



**STUDY TO DETERMINE EPIDEMIOLOGICAL FACTORS INFLUENCING  
VACCINATION COVERAGE OF CHILDREN OF AGE GROUP 12 - 23 MONTH  
RESIDING IN THE FIELD PRACTICE AREA OF TERTIARY HOSPITAL.**

**Community Medicine**

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**ABSTRACT**

**Background:** There are various factors which are responsible for inadequate level of vaccination coverage such as ignorance about need of vaccination, illiteracy, lack of awareness and poor utilization of health services are main factors. **Objective:** This study was designed to find out factors responsible for inadequate immunization, so that we can rectify them and achieve the objective of the UIP. **Material and method:** This was sectional study conducted at field practice area of tertiary care hospital during January 2017 to July 2018. Study population was children in the age group 12-23 month. As per WHO norm for identification of sample size for vaccination coverage in study area 30 cluster sampling method is preferred. **Results and observations:** There were no significant difference in immunized and non-immunized children with respect to various factors like gender, age of mother, education of mother, socio-economic status, birth order and birth weight of children ( $p < 0.05$ ). **Conclusion:** Overall immunization coverage in the area is good and higher than the national coverage level. Gender, age and education of mother, socio-economic status, birth order and birth weight had not significant effect on immunization status of children.

**KEYWORDS**

Immunization, age, gender, factor, birth weight.

**INTRODUCTION**

Though Dhanwantari, the father of Indian Medicine, spoke about preventing infectious diseases through immunization, the first documentation of successful vaccination to protect against smallpox was established by Edward Jenner in 1796. The second vaccine was developed by Louis Pasteur, against Rabies (1883). Since then, many other vaccines were developed in rapid succession.(1)

The target in UIP districts is to achieve universal coverage within one year (1986) and maintain the same in the subsequent years. This scheme has been introduced in every district of the country, and the target now is to achieve 100% vaccination coverage although technically 85% coverage levels would ensure herd immunity (2). The programme was given the status of A National Technology Mission in 1986 (GOI, 1988) to provide a feeling of urgency and commitment to achieve the goals within the specified period. UIP became a part of the Child Survival and State Motherhood (CSSM) Programme in 1992 and Reproductive and Child Health (RCH) Programme in 1997. The GOI constituted a National Technical Committee on Child Health on 11th June 2000 and launched Vaccination Strengthening Project on recommendation of the Committee<sup>8</sup>. The Department of Family Welfare established a National Technical Advisory Group on Vaccination on 28th August, 2001 to assist GOI in developing a nationwide policy framework for vaccines and vaccination (3). This programme was integrated with the Child Health (RCH) Programme in 1997. In addition to the ongoing routine vaccination programme, the Pulse Polio Vaccination (PPI) campaign was initiated in 1995 to eradicate poliomyelitis from the country.

It is believed that herd immunity can only occur if about 95 percent of people are vaccinated and every person who is not vaccinated increases the chance that they and others will come down with the disease in question. The concept of herd immunity can lull parents into a false sense of security – which can lead them to skip vaccinations. Not only does, the pattern decrease the effectiveness of any herd immunity, but each non-immunized child increases the risk of contagious diseases to spread. After all, it takes just one non-immunized person to get a disease and then spread it to others who are not immunized (4).

The goal of immunization programme is the sustainable control of vaccination preventable infectious diseases. There are various factors

which are responsible for inadequate level of vaccination coverage such as ignorance about need of vaccination, illiteracy, lack of awareness and poor utilization of health services are main factors. This study helps to find out such factors so that we can rectify them and achieve the objective of the programme.

**Material and methods**

This was sectional study conducted at field practice area of tertiary care hospital during January 2017 to July 2018. Study population was children in the age group 12-23 month. People of this area belong to different religions and follow different cultural practices and beliefs. Most of the residents belong to middle and lower socio- economic group.

**A. INCLUSION CRITERIA**

- 1) Those children in the age group of 12–23-month, parental consent given and residing in field practicing area attached to tertiary hospital.

**B. EXCLUSION CRITERIA**

- 1) Children not residing in Nerul in the last one year.
- 2) Children who were seriously ill.
- 3) Children whose parents did not give consent to participate in the study.
- 4) Children whose parents were absent or could not be contacted.

**Sampling method**

Survey will be done to obtain the data of the population from both Nerul Phase I and Nerul Phase II Urban Health Post based on different sectors, villages and nagars etc. As per WHO norm for identification of sample size for vaccination coverage in study area 30 cluster sampling method is preferred (5)(6).

As per 30 cluster sampling method –  $30 * x = \text{sample size}$   $x = 7$  (As per WHO norm for identification of sample size for vaccination coverage) (6)(7) Therefore,  $30 * 7 = 210$  (sample size).

**METHODOLOGY**

After reaching the household, before starting the interview, I will introduce myself and explain the purpose of the visit to the mother or another responsible member of the family. If there is no responsible member present who would answer the question and also if

vaccination card is not available then the household will be excluded from the study. Study subjects will be identified as per inclusion and exclusion criteria. Informed written consent will be obtained from the parents. Parents will be taken into confidence before data collection. Parents will be assured that the information they provide would remain confidential and thus will be encouraged to be truthful in their responses. They will be informed that their participation is completely voluntary and they could quit at any time, after explaining the purpose of the study. Information will be recorded in the questionnaire proforma.

**STATISTICAL ANALYSIS**

The data will be entered using Microsoft Excel 2007. All the response will be tabulated and graphical representation will be made whenever necessary. Appropriate test of significance will be used wherever necessary. Data will be analysis by using SPSS software.

**RESULTS AND OBSERVATIONS**

**Table 1: Immunization Status of Children according to Sex**

Immunization Status	Sex				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Fully Immunization	102	91.07	86	87.76	188	89.52
Partial Immunization	10	8.93	12	12.24	22	10.48
Non Immunization	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>112</b>	<b>100.00</b>	<b>98</b>	<b>100.00</b>	<b>210</b>	<b>100.00</b>

X<sup>2</sup> = 0.613 p value = 0.43

In the study 188 (89.52%) children were Fully Immunized. 22 (10.48%) children were partially immunized and none of the child was non immunized. 102 (91.07%) male and 86 (87.76%) female were fully immunized. 10 (8.93%) male and 12 (12.24%) female were partially immunized. (Table 1)

**Table 2: Immunization Status of Children according to Age of Mother**

Age of Mother	Fully Immunize		Partially Immunize		Non - Immunize		Total	
	No.	%	No.	%	No.	%	No.	%
	<20 years	35	18.62	6	27.27	0	0.00	41
20 – 30 years	152	80.85	16	72.73	0	0.00	168	80.00
>30 years	1	0.53	0	0.00	0	0.00	1	0.48
<b>Total</b>	<b>188</b>	<b>100</b>	<b>22</b>	<b>100</b>	<b>0</b>	<b>0.00</b>	<b>210</b>	<b>100</b>

X<sup>2</sup> = 0.813 p value = 0.384

This table reveals that 152 (80.85%) of children were fully immunized whose mother age was between 20-30years which was considerably more as compared to 35(18.62%) children whose mothers were <20years. (Table 2)

**Table 3: Immunization Status of children according to Education Status of Mother**

Education of mother	Fully Immunize		Partially Immunize		Non Immunize		Total	
	No.	%	No.	%	No.	%	No.	%
	Illiterate	0	0.00	7	31.82	0	0.00	7
Primary School	24	12.77	5	22.73	0	0.00	29	13.81
Secondary School	62	32.98	10	45.45	0	0.00	72	34.29
Higher Secondary School	1	0.53	0	0.00	0	0.00	1	0.48
Graduation and Post-Graduation	101	53.72	0	0.00	0	0.00	101	48.10
<b>Total</b>	<b>188</b>	<b>100.00</b>	<b>22</b>	<b>100.00</b>	<b>0</b>	<b>0</b>	<b>210</b>	<b>100.00</b>

X<sup>2</sup> = 3.663 p value = 0.16

Out of 188 fully immunized children, 101 (53.72%), 62 (32.98%), 24 (12.77%) of children whose mother had Graduation and Post-Graduation, Secondary School and Primary School education were fully immunized respectively. Out of 22 partially immunized children, 7 (31.82%), 5 (22.73%) and 12 (45.45%) of children whose mother had illiterate, Primary School and Secondary School education were partially immunized respectively. (Table 3)

**Table 4: Immunization Status Children according to Socio-Economic Status**

SES	Fully Immunize		Partially Immunize		Non Immunize		Total	
	No.	%	No.	%	No.	%	No.	%
Lower	35	18.62	2	9.09	0	0.00	37	17.62
Upper Lower	51	27.13	10	45.45	0	0.00	61	29.05
Lower Middle	92	48.94	10	45.45	0	0.00	102	48.57
Upper Middle	10	5.32	0	0.00	0	0.00	10	4.76
Upper	0	0.00	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>188</b>	<b>100.00</b>	<b>22</b>	<b>100.00</b>	<b>0</b>	<b>0</b>	<b>210</b>	<b>100.00</b>

X<sup>2</sup> = 4.511 P value = 0.211

Out of 188 fully immunized children, 92 (48.94%), 51 (27.13%), 35 (18.62%) of children belongs to lower middle, upper lower and lower socio economic status respectively. 10 (5.32%) children were belongs to Upper middle socio economic status. Out of 22 partially immunized children, 10 (45.45%), 10 (45.45%) and 2 (9.09%) of children belongs to lower middle, upper lower and lower socio economic status respectively. None of child was partially immunize who belongs to upper middle and upper socio-economic status. (Table 4)

**Table 5: Immunization Status of Children according to Birth Order**

Birth Order	Fully Immunized		Partially Immunized		Non Immunized		Total	
	No.	%	No.	%	No.	%	No.	%
	1st	77	40.96	9	40.91	0	0	86
2nd	98	52.13	11	50.00	0	0	109	51.90
3rd	13	6.91	2	9.09	0	0	15	7.14
<b>Total</b>	<b>188</b>	<b>100.00</b>	<b>22</b>	<b>100.00</b>	<b>0</b>	<b>0</b>	<b>210</b>	<b>100.00</b>

X<sup>2</sup> = 0.148 p value = 0.929

Out of 86 1st birth order children, 77 (40.96%) were fully immunized and 9 children were partially immunized. Out of 109 2nd birth order children, 98 (52.13%) children were fully immunized and 11 children were partially immunized. 13 (6.91%) were fully immunized and 2 (9.09%) were partially immunized 3rd birth order children out of 15 children. (Table 5)

**Table 6: Immunization Status of Children according to Birth Weight**

Birth Weight	Fully Immunized		Partially Immunized		Non Immunized		Total	
	No.	%	No.	%	No.	%	No.	%
	<2.5 kg	23	12.23	2	9.09	0	0	25
>2.5 kg	165	87.77	20	90.91	0	0	185	88.10
<b>Total</b>	<b>188</b>	<b>100.00</b>	<b>22</b>	<b>100.00</b>	<b>0</b>	<b>0</b>	<b>210</b>	<b>100.00</b>

X<sup>2</sup> = 0.186 p value = 0.667

Out of 25 <2.5kg new born, 13 were fully immunized and 2 were partially immunized. Out of 185 >2.5kg new born, 165 were fully immunized and 20 were partially immunized. (Table 6)

**DISCUSSION**

This was sectional study conducted at field practice area of tertiary care hospital during January 2017 to July 2018. Study population was children in the age group 12-23 month. People of this area belong to different religions and follow different cultural practices and beliefs. Most of the residents belong to middle and lower socio- economic group.

Out of 210 study participants, 53.33% of children were male and 46.67% were female. As observed, gender of the child did not significantly affect the immunization status of the child. Present study reveals that fully immunized status among male child was slightly more than female child but this difference was not statistically significant. Similar results were found by different studies in India viz. Sharma B (8) in Mumbai slums, Gill. K (9) in Amritsar slums. Study conducted by Anandhi et.al (10), found similar findings in which 57% were male and 43% was female. Similar results were found in another study at Delhi by Kar et.al. (11) which reported that the sex of the child did not affect significantly the immunization of the child.

In the study group of 210 children 86 (40.95%), 109 (51.90%) and 15

(7.14%) were from 1st, 2nd and 3rd birth order respectively. No significant association was found between birth order of children and vaccination coverage. But various studies found inverse relation between vaccination coverage and birth order viz. Sharma B (8) in Mumbai, Kulkarni and Chavan (12) in Mumbai slums. NFHS-358 found consistently negative relationship between vaccination coverage and birth order for all vaccinations. Studies done by Bobo et.al. (12) and Brenner et.al. (13) revealed that birth order was inversely related to vaccination coverage.

In the study group of 210 children 191 (91%) and 19 (9%) were from nuclear family and joint family respectively. Immunization coverage is good in both type of family as there were good health care services provided in area. In my study immunization coverage were statistically non-significant when compared with type of family. In other study like Jasmeet Singh et.al. (14) it was found that with the increase in number of family member's i.e. if we move from nuclear to joint family, the vaccination coverage improves and it was statistically significant. Goyal S et.al. (15) also found in his study that vaccination coverage was more in children of joint and three generations families as compared to nuclear families.

The government has ensured an elaborate mechanism to immunize all children under national immunization program in India. The vaccines are not only given free but delivered near to the community through the peripheral health workers, auxiliary nurse midwife/village health nurses (16). In spite of this, a section of the community prefers to take their children for vaccination with private providers; either private doctors or private hospitals, more so in the urban areas. Around 1/5th (20.95%) of the parents in this study prefer to vaccinate their children at the private centers. The findings from this study were consistent with the Coverage Evaluation Survey - 2009, undertaken by United Nations International Children's Emergency Fund, which showed that 8.7% children were taken to private health care providers for routine immunization in general and in urban area this figure was 21.1%.64. A majority of these parents, in the present study, prefer private service providers due to a convenient place (42–55%) and time (21–26%).

In the study group 168 (80%) of study mother belonged to 20-30 years of age followed by 41(19.52%) of women in less than 20 years of age. Only 1 (0.48%) mother had age more than 30 years. Study conducted by Annadhi et.al. (10), observed that majority 65% of mother belonged to 20-30 years of age group and 16.5 % of women in less than 20 years of age.

Children of literate parents were found to have more chance of completing their immunization. In this respect mother's literacy was more strongly associated than fathers. As far as level of education of parents is considered, mother's education level, was significantly associated with immunization status of their children. This fact highlights the role of female literacy and female education for the utilization of child health services. Similar significant association with maternal education was also reported by NFHS-I(17), II(18), III(19), IRMS(20), and UNICEF(21). surveys as well as various studies from India and other developing countries (20, 22-26).

In the study 188 (89.52%) children were fully immunized which is more than the national average of 43.5% (NFHS-3) and 70% immunization coverage in the state of Maharashtra(27). (10.48%) children were partially immunized and none of the child was non-immunized.

In the study when immunization coverage was compared with sex distribution of study subjects, we got chi square value as 0.613 and p value as 0.434 which was non-significant. 102 (91.07%) male and 86 (87.76%) females were fully immunized, while 10 (8.93%) male and 12 (12.24%) females were partially immunized. Verburgh AP et.al. (28), Singh J.et.al. (29), Jotna Sokhey et.al. (30), A.C. Patowar et.al. (31), Shaikh et.al. (32) observed the fully immunized were 70%, 41%, 65.7%, 57.6%, 40%, 48% and 60% respectively. Anandhi c et.al. (10) – 56% were fully immunized, 44% were partially immunized or non-immunized.

In the study when immunization coverage was compared with sex distribution of study subjects, we got Chi square value as 0.813 and p value as 0.384 which is non-significant. This table reveals that 152 (80.85%) of children were fully immunized whose mother age was between 20-30years which was considerably more as compared to 35(18.62%) children whose mothers were <20years.

In our study when immunization coverage was compared with education of mother, we got Chi square value as 3.663 and p value as 0.160 which is non-significant. Out of 188 fully immunized children, 101 (53.72%), 62 (32.98%), 24 (12.77%) of children whose mother had Graduation and Post-Graduation, Secondary School and Primary School education were fully immunized respectively. Out of 22 partially immunized children, 7 (31.82%), 5 (22.73%) and 12 (45.45%) of children whose mother had illiterate, Primary School and Secondary School education were partially immunized respectively. All above observations were statistically non-significant. Anandhi C. et.al. (10), Jha N. et.al. (33), Singh P. et.al. (20), H. Vishvanathan et.al. (34), H.Singh et.al. (35), observed that there is positive relationship between immunization coverage and educational level of the mother, Illiteracy is also associated with high failure rate and non-immunization. Rehman et.al. (36), found even in presence of maternal Illiteracy, educating mother about vaccine and vaccine preventable diseases is effective in increasing immunization coverage.

A study done by Vikram et.al. (37) found significant association between maternal education and child immunization status.

In the study when immunization coverage was compared with socio economic status of study subjects, we got chi square value as 4.511 and p value as 0.2114 which is non-significant. Out of 188 fully immunized children, 92 (48.94%), 51 (27.13%), 35 (18.62%) of children belongs to lower middle, upper lower and lower socio-economic status respectively. 10 (5.32%) children were belonging to Upper Middle socio-economic status. All children belong to Upper Middle socio-economic class shows 100 immunization coverage which was similar to the study conducted by H. Vishvanathan et.al. (34), which shows that immunization coverage is higher among higher social class.

Out of 22 partially immunized children, 10 (45.45%), 10 (45.45%) and 2 (9.09%) of children belongs to lower middle, upper lower and lower socio-economic status respectively. None of child was partially immunize who belongs to upper middle and upper socio-economic status. All above result were statistically non-significant which is similar to the study of H. Singh et.al. (35) which found that poverty is not associated with non-immunization.

In the study group of 210 children 86 (40.95%), 109 (51.90%) and 15 (7.14%) were from 1st, 2nd and 3rd birth order respectively. No significant association was found between birth order of children and vaccination coverage (chi square value = 0.148 and p value was 0.929). But various studies found inverse relation between vaccination coverage and birth order viz. Sharma B(36) in Mumbai, Kulkarni and Chavan(38) in Mumbai slums. NFHS - 3 (19) found consistently negative relationship between vaccination coverage and birth order for all vaccinations. Studies done by Bobo et.al. (12) and Brenner et.al. (13) revealed that birth order was inversely related to vaccination coverage.

In the study when immunization coverage was compared with birth weight of study subjects, we got chi square value as 0.186 and p value as 0.667 which is non-significant Out of 25 <2.5kg new born, 13 were fully immunized and 2 were partially immunized. Out of 185 >2.5kg new born, 165 were fully immunized and 20 were partially immunized. Study of Davis et.al. (39), a population-based study showed low birth weight children were at significantly greater risk of immunization delays during the first year of life. We found that there was a lack of knowledge among the mothers with regards to initiation of immunization in preterm and low birth babies. There was a statistically significant correlation between the duration of NICU stay and birth weight with the initiation of immunization as studied by Davis et.al. (37) and Langkamp et.al. (40), Vohr and Oh(41) demonstrated that LBW children previously hospitalized in their NICU received the first 3 doses of Diphtheria and Tetanus Toxoid and Pertussis (DTP) on a delayed schedule. Magoon et.al. (42) also found delays in both DTP and polio immunizations in LBW children who had been hospitalized in NIC.

## CONCLUSION

Overall immunization coverage in the area is good and higher than the national coverage level. Gender, age and education of mother, socio-economic status, birth order and birth weight had not significant effect on immunization status of children.

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