

Original Research Article

The immunization status and drop out of 0-3 years children in a rural area of Jaipur, Rajasthan, India

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ABSTRACT

Background: The vaccine preventable diseases are one of the causes of morbidity and mortality among children despite implementation of immunization program.

Methods: A cross-sectional study was conducted in rural area of Jaipur to know immunization status of 0-3 years of children and its relation to socio-demographic factors and reason for dropout.

Results: Total no of families in study was 194. Majority of them were Hindu (94.84%). Majority of children belong to socioeconomic class V (55.%) and socioeconomic class IV (28.5%). 48.17% mothers were of 25-29 years of age group. 93.02% of mothers were housewives. Majority of mothers (42.5%) were illiterate, BCG vaccination coverage was found to be 71.09%, while that of OPV was 71.09%, DPT 64.96%, Measles 60.71%, and MMR vaccination was 3.43%. This study shows that drop our rate for DPT was 19.4%, dropout rate of OPV was 22.33%. Left out rate for DPT was 35.03%.

Conclusions: Majority of children who were non immunized belong to illiterate mothers. Reasons for non-immunization in maximum number of cases was lack of information, wrong ideas regarding immunization and unaware of need for immunization.

Keywords: Dropout rate, Immunization, Literacy, Left out rate, Socio-economic status

INTRODUCTION

According to United Nation's Declaration of Rights of the child- "children are nation's supremely important asset".

The teaching of Ayurveda also stresses much on child's health and its preservation. "Kashyap Tantra" has a Chapter on "Kumara Bhritya" which means "services to children". De Hass (1958) stated that there is no creature at mercy of his environment than human child.¹

The sizable morbidity and mortality in less than three years results from preventable communicable diseases, majority of which can be prevented through immunization - "Immunization Is A Human Right, a Key

Step Towards Overcoming Poverty". In 1985 the ambitious universal immunization program was launched for effective coverage against vaccine preventable diseases. Despite repeated efforts the immunization coverage remains much below, which was only 48 percent till 2006, while our target was to reach 85 percent till 2011 (Goal of National Rural Health Mission). NFHS -3 reveals only 44 percent of infants in India are fully immunized with individual coverage for BCG, DPT, Polio, Measles as 78, 55, 78 and 59 percent respectively.²

METHODS

A Cross-sectional community based study in 0-3yrs age was done in a rural area of Jaipur using thirty Cluster Sampling technique as per 2011 census population. Based

on reported prevalence of wasting in 23 percent of children under three NFHS-3 (2005-06), A sample size of 273 was arrived at by standardized sample technique. To cater for non-response a sample of 301 children under three years in rural area formed the study group

$$N = 1.96 \times 1.96 \times Pq / L^2$$

$$3.8416 \times 0.23 \times 0.77 / 0.0025 = 272.13$$

Rounded of to 301 study participants

In rural area house to house visit was done and information regarding socio-demographic characteristics such as age of child, immunization status, socio-economic status and educational status of mother was collected. The study was conducted during the period of July 2018 to July 2019. Participants included in the study are permanent residents of the area and those who are migrants, non-permanent residents or tenants and those not willing to participate in study were excluded from the study.

Thirty Cluster Sampling technique for selecting sample in Goner (rural area) was used. All wards, which are eleven in number were listed with their 2011 census population. Subsequently cumulative population was found. On the basis of thirty clusters to be selected, a sampling interval (by dividing summation of population by thirty) was found. In this case it was found to be $5043/30 = 168.1$. A random number between 001-168 was generated with the help of currency note (Rs. 5 note no. 443148) in the present sample random number ward was 148, for selection of second cluster, sampling interval was added and ward with cumulative population, corresponding to random no. + sampling interval was second cluster selected, third cluster was the number which identified the second cluster plus the sampling interval.

The Chi-Square test was used for statistical analysis in this study to examine the difference between categorical variables in the same population and to find the association between two variables in same population.

History of immunization was verified using local terms, asking for child's health card if any. If not, then looked for scar mark of BCG and asked history of taking OPV drops (pulse polio program), or whether child had received any intramuscular injection without disease.

$$\text{Drop Out Rate} = \frac{\text{DPT1 Coverage} - \text{DPT3 Coverage}}{\text{DPT1 coverage}} \times 100$$

$$\text{Left Out Rate} = \frac{\text{Children Eligible for DPT1} - \text{Children Received DPT1}}{\text{Children Eligible for DPT1}} \times 100$$

RESULTS

Table 1 shows, out of 194 family's majority 184(94.84%) belong to Hindu religion. 89(45.87%) of families had family size of 4-6 members. Majority of children 167(55.4%) belonged to families of SE class 5 and 25(8.3%) families to SE class-6, thus both constituted

63.7% of total population. Majority of mothers 145(48.17%) belong to age group of 25-29 years and 90(29.90%) belong to age group of 20-24 years, 55(18.27%) were 30-34 years. Majority 280(93.02%) of mothers were housewives.

In this study 128(42.5%) are illiterate, 54(17.94%) were secondary educated while 41(13.62%) were primary and higher secondary educated and only 37(12.2%) had taken degree.

Table 1: Socio demographic profile of study participants.

Demographic characters of study participants	Study participants (No. and %)
Religion of family	Family
Hindu family	184(94.84)
Muslim family	10(5.15)
Total families	194(100)
Average size of family	Family
1-3	8(4.12)
4-6	89(45.87)
7-9	45(23.14)
≥10	52(26.80)
Total	194(100)
Socio-economic Status Class of children family	Study participants
SE 2	4(1.3)
SE 3	19(6.3)
SE 4	86(28.5)
SE 5	167(55.4)
SE 6	25(8.3)
Total	301(100)
Mother's Age(yrs)	Study participants
15-19	4(1.32)
20-24	90(29.9)
25-29	145(48.17)
30-34	55(18.27)
35-40	7(2.32)
Total	301(100)
Occupation	Study participants
Housewife	280(93.02)
Working	21(6.97)
Total	301(100)
Educational Status	Study participants
Illiterate	128(42.5)
Primary	41(13.62)
Secondary	54(17.94)
Higher secondary	41(13.62)
Graduate/Degree	37(12.2)
Total	301(100)

In Table 2 proportion of males is more in age group of 6-12 months being 70.7% followed by 54.54% in age group of 24-30 months, 50% in 18-24 months. While females were maximum in age group of 0-6 months constituting

72% followed by 53.57% in age group of 12-18 months, and 52.42%.

In Table 3 depicted that 214(71.09%) children had immunization for BCG and OPV0, 191(64.96%) were protected for DPT, 153(60.71%) were protected for

measles, Vitamin A given to 137(54.36%). Hepatitis B given to 23(7.82%). Table 4 shows that BCG vaccination is 100 percent in SE Class 2 then in SE class 3 and 4 being 89.4% and 81.3%. DPT/OPV1 is 100 percent in SE class 2, then in SE 3 and 4 being 78.9% and 74.4% respectively. Regarding other vaccination measles.

Table 2: Age and sex distribution of children under three years of age in rural area.

Age (months)	Male (no.)	Male (%)	Female (no)	Female (%)	Total (no.)	Total (%)
0-6	7	28	18	72	25	8.3
6-12	29	70.7	12	29.2	41	13.62
12-18	26	46.42	30	53.57	56	18.6
18-24	5	50	5	50	10	3.32
24-30	36	54.54	30	45.45	66	21.92
30-36	49	47.57	54	52.42	103	34.21
Total	152	50.49	149	49.50	301	100.00

Table 3: Distribution of children according to their immunization status.

Vaccine	Children No.	Children %
BCG	214	71.09
OPV	214	71.09
DPT	191	64.96
Measles	153	60.71
Vitamin-A	137	54.36
Hepatitis-B	23	7.82
Hib	7	2.32
MMR	7	3.43

Table 4: Relationship of immunization status of children with SE class.

SE class	BCG/ OPV	DPT1/ OPV1	Measles	Hepatitis-B	Hib	MMR	TOTAL
SE1	0	0	0	0	0	0	0
SE 2	4(100)	4(100)	2(50.00)	1(25.0)	0	0	4
SE3	17(89.4)	15(78.9)	11(57.89)	1(5.2)	0	2(10.5)	19
SE4	70(81.3)	64(74.4)	51(59.3)	16(18.6)	4(4.6)	2(2.32)	86
SE5	113(67.66)	99(59.28)	80(47.9)	5(2.9)	3(1.79)	3(1.79)	167
SE6	10(40)	9(36.0)	9(36.0)	0(0.0)	0	0	25
Total	214(71.09)	191(63.45)	153 (50.8)	23(7.64)	7(2.32)	7(2.32)	301

Table 5 : Educational status of mother with status of presence of immunization card along with not immunized children.

Education status of mother	Card present No. (%)	Card with Anganwadi worker No. (%)	Card missing No. (%)	Not immunized No. (%)	Total No.(%)
Illiterate	23 (17.96)	4 (3.12)	43 (33.59)	58 (45.31)	128 (42.5)
Primary	16 (39.02))	0 (0.00)	16 (39.02)	9 (21.95)	41 (13.62)
Secondary	26 (48.14)	2 (3.70)	15 (27.7)	11 (20.3)	54 (17.94)
Higher secondary	15 (36.58)	2 (4.87)	18 (43.9)	6 (14.63)	41 (13.62)
Degree/ graduate	18 (48.64)	0 (0.00)	16 (43.24)	3 (8.10)	37 (12.2)
Total	98 (32.55)	8 (2.65)	108 (35.88)	87 (28.9)	301 (100.0)

X²=29.17 df=1 p<0.001

Table 5 shows there is highly significant association ($p < 0.001$) of educational status of mother with immunization status of children. Out of 128(42.5%) mothers who were illiterate, majority 58(45.31%) children are not immunized, 23 (17.96) have cards, 4(3.12%) have cards with Anganwadi workers, 43(33.59%) have been immunized but card missing.

In Table 6 it is apparent that majority 59(67.8%) had lack of information and are unaware of need for immunizing, 21(24.1%) postponed till another time and 7(8.04%) say that either place of immunization too far, child was ill and mother too busy.

Table 6: Reasons for non-immunization.

Reasons	Children No. (%)
Lack of information	59 (67.8)
Lack of motivation	21 (24.1)
Obstacles	7 (8.04)
Total	87 (100.0)

Children in age group 9-36 months 53.57% are fully immunized and 29.76% are not immunized (Table 7).

Table 7: Status of immunization in children 9-36 months of age.

Immunization Status	Children No. (%)
Fully immunized	135 (53.57)
Partially immunized	42 (16.7)
Non immunized	75 (29.76)
Total	252 (100.0)

Table 8 shows reasons for non-immunization among 75 participants in 9-36 months age group is wrong ideas among 64% and postponed/ no faith among 26.6%.

Table 8: Reasons for non-immunization (9-36 months).

Reasons	Children no. (%)
Fear/wrong ideas / unaware of need	48 (64)
Postponed/no faith	20 (26.6)
Place far/mother busy	7 (9.3)
Total	75 (100.0)

In this cross-sectional study out of 194 families majority 184(94.84 %) belong to Hindu religion, 89(45.87%) of families had family size of 4-6 members. Average family size is 7.69. Majority of children 167(55.4%) belonged to families of SE class 5 and 25(8.3%) to SE class-6, thus both constituted 63.7% of total population. Majority of mothers 145(48.17%) belonged to age group of 25-29 years and 90(29.90%) belonged to age group of 20-24 years, 55(18.27%) were in age group of 30-34 years.

Majority 280(93.02%) of mothers were housewives and rest 21(6.97%) were in jobs. Majority mothers, 128(42.5%) were illiterate, 54(17.94%) were secondary educated while 41(13.62%) were primary and higher secondary educated and only 37(12.2%) had taken degree sex ratio of children was 980:1000. Proportion of males was more in age group of 6-12 months being 70.7% followed by 54.54% in age group of 24-30 months, 50% in 18-24 months and 46.42% and 47.57% in age groups of 12-18 months and 30-36 months respectively.

While females were maximum in age group of 0-6 months constituting 72% followed by 53.57% in age group of 12-18 months, and 52.42%, while 50% and 45.45% in age groups of 30-36 months, 18-24 and 24-30 months respectively.

Total number of children examined were 301, out of which 152(50.49%) were males and 149(49.50%) were females.

Majority 214(71.09%) children had immunization for BCG and OPV0 and 87 (28.90%) remained unprotected. 7 Children under six weeks of age were not eligible for DPT, so 191(64.96%) were protected for DPT, 49 children were below 9 months of age so not eligible for measles, 153(60.71%) were protected for measles, Vitamin A given to 137(54.36%). Hepatitis B given to 23(7.82%) of children, Hib given to 2.38% children, for MMR 97 children were not eligible as below 15 months of age, so coverage was, 7(3.43%) only.

BCG vaccination is 100 percent in SE Class 2 and then in SE class 3 and 4 being 89.4% and 81.3%. DPT/OPV1 is 100 percent in SE class 2, and then in SE 3 and 4 being 78.9% and 74.4% respectively. Regarding other vaccination measles vaccine given to 51(59.3%) children of SE class 4 is higher as compared to other children. MMR 2 (10.5%) is, highest in SE class 3.

There is highly significant association ($P < 0.001$) of educational status of mother with immunization status of children.

Out of 128(42.5%) mothers who are illiterate it is observed that majority 58(45.31%) children were not immunized, 23(17.96) have cards, 4(3.12%) have cards with anganwadi workers, 43(33.59%) have immunized but card missing.

Out of 41(13.62%) mothers, who have primary education, 16(39.02%) have cards, 16 (39.02%) do not have cards and 9(21.95%) didn't immunize. Out of 54(17.94%) mothers, who were secondary educated, 26(48.14%) have cards, 2(3.70%) had cards with anganwadi worker, 15(27.7%) missed their cards, 11(20.3%) not immunized.

Out of 41(13.62%) mothers who were higher secondary educated, 15(36.58%) have cards, 2(4.87%) have cards

with anganwadi worker, 18(43.9%) missed their cards, 6(14.63%) are not immunized.

Out of 37(12.2%) mothers who are graduate, majority 18 (48.64%) have cards, 16(43.24%) missed their cards and only 3(8.10%) didn't immunize their child.

Majority of mothers 34(91.89%) who are graduate, got their children immunized. Out of which 18(48.64%) had cards and 16(43.24%) missed their cards. In present study 280 children are above 3.5 months of age, 252 children are between 9-36 months of age. Out of 301 children 87(28.9%) were non-immunized.

It is apparent that majority 59(67.8%) had lack of information and were unaware of need for immunizing, 21(24.1%) postponed till another time and 7(8.04%) say that either place of immunization too far, child was ill and mother too busy.

Dropout rates - In present study 21 children were below 3.5 months, so not eligible.

For dropout rate calculation, out of total 280 children coverage was as such;

DPT1 185 (66.07%),
DPT2 165 (58.92%),
DPT3 149 (53.21%),
OPV1 197 (70.35%)
OPV2 169 (60.35%)
OPV3 153 (54.64%) respectively.

Drop Out Rate = $\frac{\text{DPT1 Coverage} - \text{DPT3 Coverage}}{\text{DPT1 coverage}} \times 100$

Dropout Rate from DPT1 To DPT3 was 19.4%.

Dropout Rate from OPV1 to OPV3 = $\frac{197 - 153}{197} = 22.33\%$

Left Out Rate = $\frac{\text{Children Eligible for DPT1} - \text{Children Received DPT1}}{\text{Children Eligible for DPT1}} \times 100$. $\frac{294 - 191}{294} = 35.03\%$.

Out of 252 children 9-36 months of age, 135(53.57%) are fully immunized, 42(16.7%) are partially immunized and 75(29.76%) are not immunized.

Out of majority, 48(64%), 50% have wrong ideas about immunization that it cause fever and 50% are unaware of need of immunization. Reasons for partial immunization was postponement in case of MMR and side effect of fever for DPT, so there was high drop out in case of DPT.

DISCUSSION

In the present study religion wise distribution depicted 94.84 percent Hindus in rural area and rest Muslims, similar findings were observed by R. J. Yadav, where 91.8% Hindus, Madhu B Singh, where 93.8 percent were

Hindus, and Tamoghna Biswas, showed 95.9 percent Hindus.⁴⁻⁶

The average family size in rural was 7.69 similar to findings of Tamoghna Biswas, where it was 5.3.⁶

In present study, the majority 83.9 percent of families belonged to SE Class 4 and 5 (55.4 percent in SE Class 5 and 28.5% in SE Class 4 respectively quite similar findings were observed by A.L. Soni, where 72.8% belonged to SE Class 4 and 5, Kamruzzaman MK, where all respondents were low to lower middle class, Sandeep Sachdeva, where 76.5% were lower socio-economic group, Tamoghna Biswas, found 52.7 percent belonged to SE class 4, while contrast findings were seen by Jayant Despande D, where majority were SE Class 3 and 4, 28% and 31% respectively.⁶⁻¹⁰

In present study majority, 78.07% of mothers are in age group of 20-29 years (29.90% in age group 20-24 years and 48.17% in age group 25-29 years), majority 93.02 percent are housewives and 6.97% are working, Similar findings were shown by S Malik, where 90% mothers are house wives, Pragati chabra, 95.4% mothers are house wives, Kammruzzaman, found 96.2% housewives different findings were shown by Jayant Despande, where 67.7% are housewives but age group found similar to our study i.e. majority are in 20-24 years group, followed by 25-29 years (45percent) while 3 percent belonged to 30 years and above, Kammruzzaman MK showed majority 66.7% were in age group 18-25 years, 22.9% in 26-36 years and 7.4% were more than 35 years of age.^{8,10-12}

Majority 57.5 percent were literate and 42.5% were illiterate, Census revealed, female literacy rate 65.4%, in this study it is lower than national average. Madhu B. Singh, showed 53.6% mothers to be literate, contrast findings were shown by Kamruzzaman MK, where 24.1 percent respondents were illiterate and 75.9 percent were literate, Census, shows literacy rate of 74.04 percent (82.14% for men and 65.46% for women) in Rajasthan it is 67.1%.^{5,8,13}

In this study 71.09% are immunized for BCG/OPV, 60.71 percent for measles quite similar findings were noted by R.J. Yadav, lesser coverage was noted by Basanta K, higher coverage seen by S Yadav, (BCG 94.7%, OPV3 84.7%, DPT3 81.4%.^{4,14,15}

In present study, dropout rate for DPT is 19.4%, for OPV 22.2%, left out rate for DPT is 35.03 percent Lesser dropout rates seen by S. Yadav, (10.4% for DPT and 10.1% for OPV), Pragati chabra, showed 18% for DPT but higher for OPV, 49 percent.^{12,15}

Fully immunized children constitute 53.57 percent, 16.7 percent are partially immunized. NFHS-317 (44%, while higher proportion (84.2%) were noted by Maj RM Joshi, similar findings were seen by Rahman M, Banerjee M, 58.2 percent were fully vaccinated.¹⁶⁻¹⁸

In present study reasons for non-immunization were wrong ideas and unawareness responded by 64 percent and rest had obstacles as interrupting factor. Similar findings were noted by R. J. Yadav, While S. Yadav found that reason for drop out was ignorance in 80 percent and inconvenience in rest.^{4,15}

In present study literacy shows positive relation with immunization, similar to findings of Pragati Chabra (p<0.01).¹²

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