



Determinants of Infant Mortality in rural Bundelkhand region of U.P.

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KEYWORDS

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ABSTRACT

Infant mortality is known to be one of the most sensitive and commonly used indicators for determining the socio-economic development of a country and therefore indirectly points towards the maternal child health. In this paper a cross-sectional survey of 100 mothers (age 15-49 years) was done to determine the socio-demographic factors affecting them and hence their infants' survival in rural Bundelkhand region of U.P. The paper focused on educational status of mother, her socio-economic status, knowledge on childcare practices, family income and influence of distance of healthcare centres from the place of living. Among all the determinants of infant mortality selected in the model study, education of the mother and the socio-economic status (including sanitation and clean drinking water) of her household played an important role in determining the survival status of the infant.

Introduction

Infant mortality rate (IMR) is the number of death of children below one year of age per 1000 live births. Infant mortality rates reflect economic and social conditions of mothers and newborns, as well as the effectiveness of health systems (Organisation for Economic Co-operation and Development, 2011). The high IMR of a country indicates the unmet health needs, unfavourable environmental factors, and low health and socio-economic status of its population. In the developing world every year over 10 million children under five years of age die and the large proportion of it is from causes that are preventable through a combination of good care, nutrition supply, and medical treatments (UNICEF report 2017). Thus the level of infant mortality would present a measure of how well a society meets the needs of its people (Bicego and Ahmad, 1996). The determinants of infant mortality are not static, they vary with geographical location. Data on causes of infants' mortality are considered essential for planning and policy making. There is also a great link of the problem with national / international policy/programmes such as; Millennium Development Goals (2000-2015) and Sustainable Development Goals (2015-2030).

India has improved its IMR marginally from 33 per 1,000 live births in 2017 to 32 in 2018 (SRS, 2017). In the last decade, the infant mortality rate declined from 50 to 32, falling about 36.7 percent in rural areas and about 36 percent in urban areas. Despite the decline in IMR over the last decades, one in every 30 infants died at the National level (irrespective of rural-urban divide). Among the States/ Union Territories, the IMR ranged from 7 in Nagaland to 47 in Madhya Pradesh for 2017 (SRS, 2017).

There are various factors associated with the mother which influence IMR such as mother's level of education, environmental conditions, political and medical infrastructure, immunization etc. (Genowska et al. 2003). Other important factors are safe water availability, nutrient deficiency, illness, injection, injury, and accident. Besides these, individual factors (occupation, education, beliefs), household characteristics (household wealth, religion, race and ethnicity, residence) and community characteristics such as economic, politic and health system efficiency also play a major role in determining the status of the infant survival. (Mosley and Chen, 2003: 25–45).

Gakidou et al, (2010: 959-71) estimated the contribution of improvement in women's education to reduction in child mortality using the data of 219 countries, gathered between 1953 and 2008. The coefficient for women's education implied that for every 1 year of increase in the education of women of reproductive age, the child mortality decreased by 9.5 per cent. In South Asia, the expansion of women's education accounted for 39.1 per cent of the reduction in the number of child deaths. Mother education emerges as the single most important determinant of child health-care utilisation in India when the influences of other intervening factors are controlled (Govindasamy and Ramesh, 1997).

In the industrial world, a dominant factor in the decline in infant mortality has been social and economic progress (Reidpath et al, 2003: 344-46). Household socio economic status is important for child survival because it determines the amount of resources (such as food, good sanitation and health care) that are available to infants (Millard, 1994: 253-68). Lower infant mortality has been reported by Da Vanzo et al. (1983: 143-60), in households where toilets exist, where piped water is used (Brockerhoff, 1990: 564) and where there is electricity (Madise and Diamond, 1995: 95-106).

Studies have attributed the rural disadvantage in infant mortality in less developed countries to the urban bias (Crenshaw and Ameen, 1993: 297-313), which indicates a disproportionate benefit gained by an urban population in the allocation of public resources (Lipton, 1977). Some have also shown a significant relationship between this urban advantage in terms of health care facilities and urban–rural mortality gaps in the developing countries, including India (Subramanian et al, 2011: 818-825).

The people of Bundelkhand face the dual burden of a poor economic environment combined with the lack of proper school education and health facilities.

Literacy levels in Bundelkhand are very low, and the overall literacy rate is 69 percent and the literacy rate for women as only 57.6 percent (Census of India, 2011). Basic literacy is low and though school education has achieved universal access to primary education, there is much to be done for the universalisation of secondary and higher education. The quality of actual learning is low, with children not able to comprehend, understand and absorb what they are being taught. Girls attend schools closer to home, but often girls are not allowed to attend schools that are located far away, and thus they miss out on education as they move to higher classes. Education in urban areas is relatively better, with a number of private schools in urban areas. But even urban educational achievements are not significantly better than those of a rural education.

The status of women in Bundelkhand, a particularly strongly patriarchal society, is not equal to men, anywhere. Leading from centuries of active discrimination, institutionalizing male dominance in customs and traditional practices, and an unchanging society have contributed to a much worse condition of women than in other parts of India. The sex-ratio is extremely low at 885 women for 1,000 men (Census of India, 2011), having improved somewhat from 873 in 2001 (Census of India, 2001).

The basic objective of this paper is to determine the effect of five socio- demographic factors influencing infant mortality in the rural Bundelkhand region, Palinda village. They are 1) Education of the mother 2) Socio-economic status of her household involving factors like kutcha/pucca house, sanitation, drinking water availability etc. 3) her knowledge on vaccination, breastfeeding and other infant care practices 4) average monthly income of her house 5) the distance of the healthcare centre from her place of living. Information from this project can assist government, policy makers, NGO's and other stakeholders to put in place systematic, efficient, organized, viable and long term strategies for improving infant health.

Methodology

Study area: The field study of the project was done in village Palinda of distt. Jhansi, Bundelkhand region, Uttar Pradesh. The village is backward and underdeveloped. It lacks daily basic necessities. The main occupation of people living here is agriculture which is challenged by drought-like conditions and deficient rainfall. The village lacks in prospects like education, standard of living, employment, necessary facilities like hospitals and doctors etc. The status of human development in U.P. is far from satisfactory even after more than five decades of development planning aimed at the social and economic upliftment of the people. The people of Bundelkhand are still facing the dual burden of a poor economic environment combined with the lack of proper school education and health facilities. (Human Dev. Report, UNDP, 2012)

In the present study a total sample size was of 100 mother respondents from age group of 15-49 years was interviewed. A pretested and modified interview schedule was framed and utilized for the collection of data. Informed written consent was taken from the participants before beginning the interview and they were familiarized with the purpose of the present study. Information pertaining to the demographic details like age at menarche, age at first conception, number of conceptions, and number of live births along with age of the infant that died (in months) were ascertained from the participants. In addition to this, data on education (in which four categories were divided in terms of no education by mother, education up to primary, secondary or tertiary class); socio-economic status of the mother (which included her living space (kutcha or pucca house), availability of in house sanitation, drinking water and availability of any vehicle. Presence of less than two or two factors was considered as poor status); knowledge of the mother regarding infant care practices (in which questions pertaining to breastfeeding, immunization, institutional delivery and pre-natal care were asked); annual income status of the family of the mother. In addition to these, the distance of the health care centre from the place of living and how it determines the decision to approach healthcare personnel during emergency situations was also assessed.

Data from the respondents were verified, compiled, coded and summarized before analysis using the Statistical Package for Social Science (SPSS) Windows software so as to make realistic inferences based on the study sample. In this Statistical package, descriptive statistics particularly frequencies and percentages were used to show the linkages between independent variables and dependent variables. Student's t-test was used when the difference between the means in two groups was considered; however when more than two groups were present analysis of variance (ANOVA) was used. Stepwise regression analysis was utilized to ascertain the variables that affected fertility in the present study.

Results

Measures of Infant mortality

The study revealed that 27% of the household surveyed had experienced infant mortality. (Table 1)

TABLE 1: *Percent mortality distribution*

Infant mortality	No. of women	Percentage
Experienced	27	27%
Not experienced	73	73%
Total	100	

Most of women from the surveyed area reported had very little knowledge of the reasons of the infant death.

TABLE 2: *Percentage infant mortality in each group for the determinants*

Determinants	Percentage infant mortality faced in the group	Mean live births in each group	p- value
Education			0.001
No formal education	62.96%	0.33	
Primary education	29.63%	0.68	
Secondary education	07.41%		
Tertiary education	0%		
Socio economic status			0.003
Poor status	59.25%	0.41	
Better status	40.74%	0.75	
Knowledge of the mother			0.018
Insufficient knowledge	70.37%	0.30	
Sufficient knowledge	29.63%	0.56	
Income			0.015
Insufficient	81.48%	0.19	
Sufficient	18.52%	0.45	
Distance of households from the health centre			0.005
Distance affects (the decision to approach healthcare in emergencies)	85.19%	0.15	
Does not affects	14.81%	0.45	

Effect of education

A mother's education plays an important role in determining the children's health conditions. It helps the children to be mentally healthy and active. People in the village seemed reluctant to allow their women to go out for education.

The respondents which were not able to attend to any kind of formal education were 41 percent whereas 59 percent were able to attend some kind of formal education. The formal education was further segregated into primary, secondary and tertiary education (Table 2). The numbers of respondents with primary education were 39 percent, secondary education i.e. completing high school was 18 percent and above that only a mere 4 percent were able to attend the education. The highest percentage of infant mortality from the sample was faced by the group with no education i.e. 41 percent. It can be seen that the mean live births is higher in group with some kind of formal education whereas it is less in the case of no formal education ($p < 0.05$).

Effect of Socio-economic status

Various factors were taken into consideration for socio-economic status like kutcha house or pucca house, sanitation, drinking water availability, owning a motorized vehicle/ non-motorised vehicle/no vehicle. These were the main factors to be considered as they displayed the basic necessities of a household.

Based on the socio-economic factors, mean was obtained from the values and the respondents with more than 2 positive responses were given a score of one and rest were given a score of zero.

It was observed from the distribution that the percentage of infants dying in the poor socio-economic status group (59.25%) is more than the percent infants dying in the better socio-economic group (41.75%). Also, there is a higher chance of survival (as seen from the mean live births) in case of better socio-economic status of the household ($p < 0.05$) (table 2).

Effect of knowledge of mother

Factors taken into consideration to judge the knowledge of healthcare practices during and after pregnancy were: breastfeeding and colostrum knowledge, immunization and its importance, pre-natal care practices, importance of institutional delivery. The responses were in the form of yes and no and a mean response was noted.

During the survey it was observed that more than 50 percent of the women lacked knowledge about the basic information on various factors that can affect the health of their infants. It could be seen (table 2) that the group of women with insufficient knowledge faced lower mean infant mortality as compared to the group of women with sufficient knowledge ($p < 0.05$).

Effect of income

During the survey it was observed that majority of the rural households of the village had a very basic minimum income and a lot of it depended on the agricultural output of their fields. Since the village economy has lower price of living therefore a threshold of Rs 8,000 per month was decided as sufficient income. It was assumed that the income of the husband and wife (if

working) is the income of the mother.

It was observed (table 2) that the majority of the rural households of the village had a very basic minimum income and a lot of it depended on the agricultural output of their fields. Therefore it was considered as the cutoff to determine the sufficiency and insufficiency of income to survive with basic requirements in the village. It was found that only 18.52 percent of the mothers had sufficient family income to survive on and were facing less risk if infant mortality whereas a majority of mothers i.e. 81.48 percent were living at a below average income and were facing more infant mortality ($p < 0.05$).

Effect of Distance of Healthcare Centers from the household of the respondents

It was noticed that the healthcare services were not available in the village within 1-2 km radius. The survey had the objective of finding out that whether the distance of City hospitals or Local primary health care centers influence the decision of the guardians to approach such services in the time of need for their infants or they depend on home remedies without any knowledge.

As from the above distribution (table 2) of IMR and distance, it can be seen that the group which gets affected by the distance has higher percentage of infant mortality (85.19%) whereas on the other hand the group which does not get affected by infant mortality faces less mortality (14.81%) ($p < 0.05$).

Regression analysis

Linear regression was employed in this study so as to check if independent variables affect dependent variable. Before analyzing, households with no infant deaths were coded 1 and 0 was used for occurrence of infant mortality. Five covariate variables were entered: distance from the healthcare services, income, education, socio-economic status and knowledge of the mother.

Table 3: Showing regression analysis result

Factors	R- square	Standard error
Education	0.101	+0.425
Socio-economic status	0.105	+0.424

The stepwise regression analysis shows that education and socio-economic status of the household are the two important factors (out the five selected) that affected infant mortality status of the selected population.

Discussion

The infant mortality correlates very strongly with the national development and is among the best predictors of states' failure. Infant mortality is also a useful indicator for judging any country's level of health and development, and it's a component of the physical quality of life index (Alderman and Behrman, 2004).

In the present study different aspects involved in a mother's life were analysed and it was seen that

each of the determinants under study had an influence, direct or indirect on the infant and his/her survival. On exploring the relationship between education and IMR it was observed that the number of mother's with some formal education experienced only a small percent of the infant deaths whereas the mother's with no formal education were at a greater risk of experiencing infant mortality with the percentage going up to 42%. The association between education and infant health can be explained a number of different ways. An educated mother might be more able to use health care information and therefore understand the importance of child immunization, early child health seeking and appropriate caring for children practice better than illiterate mothers (Desai et al, 2010: 71-81). This is consonance with the previous studies which have argued that education is the most influenced factor in differentiating the infant and child mortality levels within all the socioeconomic factors (Mondal et al, 2009: 31 – 39). Also with Caldwell's (1979: 395-413) work and Hobcraft's (1993: 159-75) review for a wide range of developing countries like Malaya, Ghana, Nigeria, Kenya etc. suggested a strong link between child survival and child health on the one side, and maternal education on the other. It suggested that a mother's education enhances child survival. But a few studies (Das and Dey, 2003: 249-73) have shown a not so intimate relationship between maternal education and infant and child mortality, although the amount of education required to produce a significant reduction in mortality differs from culture to culture.

Infant mortality is widely used as an indicator of the socioeconomic wellbeing of a society. It is an outcome rather than a cause, and hence it directly measures the results of distribution and use of resources. It can be seen our study that the household with a better condition to live were providing their infant a comparatively safer environment for survival. Similar to our conclusion, other studies like Da Vanzo et al. (1983: 143-60) points out that lower infant mortality has been reported in households where toilets exist, where piped water is available and where there is electricity. In contrast to the above results, various studies like Zachariah and Patel (1982: 125-42) showed that socioeconomic factors explained only a small percentage of the differentials in the rate at the household level. These studies concluded that a substantial decline in infant mortality rate is possible without significant improvement in economic development.

Knowledge of the mother has been analysed using the questionnaire and her response to the answers. A range of questions were asked based on her knowledge on breastfeeding, immunization, prenatal care and institutional delivery and its importance. A positive correlation could be seen between mothers with better knowledge and low infant mortality in our fieldwork. Mothers are the important health decision makers of their children, their Knowledge, Attitude and Practices in general have a great impact on survival status of their child. Nisar et al., (2010: 183-86) in his study in Karachi, Pakistan also reported a positive correlation between a mother's knowledge, attitudes and practice and children's immunization and survival. Our observations indicate that increased use of prenatal care results in better health of infants. Prenatal care which is initiation during gestation may lead to lower infant mortality, since these foetuses will be healthier in the sense that they survived to that period of gestation (Wolpin, 1997). In a study based on case-fatality ratio by feeding mode, it was observed that breastfed infants benefit from increased protection from death given illness, compared with formula-fed infants (Feachem and Koblinsky, 1984: 271-91). The knowledge of the mother can be seen to have an indirect correlation with her education. Little awareness has been a major reason for their ignorance on child healthcare and therefore was facing difficulty in ensuring the survival of her newborn.

Infant mortality is mostly a concern among poor people because children and infants are very vulnerable to bad living conditions. Hence, increase in inequality cause the poor to be poorer, which results in increasing infant mortality. Even though no study yet has developed a direct correlation

of income and infant mortality, but an indirect affect can be seen. The impact of income on infant health may be through its impact on consumption of food, housing, sanitation, medical care and education (Flegg, 1982: 441-58). Countries with more equal income distribution experience lower infant mortality rates than the countries with similar per capita income levels but unequal distribution. Such conclusions could also be derived during the survey and from the data.

On surveying, it was found out that the village had no healthcare services within its proximate reach and the residents had to especially travel outside the village to nearby suburban dispensaries and health care centres to avail the services. It was analysed how the distance affects the decision making in approaching the doctor for different type of cases. For regular checkup during pregnancy it was found out that the respondents avoided visiting the doctor due to the distance constraints. A huge impact of distance was seen on respondents as they avoided going to the doctor if the infant suffered mild discomforts like fever etc. Such decisions based on round the clock availability of the service was seen to be playing a hindsight role in affecting the health of both the mother and the infant (Sastry, 1997). Therefore, it can be said that urbanization, in general, leads to modernization and more development; higher literacy, availability or accessibility to health services, awareness about health care, more contraceptive use, and all these factors play a significant role in lowering infant mortality (UN, 1953;). Hence it is evident that the proximity of the healthcare services increases the chance of survivability of the infant.

Conclusion

Education, socio-economic factors, knowledge of the mother, income and distance of healthcare centres, all affect the rate of infant mortality either directly or indirectly. The study observed that two most important factors with a direct impact on IMR are education and socio-economic status of the mother. It can be concluded that the benefits of the mother's education in reducing infant death plays an important role even when other socio-economic factors are taken into account. The findings reached with the help of this project emphasize to provide education to the mothers of such backward regions like Bundelkhand, which are crucial for reducing infant mortality. Besides education, attempt should also be made to increase the scope of getting mass media exposure and higher level of socio-economic empowerment of the mother (two factors that are closely related with education) to reduce the infant mortality in India.

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