

## Original Research Article

# Evaluation of Complete Immunization Coverage and Effect of Migratory Factors on Immunization Coverage of Children Residing at Construction Sites in Rajkot City, Gujarat

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### ABSTRACT

**Background:** Immunization is one of the most effective public health interventions, yet children of migrant construction workers often remain under-immunized due to unique socio-demographic and logistical barriers. This study aimed to evaluate complete immunization coverage and examine the effect of migratory factors on immunization among children residing at construction sites in Rajkot city, Gujarat.

**Material and methods:** A cross-sectional study was conducted in 2019 in the field practice area of a community medicine department under Rajkot Municipal Corporation. A total of 244 children residing at construction sites were surveyed using a semi-structured questionnaire. Data on sociodemographic, immunization status, and migration history were collected and analyzed using appropriate statistical tests.

**Results:** Full immunization coverage among the study population was 39.75%, while complete immunization coverage was 30.33%. Zero-dose prevalence was 12.7%. A statistically significant association was observed between immunization coverage and factors such as gender ( $p=0.00$ ), birth order ( $p=0.00$ ), and number of migrations ( $p=0.00$ ), while place of migration showed no significant effect ( $p=0.23$ ). The most common barriers to immunization were parental unawareness about vaccination sites (33.20%) and schedules (23.77%), followed by fear of wage loss due to post-vaccination illness (19.67%).

**Conclusion:** Children of migrant construction workers in Rajkot city have considerably lower immunization coverage compared to district and national averages. Strengthening mobile outreach, increasing parental awareness, flexible session timings, and introducing incentives to offset wage loss could significantly improve immunization uptake among this vulnerable population.

**Keywords:** Immunization, Construction site, Migration, Zero-dose

## INTRODUCTION

Immunization is a cornerstone of public health. It is recognized as one of the most successful and cost-effective

intervention to prevent morbidity and mortality due to vaccine-preventable diseases (VPDs) like tuberculosis, measles, polio, hepatitis B, diphtheria, and pertussis. <sup>1,2</sup> The World Health Organization (WHO) estimates that Globally in 2023, there were 14.5 million children missing

out on any vaccination – so-called zero-dose children and coverage of a third dose of vaccine protecting against diphtheria, tetanus, and pertussis (DTP3) was 84%.<sup>3</sup>

India, despite its extensive Universal Immunization Programme (UIP), still faces challenges in reaching full coverage. According to the Rapid Survey on Children (2013–14), only 65.5% of children were fully immunized, while the recent National Family Health Survey (NFHS-5, 2019–21) reported improved coverage of 62 % nationally, 76 % in Gujarat and 84.9% in Rajkot district.<sup>4,5</sup>

India's rapid urbanization and industrial expansion have increased migration from rural to urban areas. Construction is one of the fastest-growing sectors and employs a large number of migrant workers who frequently relocate based on project needs.<sup>6</sup> These workers often live in informal settlements near construction sites with poor access to basic amenities and healthcare. Their children, who are especially vulnerable, face significant barriers to accessing immunization services, including parental unawareness, logistical challenges, and a lack of integration into local health systems.<sup>7</sup>

The health disparities faced by migrant families are well documented, with children often missing scheduled immunizations, resulting in increased susceptibility to VPDs.<sup>8</sup> A study in Delhi reported that only 64.3% of migrant children were fully immunized, highlighting the public health challenge posed by migration.<sup>9</sup> all the data pertaining to immunization is mostly available in the form of full immunization coverage which are the doses up to one year but very limited data is available related to complete immunization which includes further doses of vaccines.

In Rajkot city, located in the Saurashtra region of Gujarat, construction activity has expanded significantly in the past decade, attracting a growing population of migrant laborers. According to the 2011 Census, Gujarat had a migration population of 3.3 million.<sup>10</sup> However, there is limited data on the immunization status of children residing at construction sites in this region. Given the unique vulnerabilities of this population, this study was conducted to assess the immunization coverage among children of construction workers in Rajkot city and to explore the barriers to complete immunization in this group.

## MATERIAL AND METHODS

A cross-sectional study conducted in the year of 2019 in the field practice area of community medicine department of medical college hospital in Rajkot municipal Corporation limit. After surveying the construction sites of field practice area and surrounding housing of construction site workers, total 244 children were found for data collection. Data was collected in semi structured questionnaire. Ethical clearance was taken from institutional ethical committee and consent of parents were taken before completing questionnaire.

All the collected data were entered in Microsoft excel. Qualitative data was entered as number and proportion and quantitative data was entered as mean and standard deviation. Appropriate statistical test was applied to find out level of significance and following definitions were used to establish full and complete immunization coverage.

Full immunization:

As per the Indian UIP, a child is considered fully immunized if they have received the following vaccines by the age of 12 months: One dose of BCG, Three doses of Pentavalent vaccine, Three doses of Oral Polio Vaccine (OPV) (excluding birth dose), One dose of Measles or Measles-Rubella (MR) vaccine.<sup>11</sup>

Complete immunization:

Complete immunization refers to a child having received all primary vaccines recommended under the UIP by 24 months of age, including: One dose of BCG, Three doses of Pentavalent vaccine, Three doses of OPV (excluding birth dose), Two doses of Measles-Rubella (MR) at , One dose of JE (in endemic areas), One dose of IPV (in applicable states), Booster doses of DPT and OPV at 16–24 months.<sup>12</sup>

Zero dose children

Under India's UIP, zero-dose children are defined as those who have not received even the first dose of DPT or Pentavalent vaccine by the age of 12 months. They represent children who are completely missed by immunization services.<sup>13</sup>

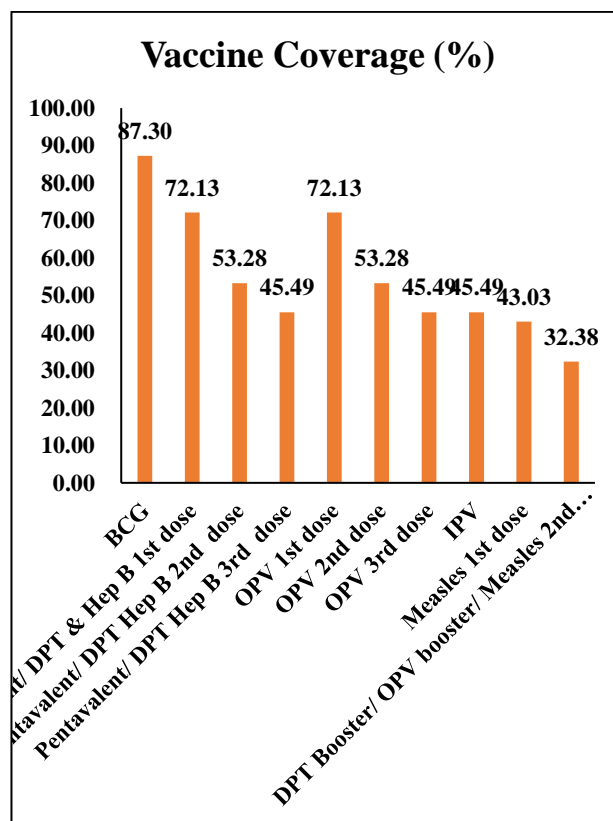
## RESULTS

Immunization coverage was assessed in 244 children who were residing at the construction sites. Data was collected for vaccines for both full and complete immunization status and following results were obtained.

**Table-1: Sociodemographic, delivery and migratory profile of Children**

	n (N=244)	Percentage
<b>Sex</b>		
Male	115	47.13
Female	129	52.87
<b>Birth order</b>		
1	47	19.26
2	113	46.31
3	57	23.36
4	27	11.07
<b>Delivery place</b>		
Govt	218	89.34
Private	17	6.97
Home	9	3.69
<b>Religion</b>		
Hindu	242	99.18
Muslim	2	0.82
<b>Socioeconomic class</b>		
1	0	0.00
2	0	0.00
3	121	49.59
4	123	50.41
<b>Presence of Mamta/ other immunization card</b>		
Yes, card seen	55	22.54
Yes, card not seen	104	42.62
No	85	4.84
<b>Number of Migration</b>		
1	19	7.78
2	78	31.97
3	89	36.47
4	31	12.70
≥5	27	11.06

As described in Table 1, the proportion of male and female children in the present study was 47.13% and 52.87%, respectively, indicating a slightly higher number of female children. The majority of children belonged to the Hindu religion (99.18%) and were from socioeconomic classes 3 and 4, with nearly equal proportions (49.59% and 50.41%, respectively). Almost half of the children included in the study were of second birth order (46.31%), followed by third birth order (23.36%). Most of the children were delivered in government hospitals (89.34%). Regarding Mamta cards or immunization cards, 22.54% of families had a physical card, while 42.62% reported having one but could not present it during the visit. Approximately one-third of the children had migrated twice (31.97%), and more than one-third had migrated three times (36.47%) since birth.



**Figure-1: Immunization coverage of different vaccines**

As shown in Graph 1, different vaccines had varying coverage rates. The highest coverage was observed for the BCG vaccine (87.30%), while the lowest was seen for booster vaccines such as DPT, OPV, and the second dose of the Measles vaccine (32.38%). Among the full

immunization category, the lowest coverage was noted for the first dose of the Measles vaccine (43.03%).

**Table-2: Full and Complete immunization coverage data**

	Number	Percentage
Coverage of Full Immunization		
Fully Immunized	97	39.75
Partially Immunized	116	47.54
Unimmunized	31	12.70
Coverage of complete immunization		
Completely Immunized	74	30.33
Incompletely Immunized	139	56.97
Unimmunized	31	12.70

As described in table no. 02, In present research full immunization coverage was found out to be 39.75 % and complete immunization coverage was found out to be 30.33 % and zero dose children was found out to be 12.70 %

**Table-3: Reasons for partial/unimmunization**

	N	Percentage
Unaware about place where to go	81	33.20
Unaware for subsequent dose	58	23.77
Fear of loss of wage in case of fever occurrence and parent have to say home	48	19.67
No one to take the child at session	41	16.80
Fear of side effects	39	15.98
Unaware about need	26	10.66
Resistance	21	8.61
Do not know anything about immunization	05	2.05

\*Multiple response possible

Several reasons were identified for partial or non-immunization. The most common reason (33.20%) was that parents were unaware of where to take their child for vaccination. This was followed by a lack of awareness regarding the timing of subsequent doses (23.77%). In 19.67% of cases, parents expressed concern that post-

vaccination fever might require them to stay at home, potentially resulting in a loss of daily wages. Only 2.05% of parents reported having no knowledge about immunization at all.

**Table-4: Factors affecting immunization coverage**

	Complete ly immuniz ed N (%)	Partially immuniz ed N (%)	Unimmuniz ed N (%)	Total N (%)
Sex				
Male	24 (20.86)	66 (57.39)	25 (21.73)	115 (100.0)
Femal e	50 (38.75)	73 (56.58)	06 (4.65)	129 (100.0)
X <sup>2</sup> = 20.39 p=0.00				
Birth order				
1	18 (38.29)	29 (61.70)	0 (0.0)	47 (100.0)
2	37 (32.47)	55 (48.67)	21 (18.58)	113 (100.0)
3	11 (19.29)	44 (77.19)	2 (3.50)	57 (100.0)
4	8 (29.62)	11 (40.74)	8 (29.62)	27 (100.0)
X <sup>2</sup> = 29.31 p=0.00				
No. of migration				
1	13 (68.42)	6 (31.58)	0 (0.0)	19 (100.0)
2	20 (25.64)	47 (60.26)	11 (14.10)	78 (100.0)
3	22 (24.72)	46 (51.68)	3 (3.37)	89 (100.0)
4	12 (38.70)	9 (29.03)	10 (32.26)	31 (100.0)
≥5	7 (25.93)	13 (48.15)	7 (25.92)	27 (100.0)
X <sup>2</sup> = 35.02 p=0.00				

Place of migration				
Gujar at	59 (31.72)	107 (57.53)	20 (10.75)	186 (100. 0)
Outsi de Gujar at	15 (25.86)	32 (55.17)	11 (18.96)	58 (100. 0)
$X^2 = 2.89$ $p = 0.23$				

In the present study, a correlation was observed between various factors and immunization coverage among children residing at construction sites. As migration is a key influencing factor, the association between the number of migrations and immunization, as well as place of migration and immunization, was examined. A statistically significant association was found between the number of migrations and immunization status ( $p = 0.00$ ), whereas no significant association was found between place of migration and immunization ( $p = 0.23$ ). Additionally, both gender ( $p = 0.00$ ) and birth order ( $p = 0.00$ ) were found to have statistically significant associations with immunization coverage.

## DISCUSSION

The present cross-sectional study aimed to evaluate the complete immunization coverage among children of construction site workers in Rajkot city, Gujarat, and explore associated migratory factors and barriers. The findings reveal that the immunization coverage among this vulnerable population remains suboptimal, particularly for complete immunization.

The present study shows boys to girl ratio is 47.1% and 52.87%, respectively. In a study conducted by Anand et al. (2014) in Bhopal showed the proportion of boys in the study was 54.4% which was slightly higher than the girls (45.6%).<sup>14</sup> Another study conducted by Varsha et al. (2013) in Pune showed the proportion of boys were 59% and girls were 41%.<sup>15</sup> So, in present study slightly different findings were observed in comparison to other studies.

In this study, full immunization coverage was found to be 39.75% and complete immunization coverage was 30.33% among children residing at construction sites in Rajkot. A significant proportion were partially immunized (47.54% for full, 56.97% for complete), and 12.70% were zero-dose children who had not received even a single dose of DPT

or Pentavalent vaccine by 12 months of age. These coverage rates are considerably lower than the average reported for Rajkot district (84.9%), Gujarat state (76%), and nationally in India (62%) according to the National Family Health Survey (NFHS-5, 2019–21). The low coverage among children of construction workers aligns with the understanding that children of migrant families face significant barriers to accessing immunization services.

Comparisons with similar studies focusing on urban poor and migrant populations highlight the significant challenges. A study conducted in Chandigarh by Sharma V et al.,<sup>16</sup> on migratory populations (construction site workers) reported even lower coverage, with only 3% of children being fully or completely immunized, while 91% were partially immunized. Another study by Sharma R et al.<sup>17</sup> mentioned within the sources found that only 25% of children in slums of Surat were completely immunized. In contrast, a study by Kadri et al.,<sup>18</sup> also referenced, reported a much higher complete immunization rate of 70.3% among children in urban slums of Ahmedabad City. The wide variation in coverage rates (20–85%) across different studies suggests localized factors and the specific vulnerabilities of the studied populations play a crucial role. The lower coverage observed in migratory groups compared to non-migratory groups in Chandigarh (3% vs 23% fully immunized) further supports the notion that migration poses a significant hurdle to achieving full immunization.

Migration emerged as a significant factor influencing immunization status in the current study, with a statistically significant association found between the number of migrations and immunization coverage. Migrant workers frequently relocate based on project needs, often living in informal settlements near construction sites with poor access to basic amenities and healthcare. This mobility contributes to children missing scheduled immunizations. Similarly, the study in Chandigarh identified migration as one of the reasons for low coverage, and a systematic review highlighted migration as a determinant affecting childhood immunization uptake among socioeconomically disadvantaged migrants in Delhi, India.<sup>19</sup> The current study also found statistically significant associations between gender and birth order with immunization coverage. While present study notes a different male-to-female ratio

compared to other studies, the impact of gender and birth order on coverage specifically is a key finding from the present study.

Exploring the reasons behind partial or unimmunization provides crucial insights. The most common reasons identified in this study were parents being unaware about the place for vaccination (33.20%) and unaware of when the child was eligible for the next dose (23.77%). A substantial percentage of parents also feared loss of wages if they had to stay home due to post-vaccination fever (19.67%), and some reported having no one available to take the child to the session (16.80%). These findings resonate with the barriers identified in the Chandigarh study,<sup>16</sup> where key obstacles for migratory populations included parents being too busy (43.6% for mother, 68.0% for both parents) and a lack of information such as being unaware of the need for immunization (64.8%) or being unaware of the place/time of immunization (63.8%). Both studies underscore the critical issues of parental awareness regarding location and schedule, as well as practical challenges related to work and logistics. Provider-related issues, such as insisting on identification cards or residential proof, identified as a significant deterrent in the Chandigarh study, were not explicitly explored as a reason for non-immunization in the results of the present study, although lack of integration into local health systems is mentioned as a barrier in the introduction.

## CONCLUSIONS

Present study reported very less immunization coverage in construction site migratory worker's children in comparison to national and state immunization coverage for general population. Key barriers identified included parental unawareness regarding immunization schedules and locations, fear of wage loss due to post-vaccination side effects, and lack of assistance in taking children to sessions. These findings underscore the urgent need to integrate migrant populations into local health systems through targeted interventions. Strengthening outreach strategies such as mobile immunization units at construction sites, enhanced awareness campaigns, and flexible session timings can significantly improve coverage. Additionally, training health workers to engage effectively with migrant communities and leveraging

existing schemes like Mamta cards can help bridge the information gap. Collaboration between urban health authorities, construction companies, and community volunteers is essential to ensure that every child, regardless of mobility or socioeconomic status, receives timely and complete immunization additionally Mother/father should be provided some incentive for immunizing their children as per schedule as per their loss of daily wages of a particular vaccination day

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