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ORIGINAL ARTICLE

Household Headship and Infant Mortality in India: Evaluating the Determinants and Differentials.

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ABSTRACT

Background: There has been ample discussion on the levels and trends of infant mortality in India over time, but what remains less explored are, the differentials in infant mortality according to household headship. This paper examined the differences in the determinants of infant mortality between male-headed households (MHH) and female-headed households (FHH).

Methods: The study used Cox proportional hazard model to examine the determinants of infant death, and Kaplan-Meier estimation technique to examine the survival pattern during infancy using data from Indian National Family Health Survey (2005-06). The analysis is restricted to women who had at least one live birth in the five years preceding the survey.

Results: The study observed that household size and number of children below five are significant risk factors of infant mortality in MHH while length of previous birth interval is the only significant risk factor of infant death in FHH.

Conclusions and Global Health Implications: The results indicate that children from FHH have higher survival probability at each age than children from MHH irrespective of place of residence and sex of the child.

Key words: Male-headed household • Female-headed household • Infant mortality • India • Economic condition

Background

Over the past several decades, infant and child mortality remain one of the major public health challenges faced by the world. Infant mortality rate may be an indicator of how a society meets the needs of its people[1] indicator of deprivation,[2] unmet health needs and unfavourable environmental factors[3] and a sensitive indicator of country's health.[4] There is consistent decline in infant mortality in India since 1970's. From 127 deaths per thousand live births in 1971, it has declined to 42 deaths per thousand live births in 2012[5] showing annual decline of 1.6 percent. Although, infant mortality has declined over time, but at the current pace, India is unlikely to achieve the Millennium Development Goal (MDG-4) of reducing infant mortality to 27 per thousand live births by 2015.[3]

The studies on infant mortality in India, has focused on the socio-economic and demographic factors that may have a direct or indirect effect on infant death. It is documented by different researchers that household environment, economic condition, place of residence, education of mother, and health care utilization; are significant determinants of infant mortality.[6-8] Recently, household headship as a factor of infant mortality has gained importance among the researchers,[9-12] but studies exploring the association between infant mortality and type of household headship are limited, at least in India. The changes in socio-economic conditions of the country has resulted in a continuous increase in female-headed households (FHH).[9, 13] According to the census of India, 2011, about 27 million (11 percent) of the total households in India is headed by women. Earlier studies from developed and developing countries suggested both positive and negative associations between female headship and economic condition of household.[9, 10, 13-17] On the basis of the above discussion, this study examined the association between household headship and infant mortality in India.

Methods

The study is based on the National Family Health Survey (NFHS-3, 2005-06) covering 109,041 households with 11 percent FHH from all the states of India. NFHS is the most comprehensive survey that provides information on death at the household level, specifically, the exact age at death of infants for each month till the first year of life. This analysis is restricted to ever-married women who had at least one live birth for a period of five years preceding the survey, and recorded 51,555 live births and 2500 infant deaths during the same period.

The variables included in the study are place of residence, religion, caste, wealth index, household size, age of the household head, number of eligible women in the household, number of children below five, age at first birth, antenatal care, education of mother, exposure to mass media, total number of children ever born, place of delivery, and preceding birth interval. Cox proportional hazard model was used to examine the determinants of infant mortality. In addition, Kaplan Meier survival curves are drawn to examine the pattern of survival at exact ages. Chi-square test was used to examine the association of sex of the household head with some selected household and individual level variables.

Results and Discussion

The results are presented in three sub-sections. The first section deals with the differences in socio-demographic characteristics according to household headship. The second section discusses the determinants of infant mortality, and the last section shows the survival pattern during infancy according to household headship.

Socio-demographic characteristics. The differences observed in socio-demographic characteristics between MHH and FHH are presented in Table 1. It was observed that, in FHH, percentage of home deliveries was high; and antenatal care and percentage of children ever breastfed was low than MHH. In addition, FHH had higher percentage of illiterate mothers (69%) than MHH (63%). Seventy percent of FHH had no exposure to mass media and only six percent had exposure to both radio and television. On the other hand, 13 percent of MHH had exposure to both radio and television. FHH also performed better in certain indicators; for example, higher percentages of children were immunized and lower percentages of children were born with short birth interval. The results

further indicate differences in economic condition of FHH and MHH. The study observed that the FHH with low economic status reported higher percentage of infant deaths. Earlier studies also revealed that FHH are generally poorer than MHH[18].

Table 1. Socio-demographic Characteristics of households reporting Infant Death in India, NFHS-3 (2005-06)

Background Characteristics	Household who experienced infant death	
	Male Headed Household	Female Headed Household
Sex of the child		
Male	50.2	49.9
Female	49.8	50.1
Place of Delivery		
Home	69.3	71.1
Health Facility	30.7	28.9
Preceding Birth Interval		
<2 years	44.7	39.7
2-3 years	41.8	50.3
4 or more years	13.5	10.0
Birth Order		
1	32.6	30.6
2-3	35.5	37.7
4 & above	31.8	31.7
Antenatal care		
Yes	69.9	59.7
No	30.1	40.3
Children ever breastfed		
Yes	65.8	63.8
No	34.2	36.2
Immunization		
Yes	12.8	15.0
No	87.2	85.0
Age at First Birth		
Less than 18	38.1	39.6
18-24	56.8	56.0
25 & above	5.0	4.4
Age at Marriage		
less than 18	67.8	69.9
18-24	30.6	28.4
25 & above	1.5	1.7

Background Characteristics	Household who experienced infant death	
	Male Headed Household	Female Headed Household
Education of Mother		
No Education	63.1	69.3
Primary	15.0	10.8
Secondary	20.2	18.3
Higher	1.7	1.6
Mass Media Exposure		
No Exposure	56.3	70.4
Either Radio or TV	31.1	23.6
Both Radio & TV	12.7	6.0
Children Ever Born		
1	12.5	9.3
2	26.3	33.5
3	18.3	17.0
4 & above	43.0	40.1
Place of Residence		
Urban	18.1	15.6
Rural	81.9	84.4
Religion		
Hindu	81.1	73.8
Muslim	14.6	23.9
Christian	1.5	.5
Others	2.7	1.8
Caste		
Scheduled Caste	24.4	26.7
Scheduled Tribe	12.6	9.3
Other Backward Classes	40.6	38.1
Others	22.3	25.9
Wealth Index		
Poorest	32.6	36.1
Poorer	26.6	35.4
Middle	20.4	9.8
Richer	13.4	11.5
Richest	7.0	7.2

Household headship and selected variables. The results of chi-square test indicate significant association of household headship with infant mortality. Other variables like household size, number of women in 15-49 age–group, number of children below five years of age, religion, caste, wealth index, exposure to mass media, preceding birth interval, place of delivery, antenatal care, age at first birth, education of mother also showed significant association with infant mortality.

Infant mortality and household headship. On the basis of the results obtained from Chi square test, the study further examined the association of different factors with infant death according to household headship. The adjusted and unadjusted hazard of infant death from MHH and FHH is presented in Table 2 and Table 3, respectively. Unadjusted estimates indicate that household size, number of under-five children, age of the household head, wealth index, education of mother, age at first birth, length of preceding birth interval, antenatal care, and breastfeeding status all have independent effect on risk of infant death, in both MHH and FHH. On the other hand, rural residence increased the risk of infant death.

Table 2. Cox proportional hazard model showing the odds of infant death in male headed households, NFHS-3 (2005-06), India

Background Characteristics	Unadjusted	Household Factors	Maternal Factors	Child Factors	All factors
Household size					
0-5	1.00	1.00			–1.00
5+	0.67***	0.78***			0.55***
Number of eligible women					
1	1.00	1.00			1.00
more than 1	0.99	1.41***			1.74***
Number of children under 5					
1 or 2	1.00	1.00			1.00
more than 2	0.52***	0.50***			0.49***
Age of the Household Head					
less than 35	1.00	1.00			1.00
35-50	0.89**	1.00			0.98
50+	0.804**	1.00			0.96
Religion					
Hindu	1.00	1.00			1.00
Muslim	0.89*	0.96			0.75*
Christian	0.77***	0.80*			0.91
Others	0.89	1.00			1.01
Caste					
Scheduled Caste	1.00	1.00			1.00
Scheduled Tribe	0.86**	0.91			1.12
Other Backward Classes	0.88**	1.01			1.20
Others	0.70***	0.86*			1.02

Table 2. Contd...

Background Characteristics	Unadjusted	Household Factors	Maternal Factors	Child Factors	All factors
Wealth Index					
Poorest	1.00	1.00			1.00
Poorer	0.97	1.02			1.08
Middle	0.77***	.79***			0.91
Richer	0.60***	.59***			0.74
Richest	0.41***	.38***			0.73
Place of Residence					
Urban	1.00	1.00			1.00
Rural	1.38***	0.99			1.03
Education of Mother					
No Education	1.00		1.00		1.00
Primary	0.86**		0.93		1.00
Secondary	0.56***		0.66***		0.74*
Higher	0.28***		0.36***		0.40*
Age at first birth					
Less than 18	1.00		1.00		1.00
18-24	0.75***		0.93*		0.83*
25 & above	0.51***		0.84*		0.69
Children ever born					
1	1.00		1.00		1.00
2	1.31***		1.24***		1.07
3	1.57***		1.31***		1.73***
4 & above	2.18***		1.64***		
Place of delivery					
Home	1.00			1.00	1.00
Health Facility	0.70***			0.79	0.83
Previous birth Interval					
<2 years	1.00			1.00	1.000
2 or more years	0.50***			0.65	0.42***
Antenatal care					
No	1.00			1.00	1.00
Yes	0.65***			0.83	0.93
Children ever breastfed					
Yes	1.00			1.00	1.00
No	16.84***			28.67	29.52***

***p<0.01, **p<0.05, *p<0.10

However, after adjusting for different household level factors, the increase in household size, number of children below five and improvement in economic condition significantly reduced the risk of infant death in MHH, while household size had no significant association with infant death in FHH. Similar results were observed from the adjusted effect of maternal characteristics for MHH and FHH. The results show that age of mother at first birth, education and number of children ever born are significant predictors for infant mortality.

Child-Level factors. Differences were observed in the association of child level factors with risk of infant death. None of the child-related factors had significant association with the risk of infant death in MHH, but antenatal care and breastfeeding status of the child were significantly associated with risk of infant death in FHH. When all the factors were considered simultaneously, household size, number of eligible women, number of children below five, education of mother, previous birth interval and breastfeeding status remained significant predictors of infant mortality in MHH. For FHH, only duration of preceding birth interval and breastfeeding status of the child had significant association with risk of infant death.

Table 3. Cox proportional hazard model showing odds ratio for infant death from Female Headed households, NFHS-3 (2005-06), India

Background Characteristics	Unadjusted	Household Factors	Maternal Factors	Child Factors	All factors
Household size					
0-5	1.00	1.00			1.00
5+	0.62***	0.97			0.59
Number of women					
1	1.00	1.00			1.00
more than 1	0.91	1.32			1.21
Number of children under 5					
1 or 2	1.00	1.00			1.00
more than 2	0.42***	0.40***			0.38
Age of the household head					
less than 35	1.00	1.00			1.00
35-50	1.42*	1.37			1.35
50+	0.88	1.16			1.32
Religion					
Hindu	1.00	1.00			1.00
Muslim	0.88	1.21			0.89
Christian	0.57*	0.53			0.51
Others	0.78	0.64			1.55
Caste					
Scheduled Caste	1.00	1.00			1.00
Scheduled Tribe	0.78	1.00			0.88
Other Backward Classes	0.61***	0.54***			0.83
Others	0.53***	0.72			1.28

Table 3. Contd...

Background Characteristics	Unadjusted	Household Factors	Maternal Factors	Child Factors	All factors
Wealth Index					
Poorest	1.00	1.00			1.00
Poorer	1.07	1.35			1.03
Middle	0.49***	0.54**			0.69
Richer	0.48***	0.52**			0.33**
Richest	0.35***	0.35***			0.60
Place of Residence					
Urban	1.00		1.00		1.00
Rural	1.33*		0.83		0.80
Education of Mother					
No Education	1.00		1.00		1.00
Primary	0.95		1.03		1.37
Secondary	0.47**		0.54***		0.59
Higher	0.27**		0.33***		0.21
Age at first birth					
Less than 18	1.00		1.00		1.00
18-24	0.84		1.08		0.64
25 & above	0.53**		1.00		0.34
Children ever born					
1	1.00		1.00		1.00
2	1.71**		1.61**		1.10
3	2.14***		1.73**		0.79
4 & above	2.70***		1.93***		
Place of delivery					
Home	1.00			1.00	1.00
Health Facility	0.61***			0.71	1.09
Previous birth Interval					
<2 years	1.00			1.00	1.00
2 or more years	0.51***			0.66	0.40***
Antenatal care					
No	1.00			1.00	1.00
Yes	0.43***			0.56**	0.73
Children ever breastfed					
Yes	1.00			1.00	1.00
No	19.30***			30.18***	29.30***

***p<0.01, **p<0.05, *p<0.10.

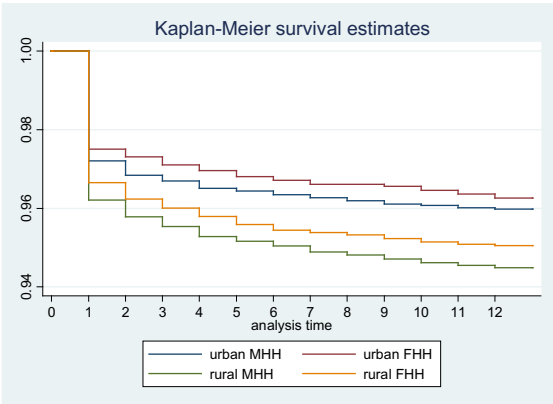

Figure 1 Survival pattern during infancy by place of residence in MHH and FHH, NFHS-3 (2005-06), India

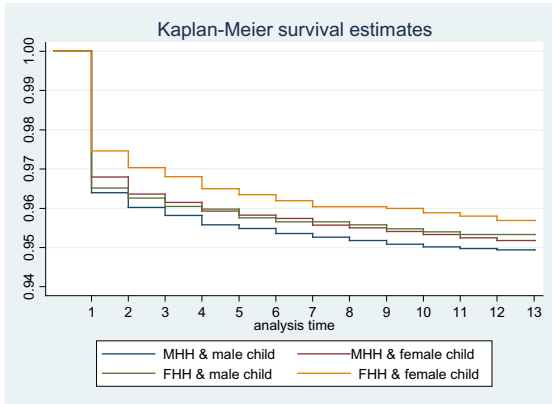

Figure 2 Survival pattern according to sex of the child in MHH and FHH, NFHS-3 (2005-06), India

Patterns of survival during infancy. Urban children living in FHH has the highest probability of survival out of the four combinations of sex of the household head and place of residence (see Figure 1). The urban advantage in survival during infancy remains same. It may be postulated that female head of the household are more concerned about the type of care to be provided to the child during infancy, and the mother of the young child may feel comfortable in discussing different issues related to child care with an elderly female member of the household than an elderly male. As shown in Figure 2, female child in FHH enjoys some advantages in terms of survival during infancy. This may indicate that, along with the biological advantage of survival for a female over a male child, a newborn girl is not discriminated against in a FHH in providing necessary care during infancy.

Conclusions and Global Health Implications

The study observed that each of the risk factors had significant association with infant death in MHH and FHH as independent predictors. The differences emerged when the risk factors were adjusted for maternal, child and other household characteristics. In MHH, household size, number of eligible women, number of children below five years and economic condition are significant risk factors, when the model is adjusted for household factors. Among the maternal factors, increase in education of mother reduced risk of infant death while increase in average number of children born, elevated the hazard of infant death. When adjusted for all the study variables, household size, number of eligible women, number of children below five and child breastfeeding had significant association with infant death.

In FHH, economic condition of the household was the only significant risk factor for infant death when adjusted for the household characteristics. Again, education of mother and number of children ever born were significant risk factors when adjusted for maternal characteristics. Among the child related characteristics, child ever breastfed and antenatal care were significant risk factors for infant death. After adjusting for all the risk factors, breastfeeding status and length of previous birth interval were the only significant risk factors of infant death.

The study further observed that the pattern of survival also differ for FHH and MHH. Children had higher survival probability at each age in FHH than MHH irrespective of place of residence and sex of the child. Thus the paper concludes that the determinants of infant mortality should be examined according to household headship. Government should promote FHH and appropriate policies should be formulated to improve economic condition of FHH.

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Key Messages

- FHH report high percentage of home deliveries and illiterate women, less exposure to mass media, low economic condition and higher number of children ever born than MHH.
- Amidst all these disadvantages also, children have higher survival probability at each age in FHH than MHH.
- Household size, number of eligible women in the household and number of children below five years of age have higher association with infant mortality in MHH than FHH.

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