



## **Original Article**

### **Immunization Coverage of Optional Vaccines**

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**Abstract: Introduction:** Immunization is a simple preventive service. Routine immunization is provided free of charge in India. The other additional vaccines are available as optional. Therefore, present study was designed to assess the coverage of optional vaccines in urban and rural setting of Amritsar district.

**Material and Methods:** The present study was a community based cross-sectional study conducted in the catchment area of department of Community Medicine, Sri Guru Ram Das Institute of Medical Sciences and Research, Amritsar. All the children in the age group of 24-60 months were included in the study. Coverage of each vaccine was computed. Analysis of association between immunization coverage and various socio-demographic variables was done using chi square test. **Results:** Out of the total children included in the study 53.9% were males and 46.1% were females. Coverage in males was significantly higher as compared to females. The difference of immunization among the rural and urban population was found to be highly significant.

**Conclusions:** This study highlights the need to accelerate efforts in improving the immunization coverage for optional vaccines particularly in rural areas.

**Key Words:** Immunization; Coverage; Vaccines; Optional; Rural; Urban

#### **Introduction:**

Vaccines and domestic immunization policy form a critical component of a nation's public health care system. This is particularly true in the context of a developing country like India, where the disease burden of Vaccine Preventable Diseases (VPD) and mortality due to them, are high given its large population to which about 26 million newborns are added every year.(1) Immunization is a simple preventive service that is

independent of need and is normally provided free of charge at all public health care facilities in India.(2)

Since the Millennium Summit in 2000, immunization has moved centre stage as one of the driving forces behind the efforts to meet the Millennium Development Goals (MDGs)- in particular the goal to reduce the deaths among children under five years of age (MDG-4).(3)

The Routine Immunization schedule includes the following vaccines: BCG, OPV, Triple antigen, measles and hepatitis B. The Indian Academy of Pediatrics has recommended the other additional vaccines available such as Hib, Typhoid, Hepatitis A, Chicken pox and MMR as optional. This has been necessitated due to significant contribution to childhood morbidity and mortality from these emerging and re-emerging diseases. In addition, organizations like the Global Alliance for Vaccine Initiative (GAVI), that work as a part of globalization of health, also exert considerable pressure on developing countries to change their immunization schedule.(4)

Currently optional vaccines are being actively promoted by the family practitioners and pediatricians. Many of them are being promoted directly by the vaccine manufacturing companies through distribution of printed educational materials through doctors or even advertisements in the media. Even then, these are used less frequently.

So what could be the possible hindrances that hamper the progress? To find answers, the present study was designed to assess the coverage of optional vaccines in urban and rural setting of Amritsar district. The socio-demographic factors affecting the utilization of these vaccines were also studied.

## Materials and Methods

The present study was a community based cross-sectional study conducted in the catchment area of urban health training center (UHTC) and rural health training center (RHTC) of department of Community Medicine, Sri Guru Ram Das Institute of Medical sciences & Research, Amritsar over a period of one year (Oct 2008-August 2009). All the children in the age group of 24-60 months were included in the study. Informants, preferably mothers were interviewed using a pre-tested self structured questionnaire by a house to house visit. Information on socio-demographic profile and vaccination status of the child regarding optional vaccines and routine vaccines was recorded. The information provided by the mother was verified from the immunization card of the child and if the card was not available, validation of immunization histories given by the mothers was done by seeking information about the time and source of immunization, the health and health care facility. The status of optional vaccines included in the study were Hep B, Hib, MMR, Hepatitis A, Chicken pox and Typhoid.

Coverage of each vaccine was computed. The child was labeled as immunized against an optional vaccine only if he/she has received all the recommended doses. A urban-rural as well as male-female comparison was also done. 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.

## Results

Out of the total population at UHTC (24,832) and RHTC (26,488), 1983 (M=1066 & F=917) and 2051 (M=1109 & F=942) children in the age group of 24-60 months were enlisted, respectively. Out of the total (4034) children included in the study 2175 (53.9%) were males and 1859 (46.1%) were females. The routine immunization coverage was recorded to be 91.4% and 92.7% in urban and rural study areas respectively.

About one fourth of the mothers were found to be illiterate during the survey. Almost all the mothers (96.6%) were housewives. Majority of the fathers had attended school for more than 8 years (54.4%) while 17.7% were illiterate. Almost one third of the fathers were skilled workers (32.2%), 26.9% were unskilled workers while 40.9% were professionals. Immunization cards were present with 65.6% of the mothers.

The Table 1 shows the immunization status for optional vaccines according to the sex of the children. The overall coverage in males was significantly higher as compared to females which is mainly due to gender disparities which are prevalent at large in the urban and rural community of Punjab. The coverage levels for Hepatitis B were high in both the sexes and hepatitis B third dose coverage was higher in females (55.8%) as compared to males (54.9%) but the difference was not found to be statistically significant. The dropout rate between Hepatitis B 1<sup>st</sup> & 3<sup>rd</sup> dose was higher in males (18.4%) than females (14.6%). The coverage of hepatitis A was the lowest in both the sexes (Males=2.9%, females=1.1%). The coverage for Hib B was higher in males (17.6%) as compared to females (11.9%) which is attributed to the cost of the vaccine (one shot costs about Rs. 200/-). The dropout rate between Hib 1 to Booster dose was higher in females (45.1%) in comparison to males (33.7%) because the parents are not ready to spend the money on the female child.

The coverage level was highest for the Hepatitis B 1 in both urban and rural settings (65% & 67.8%) and lowest for hepatitis A (4% & 0.2%). Reason for high coverage of hepatitis B was due to active promotion of this vaccine by the government officials and as well as the cost played a major role in its utilization (one pediatric dose costs Rs 20). 55.3% of children had received all the 3 doses of hepatitis B. The dropout rate between Hepatitis B 1<sup>st</sup> & 2<sup>nd</sup> dose was 10.9% (urban=10.3%, Rural=11.4%) and between 2<sup>nd</sup> & 3<sup>rd</sup> dose was 6.6% (urban=8.2%, Rural=5.0%).

Thus the dropout rate between 1<sup>st</sup> & 3<sup>rd</sup> dose was 16.7% (urban=17.7%, Rural=15.8%).

Vaccine	Total		Grand Total (4034)
	Male (2175)	Female (1859)	
Hep B -1	1464(67.3)	1216(65.4)	2680(66.4)
Hep B-2	1312(60.3)	1077(57.9)	2389(59.2)
Hep B-3	1194(54.9)	1038(55.8)	2232(55.3)
Hib -1	576(26.5)	406(21.8)	982(24.3)
Hib -2	525(24.1)	376(20.2)	901(22.3)
Hib -3	482(22.2)	334(17.9)	816(20.2)
Hib-B	382(17.6)	223(11.9)	605(15.2)
MMR	375(17.2)	209(11.2)	584(14.5)
Typhoid	303(13.9)	237(12.7)	540(13.4)
Chicken pox	149(6.9)	95(5.1)	244(6.1)
Hep A	64(2.9)	20(1.1)	84(2.1)

(Figures in parenthesis represent the percentages)

The immunization for Hib was low ranging from 24.3% (urban=40.2%, Rural=9.0%) for Hib 1<sup>st</sup> dose to 20.2% (urban=34.5%, Rural=6.4%) for Hib 3<sup>rd</sup> dose and dropout rate being 16.9% (urban=14.2%, Rural=28.6%). The immunization for Hib B was even lower i.e. 15.2% (urban=27.3%, Rural=3.1%) with dropout rate between Hib 1<sup>st</sup> and Booster dose being as high as 38.4% (urban=31.9%, Rural=65.9%).

Vaccine	Total		Grand Total (4034)
	Urban (1983)	Rural (2051)	
Hep B -1	1289(65)	1391(67.8)	2680(66.4)
Hep B-2	1156(58.3)	1233(60.1)	2389(59.2)
Hep B-3	1061(53.5)	1171(57.1)	2232(55.3)
Hib -1	797(40.2)	185(9.0)	982(24.3)
Hib -2	738(37.2)	163(7.9)	901(22.3)
Hib -3	684(34.5)	132(6.4)	816(20.2)
Hib-B	542(27.3)	63(3.1)	605(15.0)
Hep -A	80(4.0)	4(0.2)	84(2.1)
Chicken Pox	230(11.6)	14(0.7)	244(6.1)
MMR	446(22.5)	138(6.7)	584(14.5)
Typhoid	342(17.2)	198(9.7)	540(13.4)

(Figures in parenthesis represent the percentages)

The difference of immunization among the rural and urban population was found to be highly significant. The reason for high coverage in urban areas was mainly the higher socioeconomic status, education and above all availability as well as awareness.

Table 3 shows the association between various socio demographic factors and immunization coverage. As hepatitis B had maximum coverage, so only those children with complete immunization against Hepatitis B were included in this analysis as very few were there who had not opted for Hepatitis B but had undergone immunization against any other optional vaccine. Higher literacy of parents was associated with immunization against optional vaccine of the child ( $p<0.01$ ). Children whose mother had eight or more years of schooling were 3 times more likely to receive optional vaccines than those whose mother 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=6.13). Children born in a hospital were more likely to receive optional vaccine in comparison to those born at home ( $p<0.01$ , OR=3.61). Children of mothers who had an immunization card had higher immunization coverage for optional vaccines as compared to those who did not ( $p<0.01$ , OR=2.17). Children of the residents had opted more for optional vaccines as compared to the tenants.

<b>Table 3: Immunization status of children in relation to Socio Demographic Factors</b>				
<b>Socio Demographic Factors</b>	<b>Opted</b>	<b>Not Opted</b>	<b>Odds Ratio</b>	<b>P value</b>
<b>Mother's Education</b>				
Nil	372	489	1	
1-8yrs	717	874	1.08 (0.91-1.28)	p>.5
>8yrs	1143	439	3.42(2.86-4.09)	p<.01
<b>Father's Education</b>				
Nil	329	384	1	
1-8yrs	594	534	1.3(1.7-1.57)	p>.01
>8yrs	1309	884	1.73(1.45-2.06)	P<.01
<b>Father's Occupation</b>				
Unskilled	343	742	1	
Skilled	668	629	2.3(1.94 - 2.73)	P<.01
Professional	1221	431	6.13(5.16 - 7.28)	P<.01
<b>Residential Status</b>				
Resident	1473	894	1.97(1.73 - 2.24)	P<.01
Migrant	759	908	1	
<b>Family Type</b>				
Nuclear	1347	1048	1.10(0.96 - 1.24)	p>.05
Joint	885	754	1	
<b>Place of Delivery</b>				
Home	711	1120	1	
Hospital	1521	682	3.65(3.2-4.17)	P<.01
<b>Immunization Card</b>				
Present	1637	1008	2.17(1.89-2.48)	
Not Present	595	794	1	P<.01
<b>Cast</b>				
General	1543	942	2.04(1.79-2.33)	
SC/ST	689	860	1	P<.01

### Discussion

The present study was conducted in rural and urban setting of Amritsar district of Punjab to assess the immunization coverage for optional vaccines & study the factors associated with complete immunization against any one optional vaccine. Very few studies have been done in the past to assess the immunization coverage of these vaccines as most of the studies have been conducted to assess the immunization coverage of routine immunization of primary doses in 12-23 months. In the present study children in the age group 24-60 months were included to study the coverage of booster doses of various optional vaccines, Hepatitis A, Typhoid and MMR.

The study conducted at Chandigarh reported that among optional vaccines maximum uptake was of Hep B (44.7%), followed by Hib (27.8%)(6) which is consistent with our study as maximum children were immunized against Hep B (55.3%) followed by Hib B (15.0%). The main factor for maximum coverage of Hep B could be increasing number of awareness campaigns and inclusion of the vaccine in the National Immunization Schedule. The immunization coverage for Typhoid (13.4%) and Chicken Pox (6.1%) was higher than that reported by Sonia Puri et al, which was 6.01% and 2.8% respectively.(6)

In the present study the urban coverage was significantly higher than that of rural area mainly because availability and affordability is not a problem in urban areas and most of the private pediatricians are prescribing them in this part.

Immunization coverage for optional vaccines was higher among children of literate parents which may be because literacy is a proxy measure of socio-economic status. In the present study children of tenants who were migrants from other states were less likely to be immunized compared to the permanent residents of the area. Studies from African and South American countries

have also reported similarly.(7,8) 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 routine 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 immunization against optional vaccines. The studies in Mozambique and South Africa have also observed the same.(8,9) Mothers who deliver at home may be non-users of health services in general and have to be targeted for utilization of health services.

GAVI aims to provide support to poor countries for introduction of newer vaccines.(10,11) Prevailing opinion among experts favours inclusion of Hep B, MMR and Hib vaccine in National Immunization Schedule of India. Introduction of Hib vaccine is currently on the GAVI agenda. So far 92 countries have introduced but, it is likely to be eighth vaccine to be included in the World Health Organization immunization programme.(12)

Thus the present study documents that availability of optional vaccines and utilization is not a problem in urban but same can be said about rural areas. However, no uniform schedule is being followed for these vaccines. Indian Academy of Pediatrics is following a separate schedule and WHO prescribes a separate schedule. No standard schedule has been formulated which creates confusion among the parents as individual practitioners use their own regimens. This study also points towards a pressing need to accelerate efforts in improving the immunization coverage for optional vaccines particularly in rural areas. Efforts should specially be targeted at children delivered at home, children of migrants and less educated mothers.

### Limitations

Only the population in the catchment area was included in the study due to logistics constraints and this could be a potential source of bias. A point to be remembered is that the parents of children included in the study had knowledge and easy access to the optional vaccines and the results would not be generalized to the whole population. It may be presumed that knowledge and motivation levels regarding optional vaccines would be low among those where such centers are not there and thus the actual figures for the community as a whole can be expected to be lower than the study's finding.

### Conclusion

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