of Geography, The University of Burdwan, Golapbag, Burdwan-713104, West Bengal, India. Email: jana.narayan@gmail.com, Telephone: +919547789019
[2] Professor, Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi-110067, India. Email: banerjee.anb@gmail.com
[3] Research Scholar, Department of Geography, The University of Burdwan, Golapbag, Burdwan-713104, West Bengal, India. Email: gprasanta05@gmail.com

1.0 Introduction

More than half of the world's tribal population lives in India. According to the *Indian Ministry of Tribal Affairs* over 84 million people belonging to 698 communities are identified as members of Scheduled Tribes (ST) in India (Agarwal, 2013). Article 366 (25) of the Constitution of India refers to Scheduled Tribes as those communities, who are scheduled in accordance with Article 342 of the Constitution. The essential characteristics, first laid down by the *Lokur Committee*, for a community to be identified as Scheduled Tribes are –(a) Indications of primitive traits; (b) Distinctive culture; (c) Shyness of contact with the community at large; (d) Geographical isolation; and (e) Backwardness. The Primitive tribal communities have been identified by the Govt. of India on the basis of (a) pre agricultural level of technology, (b) extremely low level of literacy; and (c) small, stagnant or diminishing population (ICMR, 2003). Among 30 states, Odisha, being socio-economically backward and culturally sound, occupies a unique place in the tribal map of the country having largest number of tribal communities (62 tribes including 13 primitive tribes) with a population of 9.59 million constituting 22.86% of state's population and 9.17% of the total tribal population of the country (Census of India, 2011).

The tribal societies in India are considered to be the weakest sections of the population in terms of common socio-economic and demographic factors such as poverty, illiteracy, lack of developmental facilities and adequate primary health facilities (Thakur et al. 1991, Basu 1994). World Health Organization (WHO) defines health as a state of complete physical, mental and social well being and not merely the absence of disease or infirmity. Despite remarkable world-wide progress in the field of diagnostics and curative and preventive health, still the tribal people of Odisha are mainly living in isolated area and far away from civilization with their traditional values, customs, beliefs and myth intact. Although the healthcare system in this state has improved remarkably over the years, communicable and nutrition related diseases continue to be a major problem mostly in tribal and backward areas (State of the Environment Report, Orissa 2007). In the present paper, various health-related indicators have been analyzed and compared for representing block-wise patterns and variations in health status between tribes and non-tribes. Out of 30 districts, seven districts as well as one third area of the State is declared as "Schedule area" with more than 50% concentration of tribes (Figure 1A). In addition, Mayurbhanj has also been taken as a case study to represent the patterns and variations in health status at the micro-level.

It may be mentioned in this context that out of 30 districts in Odisha, according to Location Quotient value Mayurbhanj is the highest tribal concentrated district (Figure 1B). Total geographical area of Mayurbhanj or studied district (Figure 2) is 10,418 km^2 and extends from 21°16' N to 22°34′N, 85°42' E to 87°11'E.
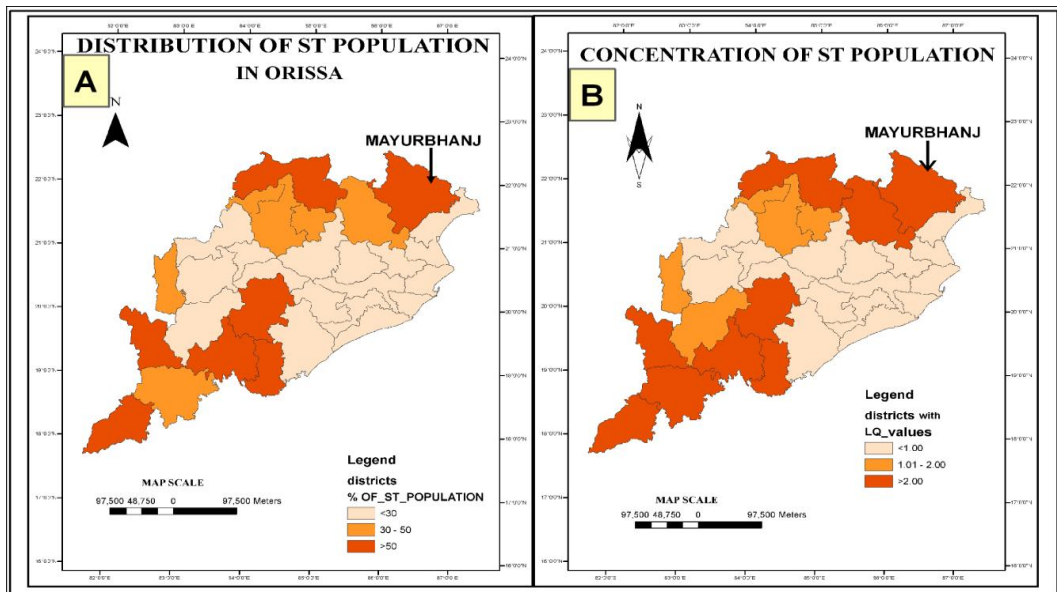

Figure-1A & 1B: District-wise Distribution & Concentration of Tribes in Odisha
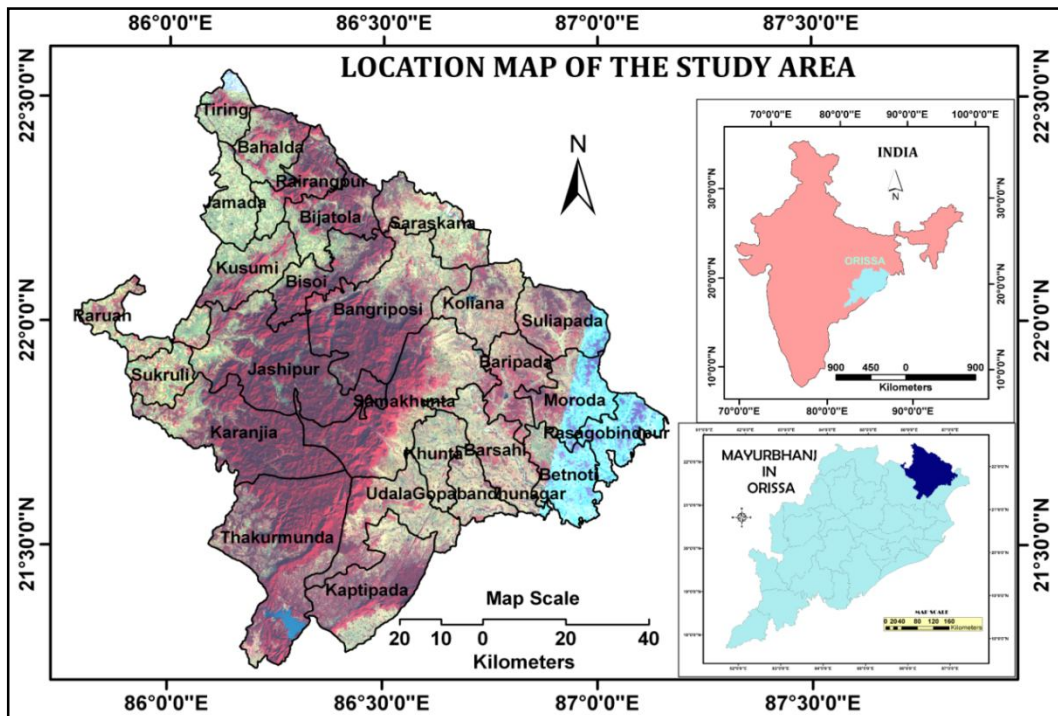
Figure-2: Community Development Blocks and Physiography of Mayurbhanj, Odisha

2.0 About the Study Area

Before Independence, Mayurbhanj was a princely state, ruled by the Mayurs and Bhanjas since the Ninth Century A.D. They ruled continuously for more than 1000 years. It was the last feudal state to be annexed with Orissa on January 1949 and became the largest district in Orissa. It is a tribal dominated border district in northern Orissa with a rich tradition and vibrant culture. The Similipal Forest is known for its biodiversity and natural panorama. For administrative convenience, the district has been divided into four sub-divisions, namely, Panchpir, Bamanghaty, Baripada and Kaptipada. There are 9 Tehsils and 28 Police Stations. The district is divided into 26 Community Development Blocks, which comprise 382 Gram Panchayats and 3,952 villages. Three distinct topographical formations are found in the district. At the centre, there are hills and lesser elevations running from north to south. These hills divide the plains into two parts: eastern and western. The eastern part slopes gradually towards the sea. Kaptipada and Baripada sub-divisions lie on this side. A number of hill streams pass through this region. On the western side, there are many rocky mounds and hills, for which the landscape is marked by rolling topography (DHDR, Mayurbhanj 2011) (Figure 2).

3.0 Objectives

The overall objective of this study is to assess health conditions of Odisha with special reference to Mayurbhanj and find out the differences between existing health facilities in tribal and non-tribal areas. In addition, we would like to calculate block-wise facilities shortfall (difference between available and required health facilities) of Mayurbhanj and to find out some remedial measures to overcome the health related problems.

4.0 Data Base and Methodology

The research methods followed in the present work involve consultation of literatures, data collection from secondary sources, preparation and analysis of maps. From some available books, reports and papers we get the basic ideas about the study area. To calculate the concentration of tribal people we use Location Quotient (statistical analysis). Physiographical maps have been prepared by mosaicing satellite images in Erdas Imagine v.9.0. Other maps have been prepared based on secondary data (obtained from District Human Development Report or DHDR of Orissa (Odisha) and Mayurbhanj, District Level Household and Facility Survey of Orissa or DLHS-3, National Family Health Survey, India or NFHS-3, District Statistical Handbook, Mayurbhanj 2009 and Bulletin of Indian Council of Medical Research) using Arc-GIS software v.9.3. Diagrams are prepared by the help of Microsoft Office Excel v.2007.

5.0 Discussion and Analysis

5.1 Spatial Distribution of Scheduled Tribes in Mayurbhanj

Among thirty districts of Odisha, Mayurbhanj has the highest concentration of tribes (Location Quotient value is 2.56). Among twenty-six Community Development Blocks of Mayurbhanj, four blocks (Suliapada, Betnoti, Moroda and Barsahi) has less than fifty percent tribal population while seven blocks (Tiring, Jamada, Bijatola, Baripada, Khunta, Udala and Thakurmunda) has more than seventy percent tribal population with respect to its total population (Figure 3A).

We use 'Location Quotient' (LQ) as geographically the proportional share of tribal population in total population of the districts and of the State can be best represented by this method. Using following formula, we get the concentration of tribal population:

LQi $=(Pij/Pi)/(Pj/P)$

Where, LQi= Location Quotient of ith unit, Pij = Population of j of class in i[th] unit, Pi =Total population of ith unit. Pj =Population of j class in total area, P = Total population of the area.
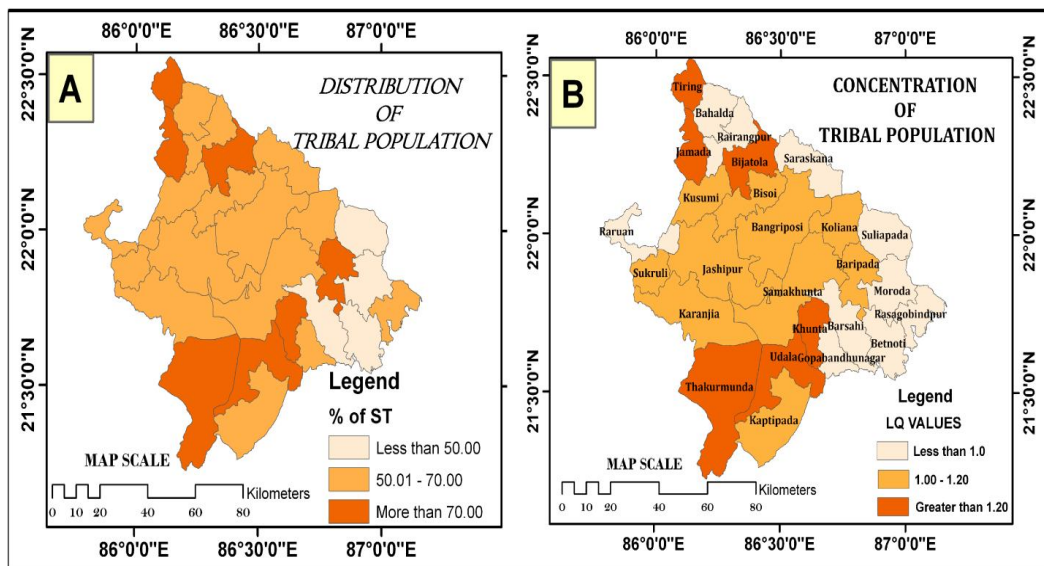

Figure- 3A & 3B: Block-wise Distribution & Concentration of tribes in Mayurbhanj

Using the value of LQ we identified six blocks as tribal dominated. The map reveals the following spatial pattern:

I. Higher level of concentration (LQ value is >1.2) - Tiring, Jamada, Bijatola, Khunta, Udala and Thakurmunda.
II. Medium level of concentration (LQ value is 1.00-1.20) - Kusumi, Bisoi, Bangriposi, Koliana, Baripada, Samakhunta, Karanjia, Sukruli, Jashipur and Kaptipada.

III. Lower level of concentration (LQ value is <1.00) Bahalda, Rairangpur, Raruan, Gopabandhunagar, Betnoti, Barsahi, Rasagobindpur, Maroda and Suliapada (Figure 3B).

5.1 Health Status of Mayurbhanj in Comparison to other Districts of Odisha

Odisha has the second largest tribal population in India next to Madhya Pradesh. It has the highest tribal concentration in its population although; the state occupies one of the lowest positions in the country in terms of the level of development. Over 47% of the population lives below poverty line as against 26% at the national level (Hassan & Daspatttanayak, 2008). If we consider human development as the process of widening the choice of people as well as the achieved levels of their wellbeing (Patra, 2009), then it will be clear that the situation is far worse in tribal districts. Human development and health indices of tribals are very low in Odisha and particularly in tribal dominated districts. The H.D.I. of Odisha is 0.579 which is much lower than the H.D.I. of India and many other states as per the Human Development Report, 2004. Seven among nine tribal districts out of thirty districts in Odisha, hold 24 to 30 H.D.I. ranks. As per the *Orissa Human Development Report 2004*, the Human Development Index of 0.639 for Mayurbhanj is much better than the state and the district occupies ninth place among the thirty districts of the state (Figure 4A).
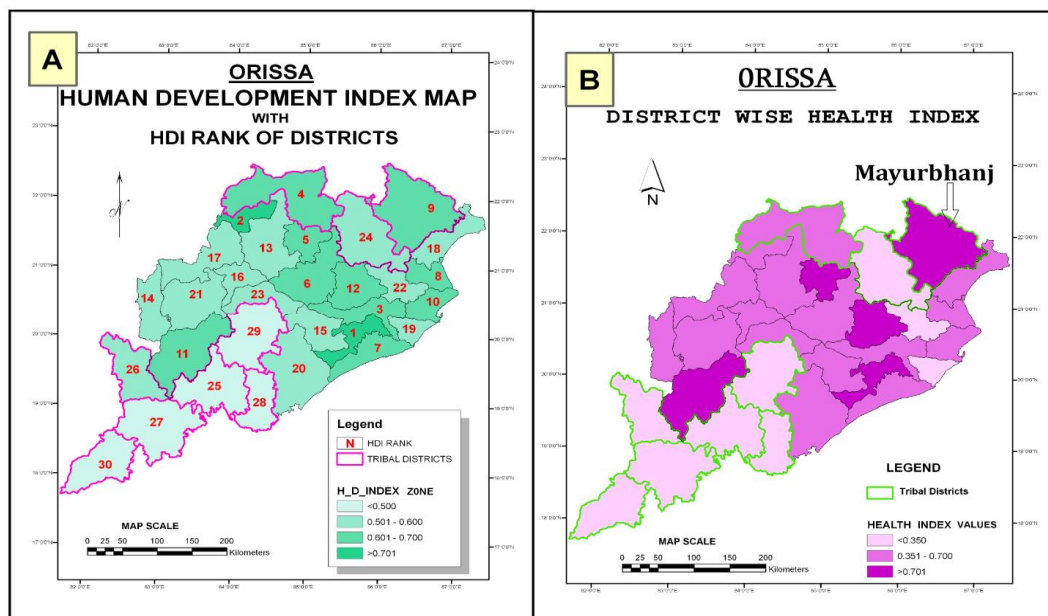
Figure-4A & 4B: Mapping of HDI and HI of Odisha

An overall picture of the health status of a region is indicated by its recent demographic changes. A slower growth rate of population in Mayurbhanj compared to the state between 2001 and 2011 gives a relatively good picture of health status in the district. As reported in *Orissa Human Development Report 2004*, the Health Index of Mayurbhanj is of 0.782, which is higher than 0.471 for the state and the district occupies first place among the districts of the state (Figure 4B). This indicates relatively good picture of health status in the district. However, other indicators of health status in the district present a mixed picture of achievements and failures (HDR, Orissa 2004). *Orissa Human Development Report 2004* estimates that 32.6% of women in the district married below 18 years of age, while the corresponding percentage for the state stood at 35.76%. In Mayurbhanj, 50.13% women had delivery or post-delivery complications and 51.1% had contraceptive side effects. However, the respective percentages for the state were higher than the district (53.38% and 56.33% respectively). The proportion of women having third and higher order birth in the district was estimated at 45.1%, almost the same as that (45.48%) for the state as a whole (District Family Planning Plan 2011-12). On the other hand, one of the important thrusts of the Reproductive and Child Health Programme is to encourage deliveries under proper hygienic conditions under the supervision of trained health professionals.

But large proportion of births (67.2%) took place at home in the district of Mayurbhanj (Figure 5A). Actually lack of awareness about mother and child care, poor communication network and unwillingness are responsible for delivery at home.
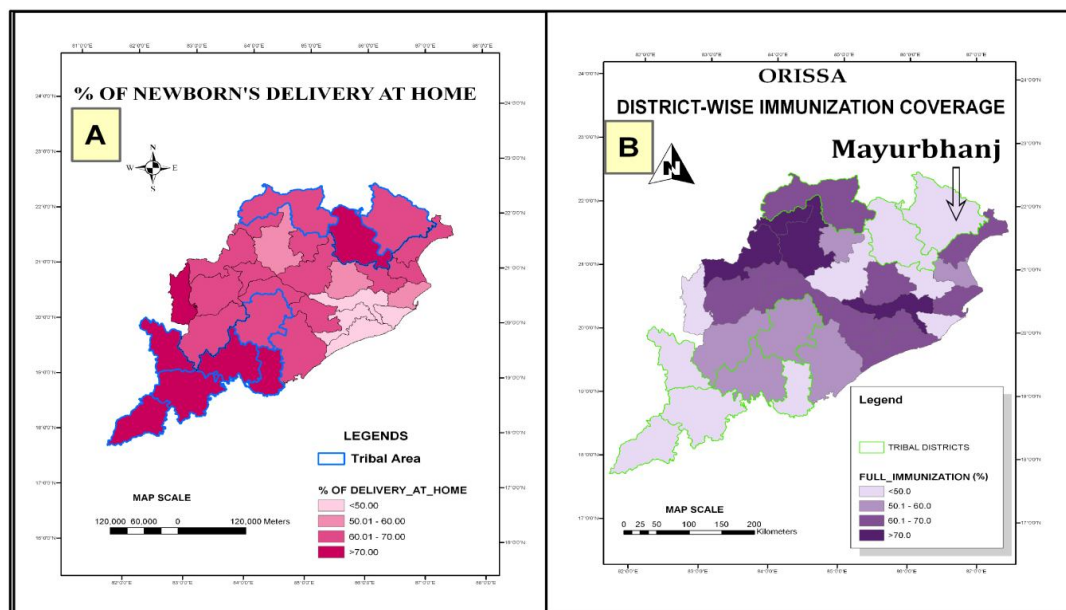

Figure-5A & 5B: Newborn's Delivery and Immunization Coverage of Odisha

The immunization of children against 6 serious but preventable diseases namely, tuberculosis, diphtheria, pertusis, poliomyelitis and measles is the main component of the child survival programme. As part of the *National Health Policy*, the *National Immunization Programme* is being implemented on a priority basis. The Government of India initiated the Expanded Programme on Immunization (EPI) in 1978 with the objective of reducing morbidity, mortality and disabilities among children from six diseases. District-wise immunization coverage map (Figure 5B) reveals that more than 60% children are fully vaccinated in only one tribal district. In case of Mayurbhanj the value is only 46.1%. Lack of awareness about the need for immunization and health facilities are the probable causes of it. In this context, a study conducted by the *Future Health Systems Consortium* in Murshidabad, West Bengal may be cited, which indicates that barriers to immunization coverage are adverse geographic location, absent or inadequately trained health workers and low perceived need for immunization (Kanjilal et. al., 2008).

In spite of low immunization coverage it is quite amazing that the Infant Mortality Rate of Mayurbhanj is lowest among thirty districts of Odisha. Though, mortality in infancy is used as a reliable indicator of health status and well-being of children but it should be kept in mind that infant mortality rate varies between geographical regions, between cultural groups and also between the regions of different economic status (Nanda et. al., 2012). In 2001, Infant Mortality Rate of Odisha and India were 91 and 66 (per thousand) respectively (Figure 6A).
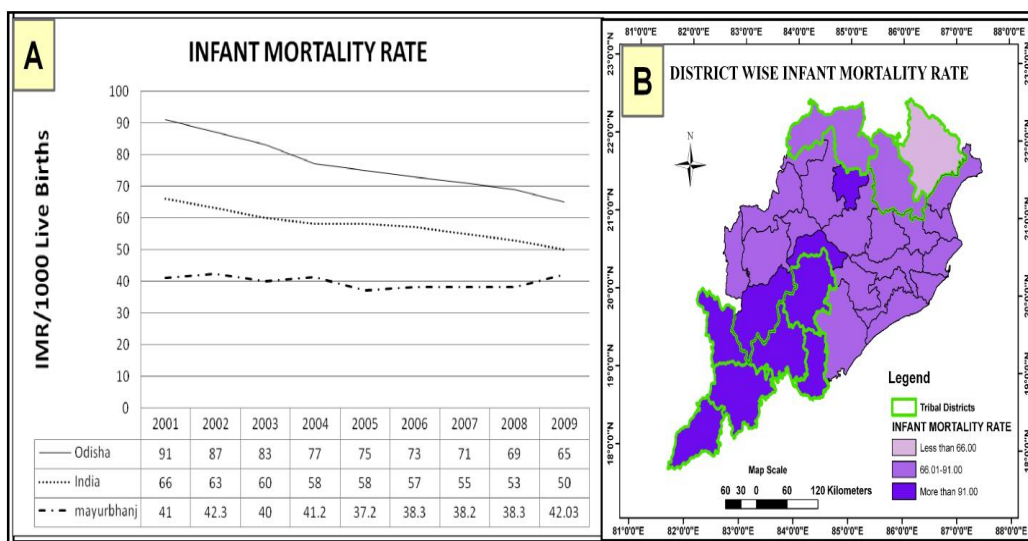

Figure-6A & 6B: Temporal & Spatial Pattern of Infant Mortality Rate

As per the *Orissa Human Development Report 2004*, the IMR of Mayurbhanj was 45 in 1999. Over a period of 10 years, it has declined to 42.03 in 2009, although after 2005, the value is slightly increasing. Study reveals that nine districts of Odisha are experiencing higher Infant Mortality Rate as compared to IMR of state average. Only Mayurbhanj has IMR lower than national average (Figure 6B). Among nine tribal districts of Odisha, on the basis of no. of deaths, we measured that eight districts are affected by both water and air borne diseases. Actually the tribal districts are more affected than other by both water and air borne diseases. Mayurbhanj is one of them (Figure 7A). The climate of Mayurbhanj is extreme and Malaria is rampant in the district. All the twenty-six blocks are covered under the *Enhanced Malaria Control Programme*. From *District Statistical Handbook of Mayurbhanj* it also came to know that other diseases like Leprosy, Tuberculosis, and Fileria affected people in 2008-09 were higher than district average (Figure 7B).

The seasonal occurrences of cholera, dysentery and diarrhea are a regular feature of the district. Though the number of detected HIV/AIDS case in 2008-09 was less than all districts' average, but it is unbeliveable that in Mayurbhanj, only 32.6% ST women and 40.6% of all women aged between 15-49 years heard about HIV/AIDS while the average value of Orissa is 46.9% (NFHS-3 and DLHS, Orissa 2007-08).
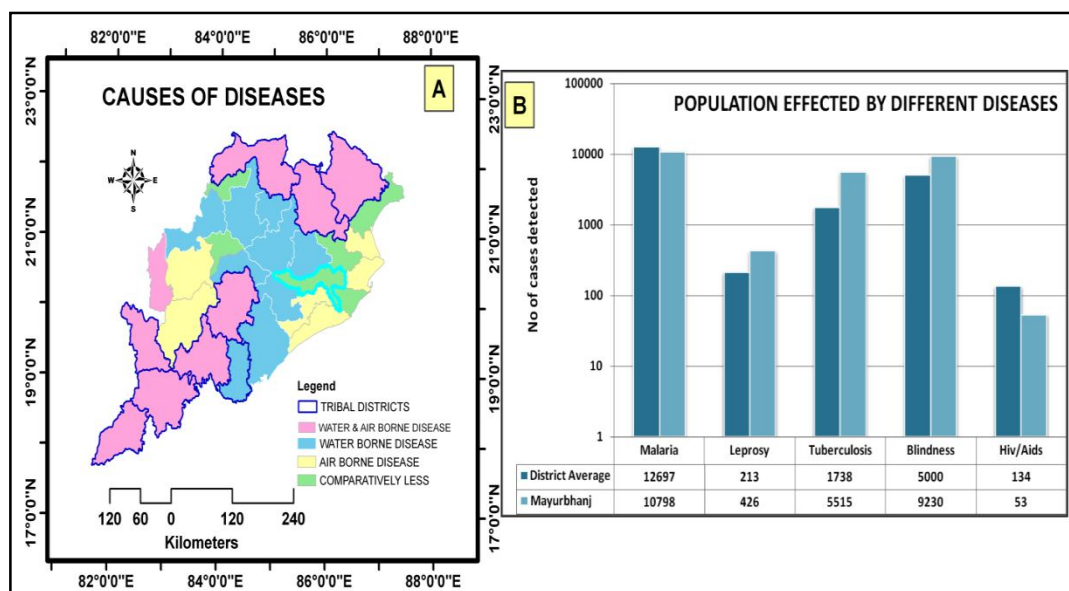

Figure-7A & 7B: Sources of different Diseases and Population Affected

5.3 Diversity of Health Status in Mayurbhanj

Though the Human Development Index and Health Index of Mayurbhanj represents relatively good picture comparing with other districts but there also variations between health status within administrative and different social groups. For example, Infant Mortality Rate (IMR) of Mayurbhanj district was lower than national level average (66/1000 live births) in 2001. But among twenty-six blocks of Mayurbhanj only six has higher IMR than national average (Figure 8A) and Udala's (tribal concentrated block) Infant Mortality Rate is more than average of Odisha (91/1000 live births). However, the IMR for the district as whole was 97/1000 live births in 1997, which declined to 42.03/1,000 live births in 2009.

Except IMR, no significant change in other health indicators is observed in Mayurbhanj in comparison to Odisha. The challenge is to reach out to vulnerable tribal groups who live in remote and poorly accessible areas (DHDR, Mayurbhanj 2011). One of the major health related problems in Mayurbhanj is Child malnutrition. About 48% children in Mayurbhanj were found to be underweight and 17.80% were severely underweight.
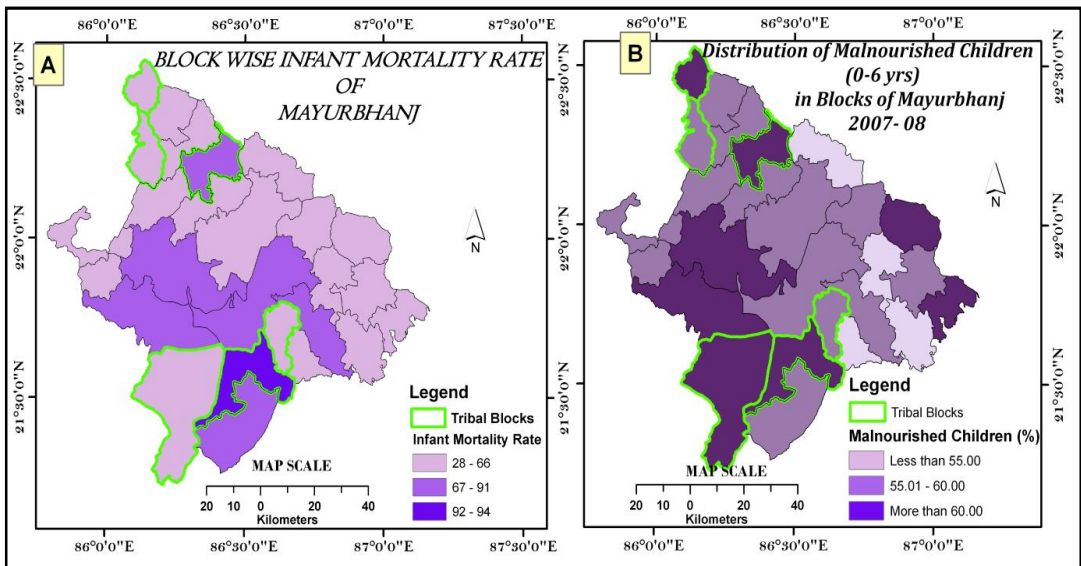

Figure-8A & 8B: Block-Wise IMR & Distribution of Malnourished Children in Mayurbhanj

Figure 8B shows block-wise status of malnourished children. From obtained data from *CDMO (*Chief District Medical Officer*) & DSWO (*District Social Welfare Officer)*, Mayurbhanj,* it is clear that in all the blocks more than half of the rural children between 0-6 years were reported as malnourished. Only in four blocks less than 55% children and in eight blocks more than 60% children are suffering from malnourishment. It also clear that among six tribal blocks, four have high percentage of malnourished children. Providing adequate antenatal care for healthy motherhood and childbirth is one of the Millennium Development Goals of Orissa as well as of Mayurbhanj. Though the figure of block-wise full antenatal care of pregnant women (%) in the district represent health picture not up to the mark (Figure 9A). In 2008, the proportion of pregnant women receiving full ANC (Ante Natal Care) in Mayurbhanj was 24.25% (DHDR, Mayurbhanj 2011).

Among twenty-six blocks of Mayurbhanj the condition of Koliana, Sukruli and Suliapada is worst. The full ANC among pregnant women in these three blocks is very low i.e. below 20%. Only in two blocks above 30% women got full ANC during their pregnancy, one is Karanjia (31.13%) and other block is Jashipur (30.23%). Though comparatively large proportion of births (67.2%) took place at home in the district of Mayurbhanj but there are also huge variation among blocks. Interaction with people in Focused Group Discussions (FGDs) during the DHDR sample survey showed, in rural areas the proportion of institutional deliveries was as low as 52.91%. On the other hand, the value was quite high (i.e., more than 99.64%) in urban areas (DHDR, Mayurbhanj 2011). From *District Human Development Report of Mayurbhanj, 2011* it also came to know that block-wise variation of institutional delivery varies from 4.64% in Samakhunta to 79.32% in Barasahi Block (Figure 9B). In Samakhunta Block, lack of transport facility due to presence of rugged topography and dense vegetation may be the cause of very low institutional delivery.
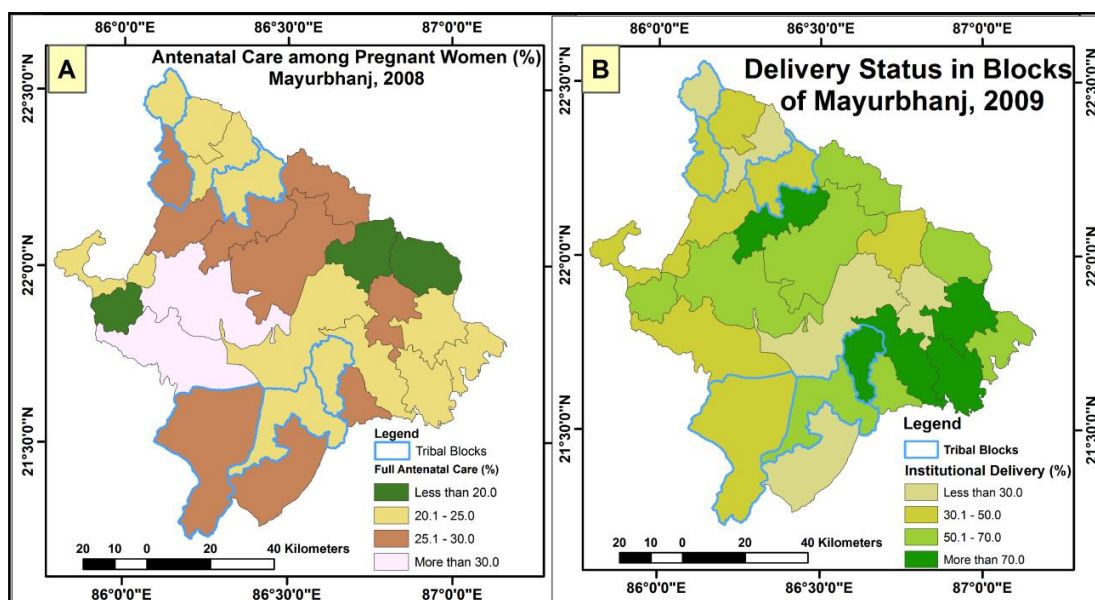

Figure-9A & 9B: Block-Wise Variations of Antenatal Care and Delivery Status in Mayurbhanj

5.4 Health Infrastructure of Mayurbhanj

Allopathic medical institutions are the backbone of the healthcare system in Mayurbhanj. There are total 16 Community Health Centres, 95 Primary Health Centres and 589 Sub Health Centres with 412 beds and 185 doctors in rural areas of twenty-six blocks (District Statistical Handbook, 2009). But the block-wise distribution of health centres is uneven mainly due to physical barrier (Figure 10A). The public healthcare system in the district is being supplemented by alternative systems of medicine. There are 86 homeopathic dispensaries, in which 39 doctors and 18 homeo-assistants are working. However, blocks such as, Bijetola, Khunta and Thakurmunda have no homeopathic dispensary (DHDR, Mayurbhanj 2011). The tribes in the district have also a long tradition of treatment by herbs, roots and leaves. From Figure 10A we may conclude that, there are 8.5 health centres per one hundred square kilometer in Mayurbhanj. Though Bangriposi, Jashipur, Karanjia, Samarkhunta and Thakurmunda have 3.75, 3.58, 3.88, 3.37 and 3.21 number of health centres per one hundred square kilometer respectively. On the other hand, only ten blocks have more than 10 health centres per one hundred square kilometer with the highest number at Gopabandhunagar (14 health centres/100 Sq Km).
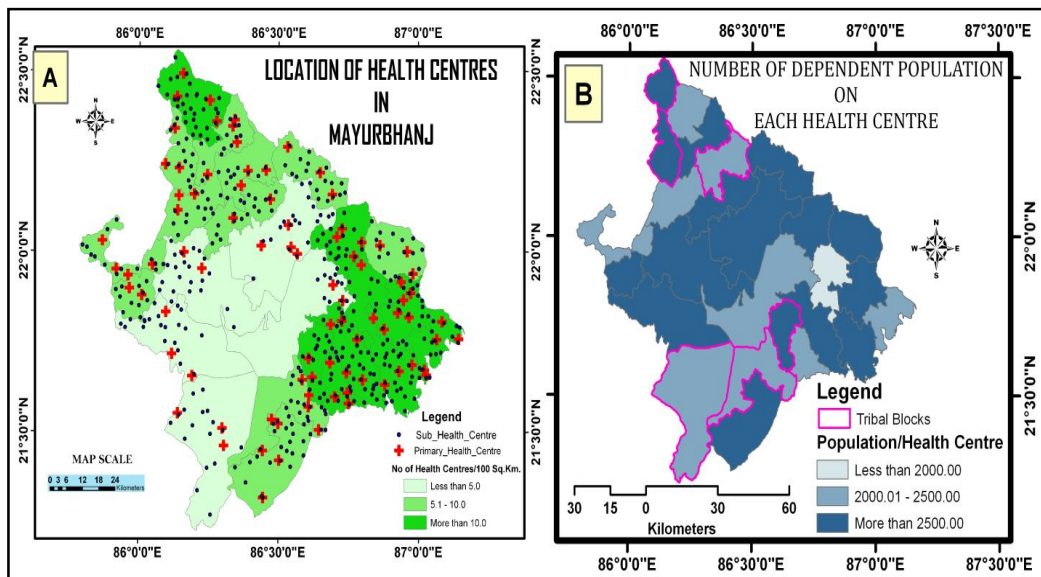

Figure-10A & 10B: Location and Block-Wise Pressure of Population on Each Health Centre

Though comparing with India (Rural Health Statistics in India, 2012) the situation is better in case of area served and population per health centre, but in case of number of served villages per health centre, the situation is little bit bad (Table 1).

Table-1: Health Infrastructure of Mayurbhanj Comparing with India

Types of Heal	Population Covered per Health Centre (HC)			Rural Area Covered (Sq. Km) per HC		Village Covered per HC	
	India	Norms for tribal area	Mayurbhanj	India	Mayurbhanj	India	Mayurbhanj
Sub Centre	5615	3000	3002	21.02	16.42	4	6.7
Primary Health	34641	20000	18614	129.66	101.85	27	41.58
Community Health Centre (CHC)	172375	80000	110521	645.21	604.71	133	246.88

From the available data in *District Statistical Handbook of Mayurbhanj, 2009* and Census data we prepare a dependency map based on block-wise number of dependent population per health centre (Figure 10B). From the map we can say that only in Baripada Block less than 2000 people depends on a health centre. It may be pointed out in this context that during calculation, we have included all type of health centres (Community Health Centres, Primary Health Centre and Sub-health Centres) and did not consider the urban population. In spite of that in sixteen blocks more than 2500 population depends on one health centre. On the other hand, if we consider beds per 1000 population then the condition will be alarming, because at present global average per 1000 population is 2.9 beds. The World Health Statistics say that India ranks among the lowest in this regard globally, with 0.9 beds per 1,000 populations – which are far below the global average. But in Mayurbhanj the value is 0.233 beds per 1000 population. The value of maximum blocks in Mayurbhanj is less than the average (Figure 11A). Though, it was recommended in 1948 by Bhore Committee that there should be one bed per 1,000 populations. However it's been 68 years since and we still haven't been able to reach that target (Sinha, The Times of India, October 10, 2011). On the other hand, in Figure 11B we can see that in Gopabandhunagar and Muruda Blocks have more than 0.15 doctors per 1000 population (Doctor-population ratio is 1:6666.67). According to *World Health Organisation* the ratio between doctor and population should be 1: 1,000 but in India there is only one doctor per 1,700 populations.

In Mayurbhanj this value reaches up to 1: 9558.5 (0.104 doctor/1000 population) because of its physical, social and political barrier, medical staffs don't want to go to the rural areas. But in this country there are 387 medical colleges (181 in government and 206 in private sector). India produces 30,000 doctors, 18,000 specialists, 30,000 AYUSH (Ayurveda, Yoga, Naturopathy, Unani, Siddha and Homoeopathy) graduates, 54,000 nurses and 36,000 pharmacists annually. So in the present juncture a revolutionary change in the mindset of medical staffs is urgently needed towards the improvement of healthcare services.
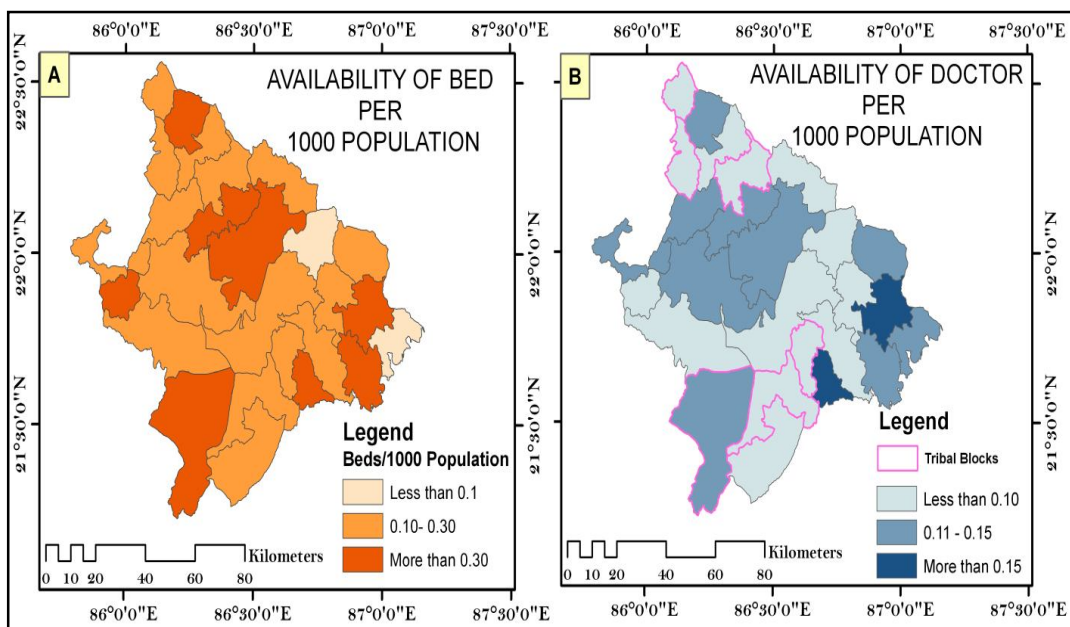

Figure-11A & 11B: Availability of Beds and Doctors per Thousand Population in Mayurbhanj
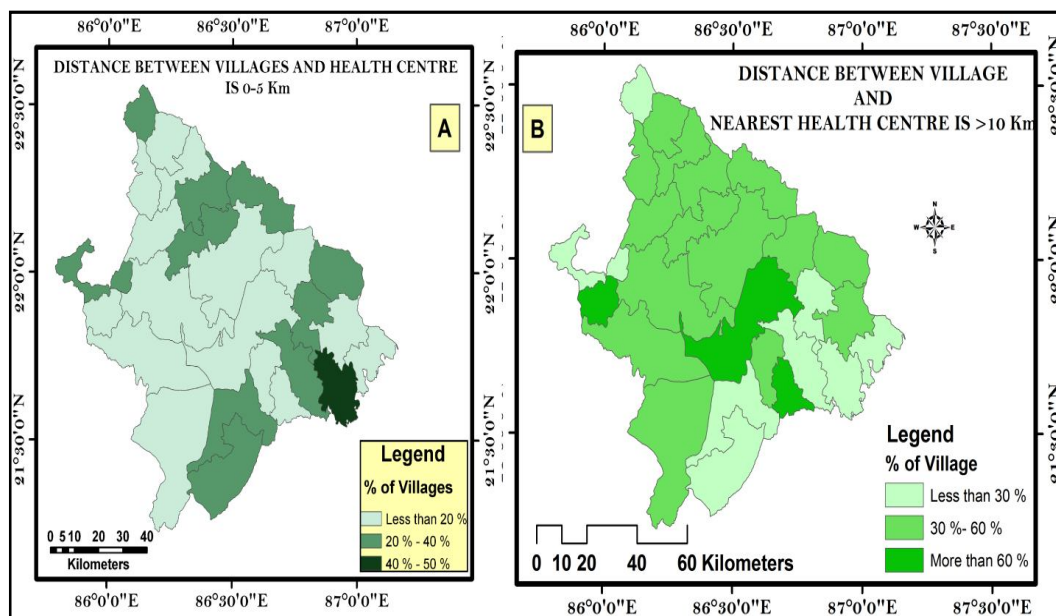
Figure-12A & 12B: Distribution of Villages on the Basis of Distance from Nearest Health Centres

In Figure 12A we have observed that only in Betnoti Block 48.71% villages are situated within five kilometer from a health centre. But in case of 80% villages in maximum blocks, the distance between villages and a health centre is more than 5 km. In Samarkhunta Block a health centre is located within 5 km for only 3.3% villages. The condition is worse in case of Gopabandhunagar, Samarkhunta and Sukruli Blocks. In case of these three blocks, the distance from nearest health centre is more than 10 km for 77.7%, 83.3% and 93.9% villages respectively (Figure 12B). On the basis of number of health centre per 100 Sq km, number of health centres, available beds and doctors per 1000 population, we gave score to the blocks of Mayurbhanj district and based on the score of each block, we prepare a deficiency map (Figure 13), where we can observe block-wise deficiency of health facilities, which also shown in Table-2.
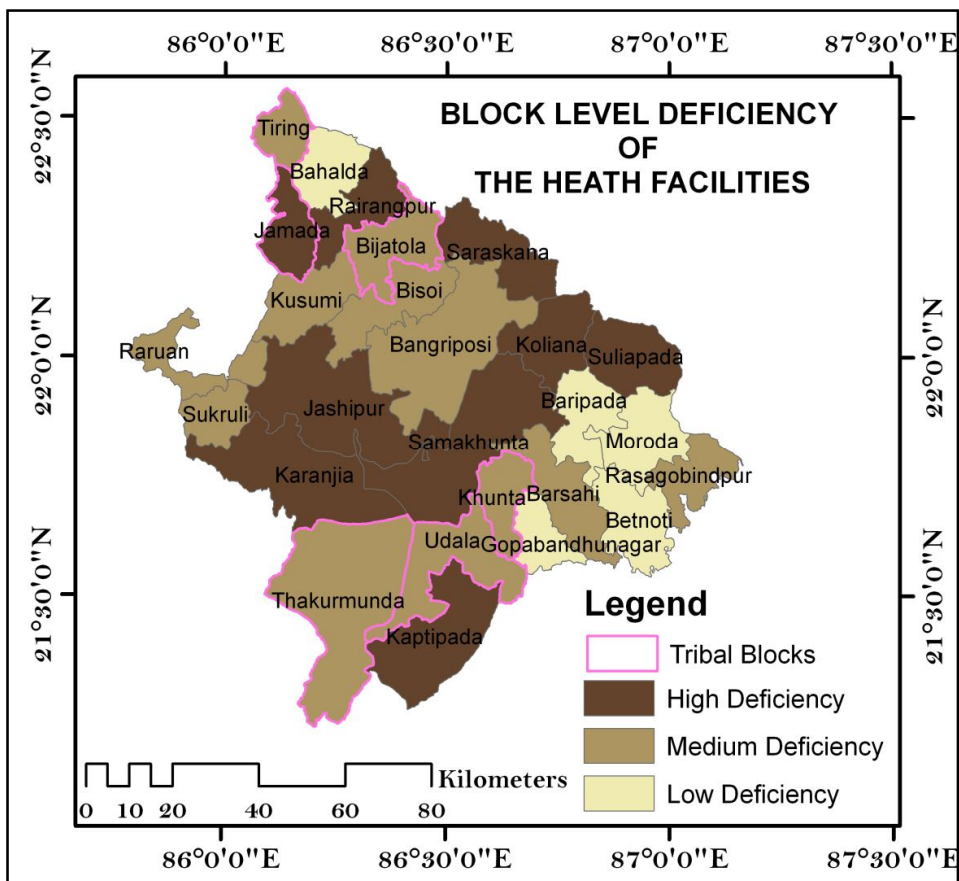
Figure-13: Deficiency Zones of Health Facilities in the Blocks of Mayurbhanj

Table-2: Deficiency of Health Facilities among the Blocks

Deficiency Zone	Blocks
Low	Bahalda, Baripada, Moroda, Betnoti and Gopabandhunagar
Moderate	Tiring, Raruan, Sukruli, Kusumi, Bijatola, Bisoi, Bangriposi, Thakurmunda, Udala, Khunta, Barsahi and Rasagobindpur
High	Jamada, Rairangpur, Jashipur, Karanjia, Samakhunta, Saraskana, Koliana, Suliapada and Kaptipada

6.0 Measures Suggested for Better Healthcare Services

It is clear from the analysis that the tribes of Orissa as well as Mayurbhanj are suffering from many health related problems as compared to other non-tribal community groups. They live in remote forests and hills.

As a result, they are unable to access the healthcare facilities. The following measures are suggested to improve the health status and proper management of healthcare services in the tribal areas of Orissa in general and Mayurbhanj in particular:

- Almost all tribal dominated districts are suffering by their biggest evil 'Poverty'. That's why the basic healthcare services and requirements like availability of nutrition, supply of pure drinking water and sanitation facilities should be provided sufficiently.
- To promote institutional deliveries, National Rural Health Mission and Orissa Health & Family Welfare Department have collectively introduced 'Janani Express' to provide free transportation facilities to pregnant women which will reduce infant and maternal deaths. But this type of facilities is inadequate as delivery load per block is more than 50 per month. So this type of facilities should be extended and also that should be properly utilized.
- People also should be aware about existing healthcare facilities so that they can utilize the facilities for their development. In this regard a mass awareness campaign on health related programmes may be organized at regular interval in tribal areas, for which government may collaborate with NGOs.
- Using GIS in health sectors will enhance the quality of services. It may also be helpful to analyze the present health status and decision making as well as to identify the areas of health risks.
- Keeping in view the complex and chronic health problems, today rural region needs specialists on priority basis. But in maximum Community Health Centers 70 % posts of specialists (surgeons, physicians, gynecologists etc.) are lying vacant.
- To ensure regular presence of medical staffs in remote rural areas, they should be motivated and trained properly to work for the remote rural tribes.
- Strong political will and commitment of the concerned administrative machineries are needed for the better healthcare of tribes in the study area.

7.0 Conclusion

Tribes are the most neglected section of the society. In Odisha as well as in Mayurbhanj improved health of tribes and improved infrastructure of health services are desirable to enhance their capabilities to participate in mainstream economic development.

Otherwise, rapid economic growth of the district and state will be hampered. At present steps are being taken to bring adequate improvement in the healthcare system of the district especially in the rural and backward tribal areas with the objectives of providing adequate qualitative healthcare services and ensuring healthcare facilities to all. So for the improvement in providing healthcare services to the people in backward areas, we need social, cultural, political and revolutionary change in the mindset of all sections of society.

References

Agarwal, S. (2013). Disadvantageous Situation of Tribal Women and Children of Orissa, India: A special Reference to Their Health and Nutritional Status. Journal of Community Nutrition & Health, 2:1.

Basu, S. (1994). A Health Profile of Tribal India. Health for the Millions, 2:124.

D.H.D.R. Mayurbhanj (2011). District Human Development Report: Mayurbhanj. Prepared by Planning and Coordination Department, Government of Orissa. Retrieved from: http://phdmaodisha.nic.in/Reports/HDRS/ Mayurbhang-DHDR.pdf (Accessed on 08.08.2014).

District Family Planning Plan (2011-12). District Family Welfare Bureau, Zilla Swasthya Samiti, Mayurbhanj, Orissa. Retrieved from: http://203.193.146.66/hfw/PDF/FP%20Plan_2011-12_Mayurbhanj.pdf   (Accessed on 12.08.2014).

District Level Household and Facility survey of Orissa (DLHS) (2007-08) and International Institute for Population Sciences (IIPS) (2010), Retrieved from: http://www.rchiips.org/pdf/rch3/report/OR.pdf (accessed 28.08.2014).

District Statistical Handbook of Mayurbhanj (2009). Prepared by District Planning & Monitoring Unit, Mayurbhanj, Government of Orissa.

Hassan, M. I. and Daspattanayak, P. R. (2008). Health-Care infrastructure in Orissa-A Geographical Study, Eastern Geographer, Bhubaneswar, January 2008, Vol. XIV.pp-33-40

Human Development Report, Orissa (2004) Government of Orissa, Prepared by Nabakrushna Choudhury Centre for Development Studies, Bhubaneswar 751013, Orissa. Retrieved from: http://planningcommission.nic.in/plans/stateplan/sdr_pdf/shdr_ori04.pdf (Accessed on 12.08.2014).

I.C.M.R Bulletin (2003). Health Status of Primitive Tribes of Orissa, 33:10, October 2003: Indian Council of Medical Research, New Delhi. ISSN: 0377-4910. Retrieved from http:// icmr.nic.in/BUOCT03.pdf (accessed 08.08.2014).

Kanjilal, B. Barman, D. Mondal, S. Singh, S. Mukherjee. M, Mandal, A. Bhor, N. (2008). Barriers to access immunization services: a study in Murshidabad, West Bengal. FHS Research Brief, 3.

Nanda, J. Adak, DK. Bharati, P. (2012).An assessment of infant and child mortality by social group and place of residence in districts of Orissa. Asian Pacific Journal of Tropical Disease. S242- S253.

National Family Health Survey, India (NFHS-3) (2005-06). Ministry of Health and Family Welfare, Government of India. Prepared by International Institute for Population Sciences, Mumbai. Retrieved from http://www.rchiips.org/NFHS/NFHS-3%20Data/Orissa_state_report.pdf (Accessed on 18.08.2014).

Census of India (2001, 2011). Office of the Registrar General & Census Commissioner, Ministry of Home Affairs, Government of India. Website Address: censusindia.gov.in/

Patra, S. (2009). Literacy and Health of Tribal's in Orissa, Indian Journal of Regional Science, Vol. XXXXI (2).pp-38-45.

Rural Health Statistics in India (2012). Statistics Division, Ministry of Health and Family Welfare, Government of India. Retrieved from: http://mohfw.nic.in/WriteReadData/l892s/8551027042RHS%202012.pdf (accessed 28.08.2014).

Sinha, K. (2011, October 10). India doesn't have even 1 hospital bed per 1,000 persons. The Times of India. Retrieved from: http://timesofindia.indiatimes.com/india/India-doesnt-have-even-1-hospital-bed-per-1000-persons/articleshow/10295898.cms.

State of the Environment Report, Orissa (2007). Retrieved from: http://www.moef.nic.in/soer/state/SoE-Orissa.pdf. (Accessed on 08.08.2014).

Thakur, DS. Thakur, DC. Saini, AS. (1991). Socio-Economic Impact of Tribal Development Programmes in Himachal Pradesh. Journal of Rural Development; Vol-10: pp-823-30.

Acknowledgements