

## Original Research Article

# Study of immunization status of under: five children in relation to various demographic variables of their mothers

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### ABSTRACT

**Background:** Immunization remains an important public health intervention. On one side morbidity and mortality caused by vaccine-preventable diseases are still high in developing countries, on the other side immunization coverage is still low. Present study aims to assess immunization status of under-five children in relation to various demographic variables of their mothers.

**Methods:** A total of 530 mothers with children under 5 years attending OPD, immunization clinic or admitted in paediatric ward were included in the study. Maternal demographic variables like age, religion, education, socio economic status, residence, parity and occupation were compared with immunization status of their children.

**Results:** Most of mothers were housewives (73.77%), primary educated (33.58%), belonged to Hindu religion (47.54%), were of 21-30 years age group (52.64%), residing in urban areas (62.07%) and belonged to middle socio economic status (45.84%). Out of total 530 children 161 (30.37%) were completely immunized as compared to 21.32% who were unimmunized. Boys were marginally more unimmunized (37.32%) than girls (23.04%). Mothers' education, occupation, parity, religion, residence and socio-economic status significantly influenced immunization status of their children ( $p < 0.05$ ).

**Conclusions:** Therefore, it is recommended that any strategy formulated to improve vaccination coverage in children of our country should focus to strengthen above mentioned weak links.

**Keywords:** Immunization, Socio demographic variables, Under five children, Universal Immunization Programme, Vaccine Preventable Diseases

### INTRODUCTION

Infant mortality rate (IMR) is an important indicator used to monitor achievements towards the Millennium Development Goals (MDGs). IMR in India was 34/1000 live births in 2016 against MDG target which was to reduce IMR to 24/1000 live births by 2015. The leading causes of infant mortality are diarrhea, measles, pneumonia, malnutrition etc. Immunization prevents illness, disability and death from vaccine-preventable

diseases (VPDs) including diphtheria, measles, pertussis, pneumonia, polio, rotavirus diarrhea, rubella and tetanus.<sup>1</sup> Immunization has saved the lives of more children than any other medical intervention in the last 50 years. Vaccines are safe, simple and one of the most cost-effective ways to save and improve the lives of children worldwide.

Vaccination coverage has now reached a plateau in many developing countries, and even where good coverage has

been attained; reaching children not yet vaccinated has proved difficult.<sup>2</sup> In Rajasthan According to Annual Health Survey (2012-2013), 74.2% children in Rajasthan received full immunization against common childhood diseases: tuberculosis, polio, diphtheria, pertussis, tetanus and measles.

Previous studies have shown that uptake of vaccination services is dependent not only on provision of these services but also on other factors including knowledge and attitude of mothers, density of health workers, accessibility to vaccination clinics, availability of safe needles and syringes and the opportunity costs (such as lost earnings or time) incurred by parents (mothers). A good attempt to address these factors may go a long way to improve vaccine utilization. Therefore, present study was undertaken to assess immunization status of under-five children in relation to various demographic variables of their mothers.

## METHODS

A simple randomized study was conducted on 530 mothers attending immunization clinic/OPD and mothers catering to under five children hospitalized in the pediatric ward at JLN Hospital, Ajmer for one year from June 2017 to May 2018. Clearance for the study was taken from the Institutional Ethical Committee of JLN Medical College Ajmer. Informed consent was taken from mothers to conduct the study.

Mothers having children under 5 years of age were included while hospitalized children who were critically ill and children whose mother did not co-operate or recall the details of immunization were excluded from the study.

Immunization status of children was assessed according to Universal Immunization Schedule (UIP) by receiving information from mother either orally and/ or by immunization card and/ or by seeing BCG scar. Maternal demographic variables like age, religion, education, socio economic status (assessed by Kuppu swami scale), residence, parity and occupation were compared with immunization status of children.

For the sake of present study immunization status was classified in following three categories: -

- Fully immunized: children who had received BCG and complete doses of hepatitis B, diphtheria, tetanus, pertussis (DPT), OPV, fIPV, rotavirus and measles vaccine applicable for that age as per National Immunization Schedule.
- Partially immunized: those who had received one or more doses of these vaccines, but not all doses.
- Unimmunized: those who had not received single dose of any vaccine.

Data were recorded in a pre-tested, pre-structured proforma and compiled in Master Chart and relevant statistical tests were applied to assess statistical significance of the data. Pearson's chi-square test was used for qualitative data whenever two or more than two groups were used to compare. Level of significance was set at  $P \leq 0.05$ .

## RESULTS

### *Age wise distribution of mothers*

Maximum number (52.64%) of mothers belonged to 21-30 years age group followed by 31-40 years (20.56%), <20 years (15.47%) and >40 years (11.32%) age group.

### *Distribution of cases according to religion*

Maximum number of mothers (47.54%) were Hindus while 35.66% mothers were Muslims and 16.79% were from other religions.

### *Distribution of cases according to occupation.*

Most of mothers (73.77%) were housewives, 17.73% had skilled job and 8.49% had unskilled job.

### *Distribution of mothers according to residence*

Urban residency (62.07%) was far more as compared to rural residency (37.93%).

### *Distribution of mothers according to education*

About one- third (33.58%) of mothers were primary educated while 27.54% were illiterate and rest were educated up to secondary (21.50%), higher secondary (8.86%) and 8.49% were higher educated.

### *Distribution of mothers according to socio-economic status*

Majority of mothers belonged to upper lower (35.84%) and lower middle (30.37%) followed by upper middle (15.47%), upper (11.13%) and lower (7.16%) class.

### *Distribution of children according to birth order*

Out of 530 children, maximum 191 (36.03%) children belonged to first birth order followed by second (33.5%), third (21.5%) and more than third (8.86%).

Out of total 530 children 161 (30.37%) were completely immunized as compared to 21.32% who were unimmunized.

Proportion of completely immunized male children was higher (37.32%) than their counterparts (23.04%). This result was statistically insignificant (Table 1).

**Table 1: Distribution of children according to immunization status.**

Immunization status	Male (n=274)	Female (n=256)	Total (n=530)
Fully immunized	102 (37.22%)	59 (23.04%)	161 (30.37%)
Partially immunized	156 (56.93%)	100 (39.06%)	256 (48.30%)
Unimmunized	16 (5.83%)	97 (37.89%)	113 (21.32%)

$\chi^2=10.01$ , p value=0.09.

Out of total 361 mothers up to 30 years of age, 65(18.01%) mothers had fully immunized their children while out of 169 mothers >30 years of age 96 (56.80%)

had protected their children with full immunization. This result was statistically insignificant (Table2).

**Table 2: Comparison of maternal age with immunization status of children.**

Age	Fully immunized (n=161)	Partially immunized (n=256)	Unimmunized (n=113)	Total (n=530)
<20	15(18.29%)	33 (40.24%)	34(41.46%)	82
21-30	50(17.92%)	54(19.35%)	32(11.46%)	279
31-40	54(49.54%)	52(47.70%)	39(35.77%)	109
>40	42(70%)	10(16.66%)	8(13.33%)	60

$\chi^2=2.39$ , p value=0.12.

Children of majority of housewives (82.09%) and mothers with skilled job (87.23%) were either fully or partially immunized as compared to mothers with unskilled job (37.77%). This result was statistically highly significant (Table 3).

Out of total 206 mothers having secondary, higher secondary and/or higher education 116 (56.31%) had given full immunization to their children, whereas 31 (15.04%) of them totally failed to immunize their children. This result was statistically highly significant (Table 4).

Out of total 324 illiterate and/or primary educated mothers only 45 (13.88%) had fully immunized children.

**Table 3: Comparison of maternal occupation with immunization status of children.**

Occupation	Fully immunized (n=161)	Partially immunized (n=256)	Unimmunized (n=113)	Total (n=530)
Housewife	93 (23.7)	228 (58.3)	70 (17.9)	391
Skilled job	64 (68.8)	18 (19.1)	12 (12.7)	94
Unskilled job	7 (8.88)	10 (22.2)	31 (68.8)	45

$\chi^2=23.5$ , p value=0.01 (S).

**Table 4: Comparison of maternal educational status with immunization status of children.**

Education	Fully immunized (n=161)	Partially immunized (n=256)	Unimmunized (n=113)	Total (n=530)
Illiterate	21 (14.38%)	53 (36.30%)	72 (49.31%)	146
Primary	24 (13.48%)	144 (80.98%)	10 (5.61%)	178
Secondary	70 (61.40%)	24 (21.05%)	20 (17.54%)	114
Higher secondary	24 (51.06%)	17 (36.17%)	6 (12.76%)	47
Higher education	22 (48.88%)	18(40%)	5 (11.11%)	45

$\chi^2=104.9$ , p value=0.001 (S).

Majority of urban children (79.63%) were either fully or partially immunized as compared to 62.18% rural

children. This result was statistically significant (Table 5).

Proportion of fully immunized children having birth order first and second was 42.93% and 37.07% respectively as compared to 8.07% of children born to

multiparous mothers having three or more children. This result was statistically highly significant (Table 6).

**Table 5: Comparison of maternal residence with immunization status of children.**

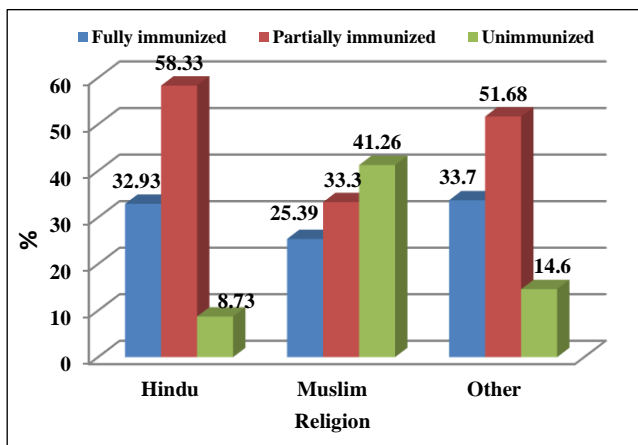
Residence	Fully immunized (n=161)	Partially immunized (n=256)	Unimmunized (n=113)	Total (n=530)
Rural	38 (18.90%)	87 (43.28%)	76 (37.81%)	201
Urban	123 (37.38%)	139 (42.24%)	67 (20.36%)	329

X<sup>2</sup>=8.12, p value=0.04 (S).

**Table 6: Comparison of birth order with immunization status of children.**

Birth order	Fully immunized (n=161)	Partially immunized (n=256)	Unimmunized (n=113)	Total (n=530)
First	82 (42.93%)	95 (49.73%)	14 (7.32%)	191
Second	66 (37.07%)	71 (39.88%)	41 (23.03%)	178
Third	10 (8.77%)	64 (56.14%)	40 (35.07%)	114
More than third	3 (6.38%)	26 (55.31%)	18 (38.29%)	47

X<sup>2</sup>=2.87, p value=0.03 (S).



X<sup>2</sup>=14.4, p value=0.02 (S).

**Figure 1: Comparison of maternal religion with immunization status of children.**

Majority of Hindu children (91.26%) were either fully or partially immunized while 58.73% Muslim children and 85.39% children belonging to other religions were having same immunization status.

A good number of Muslim (41.26%) were unimmunized compared to 8.73% Hindus and 14.60% others.

This result was statistically highly significant (Figure 3).

Majority (54.60%) of children belonging to higher socio economic status (upper and upper middle) were fully immunized as compared to 21.59% of children belonging to lower socio-economic status.

This result was statistically highly significant (Table 7).

**Table 7: Comparison of maternal socio-economic status with immunization status of children**

Socio-economic status	Fully immunized (n=161)	Partially immunized (n=256)	Unimmunized (n=113)	Total (n=530)
Upper	35 (59.32%)	20 (33.89%)	4 (6.77%)	59
Upper middle	42 (51.21%)	28 (34.14%)	12 (14.63%)	82
Lower middle	40 (24.84%)	93 (57.76%)	28 (17.39%)	161
Upper lower	41 (21.57%)	100 (52.63%)	49 (25.78%)	190
Lower	3 (7.89%)	15 (39.47%)	20 (52.63%)	38

**DISCUSSION**

Each year, two to three million lives are saved through immunization. However, more than 22 million children

still go without basic immunization thus leaving them susceptible to life-threatening illness and permanent disability. Most common reasons for partial or non-immunization were family problems of the mothers,

unawareness of immunization, fear of side effects, child too young for immunization, illness of child, parents have no faith in immunization, lack of resources, poor accessibility etc. Immunizing children against vaccine-preventable diseases is an important factor in saving lives, increasing productivity, and alleviating poverty.<sup>3</sup>

#### ***Assessment of immunization status of children under five years of age***

Out of total 530 children, 161 (30.37%) were completely immunized as compared to 21.32% who were unimmunized. Similarly, Angadi MM et al, in their study to aged 12-23 months with respect to immunization found that children of 54 out of 155 respondents (34.84%) were fully immunized, 97 (62.58%) were partially immunized and 4 (2.58%) were unimmunized.<sup>4</sup> The main reason for partial and non-immunization was found to be lack of information.

Present study revealed that proportion of completely immunized male children was higher (37.32%) than their counterparts (23.04%) but the difference was statistically insignificant (p value 0.09). Similar results were found by Kar M et al, from Delhi which reported that the sex of the child did not affect significantly the immunization of the child.<sup>5</sup>

Contrast to these study, Gupta P et al, from Lucknow reported that 74.7% of children were fully immunized, 11.1% partially immunized and 14.1% were not immunized at all and the percentage of non-immunized children were more among female children (20%).<sup>6</sup> The result was statistically significant. Likewise, Kar M et al, from Delhi reported that percentages of fully immunized and unimmunized children were 69.3% and 15.1% respectively.<sup>5</sup>

Gender discrimination in immunization coverage has been shown to exist in all states of India.<sup>7</sup> Trend analysis shows that, at the national level, the average gender disparity in full immunization has remained constant.<sup>8,9</sup>

According to India's Universal Immunization program, Immunization coverage in 2009 reported as being 61%, BCG 86.9%, Measles 74%, OPV3 70.4% and DPT371.5%. The percentage of fully immunized children in Rajasthan has increased to 74.2% from 69% in 2010 according to annual health survey 2012-13. Despite these achievements and tremendous advances in recent years the burden of VPDs remain unacceptably high.<sup>10</sup>

Out of total 361 mothers up to 30 years of age, only 65(18.01%) mothers had fully immunized their children while out of 169 mothers >30 years of age 96 (56.80%) had protected their children with full immunization. Compared to present study Elizebath et al, from US showed that 70.3% of children of mother <19yrs, 71.9% of children of mother 19-29 years and 76.5% of children of mother 30+yrs were fully immunized.<sup>11</sup> Thus it is

evident that younger mothers are less likely to get their children fully immunized compared to older ones probably because they may be unaware of immunization schedule. This is another reason why early marriage have to be discouraged, as the young mother is not in a position to assume responsibility of a child.

Children of majority of housewives (82.09%) and mothers with skilled job (87.23%) were either fully or partially immunized as compared to mothers with unskilled job (37.77%) (Figure 1). Similarly other studies have also reported statistically significant association between mother's occupation and immunization status.<sup>5</sup> Antai D from Nigeria also found that being employed was significantly associated with a higher likelihood of the child being fully immunized.<sup>12</sup> This could be explained on the basis of better education, awareness and socio economic status among mothers with skilled job. This is in contrast to the studies conducted by Omole and Owodunni et al, from South West Nigeria and Abdul raheem et al, from Nigeria, which showed that income and employment status had a significant relationship with immunization incompleteness. The reason for this outcome might come from the fact that the days of immunization might impede the mother's employment schedule.<sup>13,14</sup>

Majority of urban children (79.63%) were either fully or partially immunized as compared to 62.18% rural children. Corroborating to our study Dhadwal D et al, in Shimla showed that 84.3% of urban and 57.5% of rural children were fully immunized. Another study conducted by Gaash B et al, from Kashmir also showed better immunization among children of urban (72%) than rural (62%).<sup>15,16</sup> Similarly study by Singh and Yadav et al, revealed that urban children outnumbered rural children in attaining the higher immunization level.<sup>17</sup> This difference may be attributed to easy accessibility to medical services and better health awareness among urban population.

Out of total 324 illiterate or primary educated mothers only 45 (13.88%) had fully immunized children whereas out of total 206 mothers having secondary or higher education 116 (56.31%) had given full immunization to their children. At the same time in later group of higher educated mothers 31 (15.04%) totally failed to immunize their children. Previous studies by Marks et al, from Nigeria revealed that the educational status of mothers had a strong association with a high vaccine uptake.<sup>18</sup> Abdul raheem et al, also asserted that maternal educational level is associated with missed opportunities for vaccination.<sup>14</sup> Tadesse et al, from South Ethiopia and Onyiriuka AN, also reported that mother's education was a significant predictor of completeness of immunization because highly educated mother will be more aware of the importance of immunization.<sup>19,20</sup>

Majority (54.60%) of children belonging to higher socio economic status (upper and upper middle) were fully immunized as compared to 21.59% of children belonging

to lower socio-economic status. Similar observations were made by Dalal et al, from Goa, who also revealed better immunization among higher socio economic strata which was as follows- 100% of class I, 95.8% of class II 92.1% of class III, 81.7% of class IV and 48.6% of class V.<sup>21</sup> Per capita income in India is among the lowest in the world. Children in medium and high socioeconomic status areas tend to have 10% to 15% higher levels of coverage compared to children of low socioeconomic status. This could be explained on the basis of better affordability, accessibility, acceptability and awareness about vaccination among higher socio economic income groups.

Majority of Hindu children (91.26%) were either fully or partially immunized while 58.73% Muslim children and 85.39% children belonging to other religions were having similar immunization status. A good number of Muslim (41.26%) were unimmunized compared to 8.73% Hindus and 14.60% others, which is comparable to study by Yadav et al, who showed that 100% Christians 61.5% Hindus and 50.5% Muslims were fully immunized. Similarly, Kar M et al, from South Delhi showed that Hindus (69.9%) are better immunized than non-Hindus.<sup>5,22</sup> Another study conducted by same authors in BIMARU states in 2000 showed that 48.8% Hindus, 38.7% Muslims and 73.7% of Christians were fully immunized.<sup>23</sup> This was attributed to better literacy and socioeconomic condition of Christians. Intervention programs need to be tailored specifically for Muslim community through an in-depth analysis of psycho-social needs and subsequent corrective actions.

Proportion of fully immunized children having birth order first and second was 42.93% and 37.07% respectively as compared to 8.07% of children born to multiparous mothers having three or more children. Corroborating with our findings Munthali AC et al, (2007) from Malawi also reported that 72% of 1st born, 64% of 2nd/3rd born, 63% 4th/5th born and 58% of 6+ order was fully immunized.<sup>24</sup> Similarly inverse relationship between birth order and immunization status was disclosed in some studies, Elizabeth et al, Bhola et al, 7 and Vilas et al.<sup>25-27</sup> It has been found that mothers with 2-3 children are 20% less likely and those with >4 children are 40% less likely to have vaccinated children than those with 1 child. There is a strong association between use of family planning and use of immunization services. For obvious reasons mothers with bigger household are unable to bring their infant for immunization due to the practical difficulties.

## CONCLUSION

To conclude immunization status of children is influenced by various demographic variables especially, religion, education, socio economic status and rural inhabitants. Therefore, it is recommended that any strategy or campaign formulated to improve vaccination coverage in children of our country should focus to

strengthen above mentioned weak links which are hindering successful implementation of national immunization programme.

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