

Routine Immunization Coverage in Children in A Developing Country: An Observational Cross Sectional Study.

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Abstract

Background: Childhood immunization is a grave public health success in many developing countries. There is always need of local level data to supplement the national level survey, hence we conducted the present study to assess the immunization coverage.

Materials And Methods: This community based cross sectional study was conducted in urban and rural areas of Lucknow district over a period of 18 months in children up to 5 years of age. A total of 410 children were included. Data was collected using a pre-tested questionnaire, which was administered by the lead author during a face-to-face interview.

Results: Overall 84.3% children were fully immunized, 14.7% children were partially immunized while 1% children were not immunized at all. Percentage of fully immunized children was higher in the urban areas (91.2%) as compared to the rural areas (82%, $P < 0.05$). The drop-out rate from BCG to measles was 13.26%. In the urban areas the drop-out rate was 7.35% as opposed to 19.21% in the rural areas ($P < 0.05$). Overall the drop-out rate from DPT-3 to measles was 3.55%; with drop-out rates in urban and rural areas being a close 3.57% and 3.52% respectively ($P > 0.05$).

Conclusion: The results suggest that the immunization status in Lucknow district is marginally better than the state statistics, however, there is further need of proper information education and counseling especially in the rural areas.

Key Words: Immunization; Coverage; BCG; Measles; DPT; Vaccination.

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I. Introduction

Worldover, immunization averts between 2 – 3 million deaths each year.¹ Childhood immunization has been a grave public health issue in many developing countries, and for the last three decades the Programme on Immunization has been promoted as one of the most important key elements of child health intervention in developing countries.² With around 27 million children births in this country every year, the proportion of those at need of immunization is increasing. In India, approximately 18.3 lakh children die before their fifth birthday. As per the national family health survey – III only 43.5% of eligible children are fully vaccinated and 5% have not been vaccinated at all.³ With equity issues running deep in the country, it is the low income families who mostly lose their children to disease.⁴

In spite of nearly 30 years of Universal Immunization Programme (UIP) in India, the Routine Immunization Programme is marred with issues at the programmatic and implementation levels.^{3,4} There is always need of local level data to supplement the national level survey. Very few recent studies have been done in Lucknow district regarding routine immunization amongst children up to 5 years of age,⁵⁻⁷ hence we conducted the present study to find out the coverage of routine immunization in Lucknow district of Uttar Pradesh in the said age group.

II. Materials And Method

This community based cross sectional study was conducted in selected urban and rural areas of Lucknow district over a period of 18 months in children up to the age of 5 years. The literature review reveals the coverage of immunization to be 44%.³⁻⁷ The sample size was calculated using the following formula.

$$N = Z^2 P (1-P)/e^2$$

Z = 1.96 (Level of confidence 95%)

P = Coverage of immunization

e = Margin of error

Taking margin of error as 10%, the sample size came out to be 425. Assuming a non-response rate to be 10%, 470 children were taken up for the study. Multistage random sampling was used to select the participants. The required sample size was reached in three stages. Firstly, the sample size of 470 was divided equally into urban (235) and rural (235) areas. In the second stage, for urban areas a list of total number of 110 wards was obtained. Out of these, 10 wards were selected randomly by using a table of random numbers and from each of these 2 mohallas were selected randomly. Thus a total of 20 mohallas were selected in the urban area. For rural areas out of a total of 8 blocks, 2 blocks (Kakori and Malihabad) were selected randomly by using a table of random numbers. From each of the selected block 6 villages were selected by simple random sampling. Thus, a total of 12 villages were selected in the rural area.

In the third stage, simple random technique was used to select the first household. After reaching the mohalla/village, the centre point of that mohalla/village was selected. A pencil was dropped on the ground and the first household was selected based on the direction towards which the pencil was pointing. Then starting from the first household, all the houses, where a child of up to 5 years of age was present, were surveyed till the desired number of children were met from that mohalla/village. The children who were living in the study area for less than 6 months and those children whose respondents didn't consent were excluded from the study.

The primary respondents for the study were the mothers of children. In the absence of mother, father was taken as respondent. In case of absence of both of them, the adult in the household who remained with the child for most of the time, was taken as respondent. Data was collected from any of the respondents after explaining to them the nature of the study. A written and informed consent was obtained from the respondents before proceeding to a formal interview. Data was collected using a pre-tested questionnaire, which was administered by the lead author during a face-to-face interview. Hindi version of the proforma was also prepared to facilitate the study especially among the rural population. The immunization status of the children was categorized as follows:

- **FULLY IMMUNIZED:** When the child had received BCG, three doses of DPT, three doses of OPV, three doses of Hepatitis B and measles vaccine.
- **PARTIALLY IMMUNIZED:** When the child had received at least one of the above vaccines.
- **NOT IMMUNIZED:** When the child had not received any on the above vaccines.

The data thus collected was compiled and analyzed using SPSS version 21 for Mac (IBM Corporation, 2012). Qualitative variables were expressed as proportions in percentages. To calculate the p-value "Chi squared test" was used and a P-value of < 0.05 was taken as statistically significant.

III. Result

Eighty-three percent children had vaccination cards. The number of children having the vaccination card was higher in urban areas (86.7%) as compared to rural area (78.8%, P > 0.05). Overall 84.3% children were fully immunized, 14.7% children were partially immunized while 1% children were not immunized at all. Percentage of fully immunized children was higher in the urban areas (91.2%) as compared to the rural areas (82%, P < 0.05) and percentage of children who were partially immunized was higher in the rural areas (17%) as compared to the urban areas (6.3%, P > 0.05). Percentage of unimmunized children was 0.5% and 1% in urban and rural areas respectively (P > 0.05). The overall coverage of BCG vaccination was 99.3% with BCG scar being present in 98.3% children. Coverage in urban and rural areas was found to be 99.5% and 99% respectively (P > 0.05) with BCG scar being present in 99.5% and 97.1% children respectively (P > 0.05). The overall coverage of OPV-0 was 87.6%. In the urban areas, OPV-0 coverage was 94.6% while as in the rural areas, OPV-0 coverage was 80.5% (P < 0.05). The zero dose of Hepatitis B was received by 90.5% of children. In the urban areas, the coverage of Hepatitis B-0 was 94.6% while as in the rural areas the coverage of Hepatitis B-0 was 86.3% (P < 0.05). Table 1 shows the coverage of different vaccines.

The drop-out rate from BCG to measles was 13.26%. In the urban areas the drop-out rate was 7.35% as opposed to 19.21% in the rural areas (P < 0.05). Overall the drop-out rate from DPT-3 to measles was 3.55%; with drop-out rates in urban and rural areas being a close 3.57% and 3.52% respectively (P > 0.05). The overall drop-out rate from OPV-1 to OPV-3 was 7.34%. In the urban areas, the drop-out rate was only 2.48%, however, in the rural areas it was found to be 12.37% (P < 0.05). The overall drop-out rate from DPT-1 to DPT-3 was found to be 7.80%; with drop-out rate in the urban areas being 2.97% as opposed to 12.82% in the rural areas (P

< 0.05). The overall drop-out rate from Hepatitis B-1 to Hepatitis B-3 was 7.82%; with drop-out rates in urban and rural areas being 2.97% and 12.88% respectively (P < 0.05).

Table 1: Coverage of OPV, Hepatitis B, DPT and measles vaccines.

VACCINE	VACCINE RECEIVED			P Value (Rural Vs Urban)
	URBAN (N=235)	RURAL (N=235)	TOTAL (N=470)	
OPV-1	229 (98%)	215 (94.6%)	444 (96.3%)	0.5321
OPV-2	229 (98%)	201 (88.3%)	430 (93.2%)	0.0763
OPV-3	216 (95.6%)	195 (82.9%)	411 (89.3%)	0.0437
Hepatitis B-1	229 (98%)	215 (94.6%)	444 (96.3%)	0.5321
Hepatitis B-2	229 (98%)	201 (88.3%)	430 (93.2%)	0.0763
Hepatitis B-3	216 (95.6%)	195 (82.9%)	411 (89.3%)	0.0311
DPT-1	229 (98%)	215 (94.6%)	444 (96.3%)	0.5321
DPT-2	229 (98%)	201 (88.3%)	430 (93.2%)	0.0763
DPT-3	216 (95.6%)	195 (82.9%)	411 (89.3%)	0.0437
Measles	201 (92.2%)	184 (80%)	385 (86.1%)	0.0449

IV. Discussion

In the past few years, though some improvement has taken place, India still accounts for the largest number of children who are not immunized. Vaccination coverage varies considerably from state to state, with the lowest rates in India's large central states. Differences in uptake are geographical, regional, rural-urban, poor-rich and gender-related. On average, girls receive fewer immunizations than boys and higher birth order infants have lower vaccination coverage.⁶ Despite nearly 30 years of UIP in India, its ideal implementation is still plagued with issues. Limited capacities of staff; and gaps in key areas such as predicting demand, logistics and cold chain management are some of the challenges to immunization that result in high wastage rates.

In the present study it was found that 396 (84.3%) children were fully immunized, 69 (14.7%) children were partially immunized while only 5 (1%) children were unimmunized. The percentage of unimmunized children was however greater with 14.1% children being unimmunized. In contrast a study conducted by **Singh CM et al⁸**, in Etawah found that only 40% children were fully immunized, 40.55 were partially immunized and 19.5% were not immunized at all. Our results were similar to a study conducted by **Gupta P et al (2015)⁶** in Lucknow district where it was found that 74.4% children in the age group of 12 – 23 months were fully immunized and 11.1% were partially immunized.

In the present study, the overall coverage of measles vaccine was found to be 86.1%. In contrast to this, a study by **Singh CM et al⁸** in Etawah, Uttar Pradesh found that the coverage of measles vaccine was only 42.4%. Coverage of measles vaccine was low as per the **NFHS III¹⁰** data (37.7%) as well as the **DLHS III¹¹** data (47%). However according to **CES 2009³** coverage of measles vaccine was found to be 61.8%. Our study reported a higher coverage of BCG vaccination (99.3%) with BCG scar being present as compared to whole of Uttar Pradesh state which was found to be 61%, 73.4% and 82.2% as per data provided by **NFHS-III¹⁰**, **DLHS-III¹¹** and **CES 2009³** respectively. This difference may be due to the fact that Lucknow district does not have any tribal areas, where the immunization status is traditionally low. The same trend was seen for other vaccines also. In the present study it was found that the overall coverage of Hepatitis B-0, Hepatitis B-1, Hepatitis B-2 and Hepatitis B-3 vaccine was 90.5%, 96.6%, 93.4% and 89% respectively. In contrast, a study by **Dulipala P et al⁹** conducted in Nellore city, Andhra Pradesh among children aged 12 – 23 months found that the coverage of Hepatitis B-1, Hepatitis B-2 and Hepatitis B-3 was 78.2%, 73.4% and 70.6% respectively.

Our study has some potential limitations. We acknowledge the fact that our study may have been affected due to recall bias; as happens with all self-reported data. However most of our data was crosschecked with the vaccination cards. The strengths of this study were that the subjects were selected using random sampling technique, which helped to avoid selection bias. Both urban and rural children were included for the purpose of comparisons and to identify differences in pattern of coverage in the two settings.

V. Conclusion

The study suggests that though the immunization status in Lucknow district is marginally better than the state statistics, there is further need of proper information education and counseling especially in the rural areas.

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