

Immunization in Urbanized Villages of Delhi

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ABSTRACT

Objective. To assess the immunization coverage of BCG, DPT, OPV, Measles, MMR and Hepatitis B vaccines in two urbanized villages of East Delhi and study the factors affecting the coverage.

Methods. Children of age 24-47 months were selected using systematic random sampling. Information on socio-demographic factors and immunization status was obtained by house-to-house visit. Immunization coverage of all vaccines was computed and analysis of association between immunization coverage and socio-demographic factors was done.

Results. The coverage levels were 82.7% for BCG, 81.5% for DPT/OPV 1, 76.8% for DPT/OPV 2, 70.7% for DPT/OPV 3 and 65.3% for measles vaccine. It was 41.4% and 41.6% for DPT booster and MMR vaccine. Higher education of mother (OR=1.96) and father (OR=1.80), father's occupation (OR=1.86), residential status (OR=1.76), place of birth (OR=2.64) and presence of immunization card (OR=5.8) were significant determinants for complete immunization on univariate analysis. On regression analysis mother's education (OR=1.43), presence of immunization card OR=2.05 and place of birth (OR=3.80) remained significant.

Conclusion. Immunization evaluation surveys have shown a wide variation across regions, states and different strata of the society. [*Indian J Pediatr* 2007; 74 (2) : 131-134] E-mail: pragtichhabra@hotmail.com

Key words : Immunization coverage; Vaccines; Urban

Recent immunization coverage evaluation surveys have shown some improvement in the all India immunization coverage levels.^{1,2} The National Family Health Surveys have also, reported that the proportion of fully vaccinated children between 12-23 months of age had increased from 36% in first survey (1992) to 42% in second survey (1998).^{3,4} But these figures vary widely across regions, states and strata's of the society depending upon socio-economic factors and availability of health care.⁵⁻¹² Studies have been done to assess the primary immunization status i.e. BCG, DPT3, OPV3 and Measles.^{5,6,7,8} Data on the booster doses and the additional vaccines is scanty.^{2,9}

In Delhi, in addition to vaccines for the six vaccine preventable diseases, Measles Mumps Rubella (MMR) and Hepatitis B vaccines are also being given as part of routine immunization. There are few population-based studies on the factors associated with immunization coverage from our country.

The present study assesses the immunization coverage of BCG, the primary and booster doses of OPV and DPT, MMR and Hepatitis B, in two urbanized villages of east

Delhi among children in age group 24 –47 months. The socio-demographic factors affecting the immunization status of the children were also studied.

MATERIAL AND METHODS

The present study is a community based, cross-sectional study conducted in two urbanized villages of East Delhi. As per Census 2001, all villages having a population of 4,000 or above, a population density of 400 per km² or more and having at least 75per cent of male working population engaged in non- agricultural activity are classified as urban. The population in the two villages consists of the original landowners and their tenants, who are migrants from other states, mainly Uttar Pradesh and Bihar. Both the areas have Health Centers where weekly immunization is provided. An immunization coverage survey was conducted among children between 24-47 months. The required sample size using the software Epi Info 2000, taking the percentage of fully immunized children as 63% (IRMS survey), a confidence interval of 90%, and a relative error of 5%, was 635. A rapid survey of the population done in 2003 at both the areas, showed the total population to be 28,392, of which 3011 were children in the 1-4 year age group. Assuming, 1500 to be in the 24-

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47-month age group, every second household was included to get the required sample size. Informants, preferably mothers were interviewed using a pre-coded and pre-tested questionnaire by a house-to-house visit. Information regarding the age, education, occupation and income of the parents; the socio-economic status of the family, vaccination status of the child was recorded. The informants were enquired about the immunization card or other health records. If available, immunization status was noted. If the card was not available, immunization status was ascertained by enquiring about vaccines received. To validate immunization histories taken by recall method, informants were asked about the time and source of the immunization, the health provider and the health care facility. The presence of BCG scar was also noted.

Data collection was carried out from October 2003 to January 2004. The data was analyzed using SPSS 10 software package. Coverage for each vaccine was computed. A child was labeled as fully immunized if he/she had received BCG, three primary and booster doses of DPT and OPV and Measles and MMR vaccines.

Analysis of association between immunization coverage and various socio-demographic variables was done using Chi square test. Logistic regression was performed to assess the independent effect of each variable. Variables showing a statistically significant association at 5% level in the univariate analysis were included in the multivariate analysis.

RESULTS

The two villages lie in close proximity to each other and have similar socio-demographic profile, the data drawn from both areas have been clubbed for analysis. A total of 693 children aged 24-47 months were included for analysis. There were 361 (52%) males and 332 (48%) female children in the study.

About half of the mothers were illiterate (54.4%), 29% were educated up to high school or more. Almost all (95.4%) the mothers were housewives. Majority (75.4%) of the fathers were educated up to high school or more while 18.4% were illiterate. Almost half (47.8%) of the fathers were skilled workers, 38.6% were unskilled workers while 13.6% were clerks, shop owners or semi-professionals. Immunization cards were present with 281 (40.5%) of the mothers.

The immunization status of children in the study is depicted in Table 1.

The coverage levels were highest for BCG (82.7%) and DPT/OPV1 (81.5%) and lowest for HBV3 (24.3%). About two-third (65.3%) had received primary immunization i.e. BCG, DPT/OPV3 and measles vaccine while only 41.4% of the children had received MMR and DPT/OPV booster vaccines. 17.5% had not received any vaccine. Majority (90%) received the vaccines from the health center while

TABLE 1. Immunization Coverage of Children

Vaccine	Received		Not Received	
	n	%	n	%
BCG	573	82.7%	120	17.3%
DPT/OPV1	565	81.5%	128	18.5%
DPT/OPV2	532	76.8%	161	23.2%
DPT/OPV3	490	70.7%	203	29.3%
DPT/OPVB	287	41.4%	406	59%
OPVZERO	90	13%	603	87%
HBV1	191	27.8%	502	72%
HBV2	178	25.6%	515	74%
HBV3	162	24.3%	531	76%
Measles	453	65.3%	240	35%
MMR	295	41.6%	398	58%

42 (7.27%) from the hospital and 5.3% from private practitioners. The drop out rate between DPT/OPV1 and DPT/OPV2 was 5.8%, second and third dose of DPT/OPV was 7.8% and third and booster doses of DPT/OPV was 41%. Thus the drop out between first and third dose of DPT/OPV was 18% while it was 49% between the first and booster dose. Immunization for hepatitis was low ranging from 27.8% for HBV1 to 24.3% for HBV3, the drop out rate being 15.2%.

Table 2 shows the association between various socio-demographic factors and immunization coverage. Higher literacy of parents was associated with complete immunization of the child ($p < 0.01$). Children whose mothers had eight or more years of schooling were two times more likely to receive complete immunization than those whose mothers were not educated. Children of clerks, shopkeepers or semiprofessionals were more likely to be fully immunized as compared to those who were skilled or unskilled workers ($p < 0.01$, OR=1.8). Children born in a hospital were more likely to be fully immunized as compared to those born at home ($p < 0.01$, OR=2.6). Children of mothers who had an immunization card had higher immunization coverage as compared to those who did not ($p < 0.01$, OR=5.8). Children of the residents had higher immunization coverage as compared to those of tenants ($p < 0.01$, OR=1.8).

Table 3 shows the results of multiple logistic regression analysis. Literate mothers were 1.4 times more likely to get their children fully immunized. Hospital born children were twice more likely to receive complete immunization than those born at home. Presence of immunization card also was a significant factor associated with complete immunization of the child. However, education and occupation of the father and residential status were not significant.

DISCUSSION

The present study was conducted to assess the immunization coverage in two urbanized villages of East

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TABLE 2. Immunization Status of Children in Relation to Socio-demographic Factors

Factor	Immunization		Odds ratio	p value
	Complete	Incomplete		
Mother's education				
Nil	34.4 (130)	65.6 (248)	1	
1-8 years	48.1 (51)	51.9 (55)	1.77 (1.12-1.28)	p<0.01
>8 years	50.7 (106)	49.3 (103)	1.96 (1.37-2.81)	p<0.01
Father's education				
Nil	31.0 (40)	69.0 (89)	1	
1-8 years	33.7 (30)	66.3 (59)	1.30 (0.61-2.1)	p>0.01
>8 years	45.7 (217)	44.3 (258)	1.80 (1.21-2.89)	p<0.01
Father's occupation				
Unskilled	37.4 (99)	62.6 (169)	1	
Skilled	42.0 (139)	58.0 (192)	1.24 (0.88-1.74)	p>0.01
Prof	52.1 (49)	46.9 (45)	1.86 (1.13-3.07)	p<0.01
Residential status				
Resident	52.3 (79)	46.7 (72)	1.76 (1.21-2.58)	
Tenant	38.3 (208)	61.7 (334)	1	p<0.01
Family type				
Nuclear	40.5 (231)	59.5 (341)	1.27 (0.84-1.92)	
Joint	46.3 (56)	53.7 (65)	1	p>0.05
Place of delivery				
Home	34.6 (170)	65.4 (322)	1	
Hospital	58.2 (117)	41.8 (84)	2.64 (1.86-3.75)	p<0.01
Immunization card				
Present	68.2 (165)	32.8 (77)	5.78 (4.05-8.25)	
Not present	27.7 (122)	62.3 (329)	1	p<0.01

Figures in parentheses denote number of children

TABLE 3. Multiple Logistic Regression Analysis for Complete Immunization

Factor		Adjusted Odds ratio	p value
Mother's education	Literate	1.43 (1.03-1.99)	0.03
	Illiterate	1	
Father's education	Literate	1.10 (0.75-1.60)	ns
	Illiterate	1	
Father's occupation	Clerk etc	1.04 (0.65-1.70)	ns
	Skilled	0.95 (0.56-1.60)	
	Unskilled	1	
Residence	Resident	1.2 (0.80-1.80)	ns
	Tenant	1	
Place of birth	Hospital	2.05 (1.47-2.88)	.001
	Home	1	
Immunization card	Present	3.8 (5.37-7.39)	.001
	Not present	1	

Delhi and study the factors associated with complete immunization. Studies have been conducted in the past to assess the immunization coverage of primary doses in 12-23 month old children; the standard WHO 30-cluster or a rapid assessment during pulse polio immunization was done. In the present study systematic random sampling was done to have a higher precision and children in the age group 24-47 months were included to study the coverage of booster doses and the MMR vaccine. It was observed that 82.7%, 70.7% and 65.3% children were immunized against, BCG, DTP/OPV3 and Measles, which is consistent with the Institute for Research in Medical Statistics (IRMS) estimates. The Coverage

Evaluation Survey undertaken by IRMS, covering 90 districts of the country found that 81% had received three doses of DPT/OPV, 86% received BCG vaccine and 67% measles. Sixty three percent of the children received all the vaccines/doses¹, while the states of Karnataka, Kerala, Tamil Nadu and Pondicherry had more than 90% full coverage, it was 37%, 40% and 51% in Bihar, Rajasthan and Uttar Pradesh respectively.⁷ In Delhi, 76.5% of the children were fully immunized, a figure similar to ours. Sokhey *et al* have also reported similar figures in a survey conducted in 1999.⁸ NHFS -2 reported coverage of 71.6% for BCG, 13.1% for OPV zero dose, 53.6% for DPT third dose and 51% for measles.⁴ Variation within different districts has been observed; a recent study in West Bengal observed the coverage to range from 41.5% to 82%.⁹ Previous studies have reported a higher coverage in urban areas as compared to the rural and tribal areas.^{1,2,5,7,11,13} The area studied represents villages in Delhi undergoing rapid urbanization and experiencing major influx of migrant population. A study from urban Bangladesh reported an overall coverage of 51%, which was significantly lower in the slum (38%) as compared to non-slum areas (69%).¹⁴

About 40.5% mothers possessed immunization card in the present study, in NHFS-2⁴, mothers had vaccination cards for 34% of boys and 33% of girls while in the IRMS survey¹, 71% and in the UNICEF survey 48.5% of the mothers had immunization cards available.² The dropout rate for first to third dose of DPT and OPV was 18% in the present study comparable to 16% and 21% according to

NHFS-2, while it was 15% in the study from east Delhi.⁴
⁸ A dropout rate of 33% from BCG to measles was observed in urban Bangladesh.¹⁴

Authors also recorded the DPT booster, MMR and Hepatitis B immunization status. It was 41.4% for DPT booster, which is much higher than the figure of 15% observed in the surveys conducted by UNICEF. Only the state of Goa had coverage over 50%, while it was also neglected in the better off states like Maharashtra, Kerala and Tamil Nadu.² In a rural area of Maharashtra a higher figure of 63.4% has been reported.¹⁰ Hepatitis B vaccine coverage was only 24%, although it was higher than the figure of 14% reported in another study in East Delhi.⁸ It was low probably due to the erratic supply of the vaccine.

Higher literacy level of both mother and father was associated with a better immunization status of the child. The close association between parental, especially maternal education has also been documented in the IRMS, NFHS 2 and UNICEF surveys and other studies from India and other developing countries.^{1,2,4,14,15}

In the present study children of tenants who were migrants from other states were less likely to be immunized as compared to the permanent residents of the area. Studies from African and South American countries have also reported similarly.^{17,18} Vaccine coverage of migrants might be associated with their level of integration in the new society or may reflect the coverage of the area of origin. As majority of the tenants are from states where immunization coverage is low in the nationwide surveys, low coverage in this population may be explained.

Other factors that were associated with immunization status of the child were the place of birth of the child. Children born at home were less likely to have received complete immunization. The studies in Mozambique and South Africa have also observed the same.^{18,19} Mothers who deliver at home may be non-users of health services in general and have to be targeted for utilization of health services.

Observations from the present study point towards a pressing need to accelerate efforts in improving the immunization coverage in the area. Efforts should specially be targeted at children delivered at home, children of migrants and less educated mothers.

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