

## Original Research Article

# Immunization status of children admitted to a tertiary hospital in India

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### ABSTRACT

**Background:** In spite of the ongoing Universal immunization program (UIP), National family health survey data shows declining trend in the number of children fully immunized in Maharashtra. Hence this study was undertaken to determine immunization status in 12-23 months age children admitted to pediatric wards of a tertiary care hospital and factors affecting it.

**Methods:** A prospective, cross sectional study was carried out in which children between 12-23 months age admitted to paediatric wards of a tertiary care hospital were included. Immunization history for Universal immunization program vaccines and socio-demographic information was collected and analysed to find the immunization status and its correlation with various demographic factors.

**Results:** Of total 418 children, 70.3% were completely immunized, 27.8% incompletely immunized and 1.9% unimmunized. Majority were immunized in government centers. 83.3% subjects were of 1<sup>st</sup>/2<sup>nd</sup> birth order, 90.4% were delivered institutionally and 76.1% were delivered vaginally. Around half of the children's fathers and mothers were illiterate. Only father was employed in 75.4% while both parents were employed in 23.4%. Birth order, place of delivery, mode of delivery, father and mother's education and employment status were statistically associated with immunization while gender, presence of immunization card, migrant status and place of immunization were not associated. Reasons for incomplete immunization included lack of knowledge about immunization and 'child not well' at time of immunization.

**Conclusions:** Even in a population with health seeking behaviour almost one third of the children were incompletely immunized. Special efforts are required for finding groups of children with high chances of being incompletely immunized.

**Keywords:** Children, Determinants, Immunization

### INTRODUCTION

To date, immunization has turned out to be one of the most cost-effective public health interventions. It has helped in saving millions of lives and has also played an important part in preventing disability and illness in countless children. Global coverage rates for the third dose of the diphtheria, tetanus and pertussis vaccine (DTP3) had increased to 86.0% in 2018 from 72.0% in 2000 and 20.0% in 1980. However, it has not improved over this decade. The Global vaccine action plan target of

90.0% or greater coverage of DTP3 has not yet been achieved by 83 countries.<sup>1</sup> Moreover, over last several years the proportion of the world's children who receive recommended vaccines has not changed much.<sup>2</sup> One of the most noticeable finding in the National Health and Family Survey (NHFS) over the years has been the decline in the number of children fully immunized (Bacillus Calmette Gurein (BCG), measles and 3 doses each of oral polio vaccine (OPV) and DTP) in the 12-23 months age group for the state of Maharashtra. The figures have come down from 78.4% in NHFS 2 to 58.8

in NFHS 3 and the present 56.3% as per NFHS4.<sup>3,4</sup> This trend is alarming. There is a paucity of data on the determinants of incomplete immunization in an urban area especially in a population already in connect with health care system. Hence this study was undertaken to detect the status of immunization and factors determining immunization status in children from an urban population already utilizing the health care facilities.

**Objectives**

- To find the status of immunization of 12 to 23 months age children admitted to pediatric wards of a tertiary care hospital.
- To ascertain factors affecting the immunization status of the study population.

**METHODS**

This was a prospective, cross sectional, observational, hospital-based study. The study was carried out in the Pediatric wards of a tertiary care teaching hospital.

**Inclusion criteria**

- All children from 12 months to 23 months admitted to Pediatric ward of the hospital were included in this study over a four-month period (January to April 2018).

**Exclusion criteria**

- Only critically ill patients were excluded.

The study was approved by the Institutional Ethics Committee. An informed consent was obtained from each subject. The caretaker, preferably mother if available, was interviewed. Information was entered in a proforma prepared to record the details of immunization as well as demographic information, gender, birth order, place and method of delivery, place of immunization, education of the father and mother independently and the employment status of both the parents. For children with incomplete immunization/ no immunization the possible reasons for not completing the immunization were recorded. The vaccines used in the national immunization program were considered while assessing immunization status, viz., BCG vaccine, OPV, DPT vaccine and the measles vaccine. OPV received on national immunization days were not considered.

Immunization status was confirmed from the record of vaccination cards whenever available. In absence of immunization card, history obtained from parents was considered. A child who has received BCG vaccine after birth, three doses of DPT and OPV, and one dose of measles vaccine were deemed to be completely immunized. A child who had not received any vaccine listed above were considered unimmunized. All children between complete immunization and no immunization

were considered incompletely/partially immunized. Partially immunized and unimmunized children were studied together as a group. The children who were incompletely immunized/unimmunized were administered the pending immunizations before discharge from the hospital.

For a power of 80 and alpha of 0.05, sample size was calculated as 237 using a previous study in which the proportion of completely immunized children was 76.0%.<sup>5</sup>

**Statistical analysis**

The data was analyzed using Microsoft excel, primer of biostatistics and the Minitab software. Chi square test was applied to find out the significance of association between various factors and immunization status and a p-value <0.05 was taken as significant.

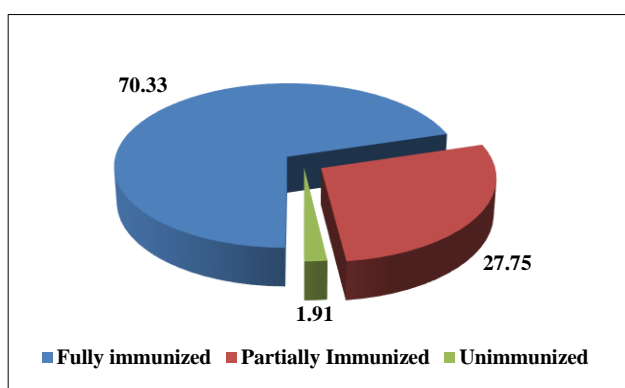
**RESULTS**

A total 418 children fulfilling the inclusion criteria were included in the study. There were 276 boys and 142 girls in this population with a male to female ratio of 1.94:1. The demographics of the study subjects is shown in Table 1.

**Table 1: Characteristics of study population.**

Variable	No. of patients (n=418)	%
<b>Gender</b>		
Male	276	66.02%
Female	142	33.98%
<b>Place of birth</b>		
Institutional	378	90.43%
Home	40	9.57%
<b>Mode of delivery</b>		
Caesarean section	100	23.92%
Vaginal delivery	318	76.07%
<b>Place of immunization</b>		
Govt	264	63.15%
Private	106	25.35%
Both	40	9.56%
Information not available	8	1.91%
<b>Mothers education</b>		
Illiterate	218	52.15%
Primary/secondary	150	35.88%
Graduate and above	48	11.48%
Information not available	02	0.47%
<b>Fathers education</b>		
Illiterate	198	47.36%
Primary/secondary	154	36.84%
Graduate and above	64	15.31%
Information not available	02	0.47%
<b>Employment status</b>		
Only father employed	315	75.35%

Variable	No. of patients (n=418)	%
Both employed	98	23.44%
Both unemployed	5	1.19%
Birth order		
≤2	348	83.25%
>2	70	16.75%
Immunization card		
Available	84	20.09%
Not available	334	79.91%
Residence place		
Local	342	81.82%
Migrant	76	18.18%



**Figure 1: Immunization status of children 12-23 months age (%).**

As seen in Figure 1, a total of 294 (70.3%) children out of 418 were completely immunized for age. Out of the 124 remaining children, 8 (1.9%) were totally unimmunized while 116 (27.8%) were incompletely immunized for age.

When considering only Pulse Polio immunization, 384 (91.9%) had received both the doses while single dose was received by 8 (1.9%) and no doses by 26 (6.2%). On considering the reasons given by the caretakers for incomplete or no immunization (Table 2), absence of knowledge about immunization was the most common reason. Other common reasons included ‘child not well’ at the scheduled date of immunization, no information about place of vaccination, fear of untoward effects and child gone to native place at scheduled date of vaccination. Miscellaneous causes put forth by the parent for incomplete immunization included loss of wages in three, sibling not well in one, mother not well in two and neither parent available in two.

When the statistical association between various factors and immunization status was studied (Table 3), birth order more than second, mother’s education, father’s education, mode of delivery, place of delivery and employment status (both paternal and maternal) were associated with the immunization status of the child where as sex of the child, availability of immunization card, place of immunization and migrant status were not related with level of immunization.

**Table 2: Reasons for non/partial immunization.**

Reason	No. of patients (n=124)	%
Lack of knowledge	58	46.7%
Child not well	21	16.9%
Place and time of vaccination not known	20	16.1%
Fear of untoward effects	13	10.4%
Gone to native place	4	3.2%
Others	8	6.4%

**Table 3: Determinants of immunization status.**

Variable	Number (n=418)	Completely immunized no. (%)	Non/partially immunized no. (%)	p value
<b>Gender</b>				
Male	276	194 (70.29%)	82 (29.71%)	0.978
Female	142	100 (70.42%)	42(29.58%)	
Place of birth				
Institutional	378	276 (74.59%)	94 (25.41%)	<0.05
Home	40	18 (37.50%)	30 (62.50%)	
Mode of delivery				
Caesarean section	100	80 (80.00%)	20 (20.00%)	<0.05
Vaginal delivery	318	214 (67.30%)	104 (32.70%)	
Place of immunization				
Govt	264	180 (68.18%)	84 (31.82%)	0.098
Private	106	82 (77.36%)	24 (22.64%)	
Both	40	32 (80.00%)	8 (20.00%)	
Mothers education				
Illiterate	218	124 (56.88%)	94 (43.12%)	<0.05
Primary/secondary	150	130 (86.67%)	20 (13.33%)	

Variable	Number (n=418)	Completely immunized no. (%)	Non/partially immunized no. (%)	p value
Graduate and above	48	38 (79.17%)	10 (20.83%)	
Fathers education				
Illiterate	198	120 (60.61%)	78 (39.39%)	<0.05
Primary/secondary	154	121 (78.57%)	33 (21.43%)	
Graduate and above	64	51 (79.69%)	13 (20.31%)	
Employment status				
Only father employed	315	234 (74.29%)	81 (25.71%)	<0.05
Both employed	98	56 (57.14%)	42 (42.86%)	
Both unemployed	5	4 (80.00%)	1 (20.00%)	
Birth order				
≤2	348	256 (73.56%)	92 (26.44%)	<0.05
>2	70	38 (54.29%)	32 (45.71%)	
Immunization card				
Available	84	64 (76.19%)	20 (23.81%)	0.189
Not available	334	230 (68.86%)	104 (31.14%)	
Residence place				
Local	342	246 (71.93%)	96 (28.07%)	0.13
Migrant	78	48 (63.18%)	28 (36.84%)	

**Table 4: Immunization status in similar studies.**

Study	Completely immunized <sup>5</sup>	Partially immunized (%)	Unimmunized (%)
Present study*	70.33%	27.75%	1.91%
Delhi <sup>8</sup>	17.85%	48%	34.15%
Uttar Pradesh <sup>9</sup>	40.66%	45.11%	14.22%
Iran <sup>10</sup>	87.5%	9.5%	3.0%
Mumbai <sup>11</sup>	76%	17.6%	6.4%
Lucknow <sup>12</sup>	74.7%	11.1%	14.1%

\*Hospital based study.

## DISCUSSION

In 1974, the expanded program on immunization (EPI) was globally launched by the World Health Organization. Prevention of six common childhood vaccine-preventable diseases by the year 2000 was the main objective of this program. This program was endorsed in 1978 by Government of India. Subsequently, on November 19, 1985, India introduced the Universal Immunization Program with the focus on covering not less than 85.0% of all infants by 1990.<sup>6</sup> The National population policy 2000 set a goal to achieve universal immunization of children against all vaccine preventable diseases by 2010.<sup>7</sup>

Several factors play a role in the variations seen in immunization of children. These factors may be related to the individual characteristics like gender and birth order or may be family related viz. area of residence, socio-economic status and education level of parents. Demographic characteristics like religion and caste as well as factors specific to the society like ease of access to and availability of health-care, health seeking behavior etc., also contribute to the inequities. An environment

needs to be created, wherein each child in the country gets an equal opportunity of immunization. Also, groups at greatest risk of remaining unvaccinated need to be recognized, these measures may contribute to equity in immunization bridging the imbalances as much as possible.<sup>8</sup>

The present study was performed to evaluate the immunization status of children attending a health care facility as well as to find out the reasons and factors associated with incomplete immunization. In this study, authors found about 70.3% of the children were completely immunized while about 27.8% were partially immunized and nearly 1.9% were unimmunized. As seen in Table 4, similar studies have shown variable results for children completely immunized or unimmunized.<sup>5,9-12</sup>

The wide variation in different studies probably reflects the immunization coverage in different areas of the country. Also, the present study being hospital based, the study population belonged to a group with health seeking behavior thus reflecting a larger proportion of children who had been immunized completely. Availability of immunization cards was seen in only 20.1% of study

population. Other studies have shown a variable figure with some showing immunization card available in around 32.0% subjects while others showing its availability in around 74.0% subjects.<sup>9,13</sup> Maintenance of immunization records is of great importance and needs to be stressed during the immunization visits. Also, the caregiver needs to be advised to carry the immunization card with them for all child health related visits as well as during change of residence for a longer time. 81.0% of the partially immunized children had been immunized by pulse polio immunization which is similar to a study carried out by Kumar D et al.<sup>9</sup>

Out of the children who were not completely immunized, the most common reason was absence of knowledge about immunization (46.7%) followed by 'child not being well' at scheduled time of vaccination (16.9%) and lack of information about place and time of vaccination (16.1%). Fear of untoward effects of vaccination was also one of the common reasons (10.4%) given by the parent. Several other studies have given similar reasons for incomplete immunization.<sup>5,9-12</sup> These findings demonstrate the need of continuous activities and efforts to spread knowledge about vaccination and its benefits. Use of mass media like television and utilization of services of prominent personalities in the field of arts and/or sports can be considered as was done in the case of pulse polio immunization campaign should also be considered. Minor illnesses are no contraindications for routine immunization. This fact needs to be reinforced repeatedly in the minds of health care workers as well as parents especially mothers during counseling at time of discharge after delivery. Similarly, the fear of untoward effects needs to be dispelled from the minds of the parents. Serious adverse effects after immunization are extremely rare and the benefits of vaccination far outweigh the risk.

The present study also attempted to determine the factors which were associated with incomplete immunization. Children delivered by caesarean section and those delivered institutionally were significantly more likely to be completely immunized. Similar findings were also reported by Kumar D et al.<sup>9</sup> Place where the delivery occurred was also shown to be significantly related with the immunization status by some other studies.<sup>11,12,14,15</sup> Mothers who deliver at home in general tend to be poor users of health services. More focus on ensuring that all deliveries take place at an institution may indirectly help in improving immunization coverage. Also, delivery at hospital ensures early start to the routine immunization and more information imparted to the parents regarding subsequent immunizations. Birth order more than second was associated statistically with incomplete immunization. This has also been demonstrated in other studies.<sup>12,14</sup> Studies have showed that later born children are a disadvantaged group within the family with respect to health outcomes.<sup>16</sup> Higher order of births had lower vaccination coverage as per analysis of the first 3 NFHS surveys.<sup>8</sup>

Education of the mother and father independently were significantly associated with incomplete immunization. Illiteracy has been shown to be associated with partial and unimmunized children in several studies.<sup>9-12</sup> A direct relationship has been found between paternal education and vaccination status of children by previous studies.<sup>17,18</sup> Similarly, several other studies have documented relationship between maternal education and immunization status.<sup>14,19-22</sup> Parental education, both maternal and paternal is an important indicator of the child's immunization. In situations where both the parents were employed, the chances of the child being incompletely immunized was significantly higher. A study by Nath et al, found that the most common factor associated with incomplete immunization of a child was absence of both parents due to their being occupied with activities for livelihood.<sup>23</sup>

The present study did not find any statistical relationship between immunization status and factors like gender of the child, place of immunization, presence of immunization card and whether the child belonged to a migrant family.

It is the right of every child to receive complete immunization against preventable childhood diseases. With the aim of strengthening and invigorating the program and to rapidly cover all children as far as immunization is concerned. Mission Indradhanush was launched by the Government of India in December 2014. Complete immunization with all available vaccines for children up to two years and pregnant women is the objective of this program.<sup>24</sup> This study illustrates the likely factors which need to be considered for improving the overall immunization coverage.

## CONCLUSION

The present study throws light on the immunization status of children in an urban population with health seeking behaviour. Better communication with and education of parents during antenatal visits, delivery period and during routine health visits may help in reducing the number of children remaining incompletely immunized. Special focus needs to be placed on finding those groups with high chances of remaining incompletely unimmunized so as to achieve optimum results with missions like Indradhanush.

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