

Nutritional Challenges Among Under-five Children of Migrant Construction Workers in Ahmedabad, Gujarat: A Cross-Sectional Convergent Mixed-Methods Study

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Abstract:

Introduction: Migrant construction workers' children often live in temporary settlements with limited access to nutrition and health services, increasing their vulnerability to undernutrition. Evidence on their nutritional status in rapidly urbanizing Gujarat remains limited. **Objectives:** To assess the nutritional status of under-five migrant children, analyze feeding practices, examine socio-demographic determinants and evaluate access to nutrition and health services. **Methods:** A cross-sectional mixed-methods study was conducted between August to November 2025 among 175 under-five children residing at construction sites across seven zones of an urban district in Gujarat. Data were collected through caregiver interviews, anthropometric assessments and qualitative inquiry. Quantitative analysis included mean, SD, chi-square tests and logistic regression; qualitative data underwent thematic analysis. **Results:** Among 175 under-five children of migrant construction workers, mean age was 29.8±15.4 months. Undernutrition was common, with 39.4% stunted, 36.0% underweight, 20.0% wasted and 4.6% having severe acute malnutrition. Exclusive breastfeeding for six months was reported in 38.3% children, while age-appropriate meal frequency was observed in 41.1%. None of the children received ICDS services and only 42.3% had adequate access to healthcare services. Stunting was independently associated with low household income (AOR 2.31, 95% CI 1.29–4.13), maternal illiteracy (1.87, 1.04–3.36), limited healthcare access (2.42, 1.31–4.25), and residence <1 year (1.74, 1.02–3.12). Qualitative findings revealed knowledge gaps explaining suboptimal young child feeding. **Conclusion:** Undernutrition among migrant children is high and influenced by poverty, maternal illiteracy, inadequate services and mobility. Strengthening outreach, improving scheme portability and targeted support for migrant families are urgently needed.

Keywords: Children, Feeding behaviour, Health service accessibility, Migrant worker, Nutrition

Introduction:

India has witnessed increasing trends in internal migration over the last three decades. The absolute number of internal migrants increased from 232.11 million in Census 1991, 314.54 million in 2001 to 455.78

million in 2011^[1]. The total population of migrant children also increased from 44.35 to 92.95 million between Censuses 1991 to 2011. In 2011, one in every five internal migrants was a child^[1]. In India, migrant children are not a homogeneous group and their reasons for movement and vulnerabilities vary. For some

Quick Response Code	Access this article online	How to cite this article : Shukla R, Rathod K. Understanding Nutritional Challenges Among Under-5 Children of Migrant Construction Workers in One of the Gujarat Metropolis: A Comprehensive Public Health Study. Healthline. 2026;17(3). 252-259
	Website : www.healthlinejournal.org	
	DOI : 10.51957/Healthline_858_2026	

Received : 26-06-2026

Accepted : 03-07-2026

Published : 15-10-2026

children, migration may open possibilities and is associated with expanding social and economic spheres, but for many others, it may bring serious risks. Socio-economic vulnerability is much more severely impact the child health than the migration status of the children^[1]. Further, migrants with children may leave their children behind in several aspects such as health, nutrition, education and so on, while pursuing economic opportunities^[2]. Previous studies found that migrants families face several challenges in availing appropriate, efficient, comprehensive and continuum of quality care services especially to younger children^[2]. India faces a significant public health challenge in addressing child malnutrition, with the National Family Health Survey (NFHS-5) reporting that 32% of children under five years are underweight, 36% are stunted and 19% are wasted^[3]. Gujarat, a rapidly urbanizing state, mirrors this national crisis, with approximately 39% of children under five being stunted, 39.7% underweight and 25.1% wasted^[3]. Among the most vulnerable groups are the children of migrant construction workers, who often reside in informal settlements at construction sites^[4].

Children at construction site

Construction work is considered conducive to family-based migration as it provides work to male and female members of a family. When women migrate, they tend to bring their children along, especially when the child is younger and is in need of care. While one can witness large presence of children at most construction sites, there has been no official exercise to enumerate them^[5]. Here, we focus on this context of migration and informal work environment to understand how it shapes childrens nutritional status.

In this study we specifically focus on undernutrition among children of migrant construction workers. Extant literature has established that undernutrition has long term (morbidity and mortality, chronic diseases, cognitive and physical impairment among others) as well as short term consequences (reduced immunity and susceptibility to infections, metabolic alteration.) for children. Research has also found that undernutrition affects physical and cognitive development, schooling and productivity. Researchers note that poor nutrition in

childhood lowers the ability to perform well in school and in later years at work. Reduced efficiency means sub-optimal income opportunities in adulthood. This impacts households or individuals economic status, as well as countrys economic potential. Black et al. estimate that undernutrition reduces “a nations economic advancement by at least 8% (direct productivity losses, losses via poorer cognition and losses via reduced schooling)^[6].”

Despite the large number of workers involved in construction works in major cities, there is limited information available or research carried out on the impact of such migration on the nutrition and educational status of the migrant workers children. Among the existing studies, most are focused on the access and availability of basic services (like drinking water, sanitation and housing etc.), health aspects and occupational hazards faced by the construction workers^[7]. There is a lack of evidence on the education and malnutrition among the children both at the macro and micro levels.

Objectives:

1. To assess the nutritional status of under-five children of migrant construction workers using anthropometric indicators such as weight-for-age, height-for-age and weight-for-height.
2. To analyze dietary intake and feeding practices, including breastfeeding, complementary feeding and meal frequency among children in the study population.
3. To assess the socio-economic and demographic characteristics of migrant construction worker families and their association with child nutritional status.
4. To evaluate the accessibility and utilization of government nutrition and health programs, such as ICDS (Anganwadi), Public Distribution System, immunization and health check-ups.

Methods:

A cross-sectional convergent mixed-methods study was undertaken in city of Ahmedabad, located in Gujarat, India between August to November 2025.

Ahmedabad is experiencing rapid urban expansion and hence construction sector attracts migrant workers from various parts of the country. Study was conducted after receiving approval from Institutional Ethics Committee. Based on formula $(1.96)^2 \cdot p \cdot q / L^2$, where p is 26^[8], q is 74 & L as 25% of p i.e.-6.5 for which sample size comes to 175. Ahmedabad city selected has 7 zones. To ensure geographic representation, construction sites were identified purposively within each zone based on the presence of migrant construction workers. Investigators visited multiple eligible construction sites in each zone. At each selected site, all under-five children meeting the eligibility criteria and present during the study visit were invited to participate. Recruitment continued across construction sites within each zone until 25 children were enrolled from each zone, resulting in a total sample of 175 participants. Piloting of the questionnaire was done amongst 10% of decided sample size within the field practice area of current institute and after finalization of the questionnaire actual data collection was done through interview of parents of selected under-five children at selected construction sites. All eligible parents or caregivers approached agreed to participate in the study. Data collected in piloting and refining of the questionnaire was not included in the final result. Written informed consent was obtained from parents/guardians prior to data collection. Along with interview of parent/guardian, anthropometric measurement of child was done. Instrument calibration was done before the study and calibrated instruments were used consistently throughout the study. Weight was measured using a calibrated digital weighing scale to the nearest 0.1 kg, and height/length was measured using a stadiometer/infantometer to the nearest 0.1 cm following standard procedures. Data collected was entered in MS Excel and analysed using MS Excel and Statistical Package for Social Science version 26. Mean, SD, chi-square test, logistic regression tests were applied. Independent variables were chosen based on evidence from previous studies and their biological plausibility. Open-ended responses were analyzed using manual thematic content analysis and codes were grouped into themes. Multiple responses were allowed. Qualitative information was collected

concurrently with the quantitative survey through a small number of open-ended questions administered to all participating caregivers during the interview. These questions explored caregivers' perceptions of a healthy child, understanding of child nutrition and perceived barriers to accessing nutrition and healthcare services. The qualitative findings were intended to complement the quantitative results by providing contextual explanations for observed feeding practices and healthcare utilization. Open-ended questions were asked to all 175 participants during the survey. All variables included in the regression analysis had complete data, so no imputation was needed.

Inclusion criteria:

- Children of construction workers who have migrated for work and are resident of another state/district
- Currently residing at or near the construction site (temporary shelters/slums)

Exclusion criteria:

- Children with diagnosed chronic illnesses (e.g., congenital anomalies, chronic systemic diseases) that could independently affect growth were excluded
- Children who were severely ill at the time of data collection or whose caregivers were not available or unwilling to participate were excluded
- Migrant families with permanent housing in the city and were not residing at construction sites were excluded.

Operational definition:

- Migration: Migration was defined as movement from another district/state for employment within the past one year
- Adequate access to healthcare service: Adequate access to healthcare services was defined as availability and utilization of nearby health facility for child health needs, including immunization, growth monitoring and treatment of illness, as reported by the caregiver

- Adequate meal frequency: Adequate meal frequency was defined as per WHO IYCF guidelines: minimum number of meals appropriate for age and breastfeeding status of the child
- Underweight: Underweight was defined as weight-for-age Z-score (WAZ) < 2 standard deviations (SD) from the median
- Stunting: Stunting was defined as height-for-age Z-score (HAZ) < 2 SD
- Wasting: Wasting was defined as weight-for-height Z-score (WHZ) < 2 SD
- Severe acute malnutrition: Severe Acute Malnutrition (SAM) was defined as WHZ < 3 SD.

Results:

A total of 175 under-five children of migrant construction workers were enrolled from all 7 zones of metropolitan area.

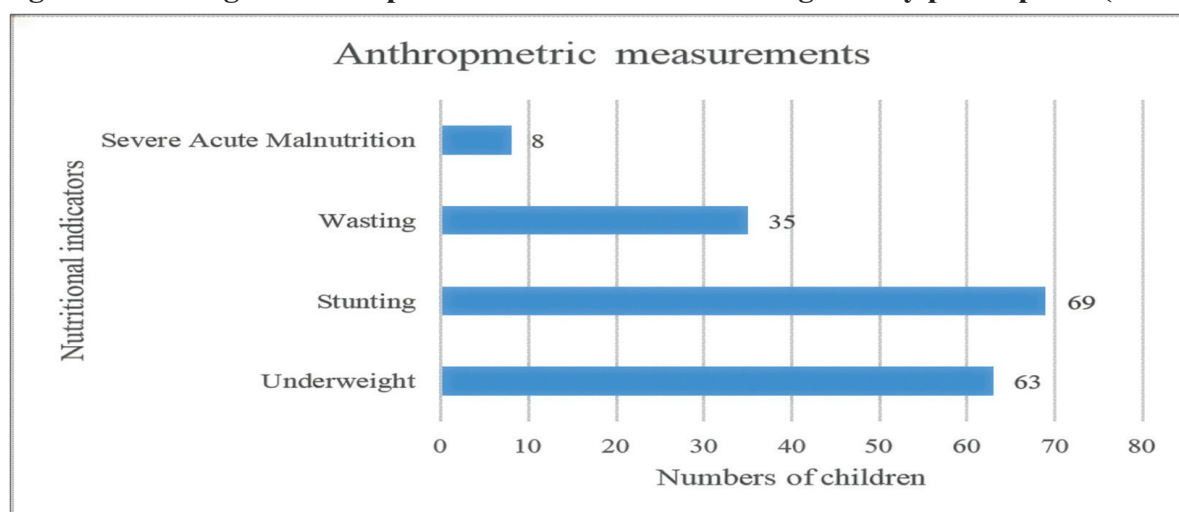
Socio-demographic Profile: Mean age of the children was 29.8 ± 15.4 months. Most respondents for the study were mothers (n=144; 82.3%). Intrastate migrant was more common (n=105; 60%) amongst participants. Most household had monthly income below 10000 (n=171; 97.7%), mothers were illiterate (n=84; 48%), father had primary education (n=93; 53.1%) and family lived in on-site temporary shelters with frequent mobility (n=163; 93.1%).

Nutritional Status: Low birth weight of the child was reported by 40 (22.9%) while 51 (29.1%) participants couldnt recall birth weight. Height and weight measurement of under-five children in last 6 months by healthcare professional was reported by 83 (47.4%) participants. Fever was the most commonly reported illness among under-five participants in the last three months (n=61; 34.9%), followed by diarrhoea (n=39; 22.3%) and respiratory infections (n=26; 14.9%). Only 49 (28%) reported that their child didnt suffer from any health issue in past 3 months. Nearly half of the participants (79; 45.1%) reported that their child appeared thin or smaller than expected for their age.

Anthropometric measurements: As shown in Figure 1, Out of 175 under-five children, prevalence of underweight was 63 (36%), stunting was 69 (39.4%), wasting was 35 (20%) and Severe Acute Malnutrition (SAM) was 8 (4.6%).

Feeding practices: Exclusive breastfeeding for 6 months was practiced amongst 67 (38.3%) children. Complementary feeding was introduced before 6 months in 44 (25.1%), at 6 months (recommended age) in 97 (55.4%) and after 6 months in 34 (19.5%) participants. Meal diversity for under-five children consisted mainly of rice, roti, dal, vegetables like potato, onion & tomato, biscuits and packaged snacks. Proper meal frequency appropriate for age was met in only 72 (41.1%) participants.

Figure 1: Findings of anthropometric measurements amongst study participants (n=175)



Source: Primary data collected from migrant construction workers in Ahmedabad, Gujarat

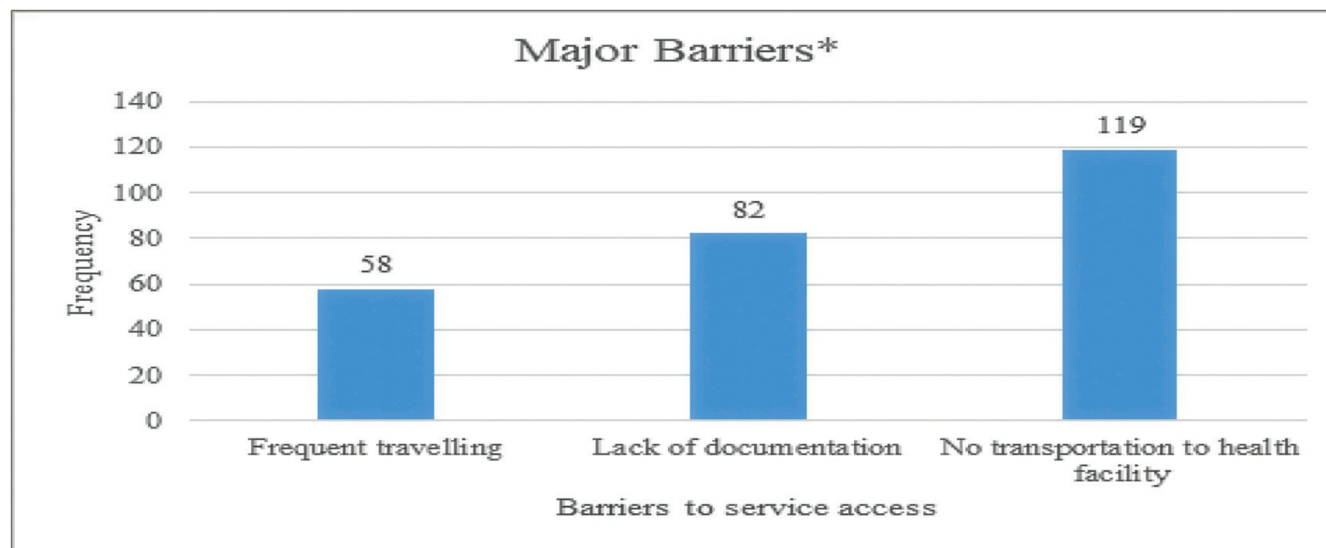
Access to Nutrition and Healthcare services: None of the participant children received ICDS (Anganwadi) services. Rations were provided solely by construction site owners. Participants couldnt avail the benefit of Take-home Ration provided by the government mainly due to non-availability of Ration card and distance between PDS shop and construction site. However, 42 (24%) participants did inform they received the benefit of low cost meal provided by the Government of Gujarat for labourers. Healthcare service utilization was also limited. Only about 74 (42.3%) participants reported of adequate access to health-related services, while 101 (57.7%) felt that they didnt receive adequate health related services. In past 6 months, Immunization services were availed by 104 (59.4%), Vitamin A supplementation by 51 (29.1%) and deworming by 40 (22.9%) participants. Major Barriers reported by participants in accessing Nutrition & Healthcare

services are given in Figure 2. Barriers included frequent travelling (53; 33%), lack of documentation (82; 47%) & No transportation to health facility (119; 68%).

A total of 45 (25.7%) participants reported that they do not seek professional help when their child was sick and managed on own or brought medicine directly from a pharmacy store nearby. In remaining 81 participants who reported that their child suffered from sickness in last 3 months, most common place of seeking healthcare for the child was nearby Private clinic 45 (55.6%) followed by government hospital 30 (37%) and traditional healer 6 (7.4%).

When inquired about what was the definition/perception of a healthy child to study participants, the answers received are given in Table 1. Responses were coded into multiple themes where applicable.

Figure 2: Major Barriers reported by participants in accessing Nutrition & Healthcare services (n=175)



*- Multiple responses allowed

Source: Primary data collected from migrant construction workers in Ahmedabad, Gujarat

Table 1: Thematic analysis of responses of study participants to their perception/definition of a healthy child (n=175)

Responses*	Frequency (%)
Proper physical growth (height and weight)	76 (43.4%)
Active & playful child	62 (35.4%)
Free from illness	63 (36.0%)
Good Eating and sleeping habit	14 (08.0%)

*- multiple responses allowed

Out of the total study participants, 102 (58.3%) reported that they had knowledge regarding child nutrition, while 73 (41.7%) stated that they did not have adequate knowledge. However, further probing during informal discussions revealed that even among those who reported having knowledge, the understanding was often basic and incomplete. Gaps were particularly noted in areas such as components of a balanced diet, importance of micronutrients and appropriate complementary feeding practices.

Regarding willingness to participate in educational interventions, a substantial proportion of participants 147 (84%) expressed interest in attending sessions on child nutrition, whereas 28 (16%) were not interested.

A statistically significant association was observed between access to health services and stunting among study participants which is given in Table 2. Similarly, meal frequency showed a significant association with underweight status which is given in Table 3.

Multivariable logistic regression analysis was performed to identify independent predictors of stunting among study participants ($n = 175$). The analysis revealed that **low household income (< 10,000 per month)** was significantly associated with higher odds of stunting, with children from low-income families having **2.31 times higher odds** of being stunted compared to those from higher-income households (**AOR = 2.31; 95% CI: 1.294.13; $p = 0.005$**). **Maternal illiteracy** was also found to be a significant predictor, with children of illiterate mothers having **1.87 times higher odds** of

stunting (**AOR = 1.87; 95% CI: 1.043.36; $p = 0.036$**). In addition, **lack of access to healthcare services** showed a strong association, with **2.42 times increased odds** of stunting among those without access (**AOR = 2.42; 95% CI: 1.314.25; $p = 0.003$**). Children with a **duration of stay less than one year** in the current residence were also at significantly higher risk of stunting (**AOR = 1.74; 95% CI: 1.023.12; $p = 0.041$**). However, **exclusive breastfeeding status** did not show a statistically significant association with stunting (**AOR = 1.39; 95% CI: 0.792.46; $p = 0.24$**).

Discussion:

The present study highlights the high burden of undernutrition and suboptimal child care practices among under-five children of migrant construction workers in an urban metropolitan setting. The findings underscore the compounded vulnerability of migrant populations due to socioeconomic deprivation, poor living conditions and limited access to health and nutrition services.

The socio-demographic profile of the study population reflects a highly disadvantaged group, with the majority of families living below 10,000 monthly income, high levels of maternal illiteracy and frequent mobility. Similar profiles have been reported in studies among migrant populations in India, where informal employment, lack of documentation and unstable housing conditions significantly impact health outcomes.^[9]

Table 2: Association between access to health services and stunting among study participants ($n = 175$)

		Stunting		Total	Chi-square (p value)
		Present	Absent		
Health services	Adequate	20	54	74	8.209 (0.0042)
	Inadequate	49	52	101	
	Total	69	106	175	

Table 3: Association between meal frequency and underweight among study participants ($n = 175$)

		Underweight		Total	Chi-square (p value)
		Present	Absent		
Meal frequency	Adequate	19	53	72	8.209 (0.0042)
	Inadequate	44	59	103	
	Total	63	112	175	

The prevalence of stunting (39.4%), underweight (36%) and wasting (20%) observed in this study was higher than corresponding national averages reported in the National Family Health Survey (NFHS-5), which documented stunting (36%), underweight (32%) and wasting (19%) among under-five children in India.^[3] This indicates that migrant children constitute a nutritionally more vulnerable subgroup, likely due to food insecurity, poor dietary diversity and inadequate health service utilization. Similar findings have been reported in studies among urban poor and migrant populations.^[10,11]

Feeding practices in the present study were suboptimal, with only 38.3% of children exclusively breastfed for six months, which is lower than the NFHS-5 estimate (64%).^[3] Early or delayed initiation of complementary feeding and poor dietary diversity were also evident. These findings are consistent with other Indian studies showing inappropriate infant and young child feeding (IYCF) practices among marginalized populations.^[12] Inadequate meal frequency was significantly associated with underweight status, reinforcing the importance of adequate feeding frequency as a key determinant of nutritional status.

Healthcare utilization was found to be inadequate, with only 42.3% reporting adequate access to health services. Immunization, Vitamin A supplementation and deworming coverage were also suboptimal. Notably, none of the children were receiving services from the Integrated Child Development Services (ICDS), highlighting a critical gap in outreach to migrant populations. Barriers such as lack of documentation, transportation issues and frequent migration have also been reported in previous studies as major impediments to service utilization.^[13,14]

The significant association between access to health services and stunting observed in this study emphasizes the role of healthcare accessibility in preventing chronic undernutrition. Similarly, inadequate meal frequency was significantly associated with underweight,

indicating the importance of feeding practices in acute nutritional outcomes. These findings are consistent with existing literature demonstrating the interplay between service access, feeding practices and child nutrition.^[6]

Multivariable analysis further identified low household income, maternal illiteracy, lack of healthcare access and shorter duration of stay as significant predictors of stunting. These findings align with established evidence that social determinants such as poverty and maternal education are strong predictors of child nutritional status.^[15,16]

Perception of a healthy child among participants was largely limited to visible physical attributes such as growth, activity and absence of illness, with less emphasis on nutrition and developmental aspects. Despite this, a high proportion of participants expressed willingness to attend nutrition education sessions, indicating a favourable opportunity for behaviour change interventions.

Limitation:

- The study was conducted among migrant construction workers in a single metropolitan city. Therefore, the findings may not be applicable to all migrant populations.
- The purposive selection of construction sites and inclusion of only eligible children present during the study visits may have introduced selection bias. Highly mobile families or those absent at the time of data collection may not have been represented, potentially affecting the representativeness of the study population.
- Information on feeding practices and healthcare utilization was based on caregiver recall and may be subject to recall bias.
- As the study was cross-sectional, cause-and-effect relationships cannot be established.
- Multicollinearity was not formally assessed during the original statistical analysis.

Conclusion:

- The study reveals a high burden of undernutrition among under-five children of migrant construction workers, exceeding national averages.
- Children belong to a highly vulnerable group characterized by low income, maternal illiteracy, poor living conditions and frequent mobility.
- Suboptimal feeding practices (low exclusive breastfeeding, poor dietary diversity, inadequate meal frequency) contribute significantly to malnutrition.
- Limited access to healthcare and nutrition services, along with barriers like lack of documentation and transportation, further aggravate the problem.
- Despite knowledge gaps, there is high willingness for nutrition education, offering scope for intervention.

Recommendation:

- There is a need for migrant-sensitive public health strategies, including strengthening ICDS outreach, ensuring portability of entitlements and promoting community-based nutrition education.

Declaration:

Conflict of Interest: NIL

Funding: NIL

Use of AI: AI was not used at any stage of the study

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