

Original Research Article

Interstate migration and its association with the prevalence of stunting in under-five children of the migrant families in Delhi-NCR, India: a cross-sectional study

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Received: 13 December 2023

Revised: 25 January 2024

Accepted: 27 January 2024

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ABSTRACT

Background: Interstate migration in India is increasing every year. Children of the migrant families often face poor living conditions and insufficient nutrition, as a result of various socio-economic determinants. This study aimed to understand the association between rural-to-urban migration and under-five stunting, and the various determinants involved. This study allows researchers to make pre and post pandemic comparison of stunting among migrant children in Delhi, since it was carried-out post the second wave of the COVID-19 pandemic.

Methods: A community-based cross-sectional survey was carried-out in the bhatti mines area of south Delhi, using a systemic sampling method. 100 households each of migrants and non-migrants were approached, and height of the under-five children was measured. Stunting was estimated using WHO child growth standards. Information on demography and socio-economic determinants was collected from the mothers using a questionnaire.

Results: Stunting was recorded in 62% of the migrant under-five children and 27% in the non-migrant children, with a significant difference between the two groups (p value <0.001), indicating a significant association between migration and stunting. Source of drinking water ($p<0.05$) and recurring episodes of diarrhea ($p<0.05$) were also found to be strongly associated with under-five stunting.

Conclusions: Under-five nutritional deficits lead to compromised immunity and delay in physical and mental growth and development. It is important to recognize and address the diverse needs of the under-five migrant population's health in order to avoid stunting and other serious manifestations.

Keywords: Delhi, Malnutrition, Migrant children, Stunting, Under-five

INTRODUCTION

As per the economic survey 2017, India experienced an average migration of 5-6 million people annually between 2001 and 2011, leading to an inter-state migration of approximately 60 million people in that period.^{1,2} The 2011 Census reported that 46 percent of India's urban population consists of migrants, and that 37% of inter-state migration was rural-to-urban. As per the report released by the Ministry of Statistical and Programme Implementation (MoSPI), the 'migration in India 2020-

2021', 54.5% of migrants living in the urban areas come from the rural areas. Migration was hit by the COVID-19 pandemic, with many of the migrant workers relocating to their hometowns; however, the year 2022-23 saw a growth in the interstate movement of migration workers as per the economic survey 2023.

Most of the migrant population in the cities works in the unorganized sectors of construction, domestic work, brick kilns, transportation, mines and textiles etc. Studies reveal that migrants employed in the informal sectors tend to

live in poor conditions. Lack of sufficient sources of potable water, toilet and sanitation facilities, utilization of unclean cooking fuel that leads to air pollutant exposure and lack of access to subsidized food grains, etc. can lead to complicated health outcomes such as malnutrition, anemia and chronic ailments.³⁻⁵ Migrant populations of Delhi are vulnerable to socio-developmental inequities such as lack of access to toilet facility and housing facilities.⁶ Studies conducted in urban slums of Delhi highlight the role of gastrointestinal infections and parasitic infestations in childhood malnutrition (expressed by stunting and underweight).⁷

Due to their mobile nature, children of migrants miss out on getting free vaccinations, growth monitoring and also regular health checkups.⁸ They are exposed to several risk factors for malnutrition and adverse health conditions. Studies reveal that the coverage rates of immunization among the migrant populations in Delhi were significantly lower than the general population. Age of mother, educational attainment of the mother and a secured job held by the head of the household improve the likelihood of complete immunization.^{9,10} Measles vaccine coverage in particular shows significantly high association with malnutrition in under-five children especially from the rural-to-urban migrant populations (internally displaced populations).^{3,11}

Studies conducted in cities like Pune and Ahmedabad reveal that 40 to 50 percent of under-five children of the migrant families are stunted. Child stunting is one of the World Health Assembly's target for nutrition. Child stunting is a risk-factor for childhood mortality and, physical and cognitive underdevelopment.¹² The evidence generated by some recent studies has highlighted the association between stunting and long-term adverse health outcomes, which led to the shift in focus from underweight to stunting.¹³ The 5th round of National Family and Health Survey (NFHS 5) reported stunting in 35.5 percent of under-five children in the country and around 30.9 percent of under-five children in Delhi. India accounts for 30 percent of under-five stunting in the world.¹¹ Delhi has shown a decrease in stunting only by 1 percent from last previous NFH survey, which reported 31.9% under-five stunting.

Delhi is the largest city in the country with a population of 21.75 million as per the census 2011. It is also among the largest destination cities for migrants within the country; however, there is a dearth of studies evaluating the nutritional status of the under-five children of the migrant population in this city.

This study aimed to understand the association of migration and the stunting levels of the under-five children involved in it. The purpose was also to study the determinants, such as living conditions, access to toilet facilities, vaccination status, access to subsidized food grains, access to potable water and utilization of unclean cooking fuel.

METHODS

This analytical cross-sectional study was carried out in the migrant settlement of New Delhi, bhatti mines, between January-June 2023. According to census 2011, Bhatti Mines has a population of 18,864; the current figure according to the local administration is expected to be around 25,000. Those families that have migrated to the city from a rural setting on or after 1st January 2018 were considered as migrant families. Participants who have migrated to the city prior to 1st January 2018 were considered as non-migrants in this study. Participants included children of migrant and non-migrant families residing in Delhi, in the age group of 2 to 5 years and their mothers. Children with any other existing health complications that are not related to migration (such as any birth defect etc.) were not considered eligible for the study. Informed consent was obtained from the legal guardians of all the participants, since the participants are below 5 years of age.

A sample size of 194 was calculated based on the prevalence observed in the previously conducted studies (3,5,7), using 'nMaster' software. A precision of 7, and a confidence level of 95% was used for the calculation, and the considered prevalence was 45%, after which sample size of 194 was arrived at, which was rounded off to 200. Interstate migrant and non-migrant households in settlement areas and slums of Delhi were identified with the help from local NGO. CURE- centre for urban and regional excellence. Participant households were selected randomly from the identified clusters of households in the area. 100 households each of migrants and non-migrants were approached for the study. Bhatti mines area has around 800 to 1000 households, the town is made up of 5 main areas; all the 5 areas were covered during the data collection process, with 40 households from each area. Using systematic sampling method, every 5th household with under-five children was considered for participation. Figure 1 illustrates the sampling procedure employed.

A questionnaire was administered to the mothers, to collect basic socio-demographic information of the under-five child and the mother, and other economic and environment related information. Anthropometric measurements of the under-five children were collected and recorded to calculate stunting among the children (WHO standards were used), the height was measured twice and the average of the two measures was recorded. Appropriate COVID precautionary measures were followed during the data collection process. Both the investigator and the participant were maintaining a distance of at least 6 feet except when measuring height of the child, while wearing a mask.

The data from the questionnaire forms was recorded in excel sheets. Participants were given a unique identification number, and any other identifying information such as name and address was not used for data analysis and reporting. After cleaning and coding,

statistical analysis was performed in STATA 15.1. Frequency and percentages were given to understand the demographics followed by logistic regression to find the associations. Chi-square test was employed for hypothesis testing. The cut-off of the p value was set at 0.05.

RESULTS

Table 1 describes the socio-demographic characteristics of the participants. Equal numbers of participants were recruited from each of the five areas of the bhatti mines town. The average age of the under-five children involved in the study was 3.44 ± 0.79 years; with 3.42 ± 0.85 in the migrant population and 3.46 ± 0.74 in the non-migrant population. The average age of the mothers in the study was 27.14 ± 4.67 years, with 26.96 ± 5.19 in the migrant population and 27.32 ± 4.09 in the non-migrant population.

Of the overall households, 94% were Hindu, followed by Muslim (5.50%) and Christian (0.50%) households. Highest educational attainment in the family for the study population was less than or up to 5th class for 29% of the population (27% in migrant; 31% in non-migrant), between 5th to 10th for 36.5% of the population (40% in migrant) and 9.5% of the population (8% in migrant; 11% in non-migrant) completed graduation. Most of the

mothers were housewives i.e. 91.5% in the overall population (94% in migrant population, 89% in non-migrant population). Monthly household income for the majority (45%) of the overall population was INR 8001-12000, with 50% of the migrant households and 40% of the non-migrant households falling in the same income category. There was no significant difference ($p > 0.05$) observed for any socio-demographic characters between the migrant and non-migrant groups.

Table 2 describes the living conditions and health related characteristics of the participants.

Significant difference was observed in stunting between the migrant and non-migrant children, with 111 (55.5%) children in the overall population showing stunting, out of which 62 (55.85% of overall stunted children) were migrants and 27 (24.32%) were non-migrants. Repeated episodes of diarrhea in the past one year were observed in 59 (29.5%) under-five children in the survey, out of which 36 (61%) were from migrant households and 23 were from non-migrant. 184 (92%) under-five children received complete vaccination for their age, out of which 89 (48.36%) were migrant and 95 (51.63%) were non-migrant, with no statistically significant difference between the two groups.

Table 1: Socio demographic characteristics of participants.

Participants characteristics (n=200)	Overall population N (%)	Migrants; (n=100) N (%)	Non-migrants; (n=100) N (%)	Chi-square test; P value
Age of mother (years) (mean±SD)	27.14±4.67	26.96±5.19	27.32±4.09	0.58 (t-test)
Age of child (years) (mean±SD)	3.44±0.79	3.42±0.85	3.46±0.74	0.71 (t-test)
Sex of children				
Male	118 (59)	65 (65)	53 (53)	0.08
Female	82 (41)	35 (35)	47 (47)	
Religion				
Hindu	188 (94)	91 (91)	97 (97)	0.17
Muslim	11 (5.50)	8 (8)	3 (3)	
Christian	1 (0.50)	1 (1)	0 (0)	
Highest educational attainment in the family				
Less than or up to 5 th class	58 (29)	27 (27)	31 (31)	0.69
5 th to 10 th class	73 (36.5)	40 (40)	33 (33)	
Completed 11 th /and 12 th	50 (25)	25 (25)	25 (25)	
Graduate and above	19 (9.5)	8 (8)	11 (11)	
Mothers' occupation				
Housewife	183 (91.5)	94 (94)	89 (89)	0.09
Domestic help	8 (4.0)	2 (2)	6 (6)	
Tailor	6 (3.0)	1 (1)	5 (5)	
Daily wage labourer	2 (1.0)	2 (2)	0 (0)	
Gardener	1 (0.50)	1 (1)	0 (0)	
Monthly household income of the family (in rupees)				
6000-8000	32 (16)	18 (18)	14 (14)	0.24
8001-12000	90 (45)	50 (50)	40 (40)	
12001-16000	69 (34.50)	28 (28)	41 (41)	
Above 16000	9 (4.50)	4 (4)	5 (5)	

Table 2: Health and living conditions related characteristics of the participants.

Indicators (n=200)	Overall population N (%)	Migrants (n=100) N (%)	Non-migrants (n=100) N (%)	Chi-square/t-test P value
Stunting of the child				
Yes	111 (55.50)	62	27	<0.001
No	89 (44.50)	38	73	
Repeated episodes of diarrhea in the past one year				
Yes	59 (29.50)	36	23	0.04
No	141 (70.50)	64	77	
Whether the child has received vaccination doses according to his/her age				
Yes	184 (92)	89	95	0.11
No	16 (8)	11	5	
Type of housing				
Concrete	120 (60)	52	68	0.049
Kaccha house	61 (30.50)	35	26	
Shanty	19 (9.50)	13	6	
Whether the household has a PDS card and is currently using it				
Yes	130 (65)	58	72	0.03
No	70 (35)	42	28	
Access to a clean toilet facility				
Yes	144 (72)	67	77	0.11
No	56 (28)	33	23	
Type of cooking fuel used				
Wood fire	76 (38)	41	35	0.64
Both wood and gas stoves	63 (31.50)	29	34	
Gas stoves	61 (30.50)	30	31	
Source of drinking water used by the household				
Bore well	176 (88)	88	88	1
Filtered water	24 (12)	12	12	

Table 3: Association of stunting with various determinants.

Items (n=200)	Stunted (n=89)	Not stunted (n=111)	Crude p value	Odds ratio	Adjusted p value
Migration status					
Migrant	61 (68.5)	38 (34.23)	<0.001	4.34	<0.001
Non-migrant	27 (31.46)	73 (65.76)			
Type of housing					
Concrete	44 (49.43)	76 (68.46)	0.01	2.22	0.82
Other (other = exposure, concrete = no exposure)	45 (50.56)	35 (31.53)			
Access to a clean toilet facility					
Yes	57 (64.04)	87 (78.37)	0.02	2.03	0.22
No (no = exposure, yes = no exposure)	32 (35.95)	24 (21.62)			
Type of cooking fuel used					
Wood fire	41 (40.06)	35 (31.53)	0.01	1.82	0.16
Both wood and gas stoves	30 (33.70)	33 (29.72)		1.61	
Gas stoves	18 (20.22)	43 (38.73)		Ref	
Whether the household has a PDS card and is currently using it					
Yes	57 (64.04)	73 (65.76)	0.80	1.03	0.54
No (no = exposure, yes = no exposure)	32 (35.95)	38 (34.23)			
Whether the child has received vaccination doses according to his/her age					
Yes	77 (86.51)	107 (96.39)	0.01	4.16	0.11
No (no = exposure, yes = no exposure)	12 (13.48)	4 (3.6)			
Source of drinking water used by the household					
Bore well	85 (95.50)	91 (81.98)			

Continued.

Items (n=200)	Stunted (n=89)	Not stunted (n=111)	Crude p value	Odds ratio	Adjusted p value
Filtered water	4 (4.49)	20 (18.01)	<0.01	4.67	0.02
Repeated episodes of diarrhea in the past one year					
Yes	39 (43.82)	20 (18.01)	<0.01	3.54	<0.001
No	50 (56.17)	91 (81.98)			
Monthly household income of the family (in rupees)					
6000-8000	24 (26.96)	8 (7.20)	<0.01	2.9	0.10
8001-12000	46 (51.68)	44 (39.63)		2.7	
12001-16000	18 (20.22)	51 (45.94)		0.9	
Above 16000	1 (1.12)	8 (7.20)		Ref	
Highest educational attainment in the family					
Less than or up to 5 th class	30 (33.70)	28 (25.22)	0.05	5.71	0.59
5 th to 10 th class	32 (35.95)	41 (36.93)		4.16	
Completed 11 th /and 12 th	24 (26.96)	26 (23.42)		4.9	
Graduate and above	3 (3.37)	16 (14.41)		Ref	

Majority of the study population lives in concrete houses i.e. 60% of the overall population with a significant difference between the migrant and non-migrant groups. Public distribution system (PDS) card was being utilized in 130 (65%) study households, out of which 58 (44.61%) were migrant households and 72 (55.38%) were non-migrant, showing significant difference between the two. 144 (72%) households had access to a clean toilet facility (67 migrant households, 77 non-migrant households). 76 (38%) of the households reported using wood-fire for cooking in the household, 63 (31.5%) of the households reported using both wood-fire and gas stove for cooking in the household (45.3% migrant and 53.1% non-migrant) and the rest of the population used gas stoves.

Post bivariate analysis between each of the following items with stunting status individually, multiple logistic regression was performed to derive the adjusted values for association, results expressed in Table 3. In the bivariate analysis, six items showed a strong association with stunting among the under-five population of the study, i.e. type of housing ($p<0.05$), access to a clean toilet facility ($p<0.05$), type of cooking fuel ($p<0.05$), vaccination status of the child ($p<0.05$), source of drinking ($p<0.05$), water used by the household ($p<0.01$) and repeated episodes of diarrhea ($p<0.01$) in the past one year. Among the six, source of drinking water and recurring diarrheal episodes were also found to be strongly associated with stunting in the multiple logistic regression performed.

DISCUSSION

This study was performed to evaluate the association between migration status and under-five stunting, this is a post-COVID study that evaluates the association of various socio-demographic and socio-economic determinants of under-five stunting among the migrant and non-migrant populations in New Delhi. Stunting was recorded in 62% of the migrant under-five children and

27% in the non-migrant children, with a significant difference between the two groups. The results of this study are comparable to the findings of similar studies in different Indian cities.^{3,14,15}

Socio-demographic determinants that were significantly associated with stunting, other than migration, were educational attainment in the family and monthly household income, in line with the findings of a pre-Covid study conducted in New Delhi to evaluate the risk factors for under-nutrition in under-five children of the migrant households. The study however has not evaluated the association between migration status and stunting, and has not taken into consideration many of the items recorded in this study. Source of drinking water ($p<0.05$) and recurring episodes of diarrhea ($p<0.05$) were also found to be strongly associated with stunting among the under-five, similar to the findings of previously conducted studies.^{16,17} Migrant settlements are often not provided with clean piped potable water for consumption and with limited knowledge of purification methods, most often tend to consume contaminated water that leads to diarrheal infections in under-five children with compromised immunity.⁵

Under-five vaccination status is not significantly different for the migrant and non-migrant groups, unlike the findings of previously conducted studies, however vaccination status is significantly associated with stunting among under-five children surveyed in the study.^{10,15} Type of housing, access to a clean toilet facility, source of drinking water, utilization of PDS card and the type of cooking fuel used in the household were found to be significantly associated with stunting in this study, upon bivariate analysis, but do not have a strong association with stunting upon regression analysis.

This study is among the few studies that compare the migrant and non-migrant under-five populations, most studies so far have only taken into account the characteristics and observations of the migrant

populations. Since this is a post-COVID study, it allows comparison between stunting levels of under-five children before and after the second wave of the pandemic. A variety of determinants have been considered in this study, with elaborate results, this study can be used as material to guide decision making and policy building.

The study has been limited to bhatti mines town in New Delhi, making it difficult to generalize the findings to other cities in India. The vaccination status has been recorded for most participants after verifying the vaccination card of the child, however for the participants who were not able to produce the vaccination card, responses were recorded based on the mother's recall and self-reporting. No medical reports were available to verify diarrheal episodes in children hence the responses were purely based on mother's self-reporting. These are some limitations pertaining to the study.

CONCLUSION

Stunting was observed in 62% of the under-five migrant population and 27% of the non-migrant under-five population. Major factors for stunting other than migration, were found out to be the source of drinking water used by the household and recurring episodes of diarrhea.

There is a need to recognize and cater to the diverse needs of the migrant population's health. Under-five nutritional deficits lead to compromised immunity and delay in physical and mental growth and development. It is important to recognize and address the diverse needs of the under-five migrant population's health in order to avoid stunting and other serious manifestations. Provision of clean drinking water, toilet facility, utilization of a clean fuel for cooking, carefully monitoring the vaccination status and periodical de-worming are essential to ensure healthy growth of under-five migrant children.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of the Indian Institute of Public Health, Delhi

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Cite this article as: Akkiraju VS, Bhutia A. Interstate migration and its association with the prevalence of stunting in under-five children of the migrant families in Delhi- NCR, India: a cross-sectional study. *Int J Community Med Public Health* 2024;11:1166-72.