Original Article

Immunization uptake and its determinants among the internal migrant population living in nonnotified slums of Hyderabad city, India

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Abstract

Background: The aim of this study is to assess the childhood immunization uptake and its determinants among the internal migrant population living in nonnotified slums of Hyderabad City, India. **Methodology:** This is a cross-sectional study of 768 rural-urban migrant mothers with a child under 2 years of age residing for period minimum of 30 days, but not more than 10 years. Data were collected for sociodemographic details, health-seeking behavior, antenatal, postnatal services, and reception of vaccines appropriate for age. **Results:** Full immunization coverage among the children of migrants was same as the general population of the State of Telangana (66.7%). The likelihood of child's reception of full immunization decreases with age of the mother and rose with the attainment of higher education. The head of household of salaried class, expectant mothers utilizing antenatal services, and the visit of postnatal health worker for counseling of expectant mothers, were significantly associated with reception of full immunization. Immunization coverage rates of children of 12–23 months age is lower than the general population of Telangana. The frequency of visits by health worker is low. **Conclusion:** Immunization uptake among the migrants and vulnerable segments of the population can be increased by locating new settlements, improving utilization of services and capacity building of health staff.

Keywords: Children, healthcare, immunization, migration, urban slums

Introduction

Rural to urban internal migration in the middle- and low-income countries contributes to more population growth in the urban areas and also responsible for urbanization of these countries.[1-3] The rural to urban migration has both positive and negative impact on fertility, mortality, morbidity, immunization, malnutrition, demographic, and socioeconomic development of these migrants populations.[4] Because of rapid urbanization and lots of influx of rural to urban migration, health system unable to meet the health needs of these population in low-income countries.[2,5]

India has made considerable progress in reducing the under-five mortality rates which have fallen by 38% in the past two decades.[6] The existing literature supports immunization as a cost-effective intervention for vaccine-preventable diseases.[7] Despite successful implementation of the universal immunization program in India, still, disparities exist across different

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communities.[2] Immunization uptake in slum and migrant population is low compared to general population.[6,8] Various studies on migrants show that effectiveness of immunization coverage is the main determinant of health system effectiveness in the urban areas.[1,2]

The National Population Policy, 2000 aims to immunize all children against six vaccine-preventable diseases (VPDs) (tuberculosis, tetanus, pertussis, diphtheria, measles, and polio) by 2010. Although immunization coverage has increased in recent years, large numbers of slum dwelling children remain incompletely immunized in cities.[8,9] Immunization coverage against 6 VPD's is only 60% among the slum dwelling children of urban India. Immunization services do not reach over one-third of the urban population.[10] Outbreaks of VPDs are more common in urban slums because of high population density and the continuous influx of the migrant population.[10] Previous studies mainly explores the health status and health-seeking behavior among the urban population,[11,12] and there are no specific studies on the migrant population living in the nonnotified slums. This study is an attempt to understand the immunization uptake and its determinants influencing the uptake of immunization services among the children living in nonnotified slums of Hyderabad. These nonnotified slums are the habitation for poor migrants reached the city recently

Materials and Methods

Study area

The study was conducted in Hyderabad, the capital city of the state of Telangana, India with a population estimated to be above 6.8 million. Hyderabad is characterized by a very significant presence of the slum population migrated from other districts of erstwhile Andhra Pradesh and neighboring states of the country. The number of slum households at present is more than 1.7 million. Details of the inhabitations of the migrant population in and around Hyderabad were obtained from the Greater Hyderabad Municipal Corporation (GHMC), Hyderabad and health facilities from the District Medical Officer. For the study purpose, areas were classified as per the norms of GHMC Zones. The quantitative and Qualitative survey was carried out in all the zones. Data collection was initiated in September 2011 and the study duration was 2 years.

Functional definition of migration and migrant

Those movements which resulted in a change of the usual place of residence of the individuals were treated as migration. A person whose last usual place of residence was different from the present place was considered a migrant. Usual place of residence of a person was defined as a place (village/town) where the person had stayed continuously for a period of 6 months or more.

Functional definition of nonnotified slums

Any compact settlement with a collection of poorly built tenements, mostly of temporary nature, crowded together, usually with inadequate sanitary and drinking water facilities in unhygienic conditions, was considered a slum for the survey, provided at least 20 households live there. If such a settlement was not notified as a slum by the municipal authorities, it was called a nonnotified slum.[13]

Sampling

Sources of data and study design

Cluster random sampling was used for selecting the migrant households from the sampling frame of nonnotified slums. Snow-balling technique was used during a survey for identifying this type of habitations for selecting sampling frame and clusters were selected from this sampling frame. Households of eligible migrants (who have migrated and residing in the city at least for 30 days, but not more than 10 years) were identified from various clusters in the city. Attempts were made to identify clusters, particularly from newer, nonnotified slums, and migrant camps, where newcomers usually reside. We stratified migrants into two groups: recent migrants and settled migrants. Recent migrants are those who have been residing in Hyderabad within the past 5 years and settled migrants are those who have been residing for at least 6 years, but not more than 10 years.

Health services in the city of Hyderabad adopted the universal immunization programme of India, which stipulates that infants should be vaccinated with the following vaccines: a dose of Bacillus Calmette-Guerin (BCG) at birth or as soon as possible, i.e., within a month; oral polio vaccine (OPV) within 48 h; three doses each of diphtheria, pertussis, and tetanus (DPT) vaccine, OPV at 6, 10, and 14 weeks of life; and one dose of measles vaccine at 9–12 months.[14] In addition, hepatitis B vaccine is to be provided (at birth or within 48 h, and at 6, 10 and 14 weeks of life) in Hyderabad. Those, who gave informed consent to participate in the study, were included. The purpose of the study was explained to participants, and informed consent was obtained from them before data collection. The Institutional Ethics Committee approved the study protocol.

Sample size

Several nonnotified slums were identified by snowball sampling technique, and finally, a total of 30 clusters (30 nonnotified slums) were selected. The sample size was calculated according to the standard guidelines.[14] Considering the choice of immunization coverage of at least 50%, the confidence level of 95%, with a relative precision of 10%, sample size calculated was 384. Taking the cluster design effect of 2, the sample size was 768. Data were collected from mothers with children <2 years old and selected from 30 clusters.

Data collection

The pretested questionnaire was used to collect the sociodemographic and economic details, migration history, health-seeking behaviors, prenatal and postnatal history and immunization details were collected from a mother who has a younger child aged <2 years. Information of immunization status of the child was determined from the immunization card, and in the absence of immunization cards, mothers were asked to recall whether the child had received different vaccines (including

the number of doses for each) as well as reception of vitamin A supplement. Separate questions were asked to obtain information on each age-appropriate vaccine to be received and reasons for incomplete or partial immunization of the child.

Measures

Two outcome measures were considered: the likelihood of a child aged 1 year or older having received (i) Full immunization against six VPDs (BCG within 1 month of age; three doses each of DPT and OPV at 6, 10, and 14 weeks of age; measles vaccine between 9 and 12 months of age), from now on referred to as complete immunization against six VPDs, and (ii) Full immunization against seven VPDs (which includes three doses of hepatitis B at 6,10, 14 weeks of age in addition to the abovementioned vaccines), from here onward referred to as complete immunization against seven VPDs. Individual-level independent variables of interest were gender and birth order of the child. The household-level characteristics were mother's age, educational status and mother's occupational status (working to earn, not working to earn), occupation of the head of household, size of the household, social class (scheduled caste or tribe, backward castes, general), religion (Hindu, Muslim, Christian), and migration status (recent migrants, settled migrants). Mothers' access to health services was assessed using a proxy indicator of availing antenatal care (ANC) services (ANC visits attended by the mother), and place of delivery (institutional, home). The system level variable was postnatal visits by a health worker.

Statistical analysis

Vaccination appropriate for age was taken as the proportion of children who received particular vaccines appropriate for their age to the total number of children in that particular age group, and 95% confidence intervals (CI) were also calculated. To examine the association of several exposure (independent) variables on complete immunization, children of 12 months of age and above were considered for analysis. Dependent variables were two outcome variables as mentioned earlier and separated binary logistic regression analyses were carried out. Initially, univariate analysis of each independent variable was performed against each dependent variable. Those variables with a minimum $P = 0.25$ were included in multiple logistic regression analyses.[15] The use of a more usual value (such as 0.05) often fails to identify variables known to be important, while the use of a higher P value has the disadvantage of including variables that are of questionable importance.[16] Multiple logistic regression analyses were carried out by backward likelihood ratio method. The fit of these models was tested by Hosmer and Lemeshow goodness of fit tests. The significance of adjusted odds ratio (AOR) was determined using Wald test. All analyses were carried out using IBM SPSS statistics V20.0 (IBM Corp., Armonk, NY, USA).[17]

Results

A total of 768 eligible mothers were contacted for the survey, 7 (0.8%) mothers refused to participate in the survey and data of another 6 mothers were incomplete. Hence, the final analysis is based on the data of 755 mothers.

Sociodemographic characteristics

Table 1 presents the sociodemographic details of the sampled mothers. Around 60% of the mothers did not receive any formal education. Regarding the occupation of the head of the household (708 were men, 47 were female), the majority were daily wage laborers (unskilled). Majority of the participants belong to scheduled castes, and 80% were Hindu.

Immunization coverage rate and dropout rate

Figure 1 reveals the coverage rate of children of 12–23 months age group of migrant mothers of Hyderabad city are significantly lower than the children of general population of Andhra Pradesh.

Table 2 presents dropout rate (child begins but does not complete immunization schedule) of immunization stratified by mothers'

Table 1: Sociodemographic characteristics of migrants

	Recent migrants, *n* (%)	Settled migrants, *n* (%)
Age group (years)		
15-20	104 (32.8)	91 (20.2)
21-25	168 (53.0)	242 (53.7)
26-30	40 (12.6)	99 (21.9)
>30	5 (1.6)	19 (4.2)
Mother's educational status		
No formal education	208 (65.6)	316 (70.0)
Primary education	30 (9.5)	35 (7.8)
Secondary education	68 (21.4)	82 (18.2)
Higher secondary and above	11 (3.5)	18 (4.0)
Type of fuel		
Cooking gas	36 (11.3)	60 (13.3)
Hearth	232 (73.2)	284 (63)
Kerosine	44 (13.9)	104 (23.1)
Other	5 (1.6)	3 (0.6)
Electricity supply		
Metered connection	106 (33.4)	222 (49.2)
No connection	211 (66.6)	229 (50.8)
Social groups		
ST	87 (27.4)	136 (30.2)
SC	108 (34.1)	137 (30.4)
OBC	110 (34.7)	125 (27.7)
Other	12 (3.8)	53 (11.7)
Religion		
Hindu	256 (80.8)	356 (78.9)
Non-Hindu	61 (19.2)	95 (21.1)
Occupation of head of household		
Salaried	40 (12.6)	67 (14.9)
Small business	31 (9.8)	46 (10.2)
Unskilled worker	237 (74.8)	306 (67.8)
Unemployed	9 (2.8)	32 (7.1)
Occupation of the mother		
Housewife	242 (76.3)	324 (71.8)
Working	75 (23.7)	127 (28.2)

age group, the gender of the child, educational status of the mother, birth order, a period of migration, religion, and caste. The dropout rate increases with mother's age.

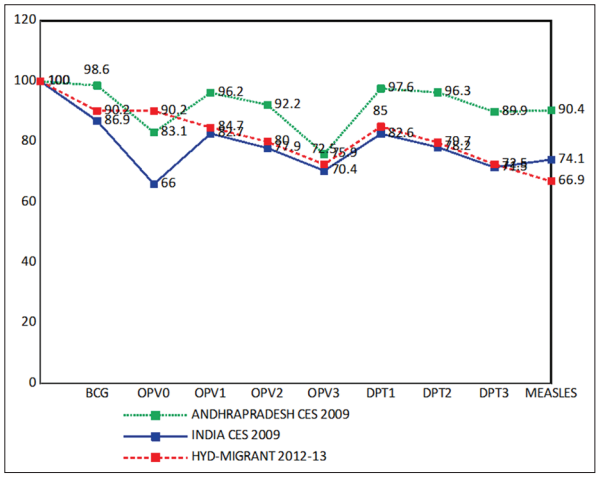

Figure 1: Comparision of immunization Coverage Rates of Children of 12- 23 months of age between Migrants of Hyderabad and Andhra Pradesh (CES2009) and India (CES 2009). Source: UNICEF Coverage Evaluation Survey 2009

$$\text{Dropout rate} = \frac{\text{No. of}\left(\begin{array}{l}\text{children immunized with first vaccine} - \\ \text{children immunized with later vaccine}\end{array}\right)}{\text{No of children immunized with first vaccine}} \times 100$$

The dropout rate is slightly higher in a male child compared to female. Higher the birth order has higher dropout rate showing an increasing trend. Settled migrants have slightly higher dropout rates compared to recent migrants. Educational status of the mother is inversely related with a dropout rate of immunization. Muslims have higher dropout rates compared to other religions.

Immunization appropriate for age

Table 3 presents the details on the reception of various vaccines appropriate for age. Approximately 88% of the children had received BCG vaccine within 1 month of age, OPV and hepatitis B vaccine at birth. Reception of measles vaccine was 69.8% and 64.1% among recent and settled migrants. Uptake of vitamin A supplement varied between 52% (recent migrants) and 49% (settled migrants). Full immunization against six VPDs was around 71% among recent migrants and 64% among settled migrants. The proportion of completely immunized children

Table 2: Dropout rates of immunization by sociodemographic characteristics of migrant population

Category	Sub-category	Dropout rates									
		BCG-measles	BCG-DPT3	DPT1-measles	DPT1-DPT2	DPT2-DPT-3	DPT1-DPT3	BCG-OPV3	OPV0-OPV3	BCG-Hep3	Hep0-Hep3
Mothers age (years)	16-20	16.74	12.33	15.21	1.73	9.14	10.71	12.33	12.33	12.33	11.53
	21-25	26.44	20.69	21.95	6.55	9.96	15.86	20.69	20.69	21.56	20.18
	26-30	40.28	28.98	30.17	11.29	6.37	16.94	28.98	28.98	28.98	27.87
	>30	27.30	18.20	27.30	18.20	0.00	18.20	18.20	18.20	27.30	27.30
Sex of the child	Male	27.47	21.75	20.61	6.38	8.52	14.36	22.20	22.20	22.65	21.14
	Female	24.12	17.43	21.81	5.88	9.60	14.92	16.89	16.89	17.87	17.05
Birth order	1	19.12	14.74	14.94	3.26	7.32	10.34	14.74	14.74	14.74	14.29
	2	26.51	18.40	21.15	3.64	9.15	12.46	18.40	18.40	19.72	18.01
	3	35.21	26.71	33.37	11.58	14.76	24.63	26.71	26.71	28.14	27.18
	4+	35.29	32.35	26.67	20.00	4.17	23.33	32.35	32.35	32.35	30.30
Migration period	Recent	23.58	16.93	18.14	6.43	4.91	11.02	16.93	16.93	17.47	16.40
	Settled	27.41	21.40	23.33	5.98	11.70	16.99	21.40	21.40	22.20	20.85
Mothers education	No formal education	31.78	24.03	27.04	8.28	11.42	18.76	24.03	24.03	25.17	31.92
	Primary education	19.27	11.63	12.49	4.20	0.00	4.20	11.63	11.63	11.63	11.63
	Secondary education	14.53	11.37	10.87	2.20	5.50	7.57	11.37	11.37	11.37	9.56
	Higher secondary and above	5.60	5.60	5.60	0.00	5.60	5.60	5.60	5.60	5.60	5.60
Religion	Hindu	22.86	16.48	18.84	3.93	8.54	12.14	16.15	16.15	17.03	15.83
	Islam	40.05	40.05	34.36	21.79	16.07	34.36	40.05	40.05	40.05	38.24
	Christian	36.67	26.65	29.62	11.14	8.27	18.48	30.06	30.06	30.06	30.06
	Tribal	74.96	49.91	66.67	33.33	0.00	33.33	49.91	49.91	49.91	49.91
Social groups	ST	35.37	25.28	30.68	9.04	11.90	19.86	25.28	25.28	26.05	24.72
	SC	22.32	16.13	18.35	5.92	6.30	11.85	16.80	16.80	17.46	16.26
	OBC	18.02	13.85	13.86	1.73	7.87	9.47	13.08	13.08	13.85	13.18
	Others	36.64	36.64	29.57	14.79	17.35	29.57	36.64	36.64	36.64	34.50

BCG: Bacillus Calmette-Guerin; DPT: Diphtheria, pertussis and tetanus, OPV: Oral polio vaccine; Hep: Hepatitis; OBC: Other backward classes; SC: Scheduled caste; ST: Scheduled tribe

Table 3: Reception of various vaccines appropriate for age among the children of migrants

Vaccines appropriate for age	95% CI	
	Recent migrants	Settled migrants
Vaccines to be received at birth (sample size RM=309, SM=446)		
BCG at birth	87.9 (85.6-90.2)	87.9 (85.6-90.2)
OPV-0 (within 48 h)	89.3 (87.1-91.5)	87.9 (85.6-90.3)
Hep B-0 (within 48 h)	88.7 (86.4-91)	86.5 (84.1-89.3)
Vaccines to be received at 6 weeks of age (sample size RM=298, SM=437)		
DPT-1	81.2 (78.4-84)	80.5 (77.7-83.3)
OPV-1	81.2 (78.4-84)	80.1 (77.3-83)
Hep-B-1	78.9 (76.0-81.8)	79.2 (76.3-82.4)
Vaccines to be received at 10 weeks of agem (sample size RM=288, SM=422)		
DPT-2	75.7 (72.6-78.8)	73.2 (70-76.3)
OPV-2	75.3 (72.2-78.4)	73.5 (70.4-76.6)
Hep-B-2	74.7 (71.6-77.8)	72.5 (69.3-75.7)
Vaccines to be received at 14 weeks of age (sample size RM=275, SM=407)		
DPT-3	70.5 (67.2-73.8)	63.1 (59.7-66.5)
OPV-3	70.2 (66.9-73.5)	62.9 (59.5–66.3)
Hep-B-3	70.2 (66.9–73.5)	62.4 (58.9–65.9)
Vaccines to be given at 9-12 months of age (sample size RM=182, SM=284)		
Measles	69.8 (66.5-73.1)	64.1 (60.7-67.5)
Supplement to be given at 9-12 months of age (sample size RM=235, SM=354)		
Vitamin A	52.3 (48.7-55.9)	49.7 (46.1-53.3)
Various vaccines to be received by 12 months/1 year of age (sample size RM=178, SM=281)		
Completely immunized for 6 VPDs	70.8 (67.6-74)	64.1 (60.7-67.5)
Completely immunized for 7VPDs	70.2 (66.9-73.5)	64.1 (60.7-67.5)

RM: Recent migrants; SM: Settled migrants; BCG: Bacillus Calmette-Gauerine; DPT: Diptheria pertussis tetanus, Hep-B: Hepatitis B; VPDs: Vaccine preventable diseases; CI: Confidence interval; OPV: Oral polio vaccine

against seven VPDs remained same at 70% among recent and settled migrants. Approximately 10% of children received no vaccines at all.

Table 4 presents reasons of incomplete or partial immunization of children of migrants of the city of Hyderabad.

Determinants of full immunization uptake

The associations between full vaccination and selected exposure variables are presented as AOR with 95% CI [Table 5]. Reception of full immunization in settled and recent migrant households are comparable. Compared to children of households (HHs) of recent migrant, settled migrant HHs have 20% lower rate

Table 4: Reasons for incomplete immunization or partial immunization of the child

Reasons for incomplete/partial immunization	*n* (%)
Not aware of importance of immunization	60 (38.7)
No health worker visits/immunization center in the locality	15 (9.7)
Immunization started at late age, yet not completed appropriate to age	12 (7.7)
Family related reasons or lack of time	11 (7.1)
Not aware of immunization schedule	10 (6.4)
Not immunized because of fear of side effects of vaccine	10 (6.5)
Vaccination facility not available in the locality/too far	10 (6.4)
Not aware of health facility that provide vaccination	8 (5.2)
Child suffered with other illness during immunization period	8 (5.2)
Cannot afford the immunization or travel costs	6 (3.9)
Not in the city	3 (1.9)
Doctors or health staff refused to immunize child	2 (1.3)
Total	155

of full immunization against six VPDs (AOR = 0.795, 95% CI = 0.486–1.3) and 13% lower rate against seven VPDs (AOR = 0.828, 95% CI = 0.508–1.352), but it is not significant. Other covariates such as higher mother's education and salaried occupation of the head of the household, ANC visits by mother, place of delivery and a postnatal visit by health worker were also significantly associated with the full immunization against six VPDs. The *P* values of the Hosmer and Lemeshow test show that the models were a good fit.

Discussion

A successful immunization program is an important public health achievement for the country. Several factors are associated with the inequity of immunization coverage in India.[18] The study findings show that immunization coverage among settled and recent migrants are comparable for full immunization for 6 and 7 VPDs. The proportion of fully immunized children of migrant HHs (66.5%) is lower than full immunization status of the city of Hyderabad (71.3%).[19,20] Migrant children particularly are at risk of not being fully-immunized, and it seems that utilization of health services by migrant population is lower compared to urban natives.[8,9] DPT3 coverage rate, an indicator of the performance of immunization program is lower in children of migrant HHs (66.5%) compared to coverage rate (89.9%) of the general population of Andhra Pradesh, Bangalore (97.72%), and India (71.5%).[21,22]

The dropout rate is an indicator of continued utilization of immunization services in the specified geographic area. Dropout rates are higher among children of mature mothers, might be due to poor educational status, higher in children of birth order 3 and above, tribal groups. Despite coverage rates of BCG are comparable among children of migrants of Hyderabad (90.8%) and Andhra Pradesh[21] (98.8%), dropout rates of BCG-Measles and BCG-DPT3 had wide variation; (25.8% and 19.5%) and

Table 5: Results of multiple logistic regression of full immunization

Exposure variable	Number of children	Proportion of children	Adjusted OR (95% CI)	
			Full immunization against 6 VPDs	Full immunization against 7 VPDs
Mothers age (years)				
<20	129	95 (73.6)	Reference	Reference
21-25	246	167 (67.9)	0.696 (0.404-1.198)	0.729 (0.419-1.268)
26-30	73	36 (49.3)	0.449 (0.226-0.889)	0.442 (0.219-0.892)
>30	11	8 (72.7)	1.281 (0.272-6.03)	0.868 (0.196-3.852)
Mothers educational status*				
No formal education	312	186 (59.6)	Reference	Reference
Primary education	28	21 (75)	1.776 (0.665-4.741)	1.598 (0.577-4.422)
Secondary education	101	82 (81.2)	2.315 (1.231-4.315)	1.884 (0.955-3.566)
Higher secondary and above	18	17 (94.4)	8.606 (1.069-69.256)	5.855 (0.697-49.819)
Occupation of head of household				
Salaried worker	60	47 (78.3)	Reference	Reference
Unskilled worker	339	236 (69.6)	0.106 (0.035-0.318)	0.107 (0.036-0.322)
Small business	39	9 (23)	0.722 (0.331-1.575)	0.726 (0.333-1.583)
Unemployed	21	14 (66.7)	0.827 (0.241-2.832)	0.846 (0.247-2.901)
Social groups				
ST	132	77 (58.3)	Reference	Reference
SC	158	110 (69.6)	1.329 (0.733-2.41)	1.282 (0.709-2.318)
OBC	134	100 (74.6)	1.402 (0.750-2.621)	1.420 (0.760-2.655)
General	35	19 (54.3)	1.713 (0.402-7.307)	1.760 (0.412-7.565)
Religion				
Hindu	386	266 (68.9)	Reference	Reference
Muslim	41	21 (51.2)	0.283 (0.081-0.988)	0.289 (0.83-1.009)
Christian	32	19 (59.4)	0.573 (0.273-1.408)	0.585 (0.238-1.436)
Ante natal care visits*				
No visits	39	10 (25.6)	Reference	Reference
1-2 visits	33	15 (45.5)	1.952 (0.666-5.720)	1.927 (0.659-5.639)
3-4 visits	124	76 (61.3)	3.032 (1.228-7.449)	2.963 (1.202-7.304)
>5 visits	263	205 (77.9)	6.566 (2.632-16.380)	6.592 (2.647-16.415)
Postnatal visits by health worker				
No	413	270 (65.4)	Reference	Reference
Yes	46	36 (78.3)	2.198 (0.937-5.154)	2.247 (0.958-5.274)
Place of delivery				
Home delivery	112	55 (49.1)	Reference	Reference
Institutional	347	251 (72.3)	1.385 (0.782-2.456)	1.338 (0.755-2.369)
Migration status				
Recent	178	126 (70.8)	Reference	Reference
Settled	281	180 (64.1)	0.795 (0.486-1.3)	0.828 (0.508-1.352)

*Significance $P < 0.05$. OR: Odds ratio; CI: Confidence interval; VPDs: Vaccine preventable diseases; OBC: Other backward classes; SC: Scheduled caste; ST: Scheduled tribe

(8.3% and 8.8%), respectively. While the BCG-Measles dropout rate in children of migrant population of Uttarakhand (38%) and Uttar Pradesh (30.8%) are higher.[21,23] Immunization services initiation in migrant communities is comparable to the generable population, but it is not sustainable and has higher drop-out rates until 2 years of age in children due to poor accessibility and utilization of these services.

The uptake of immunization among children of migrant mothers depends on factors affecting accessibility and utilization of these services. The barriers affecting accessibility are lack of motivation of health worker, poor performance, competence, and training to communicate with parents, inappropriate service hours, a distance of vaccination facility corroborate with our findings of lack of health worker visits to these communities, lack of services during evening hours.[24] The primary factor affecting utilization is parental attitude and knowledge. Parents of migrant communities have lack of knowledge to whom, where, and when (lack of awareness of immunization schedule and health facility) to contact to receive immunization for their children, fear of side effects, children suffering from minor ailments hindering them to receive immunization.[24] Family characteristics such as the educational status of parents (children of mother with higher education have higher odds of availing immunization services compared to illiterate), low income, socioeconomic status, and vulnerability of these communities might interact with these factors affecting utilization. In this study, mothers' delivered in the hospital have a higher uptake of full immunization against six and seven VPDs, but results are not significant, because, immunizations are provided on specified

weekdays in the community. Provision of immunization services in the community may be masking the influence of hospital deliveries.

Despite the implementation of immunization programs in Hyderabad, a developed city in India, the reception of full immunization by migrants is inadequate. The Global Vaccine Action Plan promotes government agencies to achieve the target of 90% of immunization coverage nationally and 80% in all districts.[25] One of the key challenges to achieve this result is better access of immunization services to the marginalized and displaced population. The initiatives to be taken by all stakeholders to achieve the target are long-term objective of increasing the female literacy rate, medium-term objective of planning and implementation of community outreach campaigns and short-term objective of immunization camps and drives as an aggressive mass media campaign to increase the awareness of parents and families.[26] The study findings reveal the need to develop healthcare services tailored to meet the needs of migrant communities by considering their sociocultural and living conditions to improve the awareness, accessibility, and utilization of immunization services.

Strengths and limitations

A limitation of the study is its retrospective reporting, which involves reporting recall bias during data collection of variables such as mother's education and duration of stay thus impacts the reliability of data. We also did not collect detailed data on health centers regarding outreach, supply, and other workforce, infrastructure-related issues and thus cannot draw any conclusions on the functioning of healthcare system. Supplementation of vitamin A is low in migrants in our study compared to other studies in India because of supply constraints of the supplement from the Government of Andhra Pradesh during the study. Despite these limitations, the study has methodological strengths, such as the scientifically drawn sample covering vulnerable migrants of nonnotified slums.

Conclusions

The risk of not being immunized by children of rural-urban migrants is high because of the livelihood insecurity and marginalization. Policy measures such as mobile health teams, listing of migrants biannually, incentivizing Accredited Social Health Activist workers and establishing health information systems to be adopted to improve access to antenatal and postnatal care services, leading to increased immunization uptake; personalized service provision by the healthcare system significantly increases the likelihood of a child receiving full immunization. Hence, making the system responsive and effective, particularly to vulnerable, socioeconomically disadvantaged migrants would help in achieving full immunization coverage. Investing in education and socioeconomic development, providing secure livelihoods, and equitable services are also important for improving and sustaining full utilization of immunization services.

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Conflicts of interest

There are no conflicts of interest.

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