ORIGINAL ARTICLE

Determinants of immunization coverage among 12-23 months children: A study from Haryana

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Citation

Article Cycle

Abstract

Background: Immunization is safe, powerful and proven tool for elimination and controlling various highly infectious diseases and in spite of every possible effort put by the Government still there is a big gap between reported and evaluated coverage. **Aims & Objectives**: To find out the immunization coverage and its determinants among children in the age group 12 – 23 months in urban and rural area of district Ambala. **Material and Methods**: It was a cross sectional study carried out by WHO recommended 30 by 7 cluster survey technique. **Results**: It was observed that overall 83.1% children were fully immunized, 14% were partially immunized and 2.9% were unimmunized. In present study Educational status of mothers, Occupation of mothers, Religion, Sex, Monthly Family Income and Caste were found to be significantly associated with immunization coverage. "Fear of side effects" of vaccination was found to be the main reason for failure to fully immunize the child. **Conclusion**: To conclude, immunization coverage was found to be reasonably but still there is a lot of scope for improvement.

Keywords

Introduction

Immunization is safe, powerful and proven tool for elimination and controlling various highly infectious diseases (1). Almost against 27 disease or infectious agents, vaccines have been developed and many more already are in pipeline or under the stage of development (2). The immunization programme varies from country to country according to number of antigens; but some antigen like Tuberculosis, DPT (i.e. Diphtheria, Pertussis, Tetanus) Poliomyelitis and measles are the part of global immunization programme(3). Immunization program in India was started with the aim to protect children from Vaccine Preventable Diseases (VPD's). Due to suboptimal immunization coverage in UIP, this program has achieved only partial success in reducing the burden of VPD's. Immunization coverage in India is still far from the target of achieving the 100% vaccination despite the long-standing commitment of

Government and Non-Government organizations, there are still pockets of low immunization coverage areas.

Aims & Objectives

1. To determine the immunization coverage in urban and rural area of district Ambala.
2. To determine the factors which affect the immunization coverage.
3. To find out the reasons for immunization failure.

Material & Methods

Study area: The study was conducted in urban and rural area of district Ambala (Haryana). **Study design:** It was a community-based cross-sectional study. **Study Period:** Study was conducted during January 2017 to December 2017. **Study Population:** The study included children aged between 12-23 months whose parents resided in the study area for the last two years.

Inclusion Criteria:

1. Children aged between 12 and 23 completed months at the time of study.
2. Children in the age group of 12-23 months whose parents are residing in the study area for a period of not less than two years.
3. Mothers/Guardians /Care takers who gave the consent for participation.

Exclusion Criteria:

1. Children in the age group of 12-23 months whose parents are residing in the study area for less than two years.
2. Parents who were not willing to participate.

Sample size: The WHO recommended 30 cluster sampling technique was adopted. A total of 30 clusters from urban and 30 clusters from rural areas were selected and seven subjects from each cluster were taken in the study i.e.; (30 x 7) x 2 = 420. So, the sample size was 210 from urban and 210 from rural, making it total of 420.

The Study was conducted in urban and rural area of district Ambala and Multistage Cluster Random Sampling was adopted i.e.;

1. Simple Random Sampling: To identify the first cluster
2. Cluster formation as per sampling interval
3. Simple Random Sampling: To identify the first house

Sampling technique:

Step 1: Identification of cluster

This step involved identifying natural clusters i.e. villages and wards within the selected geographic area (i.e. urban and rural area of district Ambala) for the study. Area under this study covered 470 villages in rural area and 31 wards of urban Ambala (MCI) catering a population of 6,27,576 and 1,95,153 respectively. A total of 30 clusters from urban and 30 clusters from rural area were identified using WHO recommended Cluster Sampling Technique.

In rural area:

Total Cumulative Population:6,27,576

Cluster Interval:20,919 (6,27,576÷30)

In urban area (Ambala MC):

Total Cumulative Population:1,95,153

Cluster Interval:6505 (1,95,153÷30)

Step 2: Selection of Households and Study subjects: Once the 30 clusters were identified, the next step was to select the household within these clusters. The list of the households was not available. So, the centre of the selected villages/wards was identified, followed by spinning a pencil and the direction pointed by the tip of the pencil was the path followed for survey. The first house was chosen randomly by using the last digit of a currency note and thereafter moved in left direction. Seven children are selected from each cluster by moving in one direction till the desired numbers of children were completed. If house was found locked then next house in the series having the child eligible for study was selected. A total of 14 children were surveyed if the cluster was selected twice and a total of 21 children were surveyed if the cluster was selected thrice. If there was more than one eligible child available in the house, only one was selected randomly which was done by lottery method.

Study Strategy: The individuals who met the inclusion criteria of being residents in the study area for a period of not less than 2 years were included. Data was collected from Mothers/Guardians / Care takers using a pre-tested semi structured questionnaire using door to door approach after explaining the purpose of study and obtaining the informed consent. Children immunization cards were scrutinized for the assessment of immunization status of the children and in cases where cards were not available Mothers'/Guardians' / Care takers' recall of vaccination was accepted.

Study Tool: The study tool consisted of a pretested semi-structured questionnaire. The questionnaire was administered to the mothers/guardians/caretakers of the study subjects and information was elicited by face to face interview. The questionnaire had the following parts:

Part I- Sociodemographic profile

The questionnaire included Sex, Age, Birth order of child, Area (Urban/Rural), Age of Mother, Age of Father, Occupation of father, Occupation of mother, Education of Father, Education of Mother, Type of family, No. of siblings, Monthly family income, Religion and Caste of child.

Part-II –Immunization details

Immunization details included Immunization card, immunization status of various vaccines, BCG scar mark, Source of vaccination (Health Facility), and reason for non-immunization / partial immunization.

Definitions

- **Fully Immunized:** - The child who had received their all due vaccine doses recommended in UIP before reaching the age of one year i.e. one dose of BCG & Hepatitis B, three doses of each OPV and Pentavalent and one dose of measles & JE.
- **Partially Immunized:** - The child who had not received all the vaccinations due for his/her age as scheduled in UIP.
- **Unimmunized**: - The child who had not received any vaccination at all.

Statistical Analysis: The data was entered into Microsoft excel and was analysed in SPSS software Version 20. For quantitative data, results were presented in terms of mean $\pm$ SD and qualitative data was presented in simple percentages. Bivariate descriptive analysis was done to study percentage distribution of full and partial immunization status of the child by selected characteristics of mother, child and Healthcare facility. The strength of association of independent and dependent variable was also studied using Chi square value. A p value < 0.05 was considered significant at 95% confidence interval.

Ethics consideration: This study has been approved by the Institutional Ethical Committee. All the subjects were fully informed about the purpose and nature of the study. A written and informed consent was obtained in the language they understood, and assurance regarding confidentiality was given. The study posed no financial burden on the participants.

Results

Immunization Coverage: A total of 420 children were enrolled in this study in the age group 12-23 months residing in the study area for at least last two years. The immunization status was shown in [figure 1].

It was observed that total 83.1% children were found to be fully immunized (83.3% children were in Rural area and 82.9% in urban area).This observation shows that immunization coverage tends to be slightly better in rural area as compared to urban area (Figure 1).

Factors Affecting Immunization Coverage: In the present study immunization coverage was significantly associated with educational status of mothers (p value 0.00), occupation of mother (p value 0.01), and education of fathers (p value 0.00), religion (p value 0.00) and caste (p value 0.00). Sex, Type of family and age of mothers had no significant association with the immunization status of children.

Reasons for immunization failure: The main reason for immunization failure (including unimmunized and partially immunized) in urban and rural area was due to lack of information i.e. "Fear of side effects" i.e. 6.7% (7.6% in urban and 5.7% in rural).

Discussion

A total of 420 Children (210 from urban area and 210 from rural area) aged 12-23 months who were residing in the rural and urban area of district Ambala were interviewed. The coverage of fully immunized children in the study area was found to be 83.1% (82.9% in urban area and 83.3% in rural area) to be quite high as compared to National family health survey (NFHS-4) (2015-16) national figures i.e. 63.9% (Urban 61.3% and Rural 62.0%) and Haryana state figures 62.2% (Urban 65.1% and Rural 57%) (4)indicating that there has been a significant improvement in overall immunization coverage of all vaccines in recent years, as a result of continuous efforts being put in to achieve universal immunization coverage.

Similarly, the coverage in this study was higher when compared to District Level Household Survey (DLHS-4) (2012-13) where the percentage of fully immunized children was were 52.1% (Rural 51.0% and Urban 54.5%), and unvaccinated children were 5.9% (Rural 6.7% and Urban 4.8%). But in present study, it was found to be 83.1% (82.9% in urban area and 83.3% in rural area).(5) Similar findings were found in a study conducted by Ganguly E et al (2018) in Raigarh block of Churu district in Rajasthan reported that full immunization coverage 88.7%, partial immunization coverage 10.3% and unimmunized children were only 1%. (6) In our study coverage was more in rural area than urban area. This was in concordance with a study by Venkatachalam B *et al* in and around Hyderabad district where full immunization coverage seen more

in rural area than in urban area i.e. 88% and 79% respectively (7). The reason behind better immunization coverage in rural area could be due to better infrastructure and manpower in peripheral health institution especially after launch of National Rural Health Mission. Another reason for poor immunization in urban area can be regular influx of migratory population especially in urban slums which is also a hurdle in achieving full immunization coverage. The full immunization coverage was slightly better in female children as compared to male children. Similar findings were observed in studies conducted by Vasantha Mallika MC. *et al* (8) and Bhardwaj AK *et al* (9).

In the present study majority of the families surveyed belonged to Hindu religion (76.4%) and the full immunization coverage among Hindu religion in the present study came out to be 95% which was quite good as compared to the NFHS-4 (10). Gupta P *et al* (11) observed the similar findings. Better education status and no cultural restriction could be the reason for better immunization coverage among Hindu and Sikhs.

The full immunization coverage was low among the children who belonged to Scheduled Caste or Scheduled Tribes (SC/ST) as compared to General / OBC Caste. The percentage of fully immunized children in SC/ST population was 85.4% in urban area and 77.8% in rural area. Majority of unimmunized children belonged to SC/ST Caste i.e. 22.2% in rural and 12.2% in urban area. Similar findings of low immunization coverage among SC/ST were also observed in a study by Phukan RK *et al*(12)

Maternal education was a significant predictor of full immunization in this study group. This study witnessed 100% full Immunization among the children born to a mother who were Graduate and above both rural and urban area as compared to only 40.4% urban and 20% rural area among children born to illiterate mothers. Education helps in better understanding of the healthcare needs of individual and hence improves the health seeking behaviour. Illiterate mothers have a greater chance being unfamiliar with the benefits of vaccination and may be equally skeptical of modern medicine. Similar findings were reported by Vikram K *et al* (13) on Linkages between maternal education and childhood immunization in India.

This study reveals that children of working women were more likely to be fully immunized as compared to house wives. The percentage of fully immunized

children who belonged to working mothers was 96.4% as compared to house wives (79.8%). Similar findings were observed by Manoj V. Murhekar*et al* (14) in a study conducted in Tamil Nadu which reveals 88.4% fully immunized children of salaried mothers as compared to 80.0% of home makers.

The main reason for immunization failure in in urban and rural area was due to lack of information, "Fear of side effects" i.e. 6.7% (7.6% in urban and 5.7% in rural). Gupta PK *et al* in a study conducted in rural area of Pune revealed the main reasons for partial immunization were found to be that the time of immunization was inconvenient (36%) and that the child brought in was ill, so immunization was not given (20%) (15).Chaudhary V *et al* conducted a study in urban slums of Bareilly reported that the main reasons for non-immunization and partial immunization were ignorance (50%) and fear of side effects (28.78%) and (42.85%) respectively (16).

In urban area more (90.0%) children from joint families were fully immunized as compared to nuclear families (only 77.5%), whereas in rural area percentage of fully immunized children was 84.4% in joint families and only 82.2% was in nuclear families. This signifies that joint families were having more inclination towards healthcare services as members in the family can spare their time to get required services while in case of nuclear families, sparing time becomes difficult due to their job responsibilities. In a study conducted by Devasenapathy N *et al* in urban poor settlement of Delhi also reported 66.35% fully immunized children were from nuclear families and 33.65% children from non-nuclear families (17).

Conclusion

To conclude, immunization coverage was found to be reasonably good when compared to National Family Health Surveys but still there is a lot of scope for improvement to achieve the national target of 100% immunization coverage. In present study Education status of mothers, Occupation of mothers, Religion, Sex, Monthly Family Income and Caste were the significantly associated with immunization coverage. "Fear of side effects" of vaccination was found to be the main reason for failure to fully immunize the child.

Recommendation

To achieve the national target of 100% immunization coverage various strategies can be used like enhanced incentives to health workers, concerted

efforts to educate the population regarding benefits of immunization. Mass media can also be efficiently used for his purpose.

Limitation of the study

The major limitation of the study was recall bias as the information on vaccination was based on mothers' recall in cases where vaccination cards were not available and this may affect the results. It was tried best to minimize the recall bias by confirming the immunization status by inquiring about the name of the vaccine, site of administration and age at which the vaccine was administered, but as it can be with any other study, it could not be totally eliminated.

Another limitation is that the study is limited to the vaccine against these six diseases that are given under UIP and not covering the coverage of other recently introduces vaccines like Rota Virus Vaccine (RVV) and Inactivated Poliovirus Vaccine (IPV) or provided through the private sector.

Relevance of the study

This study has discussed the immunization coverage in district Ambala. It has highlighted the various factors that can lead to partial /no immunization which will contribute to better planning for immunization sessions and emphasizing which groups need to be focused for immunization in this area.

Authors Contribution

SKB, AB, AM: Conception, design, data collection, analysis, drafting of the article and final approval. GS: Data collection and drafting the article. SG: Data analysis. SR: Data collection.

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Tables

TABLE 1 DETERMINANTS OF IMMUNIZATION COVERAGE IN CHILDREN

		Non-Immunization	Partial Immunization	full immunization	p-value
Overall		12 (2.9%)	59 (14.0%)	349 (83.1%)	0.475
Sex	Male	7 (3.0%)	35 (15.1%)	190 (81.9%)	0.766
	Female	5 (2.7%)	24 (12.8%)	159 (84.6%)	
Area	Urban	8 (3.8%)	28 (13.3%)	174 (82.9%)	0.475
	Rural	4(1.9%)	31 (14.8%)	175 (83.3%)	
Education of Mother	Illiterate	5 (6.1%)	51 (62.20%)	26 (31.7%)	0.00

	Primary School	3 (5.1%)	2 (3.4%)	54 (91.5%)	
	High School	4 (3.2%)	3 (2.4%)	118 (94.4%)	
	Senior Secondary	0 (0%)	3 (3.6%)	80 (96.4%)	
	Graduate & Above	0 (0%)	0 (0%)	71 (100%)	
Occupation of Mother	House Wife	11 (3.3%)	57 (16.9%)	269 (79.8%)	0.01
	Working	1 (1.2%)	2 (2.4%)	80 (96.4%)	
Education of Father	Illiterate	2 (3.4%)	50 (86.2%)	6 (10.3%)	0.00
	Primary School	4 (12.9%)	1 (3.2%)	26 (83.9%)	
	High School	1 (1.3%)	6 (7.7%)	71 (91%)	
	Senior Secondary	3 (2.5%)	2 (1.7%)	115 (95.8%)	
	Graduate & Above	2 (1.5%)	0 (0.0%)	131 (98.5%)	
Type of Family	Nuclear	7 (3.2%)	37 (17.1%)	173 (79.7%)	0.156
	Joint	5 (2.5%)	22 (10.8%)	176 (86.7%)	
Religion	Hindu	10 (3.1%)	9(2.8%)	305 (95%)	0.00
	Muslim	1 (1.4%)	50 (72.5%)	18 (26.1%)	
	Sikh	1 (4.3%)	0 (0%)	22 (95.7%)	
	Others	0 (0%)	0 (0%)	7 (100%)	
Age of Mother	< 25 Years	8 (4.5%)	29 (16.5%)	139 (79.0%)	0.196
	26 - 35 Years	4 (1.7%)	29 (12%)	208 (86.3%)	
	36 & above	0 (0%)	1 (33.30%)	2 (66.70%)	
Caste	General	4 (1.3%)	58 (18.7%)	249 (80.0%)	0.00
	SC / ST	7 (14.0%)	1 (2.0%)	42 (84.0%)	
	OBC	1 (1.7%)	0 (0%)	58 (98.3%)	

TABLE 2 REASON FOR IMMUNIZATION FAILURE

Reason for Immunization Failure		Area		Total
		Urban (n = 210)	Rural (n = 210)	(n = 420)
Reason for Immunization failure due to "Lack of Information"	Unaware of need for immunization	2 (1.0%)	6 (2.9%)	8 (1.9%)
	Unaware of need to return for 2nd or 3rd dose.	4 (1.9%)	2 (1.0%)	6 (1.4%)
	Fear of side reactions	16 (7.6%)	12 (5.7%)	28 (6.7%)
	Wrong ideas about contraindications	5 (2.4%)	4 (1.9%)	9 (2.1%)
Reason for Immunization failure due to "Lack of motivation"	Postponed until another time	2 (1.0%)	2 (1.0%)	4 (0.9%)
Reason for Immunization failure due to "Obstacles"	Child ill - not brought	7 (3.3%)	9 (4.2%)	16 (3.8%)
Total		36 (17.1%)	35 (16.6%)	71 (16.9%)

Figures

FIGURE 1 IMMUNIZATION STATUS OF THE STUDY SUBJECTS