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# *Title of the Paper* - Migration and Child Health: Exploring Disparities in Child Nutrition and Immunization in Urban India

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**Abstract**: Migration and health share a complex relationship and interactions. The increasing urbanization and rural to urban migration provides a scope to analyze the health and nutrition status of migrants living in urban India. The present study tries to understand disparities in child immunization and nutritional status among children by migration status in urban India using the most recent available data of National Family Health Survey (2005-06). Descriptive statistics and binary logistic regression models were used to study the levels and factors associated with child nutrition and immunization by migration status. Results suggest that malnutrition and no immunization are very high among children of rural to urban migrants and full immunization is lower than urban non-migrants and urban-urban migrants. More than half of the children from of marginalised households suffer from the problem of undernutrition among rural-urban migrants. Multivariate results show economic status economic status, age of the mother, education, caste and media exposure are negatively associated with malnutrition and positively associated with immunization. Children from south, north-east and east have lesser chance of being malnourished than north region of India.

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## Migration and Child Health: Exploring Disparities in Child Nutrition and Immunization in Urban India

### Background

In spite of the fact that the under-five mortality rate (U5MR) in India has gone down from 118 per 1000 live births in 1990 to 66 per 1000 live births in 2009, it still accounts for around one-fifth of the total under-five deaths of world, a figure the country is ashamed (UNICEF, 2010). It is also evident that communicable diseases like diarrhoea, pneumonia and malaria and under nutrition contribute to the bulk of child mortality, which can be prevented through Immunization and blustering nutrition (Black *et al*, 2010). However, the prevalence of underweight children in India is amongst the highest world, and nearly doubles that of Sub-Saharan Africa with dire consequences for mobility, mortality, productivity and economic growth (Gragnolati et al, 2005). Almost half of the preschool children are stunted, two-fifths of them are underweight and one-fifths of them are wasted in India. Only half of the children are fully immunized according to World Health Organization (WHO) recommended four preventable vaccines (IIPS & Macro International, 2007). Moreover, there are widespread disparities in nutrition and immunization status of children in favour of richer, higher caste and developed regions (Arokiasamy & Pradhan, 2011; Joe et al, 2010; Mohanty & Pathak, 2009; Pathak & Singh, 2010).

Literature abounds with evidences showing that the conditions that affect health and nutrition are more pronounced in rural areas than in the cities. One of the reasons forwarded to explain the urban health advantage has been that unlike villages, cities generally have an important modern health care system, which facilitates public health interventions, such as campaigns to control epidemic diseases, vaccination and maternal and child health programs, compared to rural areas. However, the urban advantage particularly in child health (Fosto, 2006) has supposedly faded in recent decades, since the urban population explosion in most developing countries has not been matched by an adequate expansion of sanitation, health services and livelihood opportunities (Brockerhoff & Brennan 1998; Lalou & Legrand, 1997). The recent urbanization has proportionately brought about considerable health inequalities between different socioeconomic groups.

In India the proportion of urban population has increased from 17 percent in 1951 to 32 percent in 2011 (about twice in last 60 years), contributing 377 million of the total population of the country (Census of India, 2011). In coming years, urban population is likely to grow

faster than the rural population – 2.5 percent annually compared to the growth of less than 1 percent in rural India (World Urbanization Prospects, 2006). This growth is largely contributed by rural to urban migration in the recent decades (Bhagat & Mohanty, 2009). In the past three decades, rural to urban migration has gone up due to different socio-economic push and pull factors. For example, 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 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 in the percentage being 39.9 (RGI, 1991). A large section of this population is living in precarious slums, which are typically overcrowded, polluted, lack basic services such as clean water and sanitation, and are exposed to infectious diseases. For example, 54 per cent of the population of Greater Mumbai was enumerated as slum dwellers (RGI, 2005).

There are evidences from developing countries that chances of child survival among rural-urban migrants are less than that of urban non-migrants (Brockerhoff, 1990; Keshri & Bhagat, 2011). Furthermore, Harpham & Stephens (1991) argued that urban migrants appeared to be greatly disadvantaged in terms of child health and survival. It is observed that mortality before age five is 1.6 times higher among children of rural to urban migrants compared to the children of urban natives. The study done by Tam (1994), based on DHS of Bolivia and Peru reveals that mortality risk of children (0-24 months) of migrant mothers falls between that of rural and urban natives. This is basically due to adaptation of urban non-migrants to urban milieus whereas the rural to urban migrants are most likely to be short term residents living a deprived life in the urban areas. In the same line, their children can suffer from poor nutrition and they remain deprived of immunization. There are studies (Azad & Rahman, 2009) from South Asia which show higher prevalence of infectious diseases among rural to urban migrants but nutritional status of migrants and non-migrants are explored little in this region. There is a dearth of literature on the association between migration and child nutrition & immunization in India. Set to this context, the present study attempts to understand disparities in child immunization and nutritional status among children by migration status and most importantly tries to assess the association between migration status and child health in India using large-scale survey data of NFHS-3 (2005-06).

## Data Source and Methods

The study utilized third round of National Family Health Survey (NFHS, 2005-06) data, which is the Indian version of Demographic and Health Survey (DHS). The DHS is the standardized survey over 80 countries with over 240 surveys worldwide. The survey followed two stage sampling design in rural areas and three stage sampling design in urban areas and survey questions in these surveys are in a standard format across all countries. The third round of NFHS (2005-06) covers 124,385 ever-married women of age 15-49 years respectively from 29 states of India that comprise more than 99 per cent of India's population (IIPS and ORC Macro, 2007). Information collected from ever-married women with at least one under five children in urban areas was used for the analysis in the present study. NFHS-3 collected data for last five births in last five years.

*Migration related information in NFHS (2005-06)*

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 natives, based upon their reported duration at the current residence as 'always'. Out of the three migration streams in urban areas, rural to urban and urban to urban migration stream has been considered for the analysis.

*Outcome variables*

1. *Underweight:* It is defined as children in the age group, 0–47 months whose weight-for-age Z-score is minus two standard deviations below the median of the reference population.
2. *Stunted:* It is defined as children in the age group 0–47 months whose height-for-age Z-score is minus two standard deviations below the median of the reference population.
3. *Wasted:* Children age 0–47 months, whose weight-for-height Z-score is minus two standard deviations below the median of the reference population are considered wasted.

4. *Full immunization:* It is considered as surviving children who have received one dose of BCG, three doses of DPT, three doses of Polio, and one dose of Measles. Immunization is estimated for children age 12-23 months only, as per the WHO schedule of immunizations.

*Predictor variables*

All the relevant socio-economic and demographic predictors were considered for the bivariate and multivariate analysis to examine factors associated with child nutrition and immunization by migration status. The independent variables considered in the present study are: a) migration status b) religion, caste and economic status households c) age, education, work status and media exposure of mother d) birth order and sex of child and e) geographical regions of India.

***Methods***

Descriptive statistics were presented to show the level of malnutrition and immunization among children by different socio-economic characteristics. Binary logistic regression models were used to examine the associated factors with nutritional status and child immunization in urban India. In order to assess the relationship between rural to urban migration and socio-economic factors with child health child health indicators we have done multivariate analysis using binary logistic regression models, as our dependent variables; stunting, wasting and underweight and immunization, are dichotomous. The results were presented in the form of odds ratios (relative risk ratios), which are the simplified linear form of probability coefficients, with corresponding significance levels. These odds ratios (ORS) are used to interpret the expected risks of a child to be undernourished, stunted, wasted or fully immunized (separately) associated with a unit change in an explanatory variable, given that other correlates in the model are held constant (Cameron &Trivedi, 2005). Analysis is done using IBM SPSS 20 statistical package.

**Results**

*Child nutrition and immunization status by migrations status in urban India*

The nutritional and immunization status of children of migrants and non-migrants are shown in Table 1. Results suggest higher level of malnutrition and low immunization coverage among rural-urban migrants than the urban non-migrants and urban-urban migrants. Around

42 percent of children of rural-urban migrants are stunted in comparison to 36 percent the non-migrants and 34 percent urban-urban migrants' children. Moreover, the rate of child immunization among rural-urban migrant children is also low (46%) as compared to non-migrants (50%) and urban-urban migrants (56%). Multivariate results also show that rural-urban migrant children are more likely to be stunted and underweight than non-migrants. But the children of urban-urban migrants are less likely to be stunted, wasted and underweight than that of the children of non-migrants. On the other hand rural-urban migrants' children are 15 percent less likely to get fully immunized and urban-urban migrants are 25 percent more likely to get immunized.

**Table 1: Nutrition and Immunization status of under-five children by migration status, 2005-06**

| | | Migration Streams | | | |
|---|---|---|---|---|---|
| **Child health Status** | **Non-Migrants®** | **Rural-Urban** | **OR$^{\alpha}$** | **Urban-Urban** | **OR$^{\alpha}$** |
| Stunting | 36.7 | 42.2 | 1.26*** | 34.0 | 0.89** |
| Wasting | 16.3 | 17.8 | 1.11 | 13.1 | 0.78*** |
| Underweight | 28.3 | 35.5 | 1.39*** | 25.6 | 0.87** |
| Full Immunization | 50.1 | 46.0 | 0.85*** | 55.7 | 1.25*** |

*Notes*: OR $^{\alpha}$ - Odds ratios of unadjusted logistic regression, ®Reference Group, Unadjusted
*Data Source*: National Family Health Survey, 2005-06.

*Socio-economic differential in nutrition of children by migration status*

The percentage of children according to nutritional categories by migration status is shown in the Table 2. By all socio-economic characteristics, the rural-urban migrants are in an unfavourable condition in terms of both nutritional categories and immunization against the non-migrants and urban-urban migrants. For example, irrespective of the caste groups the rural-urban migrants have more stunted, wasted and underweight children than that of urban natives. A high prevalence of stunting is observed among children of rural-urban migrants from Scheduled Castes (SCs) and Scheduled Tribes (STs) social groups; as 48 percent of these children are stunted as compared to 29 percent of the children of urban-urban migrants belonging to upper caste group. A similar pattern is observed in the case of wasting and underweight status with the vulnerable social groups rural-urban migrants have more proportion of wasted and underweight children in comparison to upper caste urban natives and urban-urban migrants. For lower economic profile, the results show a very high proportion of children are stunted and wasted of both rural-urban and urban-urban migrants in comparison to well to do migrants.

Almost half of the children of rural-urban migrant working mothers are stunted against one-third of urban-urban migrants and 37 percent of urban native's children. Similarly, about 20 percent children of rural-urban migrant working mothers are wasted and 43 percent children are underweight. In contrast, 15 percent and 34 percent of children of urban natives are wasted and underweight respectively. Among the rural-urban migrants, the working mothers have higher prevalence of stunted, wasted and underweight (49%, 20% and 43% respectively) children compared to mothers not working (40%, 17% and 34% respectively). It is apparent that proportion of children stunted, wasted and underweight increases with increase in birth order and it is higher among rural-urban migrants' children than urban natives and urban-urban migrant's children. In all the geographical regions rural-urban migrants' children are more stunted and underweight than children of urban natives and urban migrants. However, a very high proportion of children of rural-urban migrants' children in central and eastern region are found to be stunted and underweight than children of urban natives and urban migrants. For instance, in central region around half of the children of migrants from rural areas are stunted (51%) and underweight (48%).

*Socio-economic differential in immunization of children by migration status*

Only 54 percent of rural-rural migrants have fully vaccinated their children with all doses of BCG, polio, DPT and measles as compared to 60 percent of urban natives and 66 percent of urban-urban migrants in urban India. The child immunization status by migration status of the respondents by background characteristics are shown in table 3. By almost all background characteristics the results are inauspicious for rural-urban migrants than the non-migrants and urban migrants. The non-Hindu rural migrants have lowest immunization rates for their children, as only 47 percent of them are immunized against 70 percent of fully immunized children of urban Hindu migrants'. There is a higher proportion of working rural-urban migrants (57%) mother who have their children immunized than working urban non-migrant mothers (50%). However, among the not working mothers the rural migrants have a very low rate of vaccination (53%) than urban natives (62%) and urban migrants (66%).

The regional analysis shows that except western region the urbanites (urban non-migrants and migrants from urban areas) have a better immunization rate than migrants from rural areas. Full immunization is lowest among rural-urban migrant children in north-east; however the migrant and non-migrant gap is wider in northern India. No immunization is very high among

**Table 2: Child Nutrition Status by Migration Status and Streams by Background Characteristics in India, 2005-06.**

| Background | Stunting | | | Wasting | | | Underweight | | |
|---|---|---|---|---|---|---|---|---|---|
| **Characteristics** | **Non-Mig** | **R-U** | **U-U** | **Non-Mig** | **R-U** | **U-U** | **Non-Mig** | **R-U** | **U-U** |
| *Religion* | | | | | | | | | |
| Hindu | 37.1 | 42.0 | 33.9 | 16.4 | 18.0 | 13.5 | 30.2 | 35.9 | 26.1 |
| Non-Hindu | 36.0 | 42.6 | 34.3 | 16.1 | 17.3 | 12.2 | 25.5 | 34.4 | 24.4 |
| *Caste* | | | | | | | | | |
| SC & ST | 40.6 | 48.3 | 42.5 | 16.5 | 18.6 | 13.5 | 28.8 | 38.7 | 29.4 |
| OBC | 37.2 | 43.1 | 36.4 | 18.7 | 20.1 | 14.5 | 33.0 | 38.1 | 29.0 |
| Others | 33.3 | 37.3 | 29.3 | 14.4 | 15.5 | 12.3 | 24.9 | 32.0 | 22.1 |
| *Standard of living index* | | | | | | | | | |
| Low | 47.7 | 57.6 | 59.4 | 24.8 | 23.8 | 21.0 | 43.8 | 51.7 | 54.8 |
| Medium | 44.2 | 48.2 | 48.6 | 17.3 | 18.6 | 16.2 | 34.3 | 39.9 | 38.2 |
| High | 30.3 | 32.9 | 27.3 | 12.9 | 15.7 | 11.7 | 20.9 | 27.7 | 19.5 |
| *Age of Mother* | | | | | | | | | |
| 15-24 | 39.4 | 43.3 | 38.5 | 20.1 | 19.5 | 13.4 | 32.2 | 35.3 | 29.2 |
| 25-34 | 35.3 | 41.1 | 32.3 | 14.4 | 16.2 | 13.4 | 26.4 | 35.6 | 24.5 |
| 35+ | 34.7 | 43.9 | 30.6 | 13.8 | 19.8 | 10.1 | 25.7 | 35.4 | 20.4 |
| *Mother's Education* | | | | | | | | | |
| No education | 52.6 | 54.0 | 53.2 | 19.7 | 21.2 | 16.2 | 42.6 | 47.1 | 43.7 |
| Up to secondary | 36.8 | 37.2 | 34.5 | 16.5 | 16.6 | 13.2 | 27.9 | 30.8 | 24.8 |
| Higher | 18.4 | 20.8 | 18.2 | 11.7 | 9.4 | 10.7 | 13.7 | 12.4 | 14.0 |
| *Mother's Work Status* | | | | | | | | | |
| Not working | 36.9 | 40.7 | 34.2 | 16.8 | 17.5 | 13.0 | 29.0 | 33.8 | 24.9 |
| Working | 36.3 | 49.3 | 33.7 | 14.9 | 19.6 | 14.0 | 26.2 | 43.3 | 28.9 |
| Mass Media Exposure | | | | | | | | | |
| No exposure | 55.7 | 55.7 | 57.2 | 17.3 | 20.6 | 15.5 | 42.8 | 49.0 | 44.6 |
| Have exposure | 35.3 | 40.1 | 32.5 | 16.2 | 17.3 | 13.0 | 27.3 | 33.3 | 24.3 |
| *ANC Visits* | | | | | | | | | |
| Less than 3 | 45.0 | 48.9 | 48.9 | 21.3 | 21.9 | 20.3 | 36.6 | 44.3 | 39.4 |
| More than 3 yr | 31.7 | 35.7 | 29.3 | 16.8 | 17.2 | 12.6 | 25.4 | 29.5 | 21.8 |
| Birth order | | | | | | | | | |
| 1 | 30.9 | 35.4 | 25.9 | 15.6 | 16.9 | 12.4 | 25.1 | 29.3 | 21.3 |
| 2 | 37.6 | 40.8 | 34.6 | 15.6 | 16.9 | 12.2 | 27.7 | 33.0 | 24.0 |
| 3+ | 44.0 | 49.2 | 45.6 | 18.1 | 19.2 | 15.5 | 33.6 | 42.8 | 34.2 |
| *Birth Interval* | | | | | | | | | |
| Less than two yr | 44.5 | 52.5 | 48.7 | 15.1 | 14.9 | 12.4 | 32.2 | 42.3 | 33.2 |
| 2-3yr | 46.8 | 47.3 | 42.4 | 18.2 | 22.0 | 13.5 | 36.0 | 41.2 | 30.9 |
| More than 3 yr | 32.1 | 36.8 | 28.7 | 16.0 | 17.2 | 13.2 | 25.3 | 31.0 | 22.5 |
| No. of living children | | | | | | | | | |
| Less than 2 | 32.7 | 36.6 | 28.6 | 16.4 | 17.5 | 12.3 | 26.0 | 30.8 | 21.9 |
| More than 2 | 45.6 | 50.0 | 47.0 | 16.0 | 18.1 | 15.1 | 33.5 | 42.0 | 34.6 |
| *Region* | | | | | | | | | |
| North | 34.8 | 41.9 | 31.7 | 15.7 | 16.3 | 12.7 | 25.6 | 32.3 | 22.0 |
| North-East | 34.3 | 35.7 | 29.8 | 11.7 | 11.6 | 10.3 | 22.3 | 24.1 | 17.2 |
| East | 32.4 | 42.2 | 29.3 | 24.3 | 20.7 | 14.2 | 32.9 | 40.1 | 26.9 |
| West | 43.9 | 41.4 | 35.0 | 17.7 | 15.5 | 11.1 | 32.4 | 34.4 | 26.6 |
| Central | 45.0 | 51.3 | 44.2 | 18.6 | 24.3 | 16.4 | 37.8 | 47.5 | 34.9 |
| South | 33.9 | 36.5 | 29.1 | 18.2 | 15.5 | 13.3 | 29.7 | 29.6 | 22.3 |
| Total | 36.7 | 42.2 | 34.1 | 16.3 | 17.8 | 13.1 | 28.3 | 35.5 | 25.6 |

*Data Source*: National Family Health Survey, 2005-06.

**Table 3: Child immunization Status by Migration Status and Streams by Background Characteristics in India, 2005-06.**

| | Full Immunization | | | No Immunization | | |
|---|---|---|---|---|---|---|
| **Background Characteristics** | **Non-Migrant** | **R-U** | **U-U** | **Non-Migrant** | **R-U** | **U-U** |
| *Religion* | | | | | | |
| Hindu | 63.7 | 56.8 | 70.1 | 5.5 | 4.5 | 1.2 |
| Non-Hindu | 53.2 | 47.3 | 59.0 | 4.9 | 8.9 | 4.6 |
| *Caste* | | | | | | |
| SC & ST | 52.3 | 50.5 | 57.4 | 7.1 | 7.4 | 2.8 |
| OBC | 55.0 | 53.6 | 62.4 | 5.3 | 5.0 | 1.4 |
| Others | 66.8 | 55.3 | 72.6 | 4.0 | 5.6 | 2.9 |
| *Wealth Index* | | | | | | |
| Poorest | 21.4 | 24.2 | 27.0 | 13.8 | 13.9 | 10.8 |
| Poorer | 31.0 | 27.4 | 23.7 | 15.3 | 10.6 | 9.2 |
| Middle | 41.9 | 37.1 | 36.2 | 7.2 | 8.7 | 4.6 |
| Richer | 49.8 | 45.2 | 45.6 | 6.6 | 6.7 | 4.6 |
| Richest | 62.2 | 57.1 | 64.1 | 3.3 | 2.3 | 1.2 |
| *Age of Mother* | | | | | | |
| 15-24 | 55.4 | 51.4 | 63.6 | 6.9 | 6.8 | 1.9 |
| 25-34 | 63.8 | 57.7 | 67.5 | 3.5 | 5.2 | 2.4 |
| 35+ | 52.8 | 43.5 | 74.3 | 8.8 | 3.5 | 4.4 |
| *Mother's Education* | | | | | | |
| No education | 31.3 | 39.2 | 33.5 | 14.6 | 8.6 | 10.9 |
| Up to secondary | 62.6 | 59.5 | 67.6 | 3.9 | 5.0 | 1.2 |
| Higher | 76.1 | 80.3 | 83.3 | 1.0 | 0.0 | 0.0 |
| *Mother's Work Status* | | | | | | |
| Not working | 62.4 | 53.4 | 66.3 | 4.3 | 5.7 | 2.5 |
| Working | 50.2 | 57.3 | 68.2 | 8.3 | 6.7 | 1.2 |
| *Mass Media Exposure* | | | | | | |
| No exposure | 27.6 | 32.2 | 42.9 | 16.2 | 11.6 | 12.7 |
| Have exposure | 62.2 | 57.1 | 67.8 | 4.3 | 5.0 | 1.7 |
| *Birth order* | | | | | | |
| 1 | 65.1 | 63.9 | 75.7 | 4.0 | 5.7 | .3 |
| 2 | 65.0 | 56.7 | 69.1 | 3.9 | 3.8 | 1.8 |
| 3+ | 42.6 | 42.0 | 47.6 | 9.3 | 8.1 | 6.3 |
| *Birth Interval* | | | | | | |
| Less than two yr | 48.8 | 50.7 | 57.7 | 10.0 | 6.8 | 3.6 |
| 2-3yr | 50.2 | 45.6 | 53.8 | 7.4 | 6.1 | 3.3 |
| More than 3 yr | 64.3 | 58.2 | 71.8 | 3.7 | 5.5 | 1.8 |
| *No. of living children* | | | | | | |
| Less than 2 | 65.0 | 60.1 | 72.2 | 4.0 | 4.8 | 1.2 |
| More than 2 | 41.2 | 41.7 | 48.6 | 9.5 | 8.0 | 5.9 |
| *Region* | | | | | | |
| North | 66.7 | 52.4 | 74.3 | 9.6 | 10.1 | 4.4 |
| North-East | 49.2 | 43.5 | 55.7 | 9.3 | 12.7 | 4.9 |
| East | 51.9 | 51.6 | 72.7 | 5.0 | 9.9 | 1.2 |
| West | 61.1 | 68.7 | 73.6 | .5 | .5 | .0 |
| Central | 52.9 | 42.1 | 52.8 | 1.0 | 2.3 | 3.5 |
| South | 68.6 | 63.4 | 65.2 | 3.8 | 4.0 | .7 |
| Total | 59.6 | 53.9 | 66.4 | 5.3 | 5.9 | 2.3 |

*Data Source*: National Family Health Survey, 2005-06.

*Multivariate Analysis*

rural-urban migrants of northern and north-eastern India and notably more than one-tenth of the children 12-23 months not received any vaccination.

Logistic regression results are presented in table 4. We used two separate models to examine the association of rural to urban migration and other socio-economic & demographic factors with child nutrition (stunting, wasting and underweight) and immunization. In the first model, we used different socio-economic and demographic variables except wealth index and mother's education. We excluded education and economic status from the first model in order to check whether migration affects child nutrition through these factors or not. In the second model, we included these variables to see the impact of migration after controlling all the factors.

The results presented in the first model suggest that rural-urban migrants' children are significantly more likely to be stunted (OR=1.14, $p<0.01$) and underweight (OR=1.15, $p<0.01$) while they are less likely to be fully immunized (OR=0.90, $p<0.05$) than urban migrants with respect to WHO recommended four vaccines. This model shows urban-urban migrants children are significantly less likely to be wasted (OR=0.83, $p<0.01$) and underweight (OR=0.86, $p<0.01$) whereas they are more likely to be immunized (OR=1.13, $p<0.01$) than the children of non-migrants. Other variables like caste, mother's age and mass media exposure show significantly negative association with undernutrition and a positive association with child immunization. However, birth order and mother's working status show a significantly positive association with undernutrition and a negative association with child immunization. Notably, children of working mothers are more likely to be stunted and underweight than those who do not work.

In the second model, the significance of migration status disappears after inclusion of wealth index and educational status of mother. These results suggest that children of urban-urban migrant are significantly less likely to be wasted (OR=0.75, $p<0.01$) and underweight (OR=0.89, $p<0.10$) than the urban non-migrants. However, the education and economic status showed significant and negative association with nutrition and positive association with immunization status. The children of women with higher education who belong to better-off households are significantly less likely to be undernourished and more likely to fully immunized than children of poor and uneducated women.

**Table 4: Binary logistic regression showing adjusted odds of child nutrition and immunization by different background characteristics, 2005-06**

| | Stunting | | Wasting | | Underweight | | Immunization | |
|---|---|---|---|---|---|---|---|---|
| **Covariates** | **Model I** | **Model II** | **Model I** | **Model II** | **Model I** | **Model II** | **Model I** | **Model II** |
| *Migration Status* | | | | | | | | |
| Not Migrant® | | | | | | | | |
| Rural-Urban | 1.14*** | 0.94 | 0.98 | 0.92 | 1.15*** | 0.99 | 0.90** | 1.04 |
| Urban-Urban | 0.95 | 0.99 | 0.83*** | 0.75*** | 0.86*** | 0.89* | 1.13*** | 1.05 |
| *Religion* | | | | | | | | |
| Hindu® | | | | | | | | |
| Non-Hindu | 1.10** | 0.98 | 0.96 | 1.03 | 1.03 | 0.94 | 0.71*** | 0.88*** |
| *Caste* | | | | | | | | |
| SC & ST® | | | | | | | | |
| OBC | 0.82*** | 0.82*** | 1.03 | 1.05 | 0.95 | 1.01 | 0.98 | 1.02 |
| Others | 0.64*** | 0.79*** | 0.87** | 0.91 | 0.70*** | 0.93 | 1.25*** | 1.09 |
| *Age of Mother* | | | | | | | | |
| 15-24® | | | | | | | | |
| 25-34 | 0.70*** | 0.88** | 0.78*** | 0.86** | 0.74*** | 0.96 | 2.04*** | 1.76*** |
| 35+ | 0.62*** | 0.81** | 0.73*** | 0.85 | 0.61*** | 0.80** | 2.07*** | 1.78*** |
| *Mother's Work Status* | | | | | | | | |
| Not working® | | | | | | | | |
| Working | 1.12** | 1.04 | 1.07 | 1.07 | 1.18*** | 1.14** | 1.09** | 1.15** |
| *Mass Media Exposure* | | | | | | | | |
| No exposure® | | | | | | | | |
| Have exposure | 0.54*** | 0.86** | 0.96 | 1.18* | 0.60*** | 0.95 | 2.60*** | 1.50*** |
| *Birth order* | | | | | | | | |
| 1® | | | | | | | | |
| 2 | 1.49*** | 1.37*** | 1.09 | 1.01 | 1.25*** | 1.12* | 0.69*** | 0.71*** |
| 3+ | 2.04*** | 1.45*** | 1.29*** | 1.10 | 1.79*** | 1.22*** | 0.39*** | 0.53*** |
| *Region* | | | | | | | | |
| North® | | | | | | | | |
| North-East | 0.77*** | 0.68*** | 0.72*** | 0.60*** | 0.66*** | 0.58*** | 0.59*** | 0.57*** |
| East | 0.91 | 0.68*** | 1.33*** | 1.12 | 1.26*** | 0.98 | 0.84*** | 1.03 |
| West | 1.25*** | 1.20** | 1.03 | 0.93 | 1.35*** | 1.23** | 0.98 | 1.02 |
| Central | 1.22*** | 1.15* | 1.25*** | 1.22** | 1.40*** | 1.35*** | 0.72*** | 0.70*** |
| South | 0.82*** | 0.72*** | 0.92 | 0.87 | 0.90 | 0.80** | 0.98 | 1.00 |
| *Mother's education* | | | | | | | | |
| No education® | | | | | | | | |
| Secondary | | 0.79*** | | 0.96 | | 0.76*** | | 1.71*** |
| Higher | | 0.49*** | | 0.76** | | 0.45*** | | 1.89*** |
| *Wealth Index* | | | | | | | | |
| Poorest® | | | | | | | | |
| Poorer | | 0.88 | | 0.67** | | 0.72** | | 1.06 |
| Middle | | 0.73** | | 0.66*** | | 0.62*** | | 1.33** |
| Richer | | 0.56*** | | 0.58*** | | 0.46*** | | 1.62*** |
| Richest | | 0.32*** | | 0.49*** | | 0.27*** | | 2.18*** |

*Notes: *p<0.1, **p<0.05, ***p<0.01,* ®Reference category.

*Data Source*: National Family Health Survey, 2005-06.

We have run regression by taking the migration related variable as a sole predictor and children of rural to urban migrants were found significantly more likely to be deprived in terms of stunting, wasting and underweight and immunization. But significant effect of migration disappears after introducing background variables especially the wealth quintiles and education. That means migration affects the child health through the socioeconomic factors as most of the migrants are from poor socioeconomic backgrounds.

**Discussion and Conclusion**

The main aim of the study was to assess nutrition and immunization status of migrants in comparison to non-migrant urban residents in India. We found a glaring gap between migrants and non-migrants in these two indicators with migrants from rural area being the deprived groups. A large proportion of children of rural-urban migrant mothers are stunted and underweight against urban migrants and natives. This result is supported by the multivariate results which show children of rural-urban migrants are significantly more likely to be stunted and underweight than their counterparts. Undernutrition has high correlation with child mortality. The finding of this study goes in the same line of the studies on migration and child mortality which shows very low survival of children of rural -urban migrants in developing countries (Brockerhoff, 1990; Keshri & Bhagat, 2011; Tam, 1994). Most rural–urban migrants initially settle in poor neighbourhoods, which are characterized by lack of adequate sanitation and clean water, poor housing and overcrowding, and lack of access to modern health services may have an impact on nutrition of children (Aaby 1992; Crompton & Savioli, 1993; Todaro, 1996; Woldemicael, 2000).

The migrants living a substandard life at urban areas are less likely to provide adequate quantity of diet to their children. This has been reflected in the study as we found the migrants (both from rural and urban areas) with low standard of living have very high proportions of stunted and underweight children as compared to non-migrants in urban India. Education of parents is a key to child nutrition (Chauhan & Singh, 2012) as good education leads to better employment and way of life. Our results are also consistent with this study. However, by migration status there is marginal differences among women with no education. In the eastern and central region where undernutrition is widely prevalent as we found a very high proportion of rural-urban migrants' children are stunted and underweight.

Immunization is an 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 suggest that there is a large difference in full immunization proportion of children of rural to urban migrants and urban natives and but urban to urban migrants are found to be more immunized than others. 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. Low immunization rate among rural-urban migrants can be attributed to regular shifting of residence in the urban areas. In an unknown area, they always take time to find the curative child care services like immunization. Moreover, a regular movement leads the chance of obtaining and losing the immunization card which creates a problem in vaccination. For instance, in present study around one third of the rural to urban migrants don't have an immunization card in comparison to one-fifth of the non-migrants. Multivariate analyses show economic status, age of the mother, education, caste and mass media exposure are positively associated with immunization. With increase in birth order the children are less likely to be immunized. The odds of North-east children getting immunized are very low than north region. Thus, children of rural-urban migrants are in precarious condition in terms of immunization and nutrition. Therefore, a special attention to children of rural-urban migrants is required by policy makers.

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