How far rural to urban migration is associated with infant and child mortality? Evidences from India

Kunal Keshri[1] *& Kirti Gaur*[2]

Introduction

Infant and Child mortality continue to be an important issue for the most of developing countries and demographic research has devoted copious studies to understand the factors associated with them. Amid the increasing urbanization and concomitantly accelerating rural-urban migration, the association of later with the child survival has been a concern of many recent studies (Brockerhoff, 1990, 1994 & 1995; Islam & Azad, 2007; Stephenson et. al., 2003; Tam, 1994). Unquestionably rural areas lag behind the urban areas with respect to the availability of maternal child and health care service and evidences from several studies have shown that the type of place of residence and income are imperative determinants of child mortality and notably affects the child health care practices (Lalou & LeGrand, 1997; Poel, et. al., 2007).

According to recent estimates of UNICEF approximately 9.7 million children died before their fifth birthday (UNICEF, 2008). India being a third world country lags behind the developed sector of the world in terms of material prosperity and health care services resulting in high infant and child mortality rates. According to the estimates of National Family Health Survey- III (IIPS & ORC Macro, 2007) of India, infant mortality is 57 deaths per 1,000 live births, compared with the NFHS-2 estimate of 68 and the NFHS-1 estimate of 79 per 1,000 live births. Infant and child mortality rates are considerably higher in rural areas as compared to urban areas.

Migration in India

Migration in India is primarily short distance, with around 60 percent of migrants changing their residence within the district of enumeration and over 20 percent within the state of enumeration while the rest move across the state boundaries (Singh, 1992). Predominantly India's population is moving from rural to rural areas. The past three decades, have however witnessed an evolution in India's migration system, with increasing importance of rural-urban migration. Except for the decade 1971-1981, when rural-urban migration was of a very high order, the other two decades viz, 1961-71 and 1981-91 exhibit 20-23 percent of population

[1] Assistant Professor, G B Pant Social Science Institute, University of Allahabad, Allahabad (India)
[2] Ph.D. Student, International Institute for Population Sciences, Mumbai (India)

increase due to migration. For the decade 1971-81 while natural increase in the urban population was of 41.3 percent net migration contributed an equal addition the percentage being 39.9. (RGI, 1991). The pattern of migration in India is determined by the socio-economic development of areas. Population pressure on land, increased opportunities for work, education and a variety of reasons, especially marriage contributes either to rural – rural or rural to urban migration (RGI, 2001).

Internal migration is defined as a change of residence from one civil division to another or across the administrative boundary of a civil division (Bhende and Kanitkar, 2006). Child survival is associated to the internal migration and among four streams (rural to rural, rural to urban, urban to urban and urban to rural) of internal migration, rural to urban migration is most closely related to it (Brokerhoff, 1995).

Determinants of Child Mortality

Several factors determine the level of infant and child mortality. Considering the nature, importance and interrelationship among these determinants, these can be broadly grouped into three main categories, namely Demographic, Socio-economic and Health and Nutritional (Gandotra and Das, 1988). The foremost demographic factors that influence the infant and child mortality are age of mother at birth of the child, birth interval and birth order of the child. Among socio-economic factors, maternal education and socio-economic status of the household are significant (Kravdal, 2004). Health and hygiene as well as nutritional status have also a bearing on the levels of infant and child mortality. The infant mortality is determined by the operations of endogenic and exogenic factors. The endogenic factors include genetic causes (which affect the growth of organisms), damage during gestation, and risks of delivery. The newborn is exposed to exogenic factors, which cover infections, respiratory and digestive disorders, and faulty care of the child - all due to external conditions, which the newborn has to face after expulsion from the womb. The mortality caused by such factors may be controlled by good hygiene and other environmental conditions.

Mosley and Chen (1984) have also given an analytical framework for the study of determinants of child survival in developing countries, which is based on the premise that all social and economic determinants of child mortality, inevitably operate through a common set of biological mechanism, or proximate determinants, which are maternal factors, environmental contamination, nutrient deficiency, injury and personal illness control.

Rural – urban Migration and Child Survival

Migration *per se* cannot affect the child mortality, nevertheless a number of factors associated with migration, namely demographic, cultural, social, environmental or economic, comprehensively influence the child health and consequently the child mortality. To understand this problem first we have to consider the conditions of rural areas which lack basic amenities, such as electricity, flush toilets, and piped drinking water, and definitely these altogether make environment unfavourable for the child survival. Literature suggest that safe drinking water, construction materials used for the houses, availability of flush toilets and availability of electricity have a bearing on child mortality (Lalou and LeGrand, 1997; Dhanalakshmi, 1993). In addition, transportation, availability of health care services, particularly in the case of rural areas play a major role in determining the child mortality and child health (Brockerhoff, 1990 & 1995; Islam & Azad, 2007). There is inadequate availability of maternal and child health care services in the rural areas, and if these are available anywhere, poor villagers, having less awareness and less education, cannot make use of the health related facilities. The poor mothers in rural areas cannot get nutritional food and this led to the birth of poorly nourished children who are underweight from the birth and always struggle for the life.

Urban areas provide for better environment in favour of the child survival, especially with respect to the physical infrastructure - railroad, roads, electricity, water, sewage, and telephone systems. It is well known fact that urban areas have better conditions than rural areas with regard to the health care facilities, infrastructure, and basic amenities. Urban areas have also the superior conditions in comparison to the countryside in household environment and standard of living which helps in promoting the child survival. The limited progress of health programs and rural development policies in improving child health and survival in many rural areas is a big problem and several studies put forth the evidences to those rural mothers or parents can improve their children's survival chances by leaving their villages and settling in towns and cities (Brockerhoff, 1994).

Nevertheless, when mothers migrate from rural to urban areas the socio-economic factors change particularly, the increase in income, education and most importantly access to preventive and curative maternal and child health care facilities. Migration from rural to urban areas may result in the poor housing conditions and less hygienic environment, although increase in income neutralizes all negative effects up to some extent. Rural to urban

migration of mothers sometimes led by the push factors and sometimes it is driven by the pull factors. When it is driven by push factors the migrant women have to adapt the urban conditions and the degree of adaptation guides the course of child survival and child health.

The relationship between migration and mortality is an area that has been little researched. Brockerhoff (1990) has authored one of the most authentic studies on which association between rural to urban migration and child mortality has been established. Study was done using the data of 1986 Senegal Demographic and Health Survey and it was found that mothers improved their children's survival chances by migrating from the countryside to the city. Nevertheless, children of urban migrants, continued to experience a much higher risk of mortality before the age of five than children of urban non-migrants, even after the mother has lived in the city for several years. Brockerhoff's (1994) analysis of Demographic and Health Survey (DHS) data from seventeen countries demonstrate a three-level relationship between rural-urban migration and infant and child mortality. When migrant women, from rural areas settle in cities they experience higher infant and child mortality risks than lifelong city residents. More conclusively, the concentration of migrant women in poor quality housing, observed in virtually all cities studied, lowers survival chances throughout early childhood.

The study done by Tam (1994), based on DHS of Bolivia (1986) and Peru (1989) reveals that mortality risk of children (0-24 months) of migrant mothers falls between that of rural and urban natives. Additionally, a consistent pattern across migration categories has been found for the use of maternal care and contraception; the lowest use is among rural natives, whereas migrants attain intermediate results. The study also suggests that migrant selection, environmental exposure, and migrant adaptation are equally important contributors to these differentials. Nevertheless, migrants never adopt the patterns of urban natives in breast-feeding and use of health services, suggesting the persistence of traditional social and cultural barriers. Several studies have suggested that urban poor actually have higher rates of mortality than their rural counterparts, since urban dwellers enjoy wider range of health care alternatives due to availability of health and medical infrastructure (Poel, et. al., 2007; Lalou and LeGrand 1997).

It is found by the work of Brockerhoff (1995) that there are three groups of children that can be affected by differing degrees due to rural to urban migration: those children left behind in the rural areas; those who accompany their mothers on migration; and those born after

migration has taken place. Each of these groups has a different survival prospect, with those remaining in the rural areas and those, born either two years before or after migration have the lowest rates of mortality, and there appears to be no decline in mortality rates with duration of residence in urban areas. Thomas (2007), in his study of South Africa, found that there is an association between migrant's duration of residence and child mortality. The risk of child mortality to some extent increases as duration of residence increases in urban areas.

Stephenson et. al., (2003), after analysing the National Family Health Survey, 1992-93, (NFHS - 2) data of India, drew a conclusion that the three-level relationship between rural-urban migration and mortality is present in late post-neonatal and toddler mortality in India, but did not adequately explain the relationship between rural-urban migration and neonatal mortality. Rural-urban migrants do not have significant differences in levels of neonatal mortality compared to urban non-migrants. Furthermore, Islam and Azad (2007) have analyzed the levels and trends of childhood mortality in urban Bangladesh and examined whether children's survival chances are poorer among the urban migrants and urban poor using the 1999-2000 Bangladesh Demographic and Health Survey. The study identifies two distinct child mortality regimes in urban Bangladesh: one for natives and one for migrants. The analysis also reveals that rural-urban migration promotes child survival. Nonetheless study underscores the importance of mother's education for child survival in urban areas. Mothers economic status, mothers' autonomy, household economic status, mothers age at the time of birth, and preceding birth interval have significant differential effects on child survival (Islam and Azad, 2007).

Although the implications of rural-urban migration for socio-economic development have been of long standing interest to social scientists, very few studies have looked into the effects of migration on the health and survival of the most vulnerable members of migrants' families - infants and children. According to the estimates of NFHS - 3, in 2001- 05 the infant mortality rate was 50 per cent higher in rural areas (62 per 1,000) than in urban areas (42 per 1,000). The rural-urban difference in mortality is particularly large for children in the age interval 1 - 4 years, for whom the mortality rate in rural areas is twice as high as the rate in urban areas. In addition, the growing importance of rural-urban migration in India due to increasing urbanization, leads to a great number of people who are exposed to new environment and potentially to new influences of health and mortality.

In some of the studies, the attempts have been made to establish the relationship between infant and child mortality and different demographic factors (Gandotra and Das 1988; Dhanalakshmi and Murphy 1993) but very few studies (Stephenson, et. al., 2003) have been carried out to establish the relationship between rural-urban migration and child survival in India. Therefore, an attempt in this regard has been made to examine how far rural-urban migration is associated with infant and child mortality, study also analyzes the differentials of mortality rates and maternal and child health care utilization among different migrant and non-migrant groups (natives) using the latest data set of NFHS - 3, which provides information regarding fertility, mortality, place and duration of residence, household facilities and related socio-economic information.

Data and Methods

The study uses data from third National Family Health Survey, 2005-06 (NFHS - 3). All women aged 15-49 and men aged 15-54 have been interviewed. Survey collected information from a nationally representative sample of 124,385 women aged 15-49. This survey is designed to provide estimates of important indicators on family welfare, maternal and child health and nutrition status. Furthermore, NFHS - 3 asked all these women to provide a complete history of their births including 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 second birthday and years for children dying at later ages. This information is used to calculate estimates of infant and child mortality.

This survey defined small town, town, city, metropolitan and municipality as urban areas. There is some information such as, type of respondents' current place of residence (categorized as small city, town, countryside and capital or large city), previous place of residence, and years lived in the current place of residence (coded in single years, always and visitors), on the basis of which migration status, duration and streams of migration are computed. *In this study migrant is defined as a person who has changed place of residence across an administrative boundary*. A person that has reported previous residence as rural and current residence as urban is classified as a rural to urban migrant. The non-migrant groups of respondents are classified as urban and rural natives, based upon their reported duration at the current residence as 'always'. Out of the four migration streams, rural to urban migration stream has been considered for the analysis. Since available literature, suggests that mothers have improved the survival chances of their children and their health care utilization

only when they move from rural to urban areas. Additionally, survival prospects of the children of urban native women were highest followed by rural to urban migrants and rural natives (Brockerhoff, 1990, 1994, 1995; Tam, 1994; Islam and Azad, 2007). Therefore, our sample is restricted only to rural to urban migrants, rural natives and urban natives. Visitors are excluded from the analysis. We are assuming that almost all the children are raised in their mothers' household until at least the age of five and they have migrated along with their mothers to the urban areas.

Detailed information related to survival status of each child and information regarding preventive measures for the children who were alive at the time of survey was collected from their mothers only. Since, the unit of analysis is the child, not the mother; a sample of children was created from the women respondent's data set. The analysis henceforth refers to information on the children, where mothers' and household attributes have been attached to each record of the child. To reduce the influence of recall bias on the reporting of children's age at death, the analysis has been restricted to children born five years prior to the survey and as found in various studies (Tam, 1994 Islam and Azad, 2007). Hence, the analysis considers the births during the period 2000-05. Information regarding the ANC visits, institutional delivery and delivery assisted by health personal and treatment practices is also gathered in the survey.

Total number of children born five years preceding the survey was 51,500 (excluding visitors), in which 3,243 were resulted in death. This study follows the definition of child mortality as the probability of dying between first and third birthday (12-35 months) to provide the better exposure period for the estimates of mortality. Selection of this definition is based on the studies which defined child mortality in the same manner (Tam, 1994; Stephenson et. al., 2003). Infant mortality is defined as the probability of dying between 0-11 months. Univariate life table approach has been used for estimating differentials in infant and child mortality rates for different migration categories namely urban native, rural native and rural to urban migrant. This analysis is done in the STATA statistical package.

Besides bivariate techniques, Cox proportional hazard model (Cox, 1972) has been used to estimate the effect of migration on child mortality. This has been used in different models with only migration categories and along with other explanatory variables (such as socio-economic and demographic characteristics of mothers). Multivariate proportional hazard model is used, since the dependent variable is a time-dependent variable (age of the child at

death in this case) with censored cases (child is alive at the time of survey). Infant mortality (0-11 months) and early child mortality (12-35 months) have been taken as dependent variables in this study.

The statistical packages SPSS and STATA are used to perform the statistical analyses. All the estimation procedures are carried out by applying appropriate weights.

Dependent and Independent Variables

Study has examined the association of migration with infant and child mortality by controlling for other socio-demographic variables and household environment and economic status variables using multivariate Cox Proportional Hazard models. Evidences (Brockerhoff, 1990; Defo, 1994, Hobcraft, 1984) suggest that infant and child mortality is influenced by a number of socio-economic variables and in the light of above discussed literature the predictor variables included in this study are the migration status variables, age, education and working status of women, education of husband, working status of husband, sex of child, region, caste, place of residence, birth interval, birth order and age of women at the birth of child as well as household wealth index and mass-media exposure. For some of the bivariate analyses type of dwelling floor, source of drinking water, flush toilet facility, availability of electricity, refrigerator, radio and motorcycle are used as independent variables. For analyzing the differentials of maternal and health care utilization dependent variables are ANC (ante natal care) visits, delivery in health facility, health personnel assisted delivery, full immunization of children between age group 12-23 months, treatment seeking practices with selected child morbidity.

Results

Differentials in infant and early child mortality by migration status

Table 1 presents the percent distribution of mothers who have given births during five years preceding the survey. Results indicate that Scheduled Tribes have very less share than the average among urban natives and rural to urban migrants and proportion of Hindus is high among rural to urban migrants than average. Educational attainment and wealth index classification show that percent of middle and higher educated is higher among urban natives followed by rural to urban migrants and then by rural natives and same holds true for higher wealth index.

Table 1: Percent distribution of mothers who have given births during five years preceding the survey, according to background characteristics by categories of migration, NFHS, 2005-06, India.

Background Variables	Rural to Urban migrants (N=5556)	Urban Natives (N=1928)	Rural Natives (N=3733)
Caste			
Scheduled caste	20.8	16.8	16.6
Scheduled tribe	3.9	5.7	21.6
Other backward caste	38.5	42.2	31.2
Others	36.7	35.3	30.6
Religion			
Hindu	75.0	66.9	66.5
Muslim	20.4	24.1	22.5
Others	4.6	9.0	10.9
Education			
No education	41.3	18.1	51.6
Primary	14.4	14.5	17.6
Secondary	38.8	52.9	28.5
Higher	5.5	14.5	2.3
Wealth Index			
Poorest	7.9	5.7	31.2
Poorer	12.0	9.1	26.3
Middle	21.1	15.9	24.9
Richer	32.3	29.6	13.7
Richest	26.7	39.6	3.9
Marital Status			
Married	99.1	97.9	95.7
Single	0.9	2.1	4.3
Sex of Child			
Male	53.5	53.6	51.2
Female	46.5	46.4	48.8

Table 2 illustrates the estimated index of child mortality (mortality rates) according to sex, place of residence and migration categories. For whole India, infant mortality rate (0-11 months) is 48 per 1,000 and early child mortality rate (12-35 months) is 6 per 1,000. The child mortality rates show sex wise differences in all the categories. Male children present high infant mortality rate (49.4 per 1,000) in comparison to female counterpart. On the other hand, for early child mortality rate results are reversed i.e. female children show higher values in comparison to male children. In the absence of gender discrimination, female child mortality is lower than their male counterpart mainly because the female child is biologically

stronger than the male child (Singh, et. al., 2007). According to place of residence, the survival chances are higher for the urban children than in rural areas. Both infant and early child mortality rates show this pattern.

Differentials in infant and early child mortality rates are also presented in table among migrants and non-migrants. Infant mortality rate is 50 per 1,000 for migrants while it is 40 per 1,000 for non-migrants. Again early child mortality rate follows the same direction i.e. migrants having higher mortality (6 per 1,000) than non-migrants (5.5 per 1,000). The differentials of rates within migrants on the basis of duration show that recent rural to urban migrants have higher survival chances than older rural to urban migrants. Table also provides the index of mortality within migrants with reference to streams of migration. Rural to rural migrants show highest infant (58 per 1,000) and early child mortality rate (7.8 per 1,000) followed by urban to rural (7.2 per 1,000) and rural to urban streams (2.5 per 1,000). While urban to urban migrants are privileged with lowest infant (35 per 1,000) and early child mortality (2.5 per 1,000).

Table 3 depicts the differentials in infant and child mortality rates. Results reveal that Results depict that infant (0-11 months) mortality rate is highest for rural to urban migrants (44.2 per 1,000 live births) followed by rural natives and urban natives with 40.7 and 38.2 per 1,000 live births respectively. On the other hand early child mortality is highest among rural natives followed by rural to urban migrants and urban natives. These finding are consistent with some earlier studies (Brockerhoff, 1990; Tam, 1994; Islam & Azad, 2007).

Table 2: Estimated indices of infant and early child mortality according to sex, place of residence and migration categories (Per 1000), NFHS, 2005-06, India.

	Infant Mortality Rate (0-11 Months)	Confidence Interval		Early Child Mortality Rate (12-35 Months)	Confidence Interval	
By Sex						
Male	49.4	*46.8*	*52.2*	5.1	*4.3*	*6*
Female	46.5	*43.8*	*49.3*	7.0	*6*	*8.2*
By Type of Place of Residence						
Urban	39.3	*36.5*	*42.1*	3.7	*2.9*	*4.7*
Rural	53.4	*50.9*	*56*	7.5	*6.5*	*8.5*
By Migration Status						
Migrants	50.1	*48*	*52.4*	6.1	*4.3*	*7.2*
Non-migrants	39.6	*35.9*	*43.6*	5.6	*5.4*	*7*
By Migration Duration						
Recent migrants	48.8	*46.4*	*51.4*	5.2	*4.4*	*6.1*
Older migrants	54.2	*49.7*	*58.9*	9	*7.2*	*11*
By Streams of Migration						
Rural to Urban	44.2	*39.5*	*49.3*	4.6	*3.2*	*6.4*
Urban to urban	35.2	*31.2*	*39.6*	2.5	*1.5*	*3.8*
Urban to rural	44.6	*37.8*	*52.2*	7.2	*4.7*	*10.7*
Rural to rural	58.2	*55*	*61.4*	7.8	*6.7*	*9.1*
India	48.0	*46.1*	*50*	6.0	*5.4*	*6.8*

Table 3: Estimated indices of infant and early child mortality according to specific migrant and non-migrant categories (Per 1000), NFHS, 2005-06, India.

	Infant Mortality Rate (0-11 Months)	Confidence Interval		Early Child Mortality Rate (12-35 Months)	Confidence Interval	
Rural to Urban Migrants	44.2	*0.0395*	*0.049*	4.6	*0.0032*	*0.0064*
Urban Natives	38.2	*0.0326*	*0.044*	4.4	*0.0027*	*0.0069*
Rural Natives	40.7	*0.0357*	*0.046*	6.4	*0.0046*	*0.0088*

Table 4: Percentage of women with a live birth in the five years preceding the survey, who received the antenatal care (three or more ANC visits) according to background characteristics by migration status, NFHS, 2005-06, India.

	Rural to Urban migrants	Urban Natives	Rural Natives
Background Variables	**(N=5539)**	**(N=1924)**	**(N=3721)**
Caste			
Scheduled caste	60.4	83.6	63.4
Scheduled tribe	60.7	69.7	40.0
Other backward caste	59.9	87.2	68.4
Others	73.0	88.8	55.9
Religion			
Hindu	67.2	85.4	64.1
Muslim	50.8	88.2	44.5
Others	86.3	87.6	45.4
Education			
No Education	41.3	61.4	43.8
Primary	67.3	85.3	60.1
Secondary	81.3	90.9	77.2
Higher	96.9	97.2	94.4
Wealth Index			
Poorest	36.4	44.8	35.6
Poorer	39.9	68.3	52.7
Middle	55.4	83.8	69.4
Richer	68.3	86.7	82.2
Richest	84.7	94.7	92.8
Marital Status			
Married	65.0	86.4	58.0
Single	63.2	77.8	56.6
Father's Education			
No	41.1	71.3	43.8
Primary	59.9	80.0	57.3
Secondary and higher	73.6	90.2	71.2
Mass Media			
No	54.4	77.1	47.5
Yes	73.9	89.9	67.8
Birth Order			
'1	77.9	92.8	70.2
2-6	62.7	83.7	56.8
More than 7	27.9	46.7	24.9
TOTAL (%)	**64.9**	**86.3**	**57.7**

Differentials in maternal and child health care utilization by migration status.

Results related to ANC visits underscore that urban natives have the highest percent (86 %) of visits followed by rural to urban migrants (65 %) and rural natives (58 %) (Table 4). Caste wise results show that Scheduled Tribes are the most lagging in ANC visits in all the migration categories further, there was no differentials are observed for religion. With increase in educational level the percentage of ANC visits increases in all categories. Father's education and mass media exposure affect the ANC visits positively irrespective of migration status with an exception in urban natives where difference is not so high perhaps it might be due to already higher percentage of ANC visits. Moving from lower to higher birth order the percentage of ANC visits decreases.

Figure 1

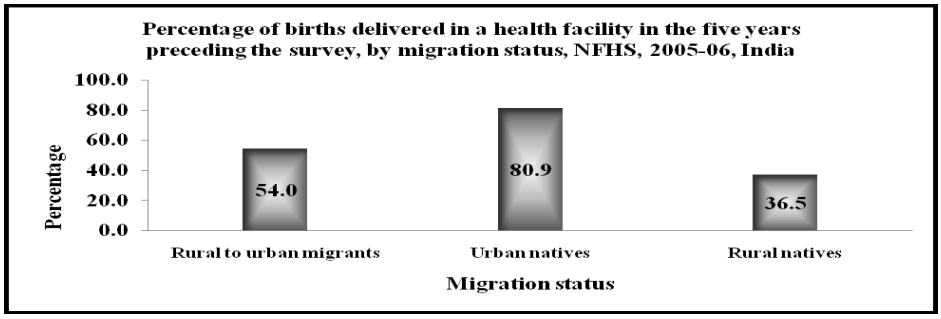


Figure 2

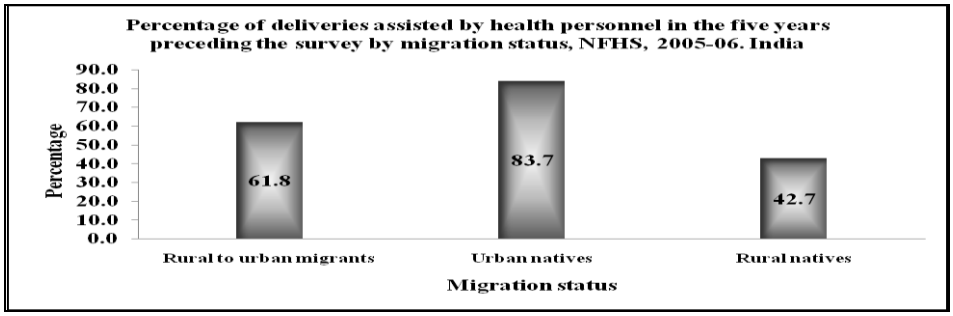
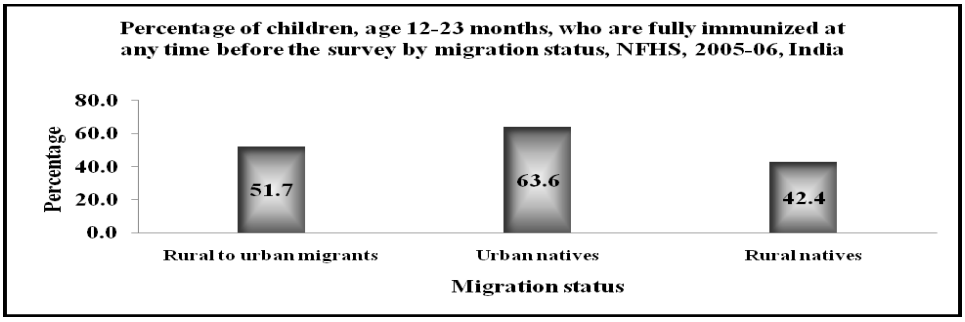


Figure 1 shows the percentage of births delivered in health facility and it is found that urban natives have the highest percentage of births (81 %) delivered in health facility followed by rural to urban migrants (54 %) and rural natives (36 %). More or less same pattern has been observed for the health personnel assisted deliveries and in both the cases rural natives are in most disadvantageous position (Figure 2). Immunization is the important indicator of preventive care and its utilization helps in reducing child mortality substantially (Singh, et.

al., 2007). Full Immunization is considered for the children 12-23 months who received one dose of BCG and measles vaccine, and three doses of Polio and DPT vaccines (Defo, B. K. 1994). It is clear from figure 3 that there is a large difference between the full immunization percentages of rural to urban migrants (54 %) and urban natives (81 %) and as usual rural natives are found to be in the least immunized position with only 36 percent of children fully immunized.

Figure 3



Diarrhoea and Acute Respiratory Syndrome (ARI) are taken to assess the differentials for curative care in this study. In this regard mothers, who have delivered children during the last five years preceding the survey, were asked if their children had suffered from cough, fever or diarrhoea during the two weeks preceding the survey, and if so the type of treatment given. Findings related with Diarrhoea infer that there are no major differences among urban natives, rural natives and rural to urban migrants in percentage of children who received any medical treatment and older migrants fell in most appalling position (Figure 4). The results show that rural to urban migrants are closer to urban migrants with respect to the percentage of children received the medical treatment for ARI and in this aspect rural natives are most deprived however the older migrants are not far behind them (Figure 5).

Figure 4

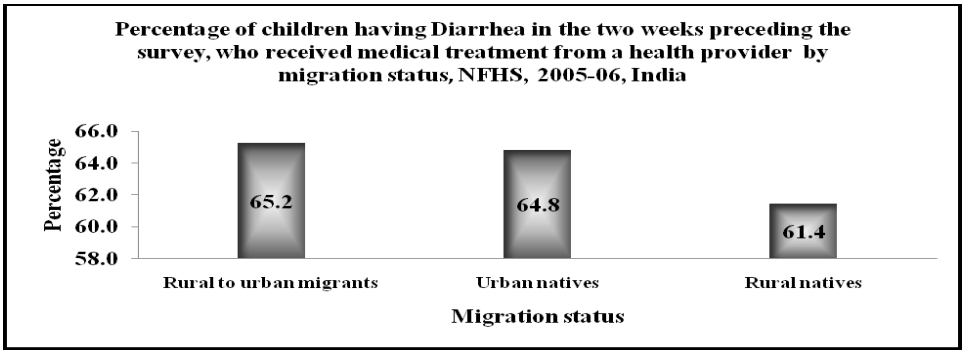
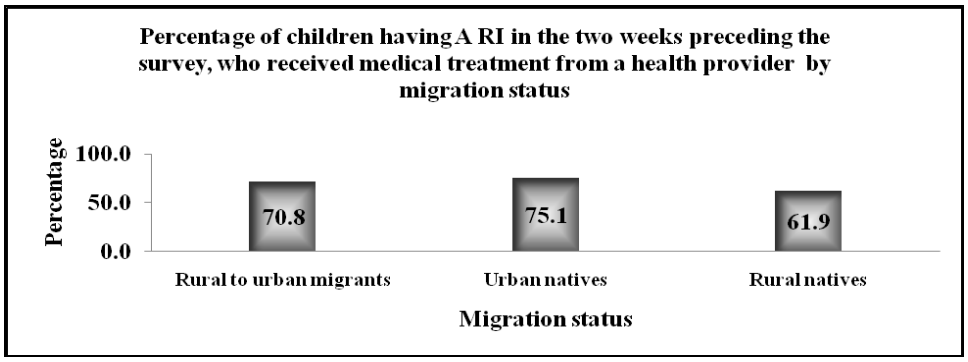


Figure 5



Effect of individual and household characteristics on infant and early child mortality by migration status.

Results from table 5 show that mean age of rural to urban migrants is lesser than that of rural natives. Higher age may lead to the superior childcare practices; but a younger age may lead in greater exposure and easier adaptation of modern childcare practices associated with lesser child mortality (Brockerhoff, 1990). It is documented that child mortality is negatively associated with education of women (Mosley & Chen, 1984). It is found that percentage of women with secondary or above schooling is highest among urban natives (67 %) followed by rural to urban migrants and then rural natives. This positive selection with regard to education could contribute to lower child mortality among rural to urban migrants than rural natives.

Table 5: Percentage of natives and rural to urban migrant (with duration) women according to selected demographic characteristics, NFHS, 2005-06, India.

	Rural to Urban migrants	Urban Natives	Rural Natives
Selected Variables	**(N=5556)**	**(N=1925)**	**(N=3727)**
Mean age	26.5	26.6	26.7
Mean years in urban area	7.4		
Mean age at time of migration	19.1		
Mean age at first marriage	17.5	18.9	17.2
Percentage secondary or above schooling	50.1	67.5	30.8
Percentage husband no schooling	21.8	15.5	39.6
Percentage husband's with white collar job	11.0	17.0	6.9
Percentage two or more tetanus injection	82.5	88.2	73.1

Table 6: Percent distribution of migrant mothers who have given birth during five year preceding the survey according to wealth index by migration status, NFHS, 2005-06, India.

	Rural to Urban migrants	Urban Natives	Rural Natives
Variables	**(N=5556)**	**(N=1925)**	**(N=3727)**
Wealth Index			
Poorest	7.9	5.7	31.2
Poorer	12.0	9.1	26.3
Middle	21.1	15.9	24.9
Richer	32.3	29.6	13.7
Richest	26.7	39.6	3.9

Table 7: Percentage of migrant mothers who have given birth during five year preceding the survey according to indicators of household environment by migration status, NFHS, 2005-06, India.

	Rural to Urban migrants	Urban Natives	Rural Natives
Variables	**(N=5556)**	**(N=1925)**	**(N=3727)**
Cement and ceramic tiles	68.0	76.8	30.5
Piped water	61.5	79.4	32.2
Flush toilet	64.8	71.3	16.9

Table 5 also gives the percentage of husbands with white collar jobs, where it has been observed that highest percentage (17 %) of the urban native women have husbands engaged in white collar jobs, while it is only seven percent among rural natives and again rural to urban migrants fall between them with the one tenth of total husbands. This gives a notion that rural to urban migrants are economically better off than that that of rural natives and very close to the condition of urban natives.

Table 6 presents the percent distribution of migrant mothers according to wealth index by migration status. Results show that poorest women are six percent of total while richer and richest quintiles combined, contribute more than two-third of them among urban natives. On the other hand, a contrasting distribution has been seen among rural natives, which has less than one-fifth of poorest women and more than one-third of richer and richest quintiles combined. The distribution among rural to urban migrants is same as among the urban natives with only an exception that there is a slightly higher percent of richer and richest quintiles combined in comparison to urban natives. Based on these results it could be inferred that rural to urban migrants have improved their economic status in comparison to rural natives.

Main floor material, source of drinking water and type of toilet have been taken as indicator of household environment. Though they are considered for computing the wealth index, they have also been taken separately to observe the conditions of hygiene and basic amenities, which can be detrimental to the children's health and consequently infant and child mortality. Table 7 shows percentage of women living in the houses having durable floor (made of cement or ceramic tiles), piped drinking water and flush toilets. It has been observed that the percentage of women having houses with cement and ceramic tiles (durable floor) is highest among urban natives (77 %), and rural to urban migrants (68 %) are definitely far ahead of rural natives (30 %) but they could not attain the status of urban natives. More than one third of recent rural to urban migrants have houses with this facility in comparison to slightly more than half in the case of older rural to urban migrant women. The percentage of women with houses having piped drinking water and flush toilet show that rural to urban migrants are very close to that of urban natives. Thus, it can be concluded that rural to urban migrants have adapted the urban conditions very well in this regard and recent rural to urban to migrants are far ahead of older ones. These findings are consistent with the findings of Islam and Azad (2007) and this allows us to get agreed with his argument that rural to urban migration helps women in improving their standard of living however they never attain the condition equal to urban natives.

Multi-variate Results

For multivariate analysis Cox proportional hazard model has been used and have been fitted in four models among which model 1 and 3 estimate the relative risk of infant and child mortality by taking only the migration categories, namely urban native, rural native, rural to urban migrant as independent variables. Model 2 and 4 have been fitted with controlling other socio-economic and demographic factors that are mainly related to child survival in poor countries. Table 8 shows the results of models 1 and 3 and it has been found that relative risk of infant mortality is six percent lesser among urban native in comparison to rural native.

Results from models 2 and 4 suggest that after controlling the effect of confounding factors the urban natives show 35 percent higher chances for infant mortality relative to rural natives. In model 2 central region shows the 25 percent higher risk, west region have 19 percent lesser relative risk and south region show 27 percent lesser relative risk of infant mortality in comparison to North region. Among infants relative risk of mortality increases by 17 percent for scheduled castes while it has been found that relative risk is 18 percent higher among

children (12-35 months) as compared to other castes, in addition relative risk of early child mortality is 69 percent higher for scheduled tribes in comparison to other castes. Availability of flush toilet is negatively associated with the child mortality since relative risk of mortality among children born to houses having flush toilets is 35 percent lesser.

In comparison to infants born to illiterate women infants born to women having primary or above education face 13 percent lesser relative risk of dying while risk for children in same case is 50 percent lesser. Women's work status has a bearing on the early child mortality and it has been found that infants of women, who are not working are more likely to die as compared to the not working women and also women working in unskilled sector. Again not working women's children are more likely to die than women working in unskilled sector. However, explanation of this finding is difficult. With respect to wealth index parameter estimates of hazard model suggest that the relative risk of dying of infants and children decreases to higher wealth quintiles in comparison to poorest quintile. Also for infants it has been found that with increasing birth order the relative risk of infants dying increases.

Table 8: Parameter estimates of proportional-hazard models of infant (0-11 months) and early child mortality (12-35 months), NFHS, 2005-06, India.

	Relative risk			
	Infant mortality (0-11)		Early child mortality (12-35)	
Covariates	**Model I**	**Model II**	**Model III**	**Model IV**
Migration Status				
Urban native	0.94	1.35**	0.69	1.78
Rural native®	1.00	1.00	1.00	1.00
Rural to urban migrant	1.09	1.34**	0.19	1.58
Place of Residence				
Urban®		1.00		1.00
Rural		0.99		0.94
Region				
North®		1.00		1.00
Centre		1.25***		1.07
East		1		1.1
Northeast		0.96		0.6**
West		0.81**		1.14
South		0.73***		0.94
Caste				
Scheduled caste		1.17**		1.38*
Scheduled tribe		1.08		1.69***
Other backward caste		1.05		0.98
Others®		1.00		1.00
Mother's Education				
Illiterate®		1.00		1.00
Literate		0.92		0.523
Mother's Work Status				
No work®		1.00		1.00
Skilled work		0.89**		0.52
Unskilled work		0.95*		0.79*

Table 8 continued

Husband's Education		
Illiterate®	1.00	1.00
Literate	0.92*	0.77*
Wealth Index		
Poorest®	1.00	1.00
Poor	1.05	0.89
Middle	0.88*	0.59***
Richer	0.77***	0.35***
Richest	0.63***	0.38***
Mass media exposure		
No®	1.00	1.00
Yes	0.98	1.01
Husband's Profession		
No work®	1.00	1.00
Skilled work	0.88	0.67
Unskilled work	1.11	0.69
Birth Order of the Child		
1®	1.00	1.00
2-3	1.41***	0.85
More than 3	1.19***	1.14

Notes: * Significant at p<0.10, ** p<0.05, *** p<0.001, [1]other migrants include rural to rural migrants, urban to rural migrants and urban to rural migrants

® = Reference category

Discussion and Conclusion

Infant and Child mortality still have not lost its importance, particularly for the developing countries including and it continues to be an important issue for the policy makers. This study is an endeavour to understand this problem in the context of migration, particularly rural-urban migration, utilizing the recent data from third National Family Health Survey (200-06) to examine the association of rural-urban migration and child survival. The study has substantiated that infant mortality (0-11 months) rate is highest for rural to urban migrants followed by rural natives and urban natives. On the other hand early child mortality is highest among rural to urban natives followed by rural to urban migrants and urban natives and result has been further confirmed by survival plots also. These finding are consistent with some earlier studies (Brockerhoff, 1990; Tam, 1994; Islam & Azad, 2007). These findings are similar to the South African findings of Thomas (2007), who found that there is an association between migrant's duration of residence and the likelihood of child mortality.

Further it has been documented that antenatal care, for which ANC visits has been taken as indicator, reveal that urban natives are very well off in this regard while rural to urban migrants are very far behind them and they are close to the conditions of rural natives. It has

been observed that scheduled tribes are the most lagging in utilization of antenatal care. With increase in educational level the utilization of antenatal care has been found to be increased and moving from poorest to richest wealth quintiles the same pattern has been seen. Father's education and mass media exposure affect the antenatal care positively while birth order is associated with it conversely. Delivery in health facility and health personnel assisted delivery are two important components of safe delivery. These two show a more or less same pattern as found in antenatal care in all categories. This result further strengthen the findings of Brockerhoff (1990) for Senegal in which urban natives and rural to urban migrants both make use of child health care services more than the rural natives.

Immunization is the other imperative indicator of preventive care and its utilization helps in reducing child mortality substantially, particularly in Indian context since immunization generally takes place after first birthday of child (Singh, et. al., 2007). Results depict that there is a large difference in full immunization proportion of children of rural to urban migrants and urban natives and as usual, rural natives are found to be in the least immunized position. Thus findings for India are consistent with the earlier findings of Islam & Azad, (2007) for Bangladesh where vaccination coverage for different types of vaccines was lower among the children of rural to urban migrants than urban migrants.

Socio-economic and demographic characteristics of rural to urban migrants, urban natives and rural natives which are related to migrant selection and adaptation have been taken for analysing their association with child survival. Age of women is an important determinant to explain the adaptation of urban conditions. Higher age may lead to the superior childcare practices; but a younger age may lead in greater exposure and easier adaptation of modern childcare practices associated with lesser child mortality (Brockerhoff, 1990). There is a positive selection with regard to education has been observed among rural to urban migrants which could contribute to lower child mortality among rural to urban migrants than rural natives. A majority of urban native women have husbands engaged in white collar jobs, while it is very less in the case of rural natives and again rural to urban migrants fall between them.

A majority of urban native women have husbands engaged in white collar jobs, while it is very less in the case of rural natives and again rural to urban migrants fall between them. This gives a notion that rural to urban migrants are economically better off than that that of rural natives and very close to the condition of urban natives.

Distribution of migrant mothers according to wealth index show that poorest and poor women are in major proportion among rural natives while as one moves from rural natives to rural to urban migrants the a major proportion of women shift to the middle and richer quintiles. Urban natives are slightly ahead of rural to urban migrants with highest proportion of women in richest wealth quintiles. Based on these results it could be inferred that rural to urban migrants have improved their economic status in comparison to rural natives. Main floor material, source of drinking water and type of toilet have been taken as indicator of household environment to observe the conditions of hygiene and basic amenities, which can be detrimental to the children's health and consequently infant and child mortality. Thus, it can be concluded that rural to urban migrants have adapted the urban conditions very well in this regard and recent rural to urban to migrants are far ahead of older ones. It proves that rural to urban migration helps women in improving their condition of household environment and conditions of hygiene.

Multivariate results show that migration status related variables are associated with the infant mortality and child mortality, and there is lesser likelihood of infant and child mortality among rural to urban migrants and urban natives in comparison to rural native but, after controlling for other socio-demographic and economic variables results are reversed. There for it could be inferred that rural-urban migration does not improve the child survival in India and it is negatively associated with the infant and child mortality. This might be due to the fact that migration selection is not due to push factors in India and majority of well to do migrants move and particularly due the marriage migration in this country.

There are some limitations of the study. Since study utilizes the NFHS-3 data which is not framed to collect the migration related information and perhaps that is the reason that multivariate results have not come in expected direction particularly with regard to effect of rural-urban migration on child mortality. The other limitation of the study is that whether the child is born before migration or after migration could not computed on the basis of available data and further work could be done by improving this shortcoming of the study.

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