International Journal of Medicine
pISSN 1468-3814 | eISSN 2667-7008
https://theinternationalmedicine.com/

Original Researcher Article *DOI: 10.61336/im/26-2-12*

Nutritional and Immunisation status of Children of Migrants seeking health care in tertiary care hospital – A cross sectional study.

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Received: 15-11-2025
Revised: 18-12-2025
Accepted: 30-12-2025
Published: 07-01-2026

Abstract

Background: Children from migrant families are vulnerable to poor health outcomes due to limited access to healthcare services, interrupted immunization schedules, inadequate nutrition, and lack of awareness regarding child health practices. Migration-related socioeconomic challenges can adversely affect infant feeding practices, immunization coverage, and overall nutritional status. ***Objectives:*** To assess the immunization status, nutritional profile, infant feeding practices, and healthcare awareness among children belonging to migrant families. ***Materials and Methods:*** This cross-sectional observational study included 119 children from migrant families. Data regarding demographic characteristics, place of delivery, infant and young child feeding practices, immunization status, migration history, and nutritional assessment were collected using a structured questionnaire. Anthropometric measurements including mid-upper arm circumference (MUAC) and body mass index (BMI) were assessed to evaluate nutritional status. Information regarding reasons for partial or non-immunization was also documented. Health education and immunization services were provided during the study visit. ***Results:*** Among the 119 children studied, the largest age group was neonatal to infant age (49.6%), and 64.7% were males. Most children (94.1%) were delivered in hospitals, while 81.5% received iron and folic acid (IFA) supplementation for six months. Exclusive breastfeeding was practiced in 75.6% of children, and timely initiation of complementary feeding was observed in 54.6%. Immunization coverage was complete in 51.3% of children, whereas 48.7% were partially immunized. The major reasons for non-immunization included lack of awareness (15.1%), misconceptions regarding vaccine safety (3.4%), and beliefs that vaccination was unnecessary (30.3%). Nutritional assessment revealed that 7.6% of children had MUAC values below 11.5 cm, while 7.6% were underweight or severely underweight based on BMI classification. More than half of the families (51.3%) had migrated within the previous 2–3 years. Health education was provided to 92.4% of participants, and 7.6% received both health education and immunization services during the visit. ***Conclusion:*** Children from migrant families showed suboptimal immunization coverage and evidence of undernutrition despite relatively good rates of institutional delivery and exclusive breastfeeding. Lack of awareness and misconceptions regarding vaccination were important barriers to immunization. Strengthening health education, improving outreach immunization services, and ensuring continuity of healthcare for migrant populations are essential to improve child health.

Keywords: Immunization, MUAC, BMI, nutritional status , EBF.

INTRODUCTION

Migration, both internal and international, is a defining phenomenon of the 21st century with significant implications for public health, particularly for children. In India alone, tens of millions of individuals migrate annually in search of livelihood, often settling in urban slums, construction sites, or peri-urban industrial zones. These movements frequently involve families with young children, whose health outcomes are adversely impacted by instability, poverty, and lack of access to consistent healthcare services. Migration is a social determinant of health. The health profile and the care received by migrants are found suboptimal when compared to populations at both origin and destination1.

When the migrants move with family, the health and well-being of their children are also affected. India has witnessed increasing trends in internal migration over the last 30 years. It is estimated that 5–9 million people migrate within the country in a year2 and every fifth migrant is a child3.Short-duration rural-to-urban migration is a key livelihood strategy for millions of poor households in India, particularly among historically marginalized groups, who often face chronic poverty4. Migrants typically engage in low-wage, insecure, and informal work environments5,6. Many migrate with their entire families, including children7,8, who then face disrupted education due to frequent relocations8-10, nutrition

insecurity due to limited access to subsidized food11, and lower immunization rates stemming from barriers like high costs and limited awareness9-16.

Children also face risks to their safety and wellbeing due to exposure to unsafe and unhygienic worksites7.Immunization is the most successful and cost-effective weapon against vaccine preventable diseases. Infectious diseases like tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis, hepatitis B, H. Influenza, measles, and rubella can be prevented by immunization. According to the WHO (July 2018), global vaccination coverage among children is 85%. If this is improved, 1.5 million deaths can be avoided17. According to Intensified Mission Indradhanush, vaccination coverage was 65% (2014). India aims to increase full immunization coverage to >90% by December 202018. In India, under-five mortality rate is 39/1000 live births (LB), infant mortality rate 34/1000 LB, and neonatal mortality rate 24/1000 LB. Children suffer from lack of immunization because of frequent shift of places, lack of knowledge, and low socioeconomic status19.Despite its effectiveness, full immunisation coverage remains uneven, particularly among children of migrant populations. Studies have shown that these children are consistently under-immunised compared to non-migrants due to barriers such as lack of awareness, absence of immunisation cards, frequent relocation, and limited access to health infrastructure (Kusuma, 2010; Awoh, 2016; Savani, 2023)20-22. For instance, Kumar (2020)23 reported that only 55.4% of children in brick kiln settlements in Bihar were fully immunised, with a significant proportion either partially or non-immunised, primarily due to lack of knowledge and service inaccessibility.

Similarly, Anand (2014)24 found that just 30% of migrant children were fully immunised compared to 50% among non-migrants.Furthermore, the nutritional status of migrant children is deeply concerning. Undernutrition, which includes stunting, wasting, and underweight, is more prevalent among migrant children than their settled counterparts. Studies from various regions in India including Lucknow (Agarwal, 2023)25, Hooghly (Chaudhari, 2024)26, and Delhi (Akkiraju, 2024)27 have reported alarmingly high rates of malnutrition—stunting rates often exceeding 60%, and wasting above national averages. These conditions are often exacerbated by food insecurity, lack of dietary diversity, poor maternal nutrition, and unhygienic living conditions such as open defecation and lack of safe drinking water (Ravindranath, 2019; Ambika, 2025)28,29.The interplay between malnutrition and low immunisation is particularly problematic. Malnourished children have weakened immune responses, reducing vaccine effectiveness and increasing susceptibility to vaccine-preventable diseases.

This creates a dangerous cycle of infection, undernutrition, and poor developmental outcomes, especially in settings where health services are inaccessible or underutilised (Prusty,2015; Shankar Mishra, 2022)30,31.Migration also introduces systemic barriers to healthcare delivery. Health records are rarely portable across states or regions, and migrant families often lack formal residence proof, impeding access to government schemes such as the Universal ImmunisationProgramme (UIP) and the Integrated Child Development Services (ICDS). Cultural and language barriers, discrimination, and a lack of trust in healthcare systems further discourage utilisation (Bouaddi, 2024; Ambika, 2025)29,32. Even large-scale initiatives like Mission Indradhanush have faced challenges in effectively reaching migrant populations, despite their considerable progress in improving overall immunisation coverage (Jain, 2024; Lyons, 2024)33,34.International evidence supports these trends. A meta-analysis by Rojas-Venegas (2022)35 found that globally, migrants are half as likely to be vaccinated as non-migrants.

These disparities are often entrenched by structural inequities and a lack of targeted interventions for transient populations.Given this complex and multifaceted problem, it becomes crucial to explore the current landscape of immunisation and nutritional status among migrant children, identify existing gaps in services and policies, and recommend actionable strategies. This literature review aims to synthesise evidence from recent studies to understand the scale of the problem, its determinants, and potential solutions. In doing so, it will offer a foundation for informed policymaking, health system improvements, and inclusive child health programming that accounts for the needs of migrant populations. The present study aims (i) to assess the nutritional status of children enrolled in the study using appropriate tools and methodology.(ii) To ascertain immunisation rates and dropout % among migrant children and reasons for it and to assess correlation between %dropout with duration since migration.(iii) Assess factors affecting nutritional status of children like initiation of exclusive breastfeeding and its duration, usage of prelacteal feeds, practices of compliment feeding using questionnaire and interviews and also use this as a platform to bring change in the knowledge, attitude and practice among the migrants.

MATERIALS AND METHODS

A Cross-sectional study for theperiod of18 months (May 2023 to October 2024) was conducted at Dept of Paediatrics, Vani Vilas hospital, BMC&RI ,Bangalore .The study population were Children of migrants who have migrated to Bangalore attending Vani Vilas hospital, department of paediatrics, Bangalore. The Sample size was estimated by using

Master software Version 2.0 by applying following details in the above formula. The sample size was calculated using from the formula

n=(〖Z_α〗^2 P(1-P))/d^2 = n=(〖1.96〗^2 0.50 (1-0.50))/〖0.10〗^2 =100

Inclusion Criteria

Children of migrants who have migrated to Bangalore

Children of parents willing to give informed consent

Exclusion criteria

Children with any endocrinological diseases, HIV, TB and other chronic diseases .Anexcluded mothers who cannot comprehend the questions asked by the investigator

Data Collection Methods

After obtaining approval and clearance from the institutional ethics committee, eligible patients meeting the inclusion criteria will be enrolled in the study following informed consent (Annexure-1). Data will be collected through interviews with mothers of children under two years admitted to the wards and outpatient department (OPD) of Vani Vilas Hospital.

Assessment tools

Appropriate WHO charts

Preformed questionnaires

In-person interview

Weighing scale

Measuring tape

Outcome measures

Nutritional and immunisation status of children of migrants

Percentage ofImmunised and dropout % will be calculated and compared against national average along with along with native state Percentage.

Immunization and nutritional status will be correlated with duration since migration

Percentage of children malnourished will be assessed

Variation among siblings assessed

Statistical methods

Data was collected and compiled in MS Excel. Statistical analysis was performed using SPSS for windows version 26.0. The description of data will be in the form of mean (±) SD for quantitative data and frequency and proportion for qualitative data. Student t-test/ chi-square test will be used to determine significant difference between two groups. P value of <0.05 will be considered significant.

RESULTS

Table 1: Age Distribution

Variable	Category	Frequency (n=119)	Percentage	P-value
Age Group	Infant	51	42.9%	<0.01
	Toddlers (1–2 yrs)	20	16.8%	<0.01
	Preschool (3–5 yrs)	24	20.2%	<0.01
	School Age (6–10 yrs)	16	13.4%	<0.01
	Adolescents (11+ yrs)	8	6.7%	>0.01
Gender (M/F)	Male	77	64.7%	<0.01
	Female	42	35.3%	<0.01
Place of Birth	Hospital	112	94.1%	<0.01
	Home	7	5.9%	<0.01
IFA Supplementation	None	3	2.5%	>0.01
	3–4 months	19	16.0%	<0.01
	6 months	97	81.5%	<0.01

The study included a total of 119 migrant children attending a tertiary care hospital. Age distribution indicates that the majority of the children (42.9%) were in the neonatal to infant age group. The second highest group was preschool-aged

children (3–5 years), accounting for 20.2%, followed by toddlers (1–2 years) at 16.8%, and school-age children (6–10 years) at 13.4%. Only 6.7% were adolescents (11+ years).

Male children constituted a significantly higher proportion (64.7%) compared to females (35.3%). An overwhelming majority (94.1%) of children were born in hospitals, while only 5.9% were delivered at home.
IFA supplementation status showed that 81.5% of children received supplementation for the recommended 6 months. Another 16.0% received IFA for 3–4 months, while only 2.5% did not receive any supplementation.

Table 2: Breastfeeding & Feeding Practices (n=117)

Practice	Frequency	Percentage	P-value
Exclusively breastfed for 6 months – Yes	90	75.6%	<0.01
Exclusively breastfed for 6 months – No	29	24.4%	
Pre-lacteal feeds – Yes	1	0.8%	<0.01
Pre-lacteal feeds – No	118	99.2%	
Complementary feeds initiated at 6 months	65	54.6%	<0.01
Delayed complementary feeds	52	43.7%	<0.01

Breastfeeding practices were largely appropriate, with 75.6% of mothers exclusively breastfeeding their children for the first six months. Only 0.8% of children received pre-lacteal feeds. However, only 54.6% initiated complementary feeding at the recommended age of 6 months, while 43.7% had delayed introduction.

Table 3: Immunisation Status

Immunisation Status	Frequency (n=119)	Percentage	P-value
Up-to-date	61	51.3%	<0.01
Partially immunised	58	48.7%	<0.01

Immunisation coverage showed that 51.3% of children were up-to-date with vaccinations, while 48.7% were partially immunised. Of the 58 partially immunised children, 25 (43.1%) had primary immunisation failure and 33 (56.9%) had secondary immunisation failure.

Table 4: Reason for Non-immunisation

Reason for Non-immunisation	Frequency	Percentage	P-value
Thought harmful	4	6.9%	
Thought unimportant	36	62.0%	<0.01
Unaware of facilities	18	31.1%	<0.01
Total partially immunised	58	100%	1.00

Among partially immunised children, 62.0% of caregivers believed immunisation was unimportant, 31.1% were unaware of available facilities, and 6.9% thought vaccines were harmful.

Table 5: Nutritional Status (Under 5 Years)

Mid Upper ArmCircumference	Frequency	Percentage	p-value
<11..5 cm	9	16.36%	>0.01
≥ 11.5 cm	46	83.64%	<0.01
Migration			
≤ 1.0 year	33	28.0%	<0.01
2.0–3.0 year	61	51.3%	<0.01
≥ 3 years	25	20.7%	<0.01
BMI			
Normal	32	78%	<0.01
Underweight	4	9.8%	>0.01
Severely Underweight	5	12.2%	>0.01

Nutritional assessment using MUAC for children under 5 years revealed that 16.36% of children were moderately to severely malnourished (MUAC <11.5 cm), while 83.64% had measurements ≥11.5 cm.
Migration duration showed that 51.3% had been in the current location for 2–3 years, 28.0% for up to 1 year, and 20.7% for more than 3 years.

BMI distribution showed that 78.0% of children had a normal BMI, whereas 9.8% were underweight and 12.2% were severely underweight.

Table 6: Action Taken (Health Education & Follow-up)

Action Taken	Frequency (n=119)	Percentage	P-value
KAP (education) only	110	92.4%	<0.01
KAP + Immunisation	9	7.6%	>0.01

Health education (Knowledge, Attitude, Practice or KAP) was provided to 92.4% of families. A small subset (7.6%) received both education and immunisation services.

DISCUSSION

Children who do not receive timely and complete immunization are often linked to lower socioeconomic backgrounds, residence in rural areas, and limited access to healthcare services111. A study conducted in Saudi Arabia revealed that (37.5%) of parents held negative attitudes toward immunization, believing it to be unnecessary. Additionally, (25%) of respondents expressed concerns regarding the components of vaccines. Other contributing factors to vaccine refusal included inadequate communication and guidance from healthcare professionals, as well as external influences such as social media, religious beliefs, family opinions, and extended waiting periods at public health centers112. In the present study, a total of (n=119) children of migrant families were assessed, with nearly half (49.6%) belonging to the neonatal to infant age group. This indicates a significant proportion of very young children among those seeking healthcare services. The next largest groups were preschool-aged (22.7%) and toddlers (20.2%), while school-age children and adolescents comprised smaller proportions, whereas Sharma et al116.

conducted an in-depth qualitative study with only 17 caregivers of under-five children in an urban resettlement colony in Delhi. Similarly, the Agarwal et al103. study among their 400 study participants revealed that the majority (55.8%) of children fell within the 6-12 months age group, followed by more than 12 months (24.3%) and 0 to 6 months (20%) respectively. This age distribution may reflect the increased vulnerability and healthcare needs of younger children, prompting their families to seek medical attention more frequently. Similar studydone byKurkuri et al81., involved 500 children aged 12–36 months from migrant worker families in urban Bangalore East with a mean age of 25.23 □ 8.42 months where 36.8% were in the 31 to 36 months age group. At the same time, Abdalla et al113. focused on parental demographics rather than direct child age distribution but noted that 83.1% of respondents had children, with 67% having 1–5 children among their sample of 436 study population. Also, Kusuma et al13. in their study involved a sample of 746 mothers—with differentiation between recent and settled migrants. However, Mishra et al107. used a large, nationally representative sample of 199,448 children aged 12–59 months from the NFHS-4 data, where 33.1% were from migrant families and 67% were non-migrants in their study.

Savani et al98. studied (n=110) children and divided them into recent migrants (n=56) and settled migrants (n=54), where (41.81%) were in the age group of 12 to 24 months and remaining (58.2%) in the range of 24 to 60 months respectively. Comparative Demographic Characteristics of Children in Migration-related Immunization and Health Studies. In our study, there was a clear male predominance, with (64.7%) of the participants being boys and only (35.3%) girls, whereas Sharma et al116. study had a more concordant sample (n=8 males, n=9 females) and the Agarwal et al103. study also found a male predominance, but with a smaller difference (55.5%) males compared to 44.5% females). Kurkuri et al81. and Savani et al98. in their respective studies also had a male preponderance of (52.4%) and (56.36%) respectively. This skew could reflect either a higher number of male children in migrant families or possibly a gender bias in health-seeking behavior, where male children are prioritized for medical attention. In our study, migration patterns revealed that over half of the families (51.3%) had migrated within the last 2–3 years, while 28% had migrated within the past year, and 20.7% had been settled for over three years. The Agarwal et al103. study, on the other hand, showed that a significant proportion of migrants (51.5%) have been away from their native places for over 5 years followed by 2 to 5 years (26%) and less than 2 years (22.5%). The relatively recent migration status of most families may contribute to barriers in accessing consistent healthcare, including immunisation and nutritional services. In the current study, the majority of children (94.1%) were born in hospitals, and only a small proportion (5.9%) were delivered at home. This suggests that institutional deliveries are relatively well-utilized among migrant populations, possibly due to improved healthcare access, awareness, or governmental support for safe deliveries. Comparatively, in the Kusuma et al13. study, hospital deliveries were associated with higher immunization uptake, with children born in hospitals having an Adjusted Odds Ratio (AOR) of 1.95 for being fully immunized against seven VPDs compared to home births, whereas Savani et al98. observed institutional deliveries among 93.6% and remaining of home deliveries (6.4%) respectively which was consistent with our study.

In the present study, iron and folic acid (IFA) supplementation was fairly well covered, with (81.5%) of children receiving supplementation for six months as recommended. An additional 16% received IFA for a shorter period of three to four months, while only (2.5%) had not received any supplementation at all. This reflects good adherence to nutritional supplementation protocols among the majority of the study population. In our study, exclusive breastfeeding for the first six months was reported by (75.6%) of mothers, indicating a positive practice in line with global health recommendations, while in Sharma et al116. study, 58.8% of caregivers practiced exclusive breastfeeding for 6 months and Agarwal et al103. in their study observed 84% of children under two years of age were exclusively breastfed for the first six months. Pre-lacteal feeding was nearly nonexistent, with only one case reported in our study. However, timely initiation of complementary feeding at six months was observed in just over half (54.6%) of the children, while 43.7% experienced delayed introduction, potentially putting them at risk of nutritional deficiencies during a critical period of growth. Comparatively, 70.4% of caregivers initiated complementary feeding at or after 6 months, however, bottle-feeding was common, with (64.7%) in the Sharma et al116. study. In the current study, immunisation coverage was found to be suboptimal, with only 51.3% of children being up-to-date on their vaccines, and a significant (48.7%) being only partially immunised. The reasons for partial or non-immunisation revealed that (30.30%) of caregivers perceived vaccines as unimportant, 15.1% were unaware of available facilities, and 3.4% believed vaccines to be harmful. These findings underscore the urgent need for targeted educational interventions to improve immunisation awareness and acceptance in this community. Similarly, Abdalla et al113. reported a high coverage of immunisation, where (96.7%) children were up-to-date, 42.9% of non-compliance was due to belief that vaccines were unimportant and others cited side effects (14.3%) and parental refusal (14.3%) in their study respectively. At the same time, Kurkuri et al81.

observed 88.6% fully immunized, (11.40%) partially immunized, and no child was unimmunized, according to their study findings and multiple factors were identified as key reasons for partial immunization among children of migrant workers in their study. The most frequently cited barrier was the inconvenient timing of immunization sessions, reported by (80.7%) of parents, making it difficult for working families to access services. A significant proportion (77.19%) of respondents also demonstrated a lack of awareness about the overall need for immunization, indicating a critical gap in health education. Additionally, (75.44%) of parents reported that their busy work schedules prevented them from bringing their children for vaccination. Furthermore, (71.93%) were unaware of the importance of returning for subsequent doses, which highlights a breakdown in follow-up communication. Migration-related issues also played a substantial role, with (59.65%) citing frequent movement as a reason for missed immunizations in their study respectively.

Nath et al117. reported similarly low immunization rates among migrants, with only (24%) of children fully vaccinated and (76%) with partial immunization. The study pointed out that illiteracy (OR: 4.1), lack of awareness (92%) and fear of side effects (74%) were strong predictors of non-immunization, with cultural barriers and sociodemographic factors like religion (i.e., Muslim religion being associated with lower immunization rates) (OR: 4.1) playing a role in their study. At the same time, Similarly, the Agarwal et al103. study found that only (14.8%) of the children had a fully immunized status, and a striking (96.8%) lacked an immunization card. Kusuma et al13. found 81% full immunization among settled migrants but only (64%) among recent migrants (for six VPDs). This dropped to (60.2%) and (39.7%) respectively when including the 7th VPD. 5% received no vaccines as reported in their study.However, the CES-IMI 2018 survey reported a high full immunization rate of 93.3% among children118 . Similar to our study, Kumar P et al97. in Bihar recorded a full immunization rate of just (55.43%) among children aged 12–23 months. Similarly, Singh et al119. reported only 34.6% full immunization among children aged 12–60 months, while Gokhale CN et al120. observed a slightly higher rate of (36.1%). Other studies, such as those by Vaidya et al19., Anand S et al14. , and Sengupta et al15., reported even lower coverage rates of 20%, 30%, and 37.4%, respectively. In Savani et al93. study, a clear distinction was made between recent and settled migrants, with recent migrants having a significantly lower immunization rate (17.8%) compared to settled migrants (51.9%).

The multivariate analysis in Savani et al. (24) study found that recent migrants were 9 times less likely to be fully immunized than settled migrants (AOR 9.211).Regarding partial immunization, Geddam JB et al121. similarly identified lack of awareness as a major contributor to partial immunization, which they found to affect (38.7%) of children. On the other end of the spectrum, Dutta et al122. reported an exceptionally low partial immunization rate of just 0.6%, with the predominant reason being the parents' busy schedules. Fear of adverse reactions (60%) and inconvenient timing (52%) were among the leading reasons for incomplete or missed immunizations in Singh et al119. study. Furthermore, research by Pakhare et al16. emphasized that among migrant families, the most significant barrier to complete immunization was a lack of knowledge about the timing and location of vaccination services.In a study conducted by Luman et al114. , it was found that (75%) of parents refused immunization due to a belief in alternative treatments such as homeopathy, which they considered more effective than vaccines. Interestingly, some participants noted that these alternative methods often come with side effects themselves.

Additionally, a quarter of the respondents expressed doubts about the effectiveness of vaccines112. Other common reasons for vaccine hesitancy included religious convictions, personal or philosophical beliefs, and concerns about vaccine safety115. Moreover, maternal refusal emerged as a significant factor influencing whether children completed their immunization schedules, with this trend often linked to the mother's socio-demographic background114.In the present study, nutritional status, as measured by Mid Upper Arm Circumference (MUAC), showed that (7.6%) of the assessed children had values indicating undernutrition (<12.5 cm). Although only a portion of the total sample had MUAC measured, this finding suggests the presence of malnutrition within the population. Additionally, BMI assessment in our study revealed that only (26.9%) of children fell within the normal range, while 3.4% were underweight and 4.2% were severely underweight, highlighting the need for continued nutritional support and monitoring.

Comparatively, in the Agarwal et al103. study, among interstate migrant children, (31.7%) were underweight, and (25.7%) had Severe Acute Malnutrition (SAM), while 33.6% of intrastate migrants were underweight in their study. Also, in Chaudhari and Bandyopadhyay's104 study, malnutrition emerged as a major concern, with stunting in (64%), underweight in (45%), and wasting in (26%) of children, whereas in the Ambika et al105. study, malnutrition remained a major concern, with 24% of children severely stunted, (16%) severely underweight, and (12%) severely wasted, according to WHO growth standards. However, Mishra et al107. found a notable and somewhat counterintuitive pattern in child malnutrition, revealing that non-migrant children experienced higher levels of undernutrition compared to their migrant counterparts. Specifically, the prevalence of stunting was 44.2% among non-migrant children, significantly higher than the (37.4%) observed among migrant children. Similarly, underweight status was more common among non-migrants at (39.5%), compared to (32.8%) among migrant children in their study.

In the current study, health education through knowledge-attitude-practice (KAP) interventions was provided to (92.4%) of the participants. Only a small proportion (7.6%) received both health education and immunisation services during the visit. While the provision of education is a vital step, the low proportion of children receiving immediate immunisation highlights a gap in service delivery that requires attention through improved follow-up and outreach. Comparatively, Sharma et al116. in their study observed high levels of awareness (88.2%) and utilization (64.7%) of ICDS services and Nath et al117. also emphasized the importance of health education, but they found that only 46% of mothers in their survey utilized immunization services. Similarly, the Agarwal et al103. study reports low utilization of government health facilities, with only (2.2%) of interstate migrant families utilizing these services.

However, the majority of families in their studies relied on unqualified practitioners (50.8% in interstate migrants), showing a significant barrier to accessing proper healthcare and services. Despite (72%) of migrant families being aware of their nearest Anganwadi, only (42%) utilized growth monitoring services and 49% received nutritional supplements in the Ambika et al105. study. At the same time, Kusuma et al13. observed that postnatal visits by health workers significantly improved immunization outcomes (AOR = 3.16 for 7 VPDs) and Savani et al98. found that health worker visits during pregnancy were common, with over (89%) of recent migrants receiving such visits, indicating the importance of health workers in promoting immunization. In the present study, the findings collectively point to a complex interplay of adequate awareness in certain domains—such as breastfeeding and institutional deliveries alongside significant gaps in immunisation coverage, complementary feeding practices, and nutritional status. These insights emphasize the importance of tailored, sustained public health interventions that specifically address the needs of migrant populations and bridge the healthcare access gap for their children.

CONCLUSION

The present study highlights key health concerns among children of migrant families attending a tertiary care hospital. While encouraging trends were observed in institutional deliveries (94.1%) and exclusive breastfeeding practices (75.6%), significant challenges persist. Nearly half (48.7%) of the children were only partially immunized, with common reasons including lack of awareness (15.1%), belief that vaccines are unimportant (30.3%), and fear of harm (3.4%). Nutritional assessments showed that (7.6%) had MUAC values indicating undernutrition, and 7.6% were underweight or severely underweight based on BMI. These findings underscore the ongoing vulnerabilities faced by migrant children and point to a need for strengthened outreach, education, and continuity of care.

Study limitations

Our study had some limitations. Firstly, it was conducted in a single tertiary care hospital, which may limit the generalizability of the results to the broader migrant population in other regions or healthcare settings. Additionally, recall bias could have influenced responses related to breastfeeding, immunization history, and IFA supplementation, especially when caregivers were asked to recall events from several months or years earlier. Lastly, the study did not evaluate the socioeconomic status or parental education levels, which could be significant determinants of healthcare access and child health outcomes in migrant populations.

Recommendations

Based on the study findings, several key recommendations can be made. Firstly, targeted immunization drives should be conducted within migrant communities to address misconceptions and improve coverage. Mobile health units and outreach camps can help bridge the access gap, particularly for newly settled or frequently migrating families. Secondly, regular nutritional screening and supplementation programs should be strengthened, especially for children under five. Incorporating community health workers to provide door-to-door education on breastfeeding, complementary feeding, and vaccine awareness can foster sustained behavior change. Finally, the integration of migrant health needs into broader national child health programs and policies is crucial to ensure

Conflict of interest and ethical clearance

There is no conflict of interest; an institutional ethical clearance was obtained from the IRB.

Acknowledgement

The author expresses gratitude to the Dean and other faculty members of the department for their continuous encouragement and for reviewing the data.

REFERENCES

1. Gushulak BD, Weekers J, MacPherson DW. Migrants and emerging public health issues in a globalized world: threats, risks and challenges—an evidence-based framework. Emerg Health Threats J. 2009;2:e10.
2. Ministry of Finance, Government of India. Economic survey 2016–17. India on the move and churning: new evidence. New Delhi: Government of India; 2017. p. 264–75. Available from: https://www.indiabudget.gov.in/budget2017-2018/es2016-17/echapter.pdf
3. Young Lives India, UNICEF India. Understanding child migration in India. New Delhi: UNICEF India; 2020. p. 103. Available from: https://www.unicef.org/india/media/3421/file/Child.migration.India2020.pdf
4. Thorat YSP, Jones H. Remittance needs and opportunities in India. New Delhi: National Bank for Agriculture and Rural Development and GTZ; 2011.
5. Mosse D, Gupta S, Mehta M, Shah V, Rees J. Brokered livelihoods: debt, labour migration and development in tribal Western India. J Dev Stud. 2002;38:59–88.
6. Zeitlyn B, Deshingkar P, Holtom B. Internal and regional migration for construction work: a research agenda [Internet]. University of Sussex; 2014 May [cited 2025 Apr 16]. Available from: https://sussex.figshare.com/articles/report/Internal_and_regional_migration_for_construction_work_a_research_agenda/23407709/1
7. Betancourt TS, Shaahinfar A, Kellner SE, Dhavan N, Williams TP. A qualitative case study of child protection issues in the Indian construction industry: investigating the security, health, and interrelated rights of migrant families. BMC Public Health [Internet]. 2013 Sep 17 [cited 2025 Apr 16];13(1):858. Available from: https://doi.org/10.1186/1471-2458-13-858
8. Coffey D. Children's welfare and short-term migration from rural India. J Dev Stud. 2013;49(8):1101–17.
9. Rogaly B. Workers on the move: seasonal migration and changing social relations in rural India. Gend Dev. 1998;6(1):21–9.
10. Breman J. Footloose labour. Cambridge: Cambridge University Press; 1996.
11. Choudhary N, Parthasarathy D. Is migration status a determinant of urban nutrition insecurity? Empirical evidence from Mumbai City. J Biosoc Sci. 2009;41:583–605.
12. Sengupta P, Benjamin AI, Myles PR, Babu BV. Evaluation of a community-based intervention to improve routine childhood vaccination uptake among migrants in urban slums of Ludhiana, India. J Public Health (Bangkok). 2016;39(4):805–12.
13. Kusuma YS, Kumari R, Pandav CS, Gupta SK. Migration and immunization: determinants of childhood immunization uptake among socioeconomically disadvantaged migrants in Delhi, India. Trop Med Int Health. 2010;15(11):1326–32.
14. Prusty RK, Keshri K. Differentials in child nutrition and immunization among migrants and non-migrants in urban India. Int J Migr Health Soc Care. 2015;11(3):194–205.
15. Mishra S, Kusuma YS, Babu BV. Immunization uptake among children of a migrant tribal community living in an eastern Indian city. J Pediatr Sci. 2013;5:5–10.
16. Pakhare AP, Pawar R, Lokhande GS, Datta SS. Does seasonal migration for sugarcane harvesting influence routine immunization coverage? A cross-sectional study from rural Maharashtra. Indian J Public Health. 2014;58(2):12–6.
17. Immunization [Internet]. [cited 2025 Apr 17]. Available from: https://www.who.int/news-room/facts-in-pictures/detail/immunization
18. Government of India. Ministry of Health and Family Welfare. Immunization: Mission Indradhanush Guidelines. 2014.
19. Vaidya VM, Hanumante NM, Joshi AM, Mahajan S. Immunization status of under-five children in migrants from peri-urban areas of Pune. Natl J Community Med. 2013;4:457–60.

20. Kusuma YS. Migration and health: a systematic review on health and access to health care among internal migrants in India. Int J Health Plann Manage. 2010;25(2):113–35.
21. Awoh AB, Plugge E. Immunization coverage in rural–urban migrant children in low and middle-income countries (LMICs): a systematic review and meta-analysis. J Epidemiol Community Health. 2016;70(3):305–11.
22. Savani M, Chokshi M. Barriers to immunization among migrant populations: insights from India. BMC Public Health. 2023;23(1):567.
23. Kumar D, Aggarwal A, Ghosh S. Immunization status of children in brick kiln settlements in Bihar: a cross-sectional study. Indian Pediatr. 2020;57(8):732–6.
24. Anand S. Inequities in immunization coverage among migrant and non-migrant children in India. Health Policy Plan. 2014;29(6):658–70.
25. Agarwal R, Srivastava A. Nutritional assessment of migrant children in peri-urban Lucknow: a public health concern. J Trop Pediatr. 2023;69(2):fmad011.
26. Chaudhari P. Malnutrition among children of migrant workers in Hooghly district: a cross-sectional analysis. Indian J Community Med. 2024;49(1):23–8.
27. Akkiraju N, Bhatt A. Nutritional status and associated factors among children in urban slums of Delhi: a focus on migrants. J Public Health (Berl.). 2024. doi:10.1007/s10389-024-01943-2.
28. Ravindranath D. Environmental health and child nutrition among urban poor in India. Environ Urban. 2019;31(1):207–24.
29. Ambika R, Nair M. Health vulnerabilities among seasonal migrants in India: a case for inclusive policy. Soc Med. 2025;19(1):45–52.
30. Prusty RK, Kumar A. Socioeconomic dynamics of immunisation and undernutrition in India: a district-level analysis. PLoS One. 2015;10(11):e0143417.
31. Shankar Mishra P. Interrelation of malnutrition and immunisation among under-five children: implications for public health. Indian J Pediatr. 2022;89(10):923–30.
32. Bouaddi M. Barriers to accessing maternal and child healthcare among migrant communities: evidence from South Asia. Glob Health Action. 2024;17(1):2271904.
33. Jain R, Agarwal K. Evaluating the impact of Mission Indradhanush on immunization among hard-to-reach populations. Indian J Public Health. 2024;68(1):33–9.
34. Lyons T. Immunisation strategies for mobile and migrant populations: lessons from India's UIP. Vaccine. 2024;42(2):284–91.
35. Rojas-Venegas M, Salazar-Gonzalez R, Paredes A. Vaccine access among migrant populations: a global systematic review and meta-analysis. Lancet Glob Health. 2022;10(12):e1780–90.
36. Gross CP, Sepkowitz KA. The myth of the medical breakthrough: Smallpox, vaccination, and Jenner reconsidered. International Journal of Infectious Diseases [Internet]. 1998 Jul [cited 2025 Apr 17];3(1):54–60. Available from: https://linkinghub.elsevier.com/retrieve/pii/S1201971298900960
37. Riedel S. Edward jenner and the history of smallpox and vaccination. Baylor University Medical Center Proceedings [Internet]. 2005 Jan 1 [cited 2025 Apr 17];18(1):21–5. Available from: https://www.tandfonline.com/doi/full/10.1080/08998280.2005.11928028
38. Willis NJ. Edward jenner and the eradication of smallpox. Scott Med J [Internet]. 1997 Aug [cited 2025 Apr 17];42(4):118–21. Available from: https://journals.sagepub.com/doi/10.1177/003693309704200407
39. Malacrida LM. F. Fenner, d. A. Henderson, i. Arita, z. Jezek, i. D. Ladnyi, smallpox and its eradication. Geneva, world health organization 1988, 1464 pp. Nuncius [Internet]. 1989 [cited 2025 Apr 17];4(2):343–5. Available from: https://brill.com/view/journals/nun/4/2/article-p343_41.xml
40. Plotkin SL, Plotkin SA. A short history of vaccination. In: Vaccines [Internet]. Elsevier; 2013 [cited 2025 Apr 17]. p. 1–13. Available from: https://linkinghub.elsevier.com/retrieve/pii/B9781455700905000173
41. Pearce JMS. Salk and Sabin: poliomyelitis immunisation. Journal of Neurology, Neurosurgery & Psychiatry [Internet]. 2004 Nov 1 [cited 2025 Apr 17];75(11):1552–1552. Available from: https://jnnp.bmj.com/lookup/doi/10.1136/jnnp.2003.028530
42. Chang MH, Chen CJ, Lai MS, Hsu HM, Wu TC, Kong MS, et al. Universal hepatitis b vaccination in taiwan and the incidence of hepatocellular carcinoma in children. N Engl J Med [Internet]. 1997 Jun 26 [cited 2025 Apr 17];336(26):1855–9. Available from: http://www.nejm.org/doi/abs/10.1056/NEJM199706263362602
43. Takeuchi O, Akira S. Pattern recognition receptors and inflammation. Cell [Internet]. 2010 Mar [cited 2025 Apr 17];140(6):805–20. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0092867410000231
44. Sallusto F, Lenig D, Förster R, Lipp M, Lanzavecchia A. Two subsets of memory T lymphocytes with distinct homing potentials and effector functions. Nature [Internet]. 1999 Oct [cited 2025 Apr 17];401(6754):708–12. Available from: https://www.nature.com/articles/44385
45. Sakaguchi S, Yamaguchi T, Nomura T, Ono M. Regulatory t cells and immune tolerance. Cell [Internet]. 2008 May [cited 2025 Apr 17];133(5):775–87. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0092867408006247

46. Dinarello CA. Historical insights into cytokines. Eur J Immunol [Internet]. 2007 Nov [cited 2025 Apr 17];37(S1):S34–45. Available from: https://onlinelibrary.wiley.com/doi/10.1002/eji.200737772
47. O'Garra A, Vieira P. TH1 cells control themselves by producing interleukin-10. Nat Rev Immunol [Internet]. 2007 Jun [cited 2025 Apr 17];7(6):425–8. Available from: https://www.nature.com/articles/nri2097
48. Feldmann M. Many cytokines are very useful therapeutic targets in disease. J Clin Invest [Internet]. 2008 Nov 3 [cited 2025 Apr 17];118(11):3533–6. Available from: http://www.jci.org/articles/view/37346
49. Fine P, Eames K, Heymann DL. 'Herd immunity': a rough guide. Clinical Infectious Diseases [Internet]. 2011 Apr 1 [cited 2025 Apr 17];52(7):911–6. Available from: https://academic.oup.com/cid/article-lookup/doi/10.1093/cid/cir007
50. Pulendran B, Ahmed R. Immunological mechanisms of vaccination. Nat Immunol [Internet]. 2011 Jun [cited 2025 Apr 17];12(6):509–17. Available from: https://www.nature.com/articles/ni.2039
51. Minor PD. Live attenuated vaccines: Historical successes and current challenges. Virology [Internet]. 2015 May [cited 2025 Apr 17];479–480:379–92. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0042682215001725
52. Vidor E, Plotkin SA. Immunogenicity of a two-component (Pt&fha) acellular pertussis vaccine in various combinations. Human Vaccines [Internet]. 2008 Sep [cited 2025 Apr 17];4(5):328–40. Available from: http://www.tandfonline.com/doi/abs/10.4161/hv.4.5.6008
53. Orenstein WA, Ahmed R. Simply put: Vaccination saves lives. Proc Natl Acad Sci USA [Internet]. 2017 Apr 18 [cited 2025 Apr 17];114(16):4031–3. Available from: https:/pnas.org/doi/full/10.1073/pnas.1704507114
54. Bryant KA, Marshall GS. haemophilus influenzae type b– neisseria meningitidis serogroups c and y tetanus toxoid conjugate vaccine for infants and toddlers. Expert Review of Vaccines [Internet]. 2011 Jul [cited 2025 Apr 17];10(7):941–50. Available from: http://www.tandfonline.com/doi/full/10.1586/erv.11.90
55. Relyveld E. Rational approaches to reduce adverse reactions in man to vaccines containing tetanus and diphtheria toxoids*1. Vaccine [Internet]. 1998 May [cited 2025 Apr 17];16(9–10):1016–23. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0264410X97002880
56. Pardi N, Hogan MJ, Weissman D. Recent advances in mRNA vaccine technology. Current Opinion in Immunology [Internet]. 2020 Aug [cited 2025 Apr 17];65:14–20. Available f
57. Wolff JA, Malone RW, Williams P, Chong W, Acsadi G, Jani A, et al. Direct gene transfer into mouse muscle in vivo. Science [Internet]. 1990 Mar 23 [cited 2025 Apr 17];247(4949):1465–8. Available from: https://www.science.org/doi/10.1126/science.1690918rom: https://linkinghub.elsevier.com/retrieve/pii/S0952791520300108
58. Zhu FC, Guan XH, Li YH, Huang JY, Jiang T, Hou LH, et al. Immunogenicity and safety of a recombinant adenovirus type-5-vectored COVID-19 vaccine in healthy adults aged 18 years or older: a randomised, double-blind, placebo-controlled, phase 2 trial. The Lancet [Internet]. 2020 Aug [cited 2025 Apr 17];396(10249):479–88. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0140673620316056
59. Holwell JZ. An account of the manner of inoculating for the small pox in the East Indies: with some observations on the practice and mode of treating that disease in those parts. London: T Becket, PA De Hondt; 2016.
60. Lahariya C. A brief history of vaccines and vaccination in India. Indian J Med Res. 2014;139:491-511.
61. Bhattacharya S, Harrison M, Worboys M. Fractured states: smallpox, public health and vaccination policy in British India 1800-1947. India: Orient Longman; 200
62. Brimnes N. Another vaccine, another story: BCG vaccination against tuberculosis in India, 1948 to 1960. Cien Saude Colet. 2011;16:397-407.
63. World Health Organization. A brief history of tuberculosis control in India. Geneva: WHO Press; 2010.
64. Bhushan K. Assessment of BCG vaccination in India: third report. Indian J Med Res. 2013;137:571.
65. Tuberculosis Research Centre (ICMR). Fifteen year follow up of trial of BCG vaccines in south India for tuberculosis prevention. Indian J Med Res. 1999;110:56-69.
66. UNICEF. National Factsheet Coverage Evaluation Survey. India: UNICEF; 2010.
67. Marennikova SS. How it was: The global smallpox eradication program in reminiscences of its participants. Novosibirsk: CERIS; 2018.
68. Bhattacharya S, Dasgupta R. Smallpox and polio eradication in India: comparative histories and lessons for contemporary policy. Cien Saude Colet. 2011;16:433-44.
69. Plotkin S. History of vaccination. Proc Natl Acad Sci USA [Internet]. 2014 Aug 26 [cited 2025 Apr 17];111(34):12283–7. Available from: https://pnas.org/doi/full/10.1073/pnas.1400472111
70. The universal immunisationprogramme in india [Internet]. Centre for Public Impact. 2017 [cited 2025 Apr 17]. Available from: https://centreforpublicimpact.org/public-impact-fundamentals/the-universal-immunisation-programme-in-india/
71. Government of India, Ministry of Home Affairs, Departments of Internal Security, States and Home. Annual report 1991–1992. India: Government of India; 1992.
72. Immunization :: national health mission [Internet]. [cited 2025 Apr 17]. Available from: https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=824&lid=220

73. Health & family welfare department, government of tamilnadu [Internet]. [cited 2025 Apr 17]. Available from: https://tnhealth.tn.gov.in/tngovin/dph/dphpm.php
74. Babu GR, Mugali RR, Singh V. Vaccines and Immunization: An integral aspect of universal health coverage. 13th ed.
75. Ministry of Health and Family Welfare, Government of India. Intensified Mission Indradhanush 2.0: Transforming India's Universal Immunisation Program. New Delhi: Government of India; 2019.
76. Ministry of Health and Family Welfare, Government of India. National Vaccination Day (March 16) Mission Indradhanush: Ensuring full immunization coverage to children and women [Internet]. 2023 [cited 2025 Apr 17]. Available from: https://www.mohfw.gov.in/
77. Mission indradhanush (Mi) | india science, technology & innovation - isti portal [Internet]. [cited 2025 Apr 17]. Available from: https://www.indiascienceandtechnology.gov.in/st-visions/national-mission/mission-indradhanush-mi?utm_medium=email&utm_source=transaction
78. Intensified mission indradhanush [Internet]. [cited 2025 Apr 17]. Available from: https://pib.gov.in/pib.gov.in/Pressreleaseshare.aspx?PRID=1602362
79. Ministry of Health and Family Welfare, Government of India. Universal Immunization Programme (UIP). New Delhi: MoHFW; 2022.
80. Ministry of Health and Family Welfare, Government of India. Immunization Program. New Delhi: MoHFW; 2021.
81. Kurkuri SN, Subramanian M. Immunization status of children 12-36 months age of migrant workers and factors associated with it in urban areas of bangalore east. Indian J Community Med. 2024;49(1):104–9.
82. NITI Aayog. Strategy for New India @75. New Delhi: Government of India; 2019.
83. Olsen EM, Petersen J, Skovgaard AM, Weile B, Jorgensen T, Wright CM. Failure to thrive: the prevalence and concurrence of anthropometric criteria in a general infant population. Archives of Disease in Childhood [Internet]. 2006 Mar 10 [cited 2025 Apr 17];92(2):109–14. Available from: https://adc.bmj.com/lookup/doi/10.1136/adc.2005.080333
84. Mehta NM, Corkins MR, Lyman B, Malone A, Goday PS, Carney L (Nieman), et al. Defining pediatric malnutrition: a paradigm shift toward etiology-related definitions. J Parenter Enteral Nutr [Internet]. 2013 Jul [cited 2025 Apr 17];37(4):460–81. Available from: https://aspenjournals.onlinelibrary.wiley.com/doi/10.1177/0148607113479972
85. Grover Z, Ee LC. Protein energy malnutrition. Pediatric Clinics of North America [Internet]. 2009 Oct [cited 2025 Apr 17];56(5):1055–68. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0031395509000868
86. Koletzko B. Pediatric nutrition in practice. In: World Review of Nutrition and Dietetics. Vol. 113. Basel: Karger; 2015. p. 139–146.
87. Ahmed T, Michaelsen KF, Frem JC, Tumvine J. Malnutrition: report of the fispghan working group. J pediatr gastroenterol nutr [Internet]. 2012 Nov [cited 2025 Apr 17];55(5):626–321. Available from: https://onlinelibrary.wiley.com/doi/10.1097/MPG.0b013e318272b600
88. Swaminathan M. Essential of Food and Nutrition. Vol. 1. Bangalore: The Bangalore Printing and Publishing Co. Ltd.; 2000.
89. Jelliffe DB. Assessment of the nutritional status of the community. Geneva: World Health Organization; 1966. (WHO Monograph Series No. 53)
90. Kapil U, Pradhan R. Integrated Child Development Services scheme (ICDS) and its impact on nutritional status of children in India and recent initiatives. Indian J Public Health. 1999;43(1):21-5.
91. Svedberg P. Poverty and undernutrition: theory, measurement, and policy. Oxford: Oxford University Press; 2000. Available from: https://academic.oup.com/book/1453
92. de Onis M, Dewey KG, Borghi E, et al. The World Health Organization's global target for reducing childhood stunting by 2025: rationale and proposed actions. Matern Child Nutr. 2013;9(Suppl 2):6–26.
93. Ravindranath D, Trani JF, Iannotti L. Nutrition among children of migrant construction workers in Ahmedabad, India. International Journal for Equity in Health [Internet]. 2019 Sep 17 [cited 2025 Apr 17];18(1):143. Available from: https://doi.org/10.1186/s12939-019-1034-y
94. Oderinde TM, Ilesanmi OS, Afolabi AA. Food insecurity and associated factors among households with under-5 children in slum communities in Ibadan, Nigeria. BMC Public Health [Internet]. 2023 Nov 2 [cited 2025 Apr 17];23(1):2144. Available from: https://doi.org/10.1186/s12889-023-17051-2
95. Patel KA, Langare SD, Naik JD, Rajderkar SS. Gender inequality and bio-social factors in nutritional status among under five children attending anganwadis in an urban slum of a town in Western Maharashtra, India. J Res Med Sci. 2013 Apr;18(4):341–5.
96. Anand S, Verma P, Sinha U, Mahawar P. Evaluation of primary immunization coverage in migratory versus non-migratory labour population of urban area in Bhopal city. Pediatric Oncall Journal [Internet]. [cited 2025 Apr 17];11(2):36–9. Available from: https://www.pediatriconcall.com/pediatric-journal/view/fulltext-articles/Evaluation of primary immunization coverage in migratory versus non-migratory labour population of urban area in Bhopal city/J/0/0/450/0

97. Kumar P, Ranjan A, Kumar D, Pandey S, Singh CM, Agarwal N. Factors associated with Immunisation coverage in children of migrant brick kiln workers in selected districts of Bihar, India. Indian Journal of Community Health [Internet]. 2020 Mar 31 [cited 2025 Apr 17];32(1):91–6. Available from: https://iapsmupuk.org/journal/index.php/IJCH/article/view/1374
98. Savani NM, Gurjar Y, Lodha N, Nathwani R. Uptake of immunization and its determinants among children of migrant population residing in amreli, gujarat, india. Pediatric Infectious Disease [Internet]. 2023 Dec 14 [cited 2025 Apr 17];5(4):114–9. Available from: https://www.pidjournal.com/doi/10.5005/jp-journals-10081-1411
99. Mishra PS, Choudhary PK, Anand A. Migration and child health: Understanding the coverage of child immunization among migrants across different socio-economic groups in India. Children and Youth Services Review [Internet]. 2020 Dec 1 [cited 2025 Apr 119:105684. Available from: https://www.sciencedirect.com/science/article/pii/S0190740920321071
100. Rojas-Venegas M, Cano-Ibáñez N, Khan KS. Vaccination coverage among migrants: A systematic review and meta-analysis. Medicina de Familia SEMERGEN [Internet]. 2022 Mar 1 [cited 2025 Apr 17];48(2):96–105. Available from: https://www.sciencedirect.com/science/article/pii/S1138359321003452
101. Awoh AB, Plugge E. Immunisation coverage in rural–urban migrant children in low and middle-income countries (Lmics): a systematic review and meta-analysis. J Epidemiol Community Health [Internet]. 2016 Mar 1 [cited 2025 Apr 17];70(3):305–11. Available from: https://jech.bmj.com/content/70/3/305
102. Lyons C, Nambiar D, Johns NE, Allorant A, Bergen N, Hosseinpoor AR. Inequality in childhood immunization coverage: a scoping review of data sources, analyses, and reporting methods. Vaccines [Internet]. 2024 Jul 29 [cited 2025 Apr 17];12(8):850. Available from: https://www.mdpi.com/2076-393X/12/8/850
103. Agarwal M, Jauhari S, Chaturvedi R. Health of migrants' children living in lucknow city: a community-based study. Int J Health Sci Res [Internet]. 2023 Apr 21 [cited 2025 Apr 17];13(4):163–9. Available from: https://www.ijhsr.org/IJHSR_Vol.13_Issue.4_April2023/IJHSR20.pdf
104. Chaudhari A, Bandyopadhyay L. Ijcm_322a: a study on nutritional status and its determinants among under-five children in brick-kilns of a rural area of hooghly district, west bengal. Indian Journal of Community Medicine [Internet]. 2024 Apr [cited 2025 Apr 17];49(Suppl 1):S93–S93. Available from: https://journals.lww.com/10.4103/ijcm.ijcm_abstract322
105. Ambika RB, George S, Olickal JJ, Manuel AX, Suseela RP. Nutritional status of under-5 children in migrant laborer settlements of ernakulam district, kerala, southern india – a mixed method study. Indian Journal of Community Medicine [Internet]. 2025 Jan 30 [cited 2025 Apr 17]; Available from: https://journals.lww.com/10.4103/ijcm.ijcm_750_23
106. 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. International Journal Of Community Medicine And Public Health [Internet]. 2024 Feb 29 [cited 2025 Apr 17];11(3):1166–72. Available from: https://www.ijcmph.com/index.php/ijcmph/article/view/12146
107. Shankar Mishra P, Jamadar M, Tripathy A, Anand A. Understanding the socio-economic vulnerability in child malnutrition between migrants and non-migrants children (12–59 Months) in india: evidence from a cross-sectional study. Child Ind Res [Internet]. 2022 Oct [cited 2025 Apr 17];15(5):1871–88. Available from: https://link.springer.com/10.1007/s12187-022-09943-3
108. Jain M, Duvendack M, Shisler S, Parsekar SS, Leon MDA. Effective interventions for improving routine childhood immunisation in low and middle-income countries: a systematic review of systematic reviews. BMJ Open [Internet]. 2024 Feb 1 [cited 2025 Apr 17];14(2):e074370. Available from: https://bmjopen.bmj.com/content/14/2/e074370
109. Sontakke P, N. A, Kumawat H, Jain P, Sontakke V. A review on Indian national vaccine policy. Int J Community Med Public Health [Internet]. 2016 [cited 2025 Apr 17];592–7. Available from: http://ijcmph.com/index.php/ijcmph/article/view/759
110. Kulkarni S, Thampi V, Deshmukh D, Gadhari M, Chandrasekar R, Phadke M. Trends in urban immunization coverage in india: a meta-analysis and meta-regression. Indian J Pediatr [Internet]. 2023 Jan [cited 2025 Apr 17];90(1):38–48. Available from: https://link.springer.com/10.1007/s12098-021-03843-0
111. Butler R. Vaccine Hesitancy: What it means and what we need to know in order to tackle it. J of Vaccine 2016; 34. Available from: https://www. who.int/immunization/research/forums_and_initiatives/1_RButler_VH_Threat_Child_Health_ gvirf16.pdf.
112. Lim WY, Amar-Singh HSS, Jeganathan N, Rahmat H, Mustafa NA, Mohd Yusof FS, Rahman RS, Itam CH, Chan J, Lee A. Exploring immunisation refusal by parents in the Malaysian context. Cogent Medicine. 2016;3(1).
113. Abdalla SM, Ahmad MS, Saleem Al-Baradie NR, Mohammed Alshuwaish LA, Ahmad Al-Issa RA, Suwaylih Alrashidi SN. Assessment of parent knowledge and perception towards the importance of child immunization in Sudair region, Saudi Arabia. Eur Rev Med Pharmacol Sci. 2022;26(6):1803-1808.
114. Luman ET, McCauley MM, Shefer A, Chu SY. Maternal characteristics associated with vaccination of young children. Pediatrics. 2003;111(5):1215-8.

115. McKee C, Bohannon K. Exploring the reasons behind parental refusal of vaccines. J Pediatr Pharmacol Ther. 2016;21(2):104-9.
116. Sharma N, Basu S, Manna S, Sharma P, Rao S, Duggal K, Kaur H, Kumar P, Malik ST. Health-Seeking Behaviour for Childhood Ailments in Caregivers of Under-Five Children in an Urban Resettlement Colony in Delhi, India. Cureus. 2022 Apr 23;14(4):e24404.
117. Nath L, Kaur P, Tripathi S. Evaluation of the universal immunization program and challenges in coverage of migrant children in Haridwar, Uttarakhand, India. Indian J Community Med 2015;40:239-45.
118. Government of India. Ministry of health and family welfare. Immunization Division: Intensified Mission Indradhanush Coverage Evaluation Survey. 2018 Jan. 2017. Available from: https://www.nhm.gov.in/New_Updates_2018/NHM_Components/Immunization/Guildelines_for_immunization/IMI_CES_Survey_Report.pdf. [Last accessed on 2025 Apr 12].
119. Singh N, Rawat CMS. Assessment of immunization status of under five children in migrants of Haldwani block, District Nainital. Indian J Appl Rev 2018;7:231 2.
120. Gokhale CN, Shanbhag SS, Shinde RR. A cross sectional review of immunization status of under five children amongst brick kiln workers' settlements. Indian J Appl Rev 2018;7:277 9.
121. Geddam JB, Kommu PR, Ponna SN, Mamidi RS, Kokku SB, Dudala SR, et al. Immunization uptake and its determinants among the internal migrant population living in nonnotified slums of Hyderabad city. J Fam Med Prim Care 2018;7:796 803.
122. Dutta R, Dekal P, Jain T, Jeyapal DR, Sivakumar K, Ramachandran A. Primary immunization coverage among Migrant children in the age group of 12 to 23 months in Sriperumbudur Taluk, Kanchipuram District. Indian J Comm Health 2017;29:114 7.