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Research Article

STUDY TO FIND OUT THE COVERAGE EVALUATION AND DROP-OUT RATES OF DIFFERENT VACCINES IN AN URBAN AREA OF ROHTAK CITY IN HARYANA

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ABSTRACT
Immunisation is one of the most effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations**.** Immunization significantly lowers the morbidity and mortality rates in children by protecting them from Vaccine Preventable Diseases (VPDs). Aims and objectives of the current work was to find out the coverage evaluation different vaccines and to determine the dropout rates of immunization in an urban area of Rohtak city in Haryana.
The study was conducted in urban area of Rohtak having population of 2, 86,807. Coverage evaluation survey in the area was conducted according to the 30 cluster sampling technique. 7 children aged 12-23 months were selected from each of the selected cluster. A pre-designed, semi-structured, pretested questionnaire regarding history of vaccination and different factors affecting the vaccination was used. The study spanned over a period of 1 year beginning from July 2011. Data was collected & appropriate statistical tests were applied for analysis. There were 120(56.3%) males out of the total number of study subjects and the rest 93 (43.7%) were females. The vaccine antigen coverage of children for different vaccines was found to be - DPT1/OPV1 had the highest coverage i.e 96.2% whereas that for DPT2/OPV2, BCG and DPT3/OPV3 was 94.4%, 93.9% & 93% respectively. The lowest coverage (85.4%) was observed for measles vaccine immunization. The drop-out rate of BCG to Measles was 9% while that for DPT1 to DPT3 was 3.4%. Improvement in coverage of vaccines and lessening of drop out rates can truly help in bringing down the vaccine preventable diseases.

Key Words: *Dropout Rates, Immunisation, Vaccine Preventable Diseases*

INTRODUCTION
Immunisation is one of the most effective health investments, with proven strategies that make it accessible to even the most hard-to-reach and vulnerable populations**.** Immunization significantly lowers the morbidity and mortality rates in children by protecting them from Vaccine Preventable Diseases (VPDs) (Ministry of Health and Family Welfare, 2012). Immunization is the process of giving vaccines (vaccination) for the development of body's protective response. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease. Vaccines have the power not only to save, but also to transform lives – giving children a chance to grow up healthy, go to school and improve their life prospects. Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases and is estimated to avert between 2 and 3 million deaths each year in all age groups from diphtheria, tetanus, pertussis (whooping cough) and measles (World Health Organization, 2012). Ironically, the fact that immunization has made many infectious diseases rare or almost unheard of can lead to the opinion among parents and health professionals that immunization is no longer necessary. Due to gaps in vaccination coverage, diseases like diphtheria, measles and polio are making a comeback. Every year, immunization saves millions of lives and greatly reduces the burden of illness and disability caused by vaccine-preventable diseases. Recognized as one of the most powerful public health interventions, immunization is the key driving force behind efforts to meet the Millennium Development Goals (MDGs). Immunization programmes are particularly critical in reaching the goal to reduce deaths among

children fewer than five years of age (MDG 4). Since 2000, efforts have been scaled up to meet the MDGs and the goals set out in Global immunization vision and strategy (GIVS) (World Health Organization, 2010). Total number of children who died from diseases preventable by vaccines currently recommended by WHO turned out to be 1.5 million.

Estimated number of all deaths in children fewer than five years (0-59 months) in 2008 was 8.8 million. Nearly 17% of all deaths in children fewer than five years are vaccine preventable. Estimated number of all deaths in children 1-59 months of age came out to be 2 million (Prinja *et al.,* 2010). About 29% of deaths in children 1-59 months of age are vaccine preventable (World Health Organization, 2012).

Every year communicable diseases kill more than 14 million people throughout the world, predominantly in developing countries. At present, measles, pertussis and tetanus, diseases that affect children, are responsible for the majority of disability-adjusted life years lost. Measles accounts for 30 million cases and 888 000 deaths worldwide annually 85% of them in South-East Asia and Africa. Outbreaks of diphtheria also occur, especially in countries with low vaccination coverage (Prinja *et al.,* 2010).

Every year more than 130 million children are born worldwide who need immunization services. While 78% of world's infants receive DPT3, the benchmark indicator of annual routine immunization coverage – an estimated 23 million infants remain unvaccinated. Seventy percent of these children live in ten countries and more than half of them live in India and Nigeria (World Health Organization, 2010).

In May 1974, WHO officially launched a global Immunization Programme, known as Expanded Programme of Immunization (EPI) for the prevention and control of six major killer diseases of children namely tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis and measles, all over the world because of following reason (Prinja *et al.,* 2010).

- These childhood diseases are highly fatal.
- Those children, who recover will have permanent sequelae.
- These diseases are responsible for high morbidity and mortality among children.
- They are easily preventable by immunization.
- Available vaccines are simple, safe, effective and affordable.

It was called as "Expanded" because:

- More diseases will be covered subsequently
- Services are extended to all corners of the world, irrespective of caste, creed, community and ability to pay for it.
- The child is immunized much before he/she is born (because mother is immunized during pregnancy.

The Government of India on 19th November 1985 renamed EPI programme as "Universal Immunization Programme (UIP)" after modifying the schedule. This programme was expanded to entire country and measles vaccine was added in the schedule of this programme (World Health Organization, 1978).

In UIP, focus was shifted from under five to under one year of age and improvement in quality of services. It was recommended to give first dose of TT to the pregnant mother in the first contact and the second dose after one month and BCG and OPV to the newborn as early as possible.

Strategy under this programme was:

1. 100% coverage of expectant mothers with two doses of tetanus toxoid.
2. At least 85% coverage of infants with 3 doses of DPT and OPV and one dose each of BCG and measles before the child celebrates his/her first birthday.

- In 1992 it was recommended to cover 100% infants under Child Survival and Safe Motherhood Programme (CSSM) (World Health Organization, 1978).

The vaccination schedule under the UIP is:

BCG (Bacillus Calmette Guerin) 1 dose at Birth (upto 1 year if not given earlier)

DPT (Diphtheria, Pertussis and Tetanus Toxoid) 5 doses, Three primary doses at 6, 10, 14 weeks and two booster doses at 16-24 months & 5 Years of age

OPV (Oral Polio Vaccine) 5 doses, 0 dose at birth, three primary doses at 6,10 and 14 weeks and one booster dose at 16-24 months of age
Measles 2 doses, first dose at 9-12 months and second dose at 16-24months of age
These vaccines vary in efficacy, according to the age at which the vaccine is administered and the number of doses given. For example, the measles vaccine is 85% effective at the age of 9 month and three doses of DPT provide over 95% protection against diphtheria, 80% against pertusis and 100% against tetanus (World Health Organization, 2010).

Aims and Objectives

To find out the coverage evaluation different vaccines and
To determine the dropout rates of immunization in an urban area of Rohtak city in Haryana.

MATERIALS AND METHODS

Study Area

The study was conducted in 30 colonies (total 163 colonies) of urban area of Rohtak city having population of 2, 86,807 (as on 31st march 2011). The population of the study area is served by PGIMS Rohtak, one District hospital and 8 urban health posts running under Department of Community Medicine. In addition, a number of urban health dispensaries and various private practitioners are also serving the population. Integrated Child Development Services (ICDS) Scheme is also functioning in this area through its 153 Anganwadi centres.

Methodology

Coverage evaluation survey in the area was conducted according to the 30 cluster sampling technique -the standard methodology for such surveys as devised by W.H.O. Seven children aged 12-23 months were selected from each of the selected cluster. If there were two eligible subjects in any household, both the subjects were enrolled in the study. It was an interview based study and a pre-designed, semi-structured, pretested questionnaire regarding history of vaccination and different factors affecting the vaccination was used. Vaccination cards were used to know the exact time of vaccination and in case cards were not available history from mother/ reliable respondent was taken.

The sampling design estimates immunization coverage to within $\pm$ 10 percentage points of true proportion, with 95% confidence. The 30 by 7 cluster survey is a two stage cluster sampling. In the first stage, all the colonies in the area were listed serially. Population of each colony was listed and cumulative population was calculated. Sampling interval was calculated by using the formula:

Total cumulative population / 30 (cluster) = Sampling interval

A four digit random number was selected from the digits of any currency note, which would be equal to or less than the sampling interval. Cluster no 1 was identified by locating the first colony whose population would be equal to or more than the random number selected.

Cluster number 2 was identified by using the formula:

Random number + sampling interval = ----------

Cumulative population listed for that colony would be equal to or exceed the calculated number. Cluster number 3, 4, 5 and so onwards were identified and located by using the formula:

Number which identified the + Sampling interval = ----------
Location of the previous cluster

In the second stage of cluster survey the first house was selected by going into the selected cluster and according to the following random selection procedure. From the centre of the colony, number of paths was marked, currency note was used and last digit of serial number was taken to decide as to which path is to be taken.

Drop- out rate was calculated by using the formula:

- For full immunization dropouts------- (BCG – Measles) X 100 / BCG
- For DPT/ OPV dropouts---------- (DPT1 – DPT3) X 100 / DPT1

The investigator himself conducted the study by house to house visits and filled the household summary form. All the study subjects were fully informed about the purpose of the study. Informed consent was taken from the individuals before conducting the interview. Information was noted from the immunization cards. For those who had no immunization cards, an enquiry was made from an adult member of the family preferably mother.

Study Period

The study spanned over a period of one year beginning from July 2011.

RESULTS AND DISCUSSION

Data Analysis

The data collected was compiled, coded, tabulated and analysed by using SPSS 20 software. Appropriate statistical tests were applied for analysis wherever applicable.

Observations

The present study was undertaken in urban area of Rohtak city. 213 children in the age group of 12-23 mothers were studied from 30 colonies of Rohtak city. The study was undertaken to find out the coverage of immunization and to find out the drop-out rates of vaccines.

Table 1: Sex- wise distribution study subject (n=213)

Sex	Number	Percentages
Male	120	56.3
Female	93	43.7

Table 1 shows that 120 (56.3%) out of the total number of study subjects were males and the rest 93 (43.7%) were females.

Table 2: Distribution of children according to vaccine antigen coverage (n=213)

Vaccine	Number of children	Percentage
BCG	200	93.9
DPT1	205	96.2
OPV1	205	96.2
DPT2	201	94.4
OPV2	201	94.4
DPT3	198	93.0
OPV3	198	93.0
Measles	182	85.4

Table 2 shows the vaccine antigen coverage of children for different vaccines. It was found that DPT1/OPV1 had the highest coverage i.e 96.2% whereas that for DPT2/OPV2, BCG and DPT3/OPV3 was 94.4%, 93.9% & 93% respectively. The lowest coverage (85.4%) was observed for measles vaccine immunization.

Table 3: Drop-out rates of different vaccines

Sr. No	Vaccine	Dropout rate (%)
1	BCG to Measles	9.0%
2	DPT 1 to DPT 3	3.4%
3	DPT 1 to Measles	7.2%

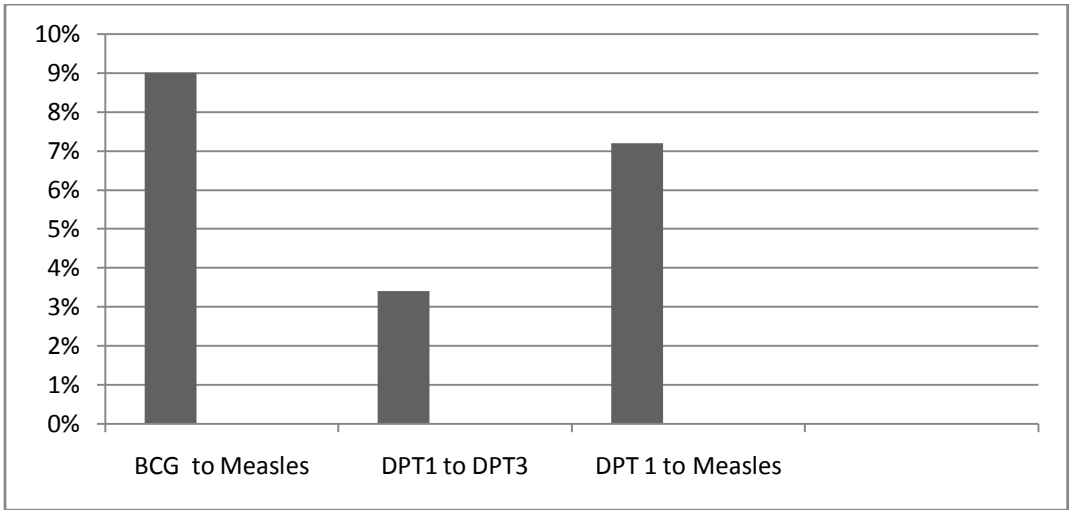

Figure 4: Bar diagram showing dropout rates of different vaccines

Table 3 shows the drop-out rate for different vaccines among study subjects. The drop-out rate of BCG to Measles was 9% while that for DPT1 to DPT3 was 3.4% & that for DPT 1 to Measles was 7.2 %

Discussion

This study was carried out in 30 colonies in urban area of Rohtak city .The aim of the study was to know the coverage of immunization and antenatal care in these areas. The study also observed the reasons for partial /non immunization and association of various socioeconomic factors with utilization of antenatal care. A total of 213 children of age group 12-23 months and 210 women who had given birth to a child in the last one year period preceding the interview for the present study were studied.

The coverage for various vaccines in the study area is quite good as compared to national figures (NFHS-3), data from state of world children for 2009 and also some of the studies undertaken in the area , however, it is still less than the national targets. BCG coverage in the present study was found to be less than DPT1, this might be due to improper recall by the mothers as only 96 (45.1%) of mothers had immunization cards. Dinesh *et al.,* also found that the importance of keeping immunization cards was even not well understood in urban areas, as cards of around one third (30.1%) of total children could not be traced by them. In the current study, coverage for measles immunization (85.4%) was low (85.4%) as compared to that observed by Singh *et al.* (2010); Yadav *et al.,* (2006). Low coverage of measles vaccine compared to other vaccines reflects that special campaign needs to be organized for measles.

Another reason might be that health workers did not assess proper history and failed to give proper immunization to the beneficiaries. It stresses upon the importance of having immunization card with both the mother and the health worker. Another main concern in our study was immunization drop-outs which was 9% for BCG to Measles and 3.4% for DPT1to DPT3, though it was less as compared to CES-2009 where it was 15 % & 13 % respectively. The drop-out rate indicates the system's inability to hold on to child once registered. The drop- out could be due to migrant nature of urban population.

Datar *et al.,* (2007) also found that the effectiveness of community health workers in extending immunization coverage was low. Anecdotal and case study evidences suggest that the current job requirement of the health workers may not be optimally allocating them time for the goal of achieving immunization coverage. At the same time providing better training and monitoring of the community health workers has been identified as an important area for improvement.

Conclusion

To reach the goal of 100% coverage of immunisation in India, the policy managers should implement the following:

- Enhance coverage by organizing more sub-national immunization days (SNIDs).
- Spread news to break religious misbeliefs against vaccination.
- Compulsory possession of immunization cards for school admission can be taken as a positive approach towards increasing the level of awareness.
- VPD & AEFI surveillance should be made mandatory and should be carried out under the direct supervision of District Immunization Officer (DIO)
- Some supply side facility enhancement can also improve demand for vaccination. For example, physician and clinic hours might be increased to reduce waiting time of the parents for getting their children immunized or introduction of mobile units in thinly populated areas to minimize travel time of parents to curtail their economic disincentives.
- Higher budgetary allocation for preventive care might improve immunization coverage but only in the short run.

REFERENCES

Ministry of Health and Family Welfare (2012). Immunization Guide for Block Program Managers, New Delhi: Government of India. Available at: http://www.nipi.org.in/Items/Resources_Manuals and Guidelines_Immunization-Guide for Block Program Managers.pdf.

World Health Organization (2012). Global Immunization Data, Geneva: WHO. Available at: http://www.who.int/immunization/GIN_October_2012.pdf.

World Health Organization (2010). Immunization and Vaccine Development South-East Asia RegionStrategic Plan 2010-2013, New Delhi: WHO. Available at: http://www.searo.who.int/entity/immunization/documents/regional_immunization_strategy_2010-2013.pdf.

Prinja S, Gupta M, Singh A and Kumar R (2010). Effectiveness of planning and management interventions for improving age-appropriate immunization in rural India. *Bulletin of the World Health Organization* **88** 97-103.

World Health Organization (1978). Expanded Programme on Immunisation, Report and Working Papers, 31st Session of WHO Reg Committee. Mongolia: WHO, SEARO. Available at: http://repository.searo.who.int/bitstream/123456789/5300/20/rdr80_Complete.Pdf.

Census of India (2001). District Rohtak. Available at: http://censusindia.gov.in/Dist_File/datasheet-0614.pdf.

World Health Organization (2005). Immunization coverage cluster survey, Geneva: WHO. Available at: http://www.who.int/vaccines-documents/DocsPDF05/www767.pdf.

World Health Organization (2001). Hoshaw-Woodard S. Description and comparison of the methods of cluster sampling and lot quality assurance sampling to assess immunization coverage, Geneva: WHO. Available at: http://www.who.int/vaccines-documents/DocsPDF01/www592.pdf.

Ministry of Health and Family Welfare (1989). Evaluate Vaccine Coverage. New Delhi: Government of India.

United Nations Children's Fund (2012). The state of the world's children. New York: UNICEF, Available at: http://www.unicef.org/sowc/files/SOWC_2012-Main_Report_EN_21Dec2011.pdf.

International Institute for Population Sciences (2007). Macro International. National Family Health survey (NFHS-3), 2005-06, India II, Mumbai: International Institute for Population Sciences.
Yadav S, Mangal S, Padhiyar N, Mehta JP and Yadav BS (2006). Evaluation of immunization coverage in urban slums of Jamnagar city. *Indian Journal Community Medicine* **31** 300-3.
Datar A, Mukherji A and Sood N (2007). Health infrastructure & immunization coverage in rural India. *Indian Journal of Medical Research* **125** 31-42.