

Predictors of Immunization Coverage among under Two-Year-Old Children in the National Immunization Program of Raipur District of Chhattisgarh, 2019

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Abstract

Background: Immunization is considered as one of the key interventions for protection of children against life threatening conditions that are preventable. In India, nearly 8.9 million are missed for full immunization every year. The study was conducted to assess the reasons for partial immunization of below two years children in Raipur district of Chhattisgarh.

Methodology: Out of all villages and urban wards, randomly one urban and one rural area were selected. A community based cross-sectional study was done with 300 children aged below two years. Simple random sampling (using revolving pen) was used to select the first household for the survey. The immunization status of the child was assessed by vaccination card and by mother's recall where vaccination card was not available.

Results: Chhattisgarh has increased its full immunization coverage from 58% in 2002-04 to 76.4%. overall 67% (135/203) children were fully immunized. In urban areas, 74% (74/100) children were fully immunized whereas in rural areas 59% (61/103) children were fully immunized. Dropout rate for BCG to measles rubella vaccine in urban areas was 5%, while, it was 7% in rural areas. Two most common reasons came out to be unaware of missed dose (38%) and fear of adverse event following immunization (28%).

Conclusion: Immunization program has not only failed in achieving its target but is lagging far behind the desired coverage goal. More awareness should be generated among the people immunize their children.

Keywords: Below two years children, immunization, reasons for partial immunization, drop out, full immunization.

Introduction

Background

Immunization is considered as one of the key interventions for protection of children against life threatening conditions that are preventable. At the community and national levels, the benefits of immunization go beyond the improvements in health and life expectancy to an impact on social and economic indicators. An effective, evenly targeted immunization program and its ability to reduce the burden of Vaccine Preventable Diseases (VPDs) will greatly contribute in achieving the Sustainable Development Goal (SDG) No. 3 target of reducing IMR to 25 per 1000 live births by 2030. India is a signatory of SDG and is committed to achieve the desired goals through its various health programs¹

Universal Immunization Program (UIP) is one such program catering to ~26 million birth cohort and 30 million pregnant women, through 9 million sessions planned every year, making it one of the largest public health programs in the world. Immunization has been one of India's greatest public health success stories. Immunization has helped reduce the annual mortality of children under five, from 3.3 million in 1990, to 1.2 million deaths in 2015; that is 17,000 deaths each day. However, to ensure that all children of India benefit equitably from this intervention, a strategic, i.e., long term approach to planning and implementation is essential¹.

The Immunization Program in India started in 1978 as Expanded Program on Immunization (EPI) with DPT, BCG, OPV, and typhoid paratyphoid fever vaccines. Since its inception, the national program on immunization has undergone various changes, which reflects in its current status; the key transition being the revamping of the program as the Universal Immunization Program (UIP) in 1985,

with the incorporation into the Child Survival and Safe Motherhood (CSSM) program in 1992, the Reproductive and Child Health Program (RCH-I) in 1997 and RCH II under the National Rural Health Mission (NRHM) in 2005.

The UIP is an integral component of the government's flagship Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) approach, and underpinning this approach is an unprecedented commitment to protect every child from vaccine-preventable diseases. Full Immunization Coverage (FIC) is also a major contributor to the SDG 3, which focuses on maternal and child survival. As a key element of the national child survival strategy, UIP has contributed significantly in reducing mortality and morbidity rate and the infant and under5 mortality rate over the last decade i.e. IMR from 60/1000 live births in 2005 to 34/1000 live births in 2016 and U5MR from 77/1000 live births in 2005 to 39/1000 live births in 2016¹. The full immunization coverage is an important measure to ascertain the progress made in the direction of universal child health.

The evaluated data indicate that the coverage has increased from 44% in NFHS-3, 2005-06 to 62% in NFHS-4, 2015-16 with 2% increase each year among children aged 12-23 months. The slow progress in full immunization coverage in India during 2005-06 to 2015-16 needs attention, particularly when new vaccines are being introduced in immunization program, and lessons learned should inform our way forward. On assessing the state of inequality in immunization as an important step in identifying where the gaps exist and to plan strategies to increase coverage in unvaccinated or under-vaccinated population subgroups, it was found that the full immunization coverage varies across the states¹.

Problem statement

Despite being operational for over 30 years, UIP has been able to fully immunize only 65% children (RSOC 2013-14) in the first year of their life. This translates into a cohort of 89 lakhs missed children majorly in hard to reach and underserved populations. Evidence shows that unvaccinated and partially vaccinated children are most susceptible to childhood diseases and disability and run a three to six times higher risk of death as compared with fully immunized children. Committed to improving immunization coverage and addressing the equity agenda, the Ministry of Health & Family Welfare, Government of India, has implemented various intensification strategies including its flagship program "Mission Indra dhanush" launched in December 2014, and delivery system strengthening exercises through improved micro-plans.

Chhattisgarh has increased its full immunization coverage from 58% in 2002-04 to 76.4% according to the various coverage surveys. It is estimated that, annually, 1.5 lakh children in the state do not receive all vaccines that are available under the universal immunization program. District Raipur has full immunization coverage of 81% during 17-18. Recent evaluations have indicated that the major reasons for not being able to reach all vaccines to all children in the state are a lack of awareness about the benefits of vaccination, a fear of adverse events following immunization and operational reasons such as non-availability of vaccines or vaccinators (ANMs) during vaccination sessions we assessed the performance of the routine immunization system in Raipur district of Chhattisgarh state against antigen coverage to identify areas for improvement.

Objective of the study

1. To describe the full immunization coverage trend in Chhattisgarh according to various surveys.
2. To assess full immunization coverage of below 2 years children in Raipur district of Chhattisgarh, 2019.
3. To assess age specific coverage of various antigens in below 2 years children in Raipur district of Chhattisgarh, 2019.
4. To assess drop-out rates for various antigens under national immunization schedule in below 2 years children in Raipur district of Chhattisgarh, 2019.
5. To assess the reasons for partial immunization of children in Raipur district of Chhattisgarh, 2019.
6. To make evidence-based recommendations.

Research hypothesis

All the children below 2 years of age in Raipur district of Chhattisgarh are fully immunized under national immunization programme.

Systematic review

Paper reviewed

“Reasons for failure of immunization: A cross-sectional study among 12-23-month-old children of Lucknow, India” by Rajaat Vohra, Anusha Vohra, Pankaj Bhardwaj, Jyoti Prakash Srivastava, and Pratibha Gupta

A community based cross-sectional study was done among 450 children aged 12-23 months. The immunization status of the child was assessed by vaccination card and by mother's recall. A pre-designed and pre-tested questionnaire was used to elicit information on immunization.

Overall, 62.7% children were fully immunized, 24.4% children were partially immunized, and 12.9% children were not immunized. The major reasons for failure of immunization were postponing it until another time, child being ill and hence not brought to the centre for immunization, unaware of the need of immunization, place of immunization being too far, no faith in immunization.

Authors tried to find out reasons for partial immunization and why children are not getting full vaccination schedule. But the paper fails to describe about timeliness of vaccination. All the antigens in universal immunization schedule have an age specific limit at which vaccine should be administered for its best effect. Vaccines can be given until certain age, but it is useful if they are received at prescribed age. In this paper age specific vaccination coverage is not described which is important indicator to see how immunization program is mobilizing children for timely vaccination and moving them towards full immunization.

Methodology

Complete list of villages in rural areas and wards in urban areas of Raipur district was procured from census department. From this sampling frame, randomly 1 rural and 1 urban ward areas were selected. Assuming a 50% average coverage, providing estimate at a level of accuracy of within $\pm 8\%$, 95% confidence level and a design effect of 2, the sample size required for the survey was 300 children. This was calculated with EPI INFO version 7.2.

A community based cross-sectional study was done among using these 300 children aged below 2 years. The sample size was divided equally into urban and rural areas. Simple random sampling (using revolving pen) was used to select the first household for the survey. Then, every household with a child below 2 years was surveyed till the desired number of children were met from that village area or urban ward. Mother of the child was preferred as the primary respondent. In the absence of mother, the father was taken as the respondent. In case of absence of both, the adult in the household who remained with the child for most of the time, was taken as respondent. The immunization status of the child was assessed by vaccination card and by mother's recall where vaccination card was not available. The immunization status of the children is categorized as follows.

Fully immunized

When the child had received Hep B birth dose, OPV 0 dose, Bacillus Calmette–Guérin (BCG), three doses of pentavalent, three doses of oral polio vaccine (OPV) and measles rubella (MR) vaccine.

Partially immunized

When the child had received some but not all vaccines according to his/her age eligibility.

Unimmunized

When the child had not received any of the vaccine. A pre-designed survey questionnaire was used to assess the reasons for non-immunization and partial immunization of the selected child aged below 2 years.

Results

Figure 1 shows that Chhattisgarh has increased its full immunization coverage from 58% in 2002-04 to 76.4% according to the various coverage surveys. For the last 10 years or so, full immunization coverage has hovering between 67% to 76.4% and it becomes almost stagnant. Table 1 shows that, overall 67% (135/203) children were fully immunized. 24.4%). In urban areas, 74% (74/100) children were fully immunized whereas in rural areas 59% (61/103) children were fully immunized.

Figure 2 shows the overall vaccination coverage of each individual vaccine as well as the coverage in urban and rural areas. Overall Hep B vaccination coverage is 76%, which was lowest in comparison to other antigens. It was 69% for rural whereas it was 83% in urban areas. Overall OPV – 0 dose vaccination coverage was 95%, while, in urban and rural areas, it was 97% and 94%, respectively. Overall BCG vaccination coverage was 100%, while, in urban and rural areas, it was 100% and 99%, respectively. OPV 1 vaccination coverage was 98% and 97% in urban and rural areas, respectively, while overall it was 98%. Pentavalent 1 vaccination coverage was 98% and 97% in urban and rural areas, respectively, while overall it was 98%. OPV 2 vaccination coverage was 100% and 96% in urban and rural areas, respectively, while overall it was 98%. Pentavalent 2 vaccination coverage was 100% and 97% in urban and rural areas, respectively, while overall it was 98%. OPV 3 vaccination coverage was 97% and 96% in urban and rural areas, respectively, while overall it was 97%. Pentavalent 3 vaccination coverage was 97% and 96% in urban and rural areas, respectively, while overall it was 97%. Overall measles rubella vaccination coverage was 95%, while, in urban and rural areas, it was 95% and 94%, respectively.

Table 2 shows the dropout rate of the vaccine. The dropout rate for BCG to measles rubella vaccine in urban areas was 5%, while, it was 7% in rural areas, whereas the overall dropout rate was 6%. The dropout rate for pentavalent 1 to pentavalent 3 in urban areas was 2%, while it was 3% in rural areas, whereas the overall dropout rate was 2.5%. The dropout rate for OPV 1 to OPV3 in urban areas was 2%, while it was 3% in rural areas; the overall dropout rate for OPV 1 to OPV 3 was 2.5%. The dropout rate for pentavalent 3 to measles rubella vaccine in urban areas was 2%, while it was 2% in rural areas; the overall dropout rate for pentavalent 3 was 2%.

Figure 3 shows that the various reasons for partial immunization of children among study participants. Most common reason came out to be unaware of missed dose (38%). Second most common reason was fear of adverse event following immunization (AEFI). It counted for 28% of all reasons. Rest of the reasons were sick child – Health worker did not opt for vaccination (9%), sick child – care giver did not opt for vaccination (7%), Vaccine was not available (6%), Family is resistant (6%) & family has no definite reason (6%).

Discussion

In the present study, overall, 67% children were fully immunized in the age group of 12-23 months, Similar results were shown by Singh *et al.* in a study in different states of India, where 63.3% children were fully immunized. AHS III observed that overall 78.4% of children in Raipur were fully immunized whereas it was 77.6% in rural areas and 80.5 in urban areas of Raipur district³

The overall dropout rate for BCG to measles in the present study was 6%. AHS 12-13 reported overall dropout of 5.4%, whereas it is 4.9% for rural and 6.8 for urban areas. In the present study, the overall dropout rate for pentavalent 1 to pentavalent 3 was 2.5%. AHS 12-13 reported overall dropout of 5.4%. In the present study, the overall dropout rate for OPV 1 to OPV 3 was 2.5%. OPV birth dose administration was 86% overall where as it is 91% in rural areas and 95% in urban areas. AHS 12-13 reported overall OPV 0 dose administration at 89.9% with rural areas at 87% and urban areas at 87.7%³. In the present study, the overall dropout rate for pentavalent 3 to measles rubella was 2%.

In study, most common reason came out to be unaware of missed dose (38%). Second most common reason was fear of adverse event following immunization (AEFI). It counted for 28% of all reasons. Rest of the reasons were sick child – Health worker did not opt for vaccination (9%), sick child – care giver did not opt for vaccination (7%), Vaccine was not available (6%), Family is resistant (6%) & family has no definite reason (6%). The 2017 Concurrent monitoring data from WHO on routine immunization reveal that 74% of reasons for missing immunization were associated with demand side issues: parents are not aware of vaccine benefits; the fear of side effects or adverse events following

immunization (AEFI) leading to dropouts¹. High levels of initial vaccination rates and low levels of subsequent series vaccines including measles vaccines were also seen in a study done by Manjunath U et al⁵. This is a clear indication that the program needs to focus not only on early immunization, but that it should also concentrate on motivating parents to complete the immunization schedule.

Another finding in the study was the poor knowledge of the caregivers regarding immunization. Though a clear majority of the respondents agreed on the fact that immunization is important to protect their children from deadly infectious diseases, most of them could not even name one disease that immunization provided protection against. This observation further cemented with finding that main reason for failure of immunization was lack of knowledge about the universal immunization schedule. Similar findings were seen in the study conducted by Manjunath et al., who concluded that though many were aware of the importance of vaccination in general, specific information on importance of completing the schedule and knowledge on vaccine preventable diseases other than poliomyelitis were very limited.

Conclusion

As mentioned earlier, despite being in operation for more than 3 decades, the immunization program has not only failed in achieving its target but is lagging far behind the 90% coverage mark. An unfortunate fact is that though a clear majority of the population recognized the importance of immunization, a superficial knowledge of the schedule and failure of the system in motivating the target population for completing the immunization schedule, has led to a large proportion of the children being partially immunized. Fear of AEFIs has also played an important role in preventing children from getting immunized in the absence of proper communication plan in place to alleviate the fears.

Government should develop a comprehensive multi-year strategy, to bring out effective changes in the attitudes and practices regarding immunization of children. These efforts should direct in both the directions. From demand side it should raise the community awareness for importance of timely complete vaccination. From supply side, government should focus on creating effective communication strategies to address the fears regarding AEFIs among community so as to have effective community participation in vaccination program.

Suggestion for future research

1. Further research can be taken up to assess the socio-economical barriers in availing the immunization services by the community. This will help us understand the demand side issues which seems to hamper the immunization coverage as still immunization is still not the priority for community. There must be some social factors which one need to look in to.
2. Supply side study to understand the service delivery mechanism in these areas with low coverage taking in to account human resource status, vaccine availability status, cold chain status, micro planning status.

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Appendix

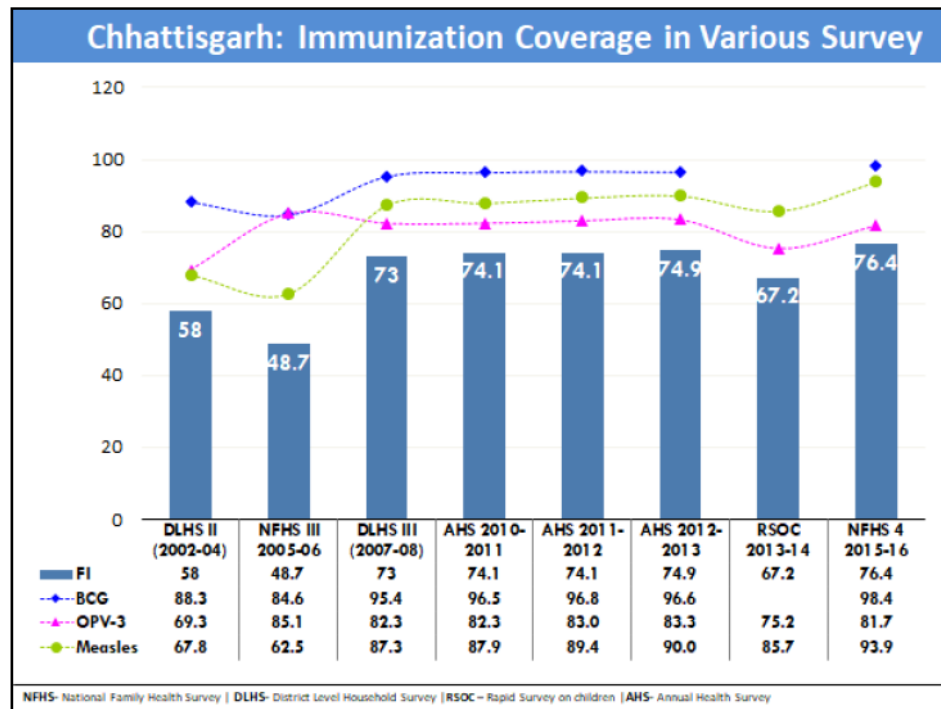


Figure 1. Chhattisgarh full immunization coverage by various survey

Table 1. Full immunization status of study participants

Immunization status	Urban	Rural	Total
Eligible for Full immunization	100	103	203
Fully immunized	74	61	135
% Fully immunized	74	59	67

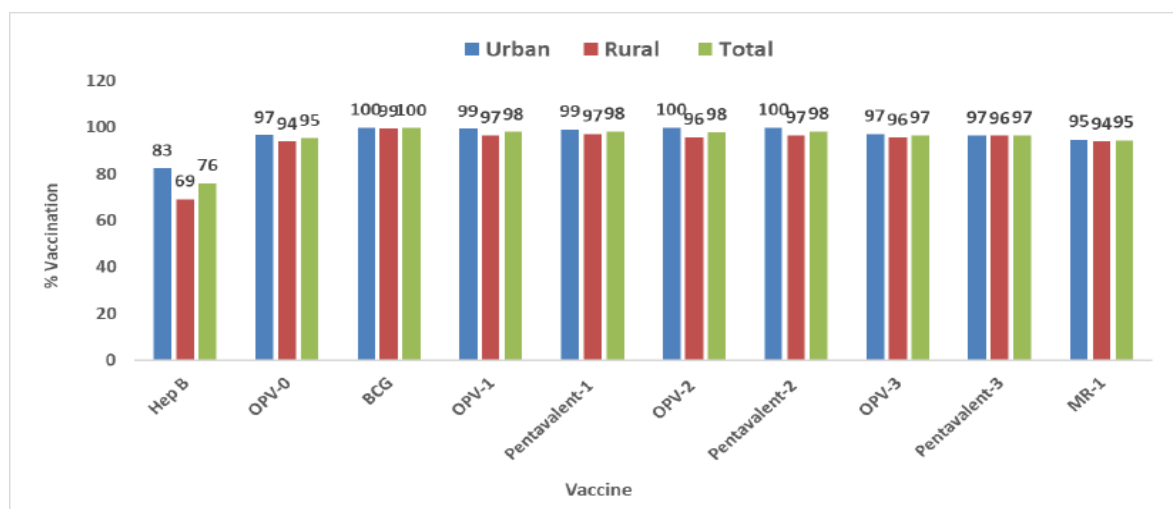


Figure 2. Vaccination coverage of different antigens for study population

Table 2. Dropout rates for various antigen

Vaccines	Urban	Rural	Total
BCG to MR 1	5	7	6
Pentavalent 1 to Pentavalent 3	2	3	2.5
OPV 1 to OPV 3	2	3	2.5
Pentavalent 3 to MR 1	2	2	2

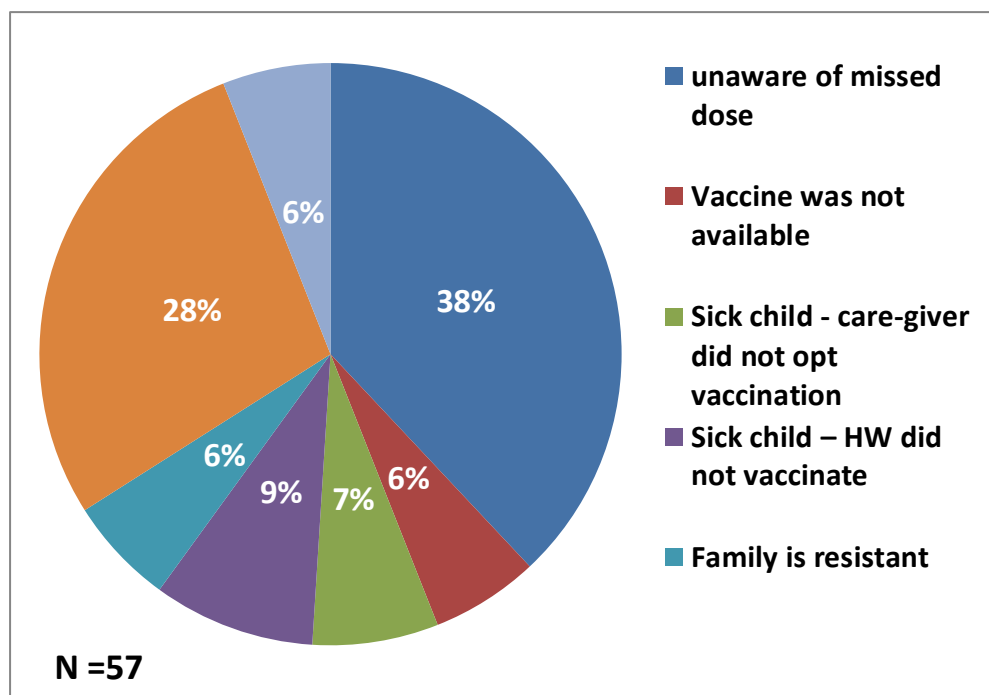


Figure 3. Reason for partial immunization of children