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Using data from the third round of National Family Health Survey (NFHS, 2005-06), the present study examined the effect of quality of housing on the risk of anthropometric failure and child health status among migrant and non-migrant children in urban India. It is very urgent to from the policy and program perspective to understand whether source of safe drinking water, type of toilet facilities, and type of housing and cooking fuel really make a difference when it comes to the health and nutritional status of Indian children, particularly the urban poor. The main findings from the present studies indicate the poor nutritional and health status of migrant and non-migrant children in urban India. There were also large interstate disparities in anthropometric failures and ARI & diarrhea among migrant and non-migrant children across various Indian states. Result from the multivariate analysis suggest that poor source of sanitation facilities and poor quality of housing significantly raised the risk of stunting and diarrhea, whereas use of safe cooking fuel reduces the likelihood of ARI among children in urban India. However, we do not find any significant effect of quality of housing on the risk of underweight and wasting. Furthermore, few of the findings from the analysis appear in opposite directions that should be interpreted with caution which might be possible due to small sample size in few categories. Therefore, we need further in-depth research at micro-level to explore the plausible mechanism of how does housing quality influence child health and nutritional status in urban India.

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Raj Narayan & Aditya Singh

Raj Narayan
Doctoral Fellow
International Institute for Population Science, Mumbai
Email: rajiips2008@gmail.com

Aditya Singh
PhD Candidate
University of Portsmouth, UK
Email: aadigeog@gmail.com

Address for correspondence:
Aditya Singh
School of Health Sciences and Social Work,
University of Portsmouth,
0.302, James Watson West,
2 King Richard 1st Road,
Portsmouth
PO1 2FR
Email: Aditya.Singh@port.ac.uk

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Background

Urbanization is defined as the process of development where rural to urban migration is responsible for urbanization (Islam and Azad, 2008; Afsar, 2000). People are migrating from rural areas to urban area due to unequal infrastructure between rural and urban areas, searching job opportunity, pursuing education, treatment or others purpose. However rural- urban migrants are increasing their income through job opportunity. The implications of rural-urban migration for socio-economic development are of longstanding interest to social scientists. There is a little work has looked at the effect of migration on child health of the most vulnerable members of the migrants' family. Apart from socio-economic development, rural-urban migrants have positive and negative impacts on biological and demographical characteristics of human beings such as fertility, mortality, morbidity, immunization, malnutrition, diseases, health, demographic and genetic structure etc. (Bogin and Mac Van, 1981). Though, health care is of a higher standard in urban place compare to rural place.

The recent population projections by United Nations indicate that by 2030 each major region in the developing world will house more urban than rural dwellers. Furthermore, by 2050 nearly two-third of population in developing countries will live in urban areas (Montgomery, 2008). The total urban population in developing world was estimated around 1.97 billion in 2000, which is likely to increase up to 3.90 billion in 2030 and finally reach a figure of 5.26 billion by 2050 as per United Nations population projection. Under the process of rapid urbanization and modernization, one of the key challenges of recent times relates to the provision of basic infrastructural facilities to urban dwellers and improving their well-being and quality of life (Sclar et al, 2005). It was for the first time in the history of human population that more than 50 percent of population now lives in cities. According to the recent United Nations estimates, the world urban population is growing annually at the rate of 1.8 percent and is likely to outpace the overall world population growth rate of 1 percent (United Nations, 2005).

However, the matter of concern relates to the fact that more than one third of current 3 billion urban dwellers live in slums or places characterized by poor structural housing conditions, deficient access to safe drinking water and sanitation, and severe overcrowding. More importantly, all these myriad factors have direct bearing upon the physical and psychological well-being of the urban population. Very often, owing to sub-standard living conditions in urban slums and shanty towns, the urban dwellers are subject to morbidities and mortality from various communicable and non-communicable health hazards and diseases. Due to inadequate provision of water and sanitation facilities, more than half of population in developing countries suffers from diarrheal and warm infections (WHO, 1999). Owing to higher level of overcrowding in urban areas, poor urban dwellers become more vulnerable to contracting various communicable diseases such as tuberculosis, acute respiratory infections and meningitis. The risk of contracting such communicable disease among urban slum dwellers is further perpetuated due to poor nutritional status and inappropriate intake of food. Furthermore, inadequate provision of drainage and sanitation facilities leads to the risk of several vector borne diseases like malaria, dengue and yellow fever etc (UN-HABITAT, 2003).

The theoretical explanation of the urban advantage has been substantiated by a number of Studies attesting that rural children stand greater risk of being malnourished or sick, or of dying, than their counterparts in urban settings. In fact, following maternal education, the type of place of residence (rural versus urban) is one of the socioeconomic covariates most frequently used in studies of child nutrition and survival in the developing world (Sastry, 1997). However, the urban advantage particularly in child health 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.

Traditional theories tend to highlight contextual and compositional explanations of differences in health by location of residence (Kawachi et al., 2002). In the former, variations in health outcomes or status arise from differences in urban or rural settings per se, and the very characteristics of cities as compared to rural areas are seen as major determinants of health experiences of individuals living in these areas. In the compositional perspective, explanations are sought in terms of differences in cultural and socio-demographic characteristics between urban and rural dwellers (Diez-Roux, 2001; Senior et al., 2000; Duncan et al., 1998; Kawachi et al., 2002). Indeed, urban and rural populations differ in respect to level of literacy, educational status, income per head, and in other respects that have an important bearing upon health (Sastry, 1997; Lalou and Legrand, 1997; Kuate, 1996).

Though previous studies in the context of developing countries have examined the health status and health seeking behavior among urban population in general (Agrawal et al, 2007). However, there is a dearth of study that specifically examine the impact of migration and living condition on child health i.e. availability of basic housing amenities like quality of housing, safe drinking water and sanitation on the health and nutritional status of children living in urban areas in developing countries in general and Indian context in particular. Therefore, the main objective of the present study is to examine the relationship between migration and the availability of housing amenities and health and nutritional status of Indian children in urban India using nationally representative cross-sectional data set.

Data & Methods

This study used cross-sectional data from third round of National Family Health Survey (NFHS) conducted in 2005-06. NFHS is a nationally representative, large scale, multi-round survey in a representative sample of households throughout India. The principal objective of NFHS is to provide state and national level estimates on fertility, mortality, family planning, HIV-related knowledge, and on important aspects of nutrition, health and health care. The survey provides state and national level estimates of demographic and health parameters as well as data on various socioeconomic and program dimensions, which are critical for bringing in the desired changes in demographic and health parameters.

The survey adopted a two-stage sample design in most rural areas and a three-stage sample design in most urban areas. In rural areas, the villages were selected at the first stage by using Probability Proportional to Size (PPS) sampling scheme. The required number of households was selected at the second stage using systematic sampling. In urban areas, blocks were selected at the first stage, census enumeration blocks (CEB) containing approximately 150-200 households were selected at the second stage, and the required number of households were selected at the third stage using systematic sampling technique (For details regarding sampling, see IIPS & ORC Macro 2007). NFHS provide sufficiently large sample sizes to carry out the analysis at the national as well as the state level. The data were collected using household and individual interview schedule.

In the interviewed households, individual interviews were completed with 124,385 women out of 131,596 who stayed in the household the night before the household interview. The individual response rate, i.e., the number of completed interviews per 100 eligible women identified in the households, was 95 percent for the country as a whole (93 percent in urban areas and 96 percent in rural areas). The response rate for eligible women varied from 90 percent in Maharashtra and

Meghalaya to 99 percent in Madhya Pradesh and Chhattisgarh. Individual interviews were completed with 74,369 eligible men out of 85,373 who stayed in the household the night before the household interview. The response rate for eligible men was 87 percent for the country as a whole (85 percent in urban areas and 90 percent in rural areas). The response rate for eligible men varied from 76 percent in Delhi to 98 percent in Madhya Pradesh.

To make the estimates representative and to account for the multi-stage sampling design adopted, we used appropriate weights in the analysis. The details of the sampling weights are given in NFHS reports of the various rounds (IIPS & ORC Macro, 2007). The present analysis is restricted 19,483 children below five years of age living in urban India during 2005-06. The kids file has been used to conduct the analysis. Access to basic amenities, such as proper housing, safe drinking water and sanitation, and clean cooking fuel, is not only an important measure of the socioeconomic status of the household but is also fundamental to the health of its members. NFHS-3 provides information on several household characteristics that affect living conditions.

Outcome variables

Migration status, migration is not focus in NFHS-III. However all eligible women and men were asked the following two questions *How long have you been living continuously in (name of the current place of residence)"* and *"just before you moved here, did you live in a city, in a town, or in the countryside".* In the present study information collected through these two questions is used to determine the status of a respondent as migrants or non-migrants as well as duration of stay of a migrant at the place of enumeration and the residential status (rural/urban) of previous place of a migrant. The first question provides the status of a person as non-migrants or migrants as well as their duration of residence at the place of enumeration. Person staying 'always' is a 'non-migrant'. All those who did not live 'always' at the place of enumeration are considered as 'migrant' at the place of enumeration. This also provides the timing of migration of a person at the place of enumeration. There is also a category of 'visitor' at the place of enumeration. Visitor is excluded from the analysis. The second question provides an idea of the type of place from where a person has migrated i.e. whether a person has migrated from rural area or urban area.

The main outcome variables related to health status of children are-*diarrhea* and *acute respiratory infections* (*ARI*). Anthropometric measures of *weight-for-age* (underweight), *height-for-age* (stunting) and *weight-for-height* (wasting) following recent WHO standards are used to assess the nutritional status of children.

To assess nutritional status, NFHS-3 included an anthropometric component, in which all children under five years of age were weighed and measured. Every interviewing team included two health investigators who conducted the anthropometric measurements. Each health investigator carried a scale and a measuring board. The scale was a solar-powered electronic SECA scale with a digital screen designed and manufactured under the guidance of the United Nations Children's Fund (UNICEF). The measuring board was specially designed by Shorr Productions for use in survey settings. Children younger than 24 months were measured lying down on the board (recumbent length); older children were measured while standing.

Evaluation of nutritional status is based on the rationale that in a well-nourished population, there is a statistically predictable distribution of children of a given age with respect to height and weight. In any large population, there is variation in height and weight; this variation approximates a normal distribution. Use of a standard reference population as a point of comparison facilitates the examination of differences in the anthropometric status of subgroups in

a population and of changes in nutritional status over time. The use of a reference population is based on the empirical finding that well-nourished children in all population groups for which data exist follow very similar growth patterns before puberty. Until 2006 the most commonly used reference population, which was used in NFHS-1 and NFHS-2, was the U.S. National Center for Health Statistics (NCHS) standard, which was recommended at that time by the World Health Organization (Dibley et al., 1987a; 1987b). NFHS estimates based on a new international reference population released by WHO in April 2006 (WHO Multicenter Growth Reference Study Group, 2006) and accepted by the Government of India. However, to facilitate the analysis of changes in nutritional status over time, nutritional status in NFHS-2 has also been recalculated using the new WHO standard.
The new WHO growth standard adopts a prescriptive approach, describing how healthy children should grow. The new standard is based on children around the world (Brazil, Ghana, India, Norway, Oman, and the United States) who are raised in healthy environments, whose mothers do not smoke, and who are fed with recommended feeding practices (exclusive breastfeeding for the first 6 months and appropriate complementary feeding from 6 to 23 months). The WHO growth standard identifies breastfed child as the normative model for growth and development standards, depicts normal early childhood growth under optimal environmental conditions, and can be used to assess children regardless of ethnicity, socioeconomic status, and type of feeding.

In the NFHS-3 discusses the prevalence and treatment of acute respiratory infection, fever, and diarrhoea. Mothers of children born during the five years preceding the survey were asked if their children had suffered from cough, fever, or diarrhea during the two weeks preceding the survey, and if so, the type of treatment given. Accuracy of all these measures is affected by the reliability of the mother's recall of when the disease episode occurred. The two-week recall period is thought to be most suitable for ensuring that there will be an adequate number of cases to analyze and that recall errors will not be too serious. It should be noted that the morbidity data collected are based on mothers' perceptions of illness without validation by medical personnel.

Acute respiratory infection (ARI) is one of the leading causes of childhood morbidity and mortality throughout the world. Early diagnosis and treatment with antibiotics can prevent a large proportion of deaths caused by ARI. In NFHS-3, the prevalence of ARI was estimated by asking mothers whether their children under age five years had been ill with a cough accompanied by short, rapid breathing which was chest related in the two weeks preceding the survey. These symptoms are compatible with ARI.

Exposure variables

We have used a set of theoretically pertinent set of socioeconomic and demographic variables that have been associated with the child health and nutritional status. I have used mainly four exposure variables to examine the association between migration, basic housing amenities and child health and nutritional status in urban India. These includes source of drinking water (categorized as unsafe, piped water inside dwelling, safe water outside dwelling); source of toilet facility (categorized as safe vs. unsafe); type of house (kuccha, semi-pucca and pucca); type of cooking fuel (unsafe vs. safe). We have also controlled various child level, mother level and household level confounding variables that might lead to spurious association between the outcome and set of exposure variables. Major confounding variables controlled in the multivariate analysis includes: age, sex, birth order, family size, birth weight, birth size, and breastfeeding status of the child; mother's age, height, education and exposure to mass media; household’s wealth index, religion and caste.

Methods

This study used the univariate and bivariate analysis to look at the sample profile of the study population and socioeconomic and demographic differentials in various child health and nutritional status indicators. Logistic regression models have been used, since the nature of the dependent variable is binary, to understand the adjusted effect of main exposure variables on outcome variables. We present the result of regression analysis in terms of adjusted odds ratios.

Results and Discussion

The basic sample profile of the study population is presented in table 1. This indicates that 44 percent, 39 percent and 42 percent, 51 percent urban to urban and rural to urban migrant children (0-59 months) had access to pipe water and outside safe drinking water within their dwellings. 48 percent and 37 percent migrant’s children were fortunate to have access to safe toilet facilities in urban India but percentage of non migrant for accessing safe toilet is lower as compare to migrant children. However, majority of rural to urban children (61 percent) were residing in Kuccha houses, though urban to urban migrant children (48 percent) were living in Pucca house. Percentage of non- nuclear families of migrant children is higher than migrant children. Near about half of the urban to urban migrant children were livings in households with safe cooking fuel. Around 41 percent migrant and 19 percent of non-migrant of my sample consist of male children with nearly 47 percent (urban to urban) and 32 percent (rural to urban) who had low birth weight (<2.5 kg). Proportions of small size at birth were urban to urban (39 percent) and rural to urban (44 percent). Urban to urban (44 percent) and rural to urban (35 percent) migrants had less than three siblings in the household. Urban to urban (46 percent) and rural to urban (37 percent) mothers belonged to 25-34 age groups. Nearly 30 percent (urban to urban) and 59 percent (rural to urban) children belonged to mothers with no education. However, the exposure to mass-media has been contained among urban to urban (49 percent) and rural to urban (26 percent) mothers. Nearly 30 percent of our sample children belonged to poorest to middle wealth quintile households. Majority of sample rural to urban children belonged to Hindu religion followed by Muslims and others. Nearly 46 percent (rural to urban) of sample children belonged to ‘schedule caste and schedule tribe’ followed by 41 percent ‘other backward class’ and 37 percent ‘others’

Table 2 presents state level differentials in the prevalence of anthropometric failure (stunting, underweight and wasting) and health status (diarrhea and ARI) among migrant and non-migrant children in urban India. Result suggests that, in urban India, nearly 35 percent migrant and 34 percent non-migrant children were suffering from stunting (chronic under nutrition), 39 percent & 38 percent non-migrant children were suffering from underweight and 15 percent migrant & 17 percent non-migrant children were wasted (acute under nutrition). On the other hand, nearly 8 percent migrant & 6 percent non-migrant of children were suffering from diarrhea and 9 percent migrant and 8 percent non-migrant had ARI. This clearly indicates the poor story of health and nutritional status among migrant and non-migrant children in urban India.

However, there also exist stark inter-state disparities in the prevalence of anthropometric failure and disease outcomes among migrant and non-migrant children across Indian states in urban areas. States from the northern, central and eastern part of India reported higher proportion of anthropometric failures and disease outcomes among migrant and non-migrant children than their counterparts in the western and southern part of India. For instance, stunting among migrant and non- migrant children was relatively higher in states like Meghalaya, Uttar Pradesh, Bihar, Haryana, Orissa, Madhya Pradesh, Assam, Gujarat, Maharashtra, Chhattisgarh, etc. Surprisingly, states like Karnataka and Delhi with relatively better economic indicators fared poor in nutritional indicators for urban children. I also note parallel inter-state disparities in the prevalence of diarrhea and ARI among migrant and non-migrant children in urban India.

Table 3 displays percentage distribution of anthropometric failure and child health status among migrant and non-migrants children by selected household, demographic and socioeconomic characteristics in urban India. Result indicates that there were not much difference household, demographic and socioeconomic variations in the prevalence of anthropometric failure and child health status among migrant and non-migrant children in urban India. But higher percentage of children were suffering from stunting, wasting and underweight along poor health status like diarrhea and ARI who had access to only unsafe toilet facilities compared to their counterparts in both categories. Similarly, result indicate that migrant and non-migrant children who where residing in household where cooking fuel was used, more proportion were suffering from various anthropometric failure and poor health outcomes. Type of housing also suggests that migrant and non-migrant children living in kuccha or semi pucca housing were more prone to suffer from poor anthropometric and health outcomes than their counterparts living in the pucca households. However, we do find any consistent pattern with the source of drinking water facility and various anthropometric failure and child health status. Rather the result comes in the opposite direction than the customary understanding suggests. I also found sharp variations among migrant and non-migrants children in the prevalence of anthropometric failure and child health status according to the mother's age of child, birth weight of child, birth size, family size, mother education, religion and caste groups etc in urban India.

Multivariate Analysis

This study has been fitted five logistic regression models to examine the association between anthropometric failure (stunting, underweight and wasting) and child health status (ARI & diarrhea) with migration status and quality of housing measured by access to safe drinking water, type of toilet facility, type of house and cooking fuel used after adjusting for various demographic and socioeconomic characteristics. I present the results of the logistic regression models in terms of adjusted odds ratio. In the first model, result suggest that after adjusting for various demographic and socioeconomic confounders, children who use piped water inside/ward/plot were (OR=1.37, 95%, CI=1.41-1.64, p<0.01) (OR=1.41, 95%, CI=1.16-1.70, p<0.01) more likely to be stunted than their counterparts in urban India respectively. The effect of type of house, household structure and coking fuel on stunting is weak and goes parallel to the expected direction. The result did not find any significant effect of migration status on stunting among children in urban India, but the outcome is in the expected direction. In the second model, results indicates that rural to urban migration were 18 percent more likely at 10% percent level of significant by underweight than urban non- migrants. Type of house (pucca) were less likely (OR=0.57, 95% CI=0.45 - 0.71, p<0.01) as compare to Kuccaha house. Household structure (non-nuclear family) were less likely at 5% percent level of significant to be underweight than nuclear family and cooking fuel (OR=0.89, 95% CI=0.82-0.96, p<0.05) significant on underweight. However source of drinking water and toilet facility had no significant effect on underweight.

In the third model, it were examined the effect of migration and housing qualities on wasting after adjusting for various demographic and socioeconomic characteristics. Results indicate migration from urban to urban 29 percent were significantly less likely effect on wasting compare to urban non migrants. Semi-pucca and Pucca house (OR=0.60, 95% CI= 0.46-0.78, p<0.01 & OR=0.63, 95% CI=0.49-0.82, p<0.01) were less likely effect on wasting. Cooking flue were 21 percent were less likely (at p<0.01) significant effect on wasting among children in urban India. even if, sources of drinking water, source of toilet facility and household structure had no any significant effect on wasting among children in urban India. In the forth model, I test the effect of migration and housing amenities on acute respiratory infections (ARI) among children in urban India, after adjusting for pertinent demographic and socioeconomic confounders. Result indicates that tube-well/bore well as a source of drinking water were 2.07 time more likely at 1% level of significant, to suffer from ARI than it counterparts. However migration status, source of toilet facility, type of house, household structure and cooking fuel did not come significant but the result come in the positive direction. In the fifth model, I examined the risk of diarrhea among children in urban India, after adjusting for various demographic and socioeconomic confounding characteristics. Result suggests urban to urban migration (OR=1.33, 95%, CI=1.08-1.63, p<0.1) and rural to urban migration (OR=1.40, 95%, CI=1.14-172, p<0.01) were more likely on risk of diarrhea compare to urban non-migrants. Household structure non nuclear family were more likely (OR=1.19, 95% CI=1.05-1.35, p<0.1) on risk of diarrhea as compare to nuclear family. Source of drinking water, source of water facilities, type of house and cooking fuel were not associated with risk of diarrhea among children in urban India. However, surprisingly I found that children who had access to water from piped water inside/yard/plot were more likely to suffer from diarrhea than their counterparts but it is not significant. This finding may be of very small sample size in the category of unsafe drinking water.

Discussion

Children in urban to urban migrant household are less prone to being wasted compared to those belonging to non-migrant households. Urban to urban migrants are mostly the households looking for better opportunities. They are often better off than others. In terms of safe water, improved sanitation, clean cooking fuel and pucca housing, they are better off than non-migrants. Such an environment provides their children immunity from recurrent episodes of diseases such as diarrhea and acute respiratory infections. This advantage is further reflected in the form of less stunted children among urban to urban migrants. On the other hand, we find that children of households that migrated from rural to urban areas have significantly higher risk of being under weight. To survive in the city, migrants must work hard and endure harsh living and working conditions. Evidence from a number of countries suggests that in pursuit of a better life, they often end up sacrificing their own health and that of their children (Garnier et al., 2003; Batbaatar et al. 2005).

People in urban areas, especially if they are migrants, often have no choice left but to drink water from contaminated sources (Basu 2013). It has been recently found that microbial contamination in municipal corporation's supplies of piped water could be due to mainly two reasons. First, the municipal authorities are unable to treat the increasing load of the municipal sewage due to which it may end up contaminating water bodies. Second, the receiving water bodies may themselves not have adequate water available for dilution (UNICEF 2013). Water quality may have many indirect effects on nutrition through increased risk of diarrhea. Recent studies have revealed that about a quarter of stunting can be attributed to the occurrence of five or more episodes of diarrhea before the age of two. Similarly, the World Health Organization (WHO) estimates that 50% of malnutrition is associated with repeated diarrhoea or intestinal worm infections as a result of unsafe water, inadequate sanitation or insufficient hygiene (WHO 2008).

One reason why children using water from bore hole or tube well are more likely to suffer from ARI compared to those who use water from unsafe sources (mostly surface water) is that bore holes and tube wells in urban areas are often very deep and may contain significant amount of arsenic (UNEP 2013). Arsenic is known to exacerbate respiratory infections. However, we could not find any study in for urban India showing how much water from urban bore wells and tube wells is contaminated with arsenic and to what extent it affects the prevalence of ARI among children.

Type of house emerge as significant variable associated with all three indicators of malnutrition. Type of house in urban areas is an indicator of economic prosperity of a household. It is a significant indicator of food insecurity of the household (Balk et al., 2005; Bloss, Wainaina et al., 2004). Food insecurity could lead to maternal malnutrition and inadequate child nutrition early in life. Kachcha houses have mud floors that promote the occurrence and development of pathogenic microorganisms, exacerbating infection and thereby prevalence of malnutrition in children. A study shows that earthen floors allow the persistence of soil transmitted helminths such as A. lumbricoides' eggs for periods of months and up to 15 years after being excreted from the feces of infected children (Dold and Holland 2011). The results of our study in this regard are similar to many other studies (Gutierrez-Jimenez et al. 2013; Grace et al. 2013).

Cooking fuel also affects childhood malnutrition in many ways. Smoke from unsafe fuels such as coal, charcoal, wood etc. contain a large number of harmful pollutants that can have adverse consequences for health of a child in the form of anemia, acute respiratory infections, and immunodeficiency disorders. Particulate matter and Polycyclicaromatic Hydrocarbons (PAHs) cause intrauterine growth retardation (IUGR), which causes low birth weight among babies. Low birth weight is associated with diarrhea and acute respiratory infections. Repeated episodes of these two disease cause impaired early childhood skeletal growth. Using cleaner fuels save children from such harmful effects of household kitchen smoke. The results of our study are in line with many previous studies.

It is often argued that the children who belong to a non-nuclear family are healthier than those who belong to nuclear families [McLanahan & Booth, 1989; Dawson, 1991; McLanahan & Sandefur, 1994; Gage 1997]. In this study too, children belonging to nuclear households have higher odds of being undernourished and suffering from diarrhea than children belonging to non-nuclear households. The findings are in line with a recent study in India (Kumar and Ram 2013). This could possibly be due to the fact that mothers in nuclear families often have to work to avoid financial difficulties and do not have enough time for proper child care [McLanahan & Sandefur, 1994]. On the contrary, in the extended families, many adult caregivers are available for a child when parents are engaged in some other activities (Griffiths et al. 2002). The presence of extended household members could compensate for income deficits by providing material assistance such as transport and child care, which may affect the nutrition status of children (Moss & Carver, 1992). In the absence of any additional caretaker, mothers in nuclear families have to carry their children to the hazardous sites such as cooking, washing and disposal of garbage and outside work. To minimize the exposure to such hazardous conditions, municipal bodies may promote subsidized crèches at a relatively safer place and motivate parents to send their children during day hours. In 2011, the Government of India through budgetary allocation has increased subsides significantly to run crèches (GOI 2006). Scaling up such simple interventions could overcome some very common obstacles to increasing child survival in urban India and help provide every child a fair chance to live, grow and thrive.

Conclusion

Using data from the third round of National Family Health Survey (NFHS, 2005-06), the present study examined the effect of quality of housing on the risk of anthropometric failure and child health status among migrant and non-migrant children in urban India. It is very urgent to from the policy and program perspective to understand whether source of safe drinking water, type of toilet facilities, and type of housing and cooking fuel really make a difference when it comes to the health and nutritional status of Indian children, particularly the urban poor.

The main findings from the present studies indicate the poor nutritional and health status of migrant and non-migrant children in urban India. There were also large interstate disparities in anthropometric failures and ARI & diarrhea among migrant and non-migrant children across various Indian states. Result from the multivariate analysis suggest that poor source of sanitation facilities and poor quality of housing significantly raised the risk of stunting and diarrhea, whereas use of safe cooking fuel reduces the likelihood of ARI among children in urban India. However, we do not find any significant effect of quality of housing on the risk of underweight and wasting. Furthermore, few of the findings from the analysis appear in opposite directions that should be interpreted with caution which might be possible due to small sample size in few categories. Therefore, we need further in-depth research at micro-level to explore the plausible mechanism of how does housing quality influence child health and nutritional status in urban India.

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Table 1 (on next page)

Percent distribution of migrant children according to selected household, demographic and socioeconomic characteristics

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Table1 Percent distribution of migrant children according to selected household, demographic and socioeconomic characteristics, Urban India, 2005-06

Variables	Non migrants	Migrants		Total
		Urban-Urban	Rural-Urban	
Source of drinking water				
Unsafe	41.3	11.8	9.2	30.6
Piped water	34.4	63.0	60.6	43.8
Outside safe water	24.3	25.2	30.3	25.5
Source of toilet facility				
Unsafe	34.9	78.0	54.9	45.6
Safe	65.1	22.0	45.1	54.4
Type of house				
Kuccha	25.4	5.8	10.9	19.1
Semi-pucca	63.2	30.0	42.0	53.2
Pucca	11.4	64.2	47.1	27.6
Household Structure				
Nuclear	75.8	70.5	64.3	72.6
Non-Nuclear	24.2	29.5	35.7	27.4
Cooking fuel				
Unsafe	92.4	43.3	66.9	79.7
Safe	7.6	56.7	33.1	20.3
Sex of child				
Male	51.3	53.5	55.2	52.4
Female	48.7	46.5	44.8	47.6
Birth weight (in kilograms)				
$<$2.5kg	83.6	92.1	72.5	83.5
$\geq$2.5kg	16.4	7.9	27.5	16.5
Size of child at birth				
Small	20.7	13.6	16.4	18.8
Average	56.1	60.0	55.7	56.7
Large	23.1	26.4	27.9	24.5
Birth order				
One	4.7	11.0	10.5	6.8
Two	15.7	23.6	18.9	17.5
Three	15.5	27.6	21.0	18.4
More than three	64.2	37.8	49.7	57.2
Living children in household				
Less than 3	16.2	25.2	23.2	19.0
More than 3	83.8	74.8	76.8	81.0
Age of mother				
15-24	36.1	55.5	50.0	41.8
25-34	50.0	38.3	43.7	46.9
35 & Above	13.9	6.3	6.3	11.3

Mother's education				
No education	48.3	35.4	55.9	47.6
Primary	19.2	19.7	17.5	19.0
Secondary	31.3	36.2	24.5	30.9
Higher	1.2	8.7	2.1	2.6
Mother’s exposure to mass media				
No	82.0	85.0	92.3	84.4
Yes	18.0	15.0	7.7	15.6
Religion				
Hindu	27.7	62.2	59.4	39.1
Muslim	14.5	19.7	28.7	17.9
Christian	52.5	9.4	10.5	37.9
Other religious groups	5.3	8.7	1.4	5.1
Caste				
Schedule Caste	9.0	16.7	14.7	11.3
Schedule Tribe	53.4	20.6	16.9	41.3
Other Backward Class	23.4	28.6	32.4	25.9
Others	14.3	34.1	36.0	21.5
Total	491	126	136	753

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Table 2(on next page)

State-wise differentials in prevalence of anthropometric failure (stunting, underweight & wasting) and morbidities (ARI & diarrhea) among migrant and non-migrant children

Table 2: State-wise differentials in prevalence of anthropometric failure (stunting, underweight & wasting) and morbidities (ARI & diarrhea) among migrant and non-migrant children, Urban India, 2005-06

State	Stunting Non Migrants	Stunting Migrants	Underweight Non Migrants	Underweight Migrants	Wasting Non Migrants	Wasting Migrants	ARI Non Migrants	ARI Migrants	Diarrhea Non Migrants	Diarrhea Migrants
India	**33.9**	**35.2**	**37.8**	**39.1**	**17.1**	**14.9**	**6.4**	**7.9**	**7.7**	**9**
North										
Jammu& Kashmir	21.2	27.3	18.2	24.2	6.1	12.1	11.1	7.1	4.5	2.6
Himachal Pradesh	0	23.5	33.3	29.4	33.3	11.8	0	5	0	5.3
Punjab	11.1	31.2	22.2	24.3	5.6	6.7	16.7	7.8	4.5	7.6
Uttaranchal	25	23.9	25	30.6	12.5	12.5	12.5	5.7	12.5	13.1
Haryana	33.3	34.2	55.6	39.9	22.2	13.5	0	0.9	22.2	6.5
Delhi	29.4	39.1	34.6	33.2	15.7	14	8.6	8.2	10.4	6.9

Rajasthan	25	31.2	44.1	41	20.6	20.8	6.9	13.9	13.6	14.9
Central										
Chhattisgarh	25	35.1	33.3	37.7	12.5	14.3	0	10.2	0	8.4
Madhya Pradesh	32.2	39.8	48.9	56.7	31.5	29.5	4	5.2	13	15.3
Uttar Pradesh	48	44.3	41.2	39.9	8.1	11	7.1	8.9	9.2	7.8
East										
Bihar	41.5	43.2	56.1	54.5	34.1	24.2	9.1	6.9	13.7	11.9
Jharkhand	26.9	29.3	52	42	28	22.2	7.7	5.2	11.8	8.9
Orissa	32.3	34.3	37.5	36.3	22.6	11	11.4	10.8	15.2	9.4
West Bengal	24.1	24.3	29.3	32.7	17.1	13.1	16.8	15.4	4.1	5.2
North east										
Arunachal Pradesh	50	36.4	50	27.3	0	8.3	0	20	33.3	15.4

Assam	38.9	31.7	27.8	33.7	11.1	13.7	12	10.8	14.3	7.3
Manipur	26.7	23.1	26.7	23.1	6.7	7.7	6.3	6.7	11.8	13.3
Meghalaya	46.2	66.7	46.2	50	30.8	0	0	0	4.8	0
Mizoram	27.3	22.2	18.2	22.2	8.3	11.1	7.1	10	15.4	11.1
Nagaland	25	27.3	25	25	0	9.1	0	6.7	16.7	7.1
Sikkim	0	50	0	50	0	0	0	0	0	0
Tripura	28.6	30.8	42.9	38.5	28.6	16.7	12.5	26.7	12.5	7.1
West										
Goa	0	18.2	0	23.8	0	9.5		7.1		7.1
Gujarat	59.3	39.7	55.6	44.4	24.5	14.3	13.3	12.4	14	13.1
Maharashtra	38.9	38.4	35.7	39.1	15	11.6	6.1	6.3	5.9	7.8
South										
Andhra Pradesh	27.5	31.7	38.2	32.4	11.2	9.2	3.3	4.5	5.3	7.9
Karnataka	40.8	27.3	41.4	35.7	17.8	15.8	3.4	3.3	8.4	9.2
Kerala	26.9	15.8	29.5	19.9	16.7	8.4	9.9	7.5	9	5.7
Tamil Nadu	25.9	26	34.2	33.5	20.4	19	3.7	2.5	3.2	4.7

Table 3 (on next page)

Percentage distribution of anthropometric failure and morbidities among migrant and non migrant children (0-59 months) by selected household, demographic and socioeconomic characteristics

Table3 Percentage distribution of anthropometric failure and morbidities among migrant and non migrant children (0-59 months) by selected household, demographic and socioeconomic characteristics, Urban India, 2005-06

Variables	Stunting		Under weight		Wasting		ARI		Diarrhea	
	Non Migrants	Migrants	Non Migrants	Migrants	Non Migrants	Migrants	Non Migrants	Migrants	Non Migrants	Migrants
Source of drinking water										
Unsafe	32.8	30.9	36.5	37.1	14.0	13.9	7.9	7.0	10.7	8.2
Piped water	34.1	33.7	37.5	37.9	18.5	14.8	5.6	7.4	6.6	9.4
Outside safe water	35.4	39.6	42.3	42.3	18.2	15.6	5.7	9.1	5.9	8.4
Source of toilet facility										
Unsafe	37.8	48.2	43.5	50.7	18.2	17.6	7.6	7.7	8.4	9.9
Safe	31.3	31.2	33.7	35.5	16.6	14.1	5.4	7.9	7.2	8.7
Type of house										
Kuccha	34.8	57.5	51.4	61.6	28.6	25.2	6.0	7.6	2.4	12.6
Semi-pucca	48.8	48.8	49.2	52.4	24.4	15.2	9.3	8.4	7.0	8.5
Pucca	30.5	30.9	34.4	34.8	15.6	14.5	4.4	7.7	7.2	9.0
Household Structure										
Nuclear	36.8	38.7	40.7	41.8	18.8	15.5	6.3	7.6	6.8	8.2
Non-Nuclear	32.3	32.0	35.7	36.6	17.5	14.5	5.0	8.1	7.1	9.7
Cooking fuel										
Unsafe	37.8	43.9	43.0	48.1	17.9	17.2	7.7	8.5	8.0	9.4
Safe	28.5	27.1	30.4	30.7	16.4	12.9	4.3	7.3	7.2	8.7
Sex of child										
Male	33.9	34.5	37.7	37.7	17.4	15.1	6.2	7.6	7.4	9.5
Female	34.0	36.0	37.6	40.7	17.1	14.7	6.4	8.2	8.0	8.4
Birth weight (in kilograms)										
≥2.5kg	27.4	25.3	30.6	29.9	16.2	13.5	5.8	7.9	6.8	8.6
<2.5kg	36.9	36.9	45.1	45.8	19.2	19.9	7.0	8.0	10.0	9.5
Size of child at birth										
Small	40.5	40.6	50.8	47.7	25.2	20.5	8.4	9.0	9.5	11.0
Average	32.1	33.6	35.0	37.2	13.9	14.1	5.7	7.4	7.2	8.4
Large	32.9	33.9	34.5	36.8	18.8	12.8	6.4	8.3	7.7	9.2

Contd…										
Birth order										
One	28.0	27.0	32.5	33.2	16.1	14.5	5.8	7.0	7.5	8.2
Two	36.0	33.7	38.6	36.7	16.9	14.3	5.4	8.3	7.8	9.2
Three	33.9	40.7	40.1	43.9	19.0	16.3	7.4	8.9	8.1	9.1
More than three	49.5	49.2	51.0	50.6	21.0	15.9	9.0	7.9	6.8	10.2
Living children in household										
Less than 3	30.1	29.0	34.6	34.2	17.2	14.5	5.9	8.0	8.0	9.1
More than 3	43.9	46.0	45.7	47.5	17.5	15.8	7.2	7.6	6.7	8.9
Age of mother										
15-24	35.3	35.5	38.1	39.3	18.2	14.9	6.3	8.0	8.4	9.6
25-34	28.9	33.6	36.9	37.7	14.3	15.4	6.1	7.6	5.0	7.5
35 & Above	34.8	45.6	30.4	50.3	13.0	10.9	10.0	5.9	6.7	5.6
Mother's education										
No education	48.3	49.4	51.1	52.7	18.4	17.9	7.5	7.4	7.4	8.9
Primary	40.9	39.1	46.2	41.3	21.5	15.8	5.9	10.2	7.4	9.6
Secondary	32.8	30.5	36.6	35.3	16.8	14.1	6.2	8.1	8.8	9.6
Higher	15.1	15.2	18.2	18.9	14.0	10.1	5.4	6.0	4.2	6.7
Mother’s exposure to mass media										
No	38.2	37.8	42.1	41.5	18.6	15.2	6.3	8.0	8.3	9.2
Yes	25.0	25.8	28.7	30.2	14.6	14.0	6.2	7.4	6.4	8.3
Religion										
Hindu	33.4	34.7	37.9	39.0	16.8	15.0	5.2	7.4	7.8	8.7
Muslim	36.1	39.5	38.3	43.4	18.4	16.4	8.6	9.8	6.5	10.2
Christian	25.6	25.6	34.4	21.1	20.0	7.3	8.5	5.5	9.6	7.3
Other religious groups	41.9	27.1	32.3	26.8	16.1	10.8	8.0	7.8	9.9	10.5
Caste										
Schedule Caste	44.0	43.9	45.3	46.0	22.0	17.0	5.5	7.9	9.7	9.3
Schedule Tribe	31.6	39.1	32.6	45.3	16.8	19.5	8.3	6.5	8.6	9.3
Other Backward Class	34.2	36.1	39.3	41.2	17.1	15.8	5.5	7.9	6.8	9.8
Others	28.6	30.3	32.8	33.7	15.5	12.8	7.4	7.9	7.9	8.2

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Table 4 (on next page)

Logistic regression models showing adjusted odds ratio for anthropometric failures (stunting, underweight & wasting) and morbidities (ARI & diarrhea) among migrants children

Table4 Logistic regression models showing adjusted odds ratio for anthropometric failures (stunting, underweight & wasting) and morbidities (ARI & diarrhea) among migrants children (0-59 months), Urban India, 2005-06. ϕ

Variables	Stunting	Underweight	Wasting	ARI	Diarrhea
Migration					
Urban non-migrants	1.00	1.00	1.00	1.00	1.00
Urban-Urban®	0.97 (0.85-1.10)	0.92 (0.81-1.05)	0.71*** (0.60-0.83)	1.24 (0.95-1.63)	1.33* (1.8-1.63)
Rural-Urban	1.10 (0.96-1.25)	1.18* (1.04-1.34)	0.90 (0.77-1.05)	1.16 (0.88-1.51)	1.40*** (1.14-1.72)
Source of drinking water					
Unsafe®	1.00	1.00	1.00	1.00	1.00
Piped water inside/yard /plot	1.37*** (1.14-1.64)	1.25(1.05-1.49)	1.20 (0.94-1.52)	1.39 (0.91-2.13)	1.01 (0.77-1.33)
Tube-well/bore well	1.41*** (1.16-1.70)	1.21 (1.01-1.45)	1.15 (0.90-1.48)	2.07*** (1.34-3.18)	0.90 (0.68-1.20)
Source of toilet facility					
Safe®	1.00	1.00	1.00	1.00	1.00
Unsafe	0.77 (0.69-0.86)	0.83(0.74-0.92)	0.92 (0.80-1.06)	1.13 (0.91-1.41)	0.88 (0.74-1.05)
Type of house					
Kuccha®	1.00	1.00	1.00	1.00	1.00
Semi-pucca	0.96 (0.77-1.20)	0.82 (0.65-1.03)	0.60*** (0.46-0.78)	0.85(0.55-1.30)	0.78 (0.55-1.10)
Pucca	0.63***(0.50-0.78)	0.57*** (0.45-0.71)	0.63*** (0.49-0.820	0.74 (0.48-1.14)	0.86 (0.61-1.21)
Household Structure					
Nuclear	1.00	1.00	1.00	1.00	1.00
Non-Nuclear	0.83*** (0.77-0.90)	0.89** (0.82-0.96)	0.96 (0.86-1.07)	1.06 (0.90-1.25)	1.19*(1.05-1.35)
Cooking fuel					
Unsafe®	1.00	1.00	1.00	1.00	1.00
Safe	0.64*** (0.58-	0.62*** (0.57-	0.79*** (0.70-0.90)	0.84 (0.69-1.02)	0.94 (0.81-1.09)

	0.71)	0.68)

Note: ®: reference category

***p<0.01, **p<0.05, *p<0.1

ϕ: Results have been mutually adjusted for sex, birth order, family size, birth weight, birth size, living children, mother's age and education, exposure to mass media; religion and caste.