

## Household Environment and Infant Mortality in India: A State Level Analysis With Special Focus to Orissa

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### INTRODUCTION

The infant mortality rate (IMR) is a prime indicator of socio-economic development and quality of life within a society. The causes of infant death vary with age, such that neo-natal deaths are primarily affected by endogenous factors and post neonatal deaths are largely due to exogenous causes. Orissa has an IMR much higher than the national average and as per census 1991 it ranked first among all the states of India, with the incidence of 126 infant deaths per 1000 live births, which SRS, 1995 reports a little drop in recent years. Orissa has been at a higher level of poverty, with 44.7 per cent of its population living below the poverty line, hence restricting the future economic and social development of the state (Planning Commission, 1987-88). Thirty-five per cent of all infant deaths in Orissa occur in the post-neonatal period, the leading causes of death being pneumonia and diarrhoea, thus emphasising the importance of exogenous factors. The remaining 65 per cent of deaths are neo-natal deaths, 5 per cent of which take place within one hour of the birth, 15 per cent neonates die (mainly due to premature birth) within one day of birth and 40 per cent of neonatal deaths occur within one week of birth.

It is known that the physiological factors which are mainly responsible for neonatal deaths are subject to control through public health measures and improvements in social and environmental conditions (U.N., 1973; Moriyama, 1967). The influence of such measures on post-neonatal deaths is an area of interest due to the manifested effects of the social-economic environment on survival during the post neonatal period. Previous studies have correlated low female literacy, low female work participation and poor extension of medical amenities to the increased IMR of Orissa. However, given that these measures of social development are equally

poor in some other states, these cannot adequately explain the continuation of highest IMR of Orissa.

A number of studies conducted in India illustrate that a host of demographic and socio-economic factors including household environment, sanitation, medical care, and nutrition play important role in determining the level of infant mortality. Padmanabha (1982) noted that inadequate social and medical amenities are responsible for high numbers of infant deaths in India. It was shown that drinking water from a well and non-electric source of lighting are associated with higher levels of infant mortality both in urban and rural areas. Nag (1983) reported that despite the relatively low economic development of Kerala the IMR is among the lowest in India due to a higher social development, particularly in relation to education and medical facilities. Jain (1988) studied poverty as a selected index affecting infant deaths in rural India by taking per capita monthly expenditure. It was discovered that the effect of poverty becomes more significant when other variables such as female education, medical facilities etc. are included in the regression equation. Gondotra and Das (1988) considered household amenities as a 'status index' in the study of infant mortality in Gujarat, and concluded that the index has a negative association with IMR. Panda (1992) reported that there is a positive association between the presence of electricity in the household and child loss during pregnancy. Kar (1993) suggests that health inputs are more influential in controlling infant deaths in Orissa. Alternatively, Bose (1995) suggests that the Human Misery Index, an index of the economic and physical environment of a household, is more appropriate for the study of child survival in a population.

Therefore, this paper will attempt to evaluate the IMR of Orissa taking into account socio-economic and household environmental factors, in other words to examine some of the 'micro

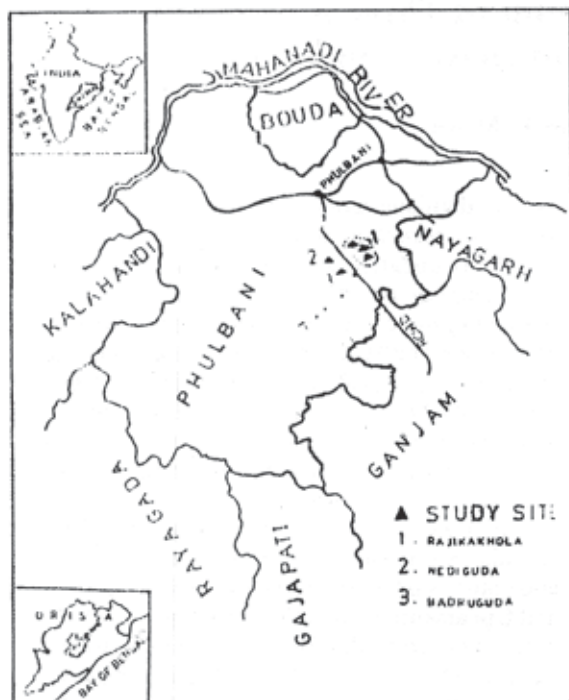


Fig. 1. Map showing the study site. Inset is the India and Orissa map.

experimental villages are of Desia Kondhs.

### Demography

During July 1994, the total human populations of Rajikakhola, Nediguda and Badruguda were 95, 83 and 79, respectively. Rajikakhola hemlets such as Badeguda, Padarsahi and Upparsahi has 43, 30 and 22 humans respectively. The low population in the hemlets is the characteristic feature of tribals residing inside the forest, who mostly depend upon the forests for their livelihood. Total male populations of the villages were 41, 48 and 46 in Rajikakhola, Nediguda and Badruguda respectively and the remainings were females (Table 1). Population maxima were observed in the age group of 15-25 in Rajikakhola and Nediguda while it was observed in the age group of 25-40 in Badruguda, thereafter the population almost decreased in both the sexes. The decrease in population after 40 years was due to death. Due to scarcity of

food the tribals become old at an early age and eventually die due to starvation and malnutrition. The male-female ratios in the villages show that females were more in Rajikakhola than that of Nediguda and Badruguda (Table 1). The average family sizes were 4.1, 4.6 and 4.1 persons per household in Rajikakhola, Nediguda and Badruguda, respectively.

### Literacy Rate

All those who could write their names were considered literate. The average literacy rate during 1994 was highest in Badruguda (14%) followed by Nediguda (12%) and Rajikakhola (8%). The literacy rate was mainly due to school going children upto 14 years. Most of the villagers older than 14 years were illiterate.

### Housing pattern

Kondhs live in small 1-2 roomed thatched mud houses constructed with mud or mud with wooden sticks. Huts were thatched with paddy straw, thatch-grass, sago palm leaves along with bamboo. No particular pattern was followed in construction of houses in these villages and they were mostly scattered. Both human beings and cattle shared the same roof in Badruguda and Nediguda while in Rajikakhola separate sheds were present. Houses were open to front and some to backside without any window. A narrow varandah was present in the front side of each house.

### Marriage System

Marriage among Kondhs takes place between both closely and distantly related clans. There is no age bar for marriage and girls are generally declared fit for marriage after attainment of puberty. Child marriage system is not observed in these villages. Newly married couples are allowed to stay in a separate house known as "Dhangada Ghar". However, unmarried girls and known young boys from the same village or other villages are also allowed to stay in the "Dhangada Ghar" to interact before marriage. But this tradition is gradually becoming obsolete. Family planning is insignificant among Kondhs. However, sometimes they use traditional herbal medicine for abortion. Usually abortion was done by the village priest (*Pujari*).

**Table 1: Distribution of population by age and sex in three Kondh villages of Phulbani district, 1994-96**

| Age group<br>(Years) | Village ecosystem |        |       |          |        |       |           |        |       |
|----------------------|-------------------|--------|-------|----------|--------|-------|-----------|--------|-------|
|                      | Rajikakhola       |        |       | Nediguda |        |       | Badruguda |        |       |
|                      | Male              | Female | Total | Male     | Female | Total | Male      | Female | Total |
| Below 2              | 02                | 02     | 04    | —        | —      | —     | 03        | 01     | 04    |
| 02 - 05              | 03                | 05     | 08    | 04       | 04     | 08    | 02        | 02     | 04    |
| 05 - 10              | 03                | 05     | 08    | 12       | 04     | 16    | 11        | 04     | 15    |
| 10 - 15              | 05                | 04     | 09    | 05       | 04     | 09    | 05        | 04     | 09    |
| 15 - 25              | 09                | 14     | 23    | 10       | 10     | 20    | 09        | 08     | 17    |
| 25 - 40              | 11                | 11     | 22    | 08       | 06     | 14    | 07        | 12     | 19    |
| 40 - 45              | 08                | 11     | 19    | 03       | 05     | 08    | 07        | 02     | 09    |
| Above 55             | —                 | 02     | 02    | 06       | 02     | 08    | 02        | —      | 02    |
| Total                | 41                | 54     | 95    | 48       | 35     | 83    | 46        | 33     | 79    |
| Male : Female        |                   |        | 1:1.3 |          |        | 1:0.7 |           |        | 1:0.7 |
| Total households     |                   |        | 23    |          |        | 18    |           |        | 19    |

### Religio-cultural Beliefs

Kondhs believe in natural power and worship God and Goddess. Every year in March they observe the festival, "Chaitra Parba"; it is celebrated in all Kondh villages with pomp and ceremony. Sacrifice of animal and offering of liquor to deities are the common practice and are usually done by the priest (*Pujari*). Sacrifice of animals such as sheep, goat and poultry is done to satisfy the village deities, for good health, better crop and also for a healthy environment. Kondhs generally do not get the modern health service but depend on the traditional medicine which is practised by the priests. However, their attitude towards religious beliefs, customs, caste-category, marriage and kinship is changing gradually due to influence of modernisation.

### Occupation

Families in these villages do not have any specific occupation. Most of them depend upon daily wage or cultivation coupled with daily wage (Table 2). Rajikakhola women attend agricultural work in their own village only. All families of all villages collect non-timber forest products (NTFPs) in different seasons. However, the Rajikakhola people collected maximum non-timber forest products (Dash, 1997). In Rajikakhola, 2 priests, apart from cultivation, do spiritual and religious work in and around the villages.

### Resource Base and Economic Structures

The local production system form the

resource base of the villages. They fall into three major categories: viz., agricultural sub-system, which includes valley cultivation, shifting cultivation and home-garden; animal husbandry sub-system, and forest sub-system. Economic return from home-garden and animal husbandry is very low and generally fulfill the domestic requirements of households in the villages. The non-timber forest products constitute an important resource base and the tribals export a sizable quantity of their collection. They import essential commodities including food grains from outside the village. The quantity of export and import depends upon the availability of resources in the villages. Export and import are mainly done either through vendor or by barter system.

Collection of NTFP was done individually by the households except for the collection of mohua flowers and sap of sago palm which were normally done in groups. The collected mohua flowers and sago palm sap were divided equally among

**Table 2: Occupational status of households in three villages**

| Occupation                      | Villages    |          |           |
|---------------------------------|-------------|----------|-----------|
|                                 | Rajikakhola | Nediguda | Badruguda |
| Cultivation                     | —           | 4        | 1         |
| Daily wage earner               | 4           | 2        | —         |
| Cultivation + wage earner       | 14          | 11       | 15        |
| Animal grazer                   | 1           | —        | 1         |
| Carpentry                       | —           | —        | 1         |
| Priest                          | 2           | —        | —         |
| Ideal (getting old age pension) | 2           | 1        | 1         |
| Total                           | 23          | 18       | 19        |

the households. Children and women supplemented their labour for collection of NTFPs.

### Land Use Pattern

The total geographical areas were 31.9 ha, 12.4 ha and 17.1 ha for Rajikakhola, Nediguda and Badruguda respectively. The aquatic entities were only 0.7 % in Rajikakhola and 0.9% in Nediguda, while Badruguda had no aquatic entities. The total average available cultivated land was 66 % in these villages. Area occupied by houses was very less (0.1 to 4.8 %) (Table 3).

The common property resources (CPRs) land constitutes the area upto which the communities have free access and to which no individual has exclusive property right. The CPR of the villages includes village roads, pasture lands, water bodies and the government forests (for shifting cultivation).

The *per capita* land holding is very low (0.26 ha, 0.1 ha, and 0.12 ha for Rajikakhola, Nediguda and Badruguda respectively) as compared to the other tribal areas of the state (Nayak et al. 1993; Naidu and Misra, 1998). The land holding categories of the villages show that maximum households were either landless or had less than one hectare of land (Table 4).

The scarcity of agricultural land in the villages compelled the Kondhs to shift their occupation from forest-based activity to some other economically viable activities such as wage

Table 3: Land use pattern in the three villages (% of contribution)

| Category              | Villages      |               |               |
|-----------------------|---------------|---------------|---------------|
|                       | Rajikakhola   | Nediguda      | Badruguda     |
| Total area            | 100<br>(31.9) | 100<br>(12.4) | 100<br>(17.1) |
| Aquatic               | 0.7           | 0.9           | —             |
| Terrestrial           | 99.3          | 99.1          | 100           |
| Housing               | 0.6           | 4.8           | 0.56          |
| Courtyard             | 11.6          | 15.6          | 15.05         |
| Area surrounding home | 10.8          | 13.1          | 13.18         |
| Road                  | 0.72          | 2.49          | 1.86          |
| Other area            | 87.1          | 78.7          | 84.36         |
| Cultivated            | 77.7          | 65.8          | 54.26         |
| Uncultivated          | 9.37          | 12.86         | 30.10         |
| Fallow land           | 2.82          | 3.54          | 21.94         |
| Marshy land           | 1.91          | 1.77          | 2.92          |
| Shallow land          | 4.64          | 7.55          | 5.25          |

Figures in parentheses are the total area of the villages in hectares.

Table 4: Distribution of households according to land holding in the three villages

| Category         | Village ecosystems |          |           |
|------------------|--------------------|----------|-----------|
|                  | Rajikakhola        | Nediguda | Badruguda |
| Landless         | 4                  | —        | 2         |
| Below 1 ha       | 9                  | 8        | 10        |
| Between 1 - 2 ha | 4                  | 4        | 7         |
| More than 2 ha   | 6                  | 6        | —         |
| Total            | 23                 | 18       | 19        |

labour. Kondh women do not work as wage labourers but do all the household works such as cooking, cleaning, child rearing, fetching water and gathering firewood and so on.

### Cropping Pattern

Cropping pattern is divided into 3 categories viz., valley cultivation, podu cultivation and home-garden. Rice (*Oryza sativa*) is the main crop grown in wetlands and uplands, finger millet or ragi (*Eleusine corocana*), blackgram (*Vigna mungo*), green gram (*Vigna radiata*) niger (*Guizotia abyssinica*), black mustard (*Brassica campestris* var *dichotoma*) and ground nut (*Arachis hypogaea*) were also cultivated in uplands.

Redgram (*Cajanus cajan*), barnyard millet (*Echinochloa colonum* var *frumentacea*), common millet (*Panicum sumatranse*) and pearl millet (*Pennisetum typhoides*) were cultivated under shifting cultivation.

As all the lands are rainfed, agricultural activity starts with the onset of monsoon (June - July) and harvesting is done during November - December. Females and children are participating in all agricultural operations such as transplanting, weeding, harvesting, transporting and threshing, except ploughing. Kondhs do not use any chemical fertilizer in their crop fields.

### Livestock Sub-systems

Table 5 shows the livestock population of the villages during the study period. The peculiarity observed in these villages was that milk was never extracted from cows. Moreover, cows were utilized as draught power in cultivation.

The cattle population was largely depended upon the degraded forest lands and on adjacent forest. There was no demarcated grazing land in these villages for the cattles.

**Table 5: Total livestock population of the villages**

| Animal category       | Villages    |          |           |
|-----------------------|-------------|----------|-----------|
|                       | Rajikakhola | Nediguda | Badruguda |
| Total cow             | 15          | 39       | 26        |
| Cow for ploughing     | 11          | 15       | 13        |
| Total bullock         | 17          | 21       | 12        |
| Bullock for ploughing | 11          | 17       | 10        |
| Total he - buffalo    | 4           | —        | —         |
| Total she - buffalo   | 25          | —        | 2         |
| Milching she-buffalo  | 9           | —        | 1         |
| Goat                  | 51          | 8        | 28        |
| Swine                 | 3           | —        | —         |
| Poultry               | 52          | 25       | 68        |
| Total                 | 107         | 93       | 137       |

## Food

The staple food of the villagers is rice. Next to rice is cooked products of other cereals such as common millet, barnyard millet and finger millet (ragi). Tribal people take three meals a day—morning, noon and evening. In addition, the working group and children take *Jau* (semi-liquid preparation) made from the flour of finger millet and *Peja* (cooked rice water). The general combination of food was cereals, legumes and vegetables. Liquid curry (*Kanji*) is prepared out of leafy vegetables. On auspicious occasions they take mutton or chicken or pork. The variety and quantity of food items consumed during the year depends on availability of and economic condition of the households. The peculiarities observed in these villages are that after harvest season, villagers do not opt for any economic activity until the stored foodgrains are completely consumed. Aluminium and earthen utensils (*pots*) are used by all households for domestic work. *Siali* (*Bauhinia vahlii*) and *sal* (*Shorea robusta*) leaf plates are used invariably while serving the food. The peculiarity observed in Rajikakhola was that they never take the food directly in bare hand, but they use a sal leaf like a spoon while eating. The reason is unknown, but may be for cleanliness. It is a part of their culture.

## Smoking, Snuffing and Drinking

All adult male tribals generally consume country liquor everyday. At times the tribal children also consume diluted country liquor. In festive days consumption of liquor was maximum in the age group of 25-40 years in both sexes. In

these villages, on an average 18.6% of women shared with the male in liquor consumption. However, per capita liquor consumption was highest in Rajikakhola (250 ml) and lowest in Nediguda (212 ml). This liquor consumption rate is lower than the consumption rate (364 ml cap<sup>-1</sup> day<sup>-1</sup>) of Nolias (fisherman folk) of coastal Orissa (Sahoo and Misra, 1994), and almost equal with the consumption rate of *Sabar* (223 ml cap<sup>-1</sup> day<sup>-1</sup>) tribes of Ganjam district of Orissa (Nayak et al. 1993). Age and liquor consumption showed a curvilinear relationship (Dash, 1997).

Men and women, particularly of working class of different age groups are habituated to smoking of *pikka* or black cigar (rolled tobacco leaves) and snuffing (Snuff, called "*Nasha*", the powdered tobacco leaves).

## Fuel Energy Utilization Pattern

The bulk of fuel energy used for domestic activities such as cooking, heating, cremation of dead bodies, camp fire and festive fires comes from biomass sources. The biomass fuel consists of stemwood and branch-wood. In all these villages kerosene is used only for lighting and per capita kerosene used was 23 ml, 17 ml and 13 ml in Badruguda, Nediguda and Rajikakhola respectively.

Firewood, both for domestic and commercial purposes was collected from the nearby forests. The distance covered, time spent for collection of firewood and the quantities used in different villages depended upon the availability of wood. The people of all the villages depended upon the degraded forest present near Rajikakhola. On an average Kondh spends about 5-6 hours per day for firewood collection on ideal seasons.

## Constrain on Upliftment of Tribals

The main socio-economic factors which hinder the functioning of the village ecosystems are illiteracy and alcoholism of the tribals and the interference of plainland people in their life-supporting activities. The traditional Kondh economy depends mostly on valley cultivation and collection of non-timber forest products. Thus, it is essential to strengthen these two sectors to improve the economy of the Kondhs. The following constraints were observed in these villages.

### Traditional Obsolete Practice

In the rainfed agricultural sub-system rice was found to be most efficient among the crops grown in these villages. But the efficiency of production is very low as compared to the other parts of India. The agricultural fields get very small amount of nutrients as wash-out because the surrounding hills are mostly barren and the nutrient status of these soils is very poor. Moreover, no organic or inorganic fertiliser is being used in the agricultural fields. Thus agricultural activities are mostly restricted to monsoon period.

### Unplanned Shifting Cultivation

Podu (shifting cultivation) is an important traditional agricultural practice of the Kondhs of the Eastern Ghats of Orissa. But due to population pressure and repeated podu cultivation, in many areas secondary succession is arrested and most of the forests disappeared and the land become almost barren. In many cases podu is restricted only to the burning of annual weeds, for example, in case of Nediguda and Badruguda villages. Thus repeated burning of annual weeds and in absence of any fertilizer input, the soil become unfertile and unproductive.

### Lack of Modern Concept in Animal Husbandry

Animal husbandry sub-system in the studied villages was unorganised. Cows are even used for ploughing. The most peculiarity is that Kondhs do not extract milk from cows. Due to this the children are deprived of milk and develop malnutrition. However, non-availability of fodder and sufficient grazing land are the main constraints in rearing animals to improve the economic status of the people.

### Fast Depletion of Forest Cover

Non-timber forest products play a major role in regulating the tribal economy. But it was observed that the collection of NTFPs is poorly managed and the unprocessed materials are sold in the market. Moreover, adequate market facility is not available in the area.

The Kondhs of the studied villages as well as the nearby villages completely depend on Rajikakhola forest for wood biomass, used for

all domestic purposes such as fuel, construction of houses, fencing, camp fire as well as for commercial purpose. This indiscriminate use of the forest has deleterious impact on the environment.

## DISCUSSION AND SUGGESTIONS

In view of the resource constraint and difficulties in conservation and management of village resource base, suitable methods must be developed to improve the situation. Sustainable development of the area involves in improving some infrastructural components and traditional practices. An ecological insight into the studied tribal villages certainly improve the socio-economic condition of the inhabitants. The specific suggestions for the improvement are :

### Agriculture Sub-system

1. Introduction of suitable high yielding early variety of rice with sustainable management practices would help in obtaining two harvests in a year and this would also increase the energy efficiency of the crop.
2. As water is a major constraint during dry period, even for domestic use, rain water can be harvested in tanks (or small reservoirs) which is presently not available in the area.
3. In the podu areas as well as in sloppy areas nitrogen fixing fodder plants may be planted. This would supply fodder and can stop soil erosion and improve soil fertility.
4. The home garden practised in the tribal areas is restricted to only annual leafy vegetables which is economically not efficient. This could be improved by extending perennial home garden species to which the environment is conducive. Some of the species which could be adapted in the area are mango, jack fruit, citrus, black-pepper, pine apple, banana, guava and so on.
5. In addition to indigenous cattle, introduction of hybrid cattle in the area and use of milk in daily diet may help improve the health condition of the tribals and export of milk will fetch money. Attempts should be made to improve the poorly developed indigenous poultry farming, which is economically sound. But goatery should not be encouraged as these browsers are not conducive to forest ecology.

### Forest Sub-system

1. The unplanned marketing of NTFPs must be managed in a proper manner.
2. Local tribals, particularly youths may be imparted training for the mechanised processing of siali and sal leaves into plates and cups which have a better market in urban areas.
3. The mohua seeds which are presently neglected can fetch good economic return, if properly managed.
4. Presently tamarind pulp is exported to outside the district. But the tamarind seeds are left in the environment as waste. Government or some non-government agencies should take initiative to collect the tamarind seeds for the extraction of starch or may be used as seed for development of plantation in the area, which ultimately help in enhancing the economic conditions of Kondhs.
5. The sap of sago palm (*Caryota urens*) is extracted in large quantity during winter and early summer months. The sap is consumed as nutritious food immediately after extraction and consumed as liquor after a suitable period of fermentation. But due to lack of any preservation facility the extracted sap is either completely consumed or distributed among nearby villagers. Attempt should be made to preserve the sap by available scientific method and further research can be made for improvement. If the sap (preserved) would be available throughout the year this can save a lot of money that would have been spent towards country liquor consumption.
6. Introduction of cash crops such as bamboo in the fallowlands would help improve the economic condition of the tribals.
7. Present practice of introduction of exotic species through afforestation and wasteland management programmes into an area limits the sources of livelihood of the tribals, it only supplies wood-biomass. Cultivation of other cash crops such as thatch grass, broom

grass, lemon grass and sabai grass would be of much help to the Kondhs as the environment is conducive.

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**KEY WORDS** Kondh. Village Ecosystem. Ecology. Socio-economics. Demography.

**ABSTRACT** An empirical study on the Kondhs of Phulbani district of Orissa, India was made by selecting three typical Kondh villages-Rajikakhola, Nediguda and Badruguda - during 1994-96. Population of these villages varied between 79 to 95. Socio-economic structure of these villages revealed a poor status of the tribals. Ecological parameters including resource base of these villages were described. Difficulties encountered in improving the financial condition of these tribals were also analysed. Suggestions for improvement of these village ecosystems were made.

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