

A Path-Analysis on the Multiple Determinants of Infant Mortality Among the Oraons

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ABSTRACT The present study examines the total effect as well as the direct and indirect effects of the independent variables viz., type of family, socio-economic status, mother's age at marriage, type of delivery attendant, hygiene and health status of mother on infant mortality on the basis of a sample study of 600 Oraon couples of central India. The type of delivery attendant emerged as the single most important determinant of infant mortality differentials among the Oraons.

INTRODUCTION

The level of Infant Mortality presents an excellent summary of the socio-economic development of any population. In other words, infant mortality rate (IMR) can be looked upon as the most sensitive indicator of the Physical Quality of Life Index (PQLI) that characterizes various sub-groups within a population (Morris and McAlpin, 1982). In this context, an understanding of the multi-dimensional determinants of infant mortality is of crucial importance. Apart from the need to check the human suffering implied through high incidence of death of infants, such an understanding would guide the high priority efforts being made throughout the third world to regulate the fertility at a low level. In fact, it is widely accepted that a substantial fall in infant mortality tends to lower the fertility level of any population (Flegg, 1982; Preston, 1978). Differentials in the level of infant mortality among different sub-groups of India's population is the result of differences not only in socio-economic development, environmental condition, and health service facilities, but also in the existing cultural milieu. Cultural responses to problems involving infant mortality are critical in the

social life of any human group. Hence, the need arises to study special cultural groups on differentials and determinants of infant mortality within the framework of a given cultural setting.

A 'tribe' being a closed social entity, provides us ample scope for an indepth study on various dimensions of human experiences of birth, healthy survival, illness and the tragedy of death. The present paper makes an attempt to analyze few selected crucial determinants of infant mortality differentials among the Oraons, a primitive tribe in the central tribal belt of India. Although the determinants of infant mortality are many, only a few selected determinants (Variables) have been considered here due to the operational difficulty in handling too many variables in a path analysis model. However, the selection of these few variables for the present analysis is based on the established importance of these variables in the Oraon tribe as identified in a major study conducted by one of the authors of this paper (Koshy, 1993).

ABOUT THE TRIBE : THE ORAONS

The Oraons constitute a major tribal group in the central tribal belt of India. This tribe is found in the states of Bihar, Orissa and Madhya Pradesh. However, according to several legendary evidences, the Chota Nagpur plateau (in Bihar) is the original homeland of the Oraons. During the last quarter of the 19th century and also during the first two decades of this century, many Oraon families from the Chota Nagpur plateau had migrated to the adjoining princely states, now part of the present day states of Orissa and Madhya Pradesh (Russell and Lal, 1975). The Dravidian tribe 'Oraon' has received a familiar face in anthropological literature as a

group of highly traditional and ethnocentric people (Roy, 1951 ; Bose, 1972; Das, 1972). The traditional Oraons profess a primitive animistic form of religion.

Since the days of the British regime in India, the tribals in the central tribal belt of India have been exposed to a continuing influx of Catholic Missionaries. The three major aboriginal tribes among whom the conversion activities of the Christian Missionaries were very successful are the Austroic-speaking Mundas and the Kharias, and the Dravidian-speaking Oraons. However, only the traditional sect of the Oraon tribe (non-Christians) has been taken into account for the present study.

METHODOLOGY

Sampling and Data Collection

The present research investigation was carried out among the traditional Oraons in the state of Orissa, which is part of the Central Tribal-Belt of India. The distribution of the Oraon Population among the districts of the state is not uniform. According to the 1971 census, the major bulk of the Oraon population inhabits the western region of the state. The district of Sundergarh in this region alone accounts for nearly 85 per cent of the total Oraon Population in the state. For this very reason, the sample for the present study has been drawn from the Oraon population in the district of Sundergarh in the western region of the state of Orissa.

In order to draw the required sample, a multi-stage random sampling technique was adopted. Based on the availability of sizeable population of the tribe, a total of 108 villages in the Sundergarh district were identified and listed out. In the first phase of the sampling, 50 villages (out of 108 identified villages) were selected at random. All the events of live-births that took place during the two years reference period of this study (*i.e.* live births that took place in not more than three years nor less than one year prior to the date of the present survey) were identified and listed through a preliminary survey covering all the Oraon families in these 50 villages. Thus a total of 3,167 live birth were reported from the 50 Oraon villages during the two years reference period. In the final stage of the sam-

pling of 600 cases of live-births (about 20 per cent of the total reported cases) were selected at random to constitute the sample for this study. Further, a total of 161 cases of infant deaths were reported as on the date of the survey from the study sample of 600 live births. The infant mortality rate for the sample population has been worked out to be 268 per one thousand live-births, which is at an extra-ordinarily high level. Statistically, this high rate of infant mortality could be partly attributed to the small size of sample population. Though a still bigger sample may be desirable for a mortality study, however, it could not be considered here for several technical limitations. Since the incidence of infant deaths is very high in the sample population, the size of the present sample can be considered appropriate though moderate.

The data base for the present study comes out of a field survey of the sample Oraon population. The Oraon couples (parents) were interviewed using an interview schedule. Besides the principal method of data collection *i.e.* interview, other anthropological techniques such as, case study and observation (non-participant) methods were also adopted to supplement in gathering information on several crucial factors for which the interview method alone, it was felt, could not do full justice.

Data Analysis

In fact, any variable may have only a direct effect on infant mortality or/and its effect reaches through one or many other variables. With this assumption, a path-analysis method of data analysis has been adopted for the present study (in preference to other multi-variate analysis techniques) due to its advantage in estimating separately the magnitude of the direct, indirect and the total effects of each independent variable (determinant) on the dependent variable (here, infant mortality).

As mentioned earlier, due to operational feasibility reasons, only a few selected variables (six variables) have been taken into account for the present path-analysis. However, the selection of these variables is not arbitrary. In fact, they were chosen (out of a total of 32 variables examined) based on their strong correlation with infant mortality as noticed from the

correlation-matrix table. Also certain theoretical and practical realities associated with these variables and their relevance on the study group was also under consideration while selecting these six variables for the present path analysis.

The six variables selected for the path-analysis are :

1). The following Structural Equations have been derived from the path diagram :

$$Y_0 = P_{02}X_2 + P_{03}X_3 + P_{04}X_4 + P_{05}X_5 + P_{06}X_6 \dots (i)$$

$$X_2 = P_{21}X_1 + P_{23}X_3 + P_{24}X_4 + P_{25}X_5 + P_{26}X_6 \dots (ii)$$

$$X_3 = P_{31}X_1 + P_{32}X_2 \dots (iii)$$

$$X_4 = P_{41}X_1 + P_{42}X_2 \dots (iv)$$

$$X_5 = P_{51}X_1 + P_{52}X_2 \dots (v)$$

The Independent Variables

- | | |
|---|---|
| 1. Type of family (X_1) | : Joint/Transitional/Nuclear |
| 2. Socio-economic Status (X_2) | : Low/Moderate/High (based on an index) |
| 3. Mother's Age at marriage (X_3) | : Age (in completed years) at the beginning of actual conjugal life. |
| 4. Type of delivery attendant (X_4) | : Home delivery attended to by untrained traditional birth attendant/home delivery attended to by trained paramedical person/Hospital based delivery. |
| 5. Family Hygiene (X_5) | : Poor/moderate/good (based on an index) |
| 6. Health Status of Mother (X_6) | : Poor/Moderate/Good (based on an index) |

Dependent Variable

- | | |
|----------------------------|---|
| Infant Mortality (Y_0) | : If the reference child died during infancy?
Yes/No |
|----------------------------|---|

For the correlation analysis (Table 1), low to high scores were assigned to the different categories under each of the two variables viz., Type of family (X_1) and type of Delivery Attendant (X_4) on the basis of their observed nature of influence on infant mortality in the study group. For Mother's age at Marriage (X_3), the age (in completed years) at the time of starting actual conjugal life has been taken into consideration. The other three variables, viz., Parent's socio-economic status (X_2), Hygiene (X_5) and Health status of mother (X_6) are based on Index values (composite indices were constructed separately for each of these variables). It may be mentioned here that from the path diagram, several Structural Equations were worked out. Taking into account these structural equations and the correlation coefficients, the path-coefficients were estimated by Multiple Regression analysis.

RESULTS AND DISCUSSION

There could be many possible paths through which the effects of these six variables reach the dependent variable (infant mortality). However, only a few major paths have been designed for the present path-analysis with a view to have a more precise and deeper understanding (see Fig.

Table 1: Correlation matrix

	X_1	X_2	X_3	X_4	X_5	X_6	Y_0
X_1	1.000	0.251	0.263	0.224	0.162	0.220	-0.114
X_2	0.251	1.000	0.359	0.475	0.482	0.530	-0.233
X_3	0.263	0.359	1.000	0.407	0.291	0.290	-0.176
X_4	0.224	0.475	0.407	1.000	0.351	0.286	-0.278
X_5	0.162	0.482	0.291	0.351	1.000	0.349	-0.172
X_6	0.220	0.530	0.290	0.286	0.349	1.000	-0.186

Based on the structural equations and the Zero-order correlation values, the path-coefficients have been worked out (see Fig. 1). The final results on the direct, indirect and the total effects of each of the six variable have been presented in table 2.

Table 2: Direct, indirect and total effects of the variables (determinants) on Infant Mortality

Variable	Direct effect	Indirect effect	Total effect
Type of family(X_1)	—	-0.1140	-0.1140
Socio-economic.....(X_2) status	- 0.0740	0.1590	- 0.2330
Mother's age at(X_3) marriage	- 0.0408	-0.1352	-0.1760
Type of delivery.....(X_4)	- 0.1955	- 0.0825	- 0.2780
Hygiene(X_5)	- 0.0321	- 0.1399	- 0.1720
Health status of.....(X_6) mother	- 0.1860	—	- 0.1860

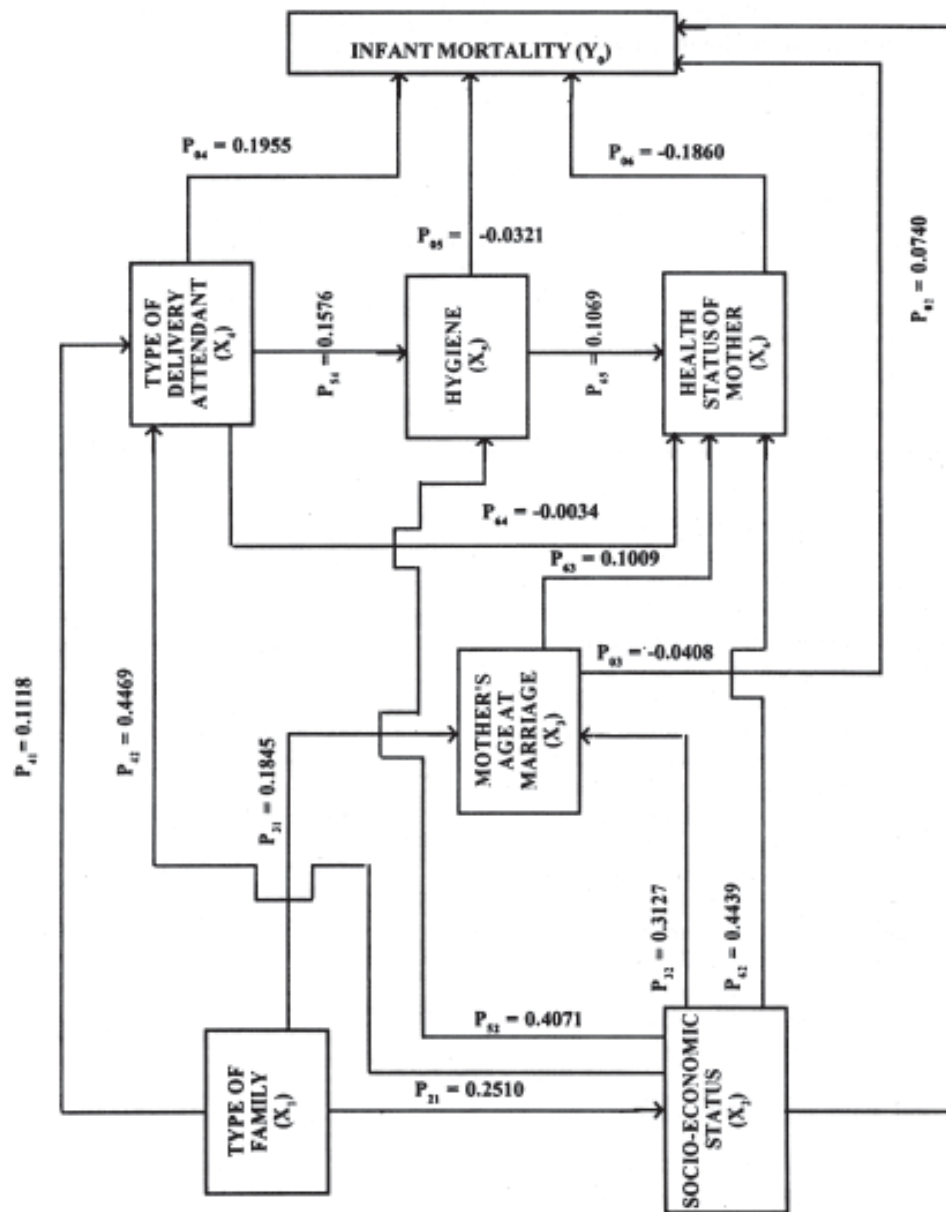


Fig. 1. Path diagram showing Path-coefficients

Type of Delivery Attendant

The service rendered by the delivery attendant has been structured on a quasi-linear basis (in an ascending order), from unscientific service (home delivery attended to by untrained traditional birth-attendant) to quasi-scientific (home delivery attended to by trained birth attendant) and finally fully scientific (hospital based delivery). Such a classification made this variable more sensitive and precise in explaining its type of influence on infant mortality. From the path-analysis results (Table 2), type of delivery attendant has emerged as the singlemost important determinant of infant mortality differentials among the Oraons. It has shown a strong negative effect (-0.2780) on infant mortality. Nevertheless, the effect of this variable on infant mortality is found to be mostly direct (-0.1955) with only negligible indirect effect (-0.0825) through hygiene and mother's health status. The finding clearly calls for the urgency to popularise hospital based delivery among the tribals in general and the Oraons in particular.

The emergence of the variable "Type of Delivery Attendant" as the single most important determinant of infant mortality can be explained as couples those who had opted for skilled or trained Birth Attendant (including hospital based deliveries) showed greater concern about the safety of the mother as well as the new borns. Such a positive attitude is a result of better socio-economic status, greater sense of hygiene and so on.

Socio-Economic Status

Parental socio-economic status is found to be the second most important factor in explaining the differentials in infant mortality among the Oraons. A composite index was constructed on the major socio-economic variables (education, occupation and income) of both the parents together. The variable socio-economic status has been made linear (based on the index score as low/moderate/high) for facilitating the analysis. Parental socio-economic status has shown a strong negative effect on infant mortality in the study group (-0.2330). However, the effect is found to be mostly indirect (-0.1590) through other variables viz., mother's age at marriage, type of delivery attendant, hygiene and mother's health

status. Parental socio-economic status acted as a predisposing factor that influenced several other determinants of infant mortality viz., hygiene, type of delivery attendant health status of mother etc.

Health Status of Mother

For linear structuring of the variable 'Health status of mother', an index was constructed taking into consideration several dimensions of health. Health status of the mother has emerged as the third important determinant of infant mortality differentials among the Oraons. It has shown a significant negative (only direct) effect (-0.1860) on infant mortality operated through health status of the mother (Fig. 1).

Hygiene

An index was constructed taking into account various hygienic aspects pertaining to the family. On the basis of the index score, the variable 'hygiene' has been structured on a linear basis as poor/moderate/good. Hygiene has shown a significant negative effect (-0.1720) on infant mortality in the study population. Good sense of hygiene is an integral part of positive health behaviour.

Mother's Age at Marriage

Mother's age at marriage has shown a significant negative effect (-0.1760) on infant mortality. The effect is found to be mostly indirect (-0.1352) operating through health status of the mother. This finding reveals that the late marriage of the tribal women would not only reduce the level of infant mortality in the study population but also promote better health of women. Of course, early marriage of girls is common among the Oraons. Higher age at marriage of women is not only characterized by better reproductive health, but also speaks of better socio-economic status including education.

Type of Family

Nuclear family situation is found to be conducive for greater survival chances of infants among the Oraons. On the other hand, incidence of infant mortality is comparatively higher among the joint families in the study population. The variable 'type of family' has been graded on a quasi-linear basis (with low to high scores) as joint family followed by transitional family and

lastly the nuclear family. Type of family has shown a negative effect (-0.1140) on infant mortality, however, only indirectly through parental socio-economic status, type of delivery attendant and mother's age at marriage. It was found that the religious and cultural barriers to scientific health behaviour operate more rigidly in a joint family as compared to a nuclear family.

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