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Infant Mortality and its Determinates in Uttar Pradesh, India

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Abstract: The effects of socio-economic and demographic variables play significant role in infant mortality in less developed states in India. The deleterious effect on infant survival of reduced birth spacing is exacerbated in states such as Uttar Pradesh where economic development is limited. The determinants of infant mortality in developing countries can be classified under two major headings: socioeconomic and demographic. Socio-economic determinants include mother education, place of residence, mother caste and religion; demographic variables include sex and birth order of the child, maternal age at birth, birth interval [1]. For infant mortality, traditional societies, the demographic factors have more impact than the socioeconomic factors. From the NFHS-III, aggregate deaths reported at ages 0-12 are used to estimate infant mortality. The differentials by socioeconomic and demographic variables are examined and then their importance is assessed using binomial logistic regression. Data analysis shows that preceding birth interval length, birth order are the most important factors associated with differential infant mortality risks; sex of the index child and mothers education and their place of residence are also significant. With the aim of updating the earlier findings, the present paper examines whether there have been any changes in the factors explaining differentials in infant mortality in Uttar Pradesh.

Keywords: Infant mortality, NFHS-III, Socio-economic determinants

1 Introduction

The infant mortality level of any region works as a summary index of the socio-economic development of that region. The recognition of this index has spurred international organizations and national governments to intensify their efforts to reduce the level of infant mortality and promote greater child survival. The sixth and seventh Five Year Plans of India have also aimed at nation-wide programmers in this direction as the government has adopted the national goal of halving the prevailing level of infant mortality to 60 by the turn of the century. It therefore becomes imperative to explore the underlying causative factors that impede the reduction in infant mortality [3].

Way back in sixties [2] indentified two types of factors viz. endogenous and exogenous that affect infant mortality. Exogenous factors of infant mortality are dependent on environment in which an infant is exposed and include deaths to infants due to infectious, parasitic and respiratory diseases. Such causes normally occur in the post-neonatal period (1 to 11 months of age of infant) and they are easier to control. On the other hand, endogenous causes of mortality are more biological in nature and include deaths due to congenital malformations and birth process. They occur in the neonatal period (less than 1 month of age of infant) and are rather difficult to control.

In analyzing infant mortality, Mosley and Chen [11] have grouped the dominant variables into five categories: i) maternal factors in the reproduction process, ii) environmental contaminations, iii) nutritional deficiency, iv) injuries to the child, and v) practices in the health care of the child. It is mentioned that all these are influenced by socio-economic factors. Pandey et al. [12] examined that babies born to young mothers were more likely to be premature, have low birth weights and suffering from complication at the time of delivery. Study in Bangladesh by Howlader et al. [7] showed that infant mortality would increase as birth order increased. The critical forces behind for this decline of mortality are the downward of agriculture, the increase of urbanization and the launch of globalization which accelerate the economic performance of a country, had significantly negative impact on mortality particularly reduced infant mortality rates [9].

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Kombo and Ginneken [10] using the result of 2005-06 Zimbabwean DHS investigate the maternal, socioeconomic and sanitation factors on infant and child mortality by using Cox regression model. They found an evidence of birth order (6+) with short preceding interval significantly associated with high risk of infant and child mortality. Multiple births tend to increase infant and child mortality. On the other hand the expected U shape relationship between birth order and infant and child mortality, and mothers age and infant and child mortality is not conformed in their analysis, that children who are first born and those born to mothers aged 40-49 years are found tend to decrease infant and child mortality.

An examination of the state-wise data reveals that Uttar Pradesh is still very far away with regard to the overall level of development, differentials were evident with respect to infant mortality. Lots of reasons behind this level of infant mortality in this state, as the prime factor is education ; which has very poor status in this state. Mostly women are not aware about their child immunization, second one social taboos are very strong in UP, preference for sons in society is the result of traditional religious beliefs, social customs (dowry system, lineage, familial and kinship ties etc.), economic benefits and including support of ageing parents is widespread.

In the first section, the study tries to see the sex ratio trend in different years before the survey and also according to desire of couple. In second section study tries to see the impact of some of these covariates on infant mortality. The independent variables considered having an impact on the level of infant mortality are discussed in the subsequent section of this paper.

2 Data and Methods

The more recent data come from the National Family Health Survey-III was conducted in 2005-06 in order to monitor the countrys fertility and mortality levels. NFHS-III asked all women age 15-49 to provide a complete history of their births including for each live birth, the sex, month and year of birth, survival status, and age at the time of the survey or age at death. Age at death was recorded in days for children dying in the first month of life, in months for other children dying before their second birthday, and in years for children dying at later ages. Binomial logistic regression was used to estimate the mortality risk according to different socio economic variables. Here the dependent variable is child death before one year .Since multiple births may be associated with very high mortality risk, such cases have been ignored in the analysis. All missing information excluded from the data set.

3 Results

According to table 1 the sex ratio at birth appears to be increasing gradually from 20-29 years before the survey cohort to 5-9 years before the survey, may suggest a better coverage of female children in recent past. Since the ratios of the cohorts closer to the survey date are not unexpectedly high, this may be related to omission of female children rather than displacement. Table 2 represents the distribution of births by years before survey and sex according to desire of couple, according to the figure in table 2 represents in case of desire the ratio is higher as compared to when couple has no desire. This shows that from past to recent past there is sons preference in Uttar Pradesh. In case of no desire the ratio was on decline trend while in case of desire the ratio at birth appears to be increasing gradually from 20-29 years before the survey cohort to 5-9 years before the survey, while in cohort closer to survey it was on dramatically low. This result shows the large number of omission of female children in Uttar Pradesh.

Table 3 compromises the infant mortality per 1000 live births overall and infant mortality per 1000 live births for last child only according to different socio economic and demographic variables. A sharp decline appears to occur in infant mortality in Uttar Pradesh for the cohorts considered here. The cohort born between 10 and 15 years before the survey experienced a high rate, while the most recent cohort had the lowest rate in both cases. Male children had a little bit higher rate than female for all children while for last child only female children had markedly higher rate than male (59 as against 43).A very much higher rate appears for infants born to teenage mothers and mother whose age 35 and over or in other words we can say that there is U shaped relationship between infant mortality and mother age. Similar results are found for birth order, since age at birth and birth order are likely to be closely related. Infants with parents living in rural areas and those whose mothers had a rural childhood had higher rates than their urban counterparts. As is expected, mothers education are negatively related to mortality; infants with either of their mother having secondary level education or higher experienced the lowest rate. Infants born within 12 months or after 2 years after a preceding sibling and those whose preceding sibling had very high mortality rates. Other notable variables are religion and caste; infant mortality is higher in non-Hindus as compared to Hindus and as well as higher in SC, ST as compared to OBC and general caste.

Table 4 describes the probability of infant mortality according to different sociodemographic variables, according to sex of child, female child has 35 % OR-1.35(1.10-1.65) more chance to die than male child. Cultural differences between the society and regions have an impact for the child survival probability of male and female children [11]. Results shoes

that sex of child is significant variable. The probability of dying child in infant period is increasing along with the women age 30 and above and as well as women has low risk to lose her infant child as compare to in her twenty age. So, here we conclude that best maternal age at birth is 20-30. The result shows that a striking higher risk of infant mortality in rural region. This is mainly unequal distribution of socioeconomic and health infrastructures between urban and rural regions. The higher the mothers education, the lower the probability of a child dying in the first year of life, Having a mother with secondary education increases by 25 percent and mother with higher education increases approximately two times of dying between the ages of 0-11 months, the effect of primary education is robust. Similarly, as expected, bio maternal factors have a stronger effect on survival to age one than beyond. The negative effect of a short (less than 12 months) previous birth interval, although it has a stronger impact on the odds of dying up to age one than beyond .When this interval is 12-24 months it has 93 percent more risk as compared to more than 24 months period. As expected, being first born significantly increases the probability of dying at ages 0-11 months. However, the variable birth order appears to have unpredicted effects on the risk of infant mortality for children at the other birth orders. Probability of dying at ages 0-11 months is increasing as birth order is increases. Table reveals that second order child has lower risk of die as compared to first order. According to caste, SC ST and OBC 45, 80, 25 percent has more chance as against with General respectively. While according to Hindu result shows only 2.4% risk in comparison to Non-Hindu.

4 Conclusion

The study has empirically investigated and identified the bio-demographic (proximate) and socioeconomic determinants of infant mortality in Uttar Pradesh using logistic regression method. The results of the logistic regression reveal interesting insight have substantial impact of bio-demographic (proximate) determinants on improving infant mortality. According to infant mortality marital age at birth, birth order, and preceding birth interval are the dominant significant proximate determinants of infant mortality. However, it is difficult to generalize and compare the strength and weakness of the impact bio-demographic (proximate) and socioeconomic determinants on infant in previous five years period of 2000 and 2005 due to the results found to some extent inconsistent and needs in-depth investigation. This indicates infant mortality had not consistent relationship over time which might be the change of the effects of different factors and this supported by the regional difference due to uneven distribution of socioeconomic and health infrastructures.

Table 1: Distribution of births by years before survey and sex, Uttar Pradesh, 2005-06

Year before survey	Number of Births			
	Total	Male	Female	Sex ratio at birth
1-4	5615	2955	2660	900
5-9	5898	3050	2848	934
10-19	9162	4805	4357	907
20-29	3293	1749	1544	883

Table 2: Distribution of births by years before survey and sex according to desire of couple, Uttar Pradesh, 2005-06

Year before survey	Desire							
	Yes				No			
	Number of Births				Number of Births			
	Total	Male	Female	Sex ratio at Births	Total	Male	Female	Sex ratio at Births
1-4	1342	594	748	1259	3374	1884	1490	546
5-9	691	273	418	1531	5115	2727	2388	876
10-19	350	136	214	1574	8805	4665	4140	887
20-29	25	10	15	1500	3265	1737	1528	880

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Table 3: Infant mortality level by selected demographic and socio economic variables

Variables	Infant Mortality (per 1000 live births)	Infant Mortality* (per 1000 live births)
Year Before Survey		
1-4	129 (2587)	36 (3184)
5-9	168(5013)	56(1824)
10-14	173(6727)	58(1166)
Sex of child		
Male	117 (7254)	43 (4522)
Female	113(6775)	59(3416)
Maternal age at birth (years)		
< 20	96 (743)	62 (730)
20-24	89(1984)	38(1917)
25-29	91(2644)	38(2525)
30-34	87(1034)	43(974)
35-39	159(1767)	77(1069)
40+	163(192)	84(179)
Residence		
Urban	93 (3402)	37 (5158)
Rural	132(4271)	59(7025)
Mothers Education		
Illiterate	131 (4937)	61 (5870)
Primary	125(903)	61(1426)
Secondary	76(1796)	30(1740)
Higher	46(737)	15(1252)
Religion		
Hindu	123 (6593)	50 (9449)
Non-Hindu	160(1948)	49(1691)
Birth Order		
1	52 (1053)	53 (1114)
2	49(1623)	30(1632)
3	64(1554)	33(1559)
4	86 (1267)	49 (1270)
5	282(1003)	52(1006)
6+	173(1867)	80(1870)
Preceding birth interval		
<12	327 (29)	71 (28)
12-24	127(707)	46(681)
24+	118(6557)	68(6151)
Caste		
SC	140 (1837)	59 (2615)
ST	169(73)	74(91)
OBC	118(5302)	51(3863)
GEN	90(2364)	40(3560)

* for last child only

Table 4: Logistic regression model analysis of infant mortality, Uttar Pradesh

Variables	Beta Coefficient	Odds Ratio	95% CI	S.E.	p-value
Sex of child					
Male*					
Female	0.301	1.352	(1.104-1.655)	0.103	0.004
Maternal Age at birth (years)					
< 20*					
20-24	-0.501	0.606	(0.414-0.888)	0.195	0.010
25-29	-0.478	0.620	(0.431-0.891)	0.185	0.000
30-34	-0.373	0.689	(0.448-1.060)	0.220	0.001
35-39	-0.199	1.220	(0.858-1.736)	0.180	0.007
40+	-0.273	1.314	(0.717-2.408)	0.309	0.010
Residence					
Urban*					
Rural	0.471	1.601	(1.286-1.995)	0.112	0.000
Mothers Education					
Higher*					
Illiterate	0.008	2.008	(3.743-1.367)	0.155	0.006
Primary	0.691	1.501	(2.371-0.677)	0.54	0.000
Secondary	1.369	1.254	(2.138-0.467)	0.310	0.000
Religion					
Non-Hindu*					
Hindu	0.023	1.024	(0.798-1.313)	0.127	0.000
Birth Order					
1*					
2	-0.580	0.720	(0.377-0.831)	0.202	0.002
3	0.491	1.612	(0.414-1.905)	0.200	0.000
4	0.100	2.905	(1.621-3.318)	0.192	0.001
5	0.032	2.969	(1.654-3.435)	0.201	0.004
6+	0.384	3.468	(1.065-4.024)	0.164	0.000
Preceding birth interval					
24+*					
<12	0.336	2.715	(1.446-3.146)	0.241	0.002
12-24	0.068	1.934	(0.701-2.246)	0.147	0.000
Caste					
GEN*					
SC	0.374	1.454	(1.088-1.942)	0.148	0.001
ST	0.584	1.793	(0.707-5.549)	0.475	0.000
OBC	0.226	1.254	(0.973-2.089)	0.130	0.000

* Ref Variable

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