E-ISSN:2454-9894 P-ISSN: 2454-9886
International Archives of
BioMedical and Clinical Research
(An Official Publication of "Ibn Sina Academy of Medieval Medicine & Sciences")
WWW.IABCR.ORG

Section Physiology

Original Article

Status of Immunization Coverage among Preschool Children in an Area of South Delhi, New Delhi, India

Anis Ahmad[1], Sazina Muzammil[2], Krishna Mohan[3], Md. Aftab Alam[4], Khalid Umer Khayyam[5]

[1]Department of Tahaffuzi-Wa-Samaji Tibb, Faculty of Medicine (Unani), Jamia Hamdard, New Delhi, India
[2]Head, Dept. of Physiology, Faculty of Dentistry, Jamia Milia Islamia, New Delhi, India
[3]PhD Scholar, Division of Clinical Research, Department of Biosciences, School of Basic and Applied Sceinces, Galgotias University, Greater Noida, Uttar Pradesh, India
[4]Professor, Department of Pharmacy, School of Medical and Allied Sciences, Galgotias University, Greater Noida, Uttar Pradesh, India
[5]Head, Department of Epidemiology and Public Health, National Institute of TB and Respiratory Diseases, Sri Aurobindo Marg, New Delhi, India

ABSTRACT

Background: *High levels of immunization coverage in children can ensure the control of vaccine-preventable diseases, and there are various factors that can affect preschool immunization. Studies that focus on vaccination coverage in various populations are crucial for identifying the vaccination status of a given community and for strategizing the national programs. This study assessed the vaccination coverage in preschool children living in a resettlement colony in an area of New Delhi.*
Methods: *This community-based cross-sectional study was conducted in JJ Colony, Madanpur Khadar Extension of South Delhi, New Delhi between October 2008 to January 2009, in 100 preschool children between 24 – 47 months of age, with equal number in both genders. No significant association of the vaccination status with factors like gender of the children, educational, or socio-economic condition, was found in this study.*
Results: *Out of a total of 100 children studied, forty-four children (44%) were fully vaccinated, forty-nine children (49%) were partially immunised, and seven children (7%) were not vaccinated. Vaccines for diphtheria-tetanus-pertussis (DPT-I) and oral poliovirus vaccine (OPV-I) had the maximum coverage (92%) while DPT Booster and OPV Booster had the lowest (44%).*
Conclusion: *Future possibilities and potential for evaluating vaccination coverage should be explored in vulnerable areas like resettlement colonies, in migrant populations and in urban poor sections of society to get estimates on the gap in vaccination coverage in such areas.*

Keywords: *Immunization coverage, Preschool children, Community survey*

Article History
Received: 10.03.2022
Accepted: 25.03.2022

***Corresponding Author**

Dr. Khalid Umer Khayyam
Email: khalid.k@nitrd.nic.in

Copyright: © the author(s. IABCR is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.
This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial

INTRODUCTION

Vaccination is one of the most successful public health interventions,[1] however, global coverage dropped from 86% in 2019 to 83% in 2020 and a total of 23 million children worldwide under the age of one, did not receive any basic vaccines.[2] Vaccine-preventable illnesses, on the other hand, continue to pose a substantial public health threat across the world, owing to low vaccination rates.[3] Race, income, parental marital status, parental education, number of children in the family, gender, have all been linked to vaccination coverage gaps.[4,5,6]

In several places and socio-demographic categories, preschool vaccination coverage is inadequate because of which systematic monitoring of the vaccination status in children becomes essential for determining the future health status for a country. The monitoring of vaccination status in children is performed in many developed countries.[7,8] India had launched the Expanded Program of Immunization (EPI) in the year 1978 with the goal of lowering death and morbidity associated with vaccine-preventable illnesses. For widespread impact on vaccination messages, multipronged initiatives on commercials and awareness activities have been undertaken. In 1985, India initiated the Universal Immunisation Programme with two key components: tetanus vaccination for pregnant women and the EPI target illnesses vaccination for infants in their first year of life.[9]

India is a leading producer and supplier of vaccines however, one-third of the world's under-five children (U5C) who are unvaccinated, are present in India.[10]

According to the UNICEF Coverage Evaluation Survey from 2009, just 61 percent of Indian children are properly vaccinated. As per National Family Health Survey (NFHS -4) of 2015-16, in India the national average for full immunization is 62 per cent. According to another study

Access this article online	
Website: www.iabcr.org	Quick Response code
DOI: 10.21276/iabcr.2022.8.1.1	

How to cite this article: Ahmad A, Muzammil S, Mohan K, Alam MA, Khayyam KU. Status of Immunization Coverage among Preschool Children in an Area of South Delhi, New Delhi, India. Int Arch BioMed Clin Res. 2022;8(1):HP1–HP4.

Source of Support: Nil, **Conflict of Interest:** None

with the Universal Immunization Programme (UIP) in India being one of the world's largest regular childhood immunisation programmes, just about 65 percent of Indian children under the age of two were properly vaccinated in the year 2019.[11] According to the same study, the expected national cost of basic vaccines was 784.91 million US dollars. The cost of giving all vaccines contained in the Government of India's normal children immunisation schedule was projected to be $1.73 billion US dollars for the year 2020.

The purpose of this study was to assess the immunization coverage among preschool children at a randomly selected resettlement colony in New Delhi area.

METHODS

A community based observational, cross-sectional study on status of vaccination coverage was conducted in JJ Colony, Madanpur Khadar Extension, New Delhi. The population of the area is approximately one lakh. It has a large population of migrants from Haryana, Punjab, UP, Bihar and Rajasthan. Mostly lower socioeconomic status population is residing in this area and majority of them are daily wageworker by occupation. The area is now developing but still has limited civic facilities.

The whole area has been divided into phases, and then further divided into pockets. Total eight pockets were found here, and all eight pockets were covered in this study. The sample were selected by Probability Proportionate to Size (PPS). Probability Proportionate to Size sampling indicates that the number of children included in the research study was proportionally drawn from each pocket, which was then rounded off to 100. Eligible children were sampled from a list of children obtained from Anganwadi (local rural care) centres. The field work was conducted during the period of four months i.e., from October 2008 to January 2009.

A standardised questionnaire was developed to obtain data on vaccination and socio-demographic characteristics. This systematic interview tool was designed with the help of experts in the field of community medicine, paediatrics and nursing, who assessed the validity before implementation was piloted. The tool was translated to Hindi language and then back translated to English. This questionnaire contained the details to be captured about the vaccination history in the children. Where accessible, the vaccination card was examined, otherwise the immunization history obtained from the mothers was captured.

Data was analyzed using Statistical Package for the Social Sciences (SPSS) Version 26. Both descriptive and inferential statistics have been used for analysis of the obtained data. Descriptive statistics such as frequency and percentage have been used to describe the socio-demographic data. Inferential statistics such as chi-square and correlation coefficient have been used to determine the significant relationship between the vaccination status and other factors studied.

Ethical clearance was obtained from the Institutional Ethics Committee and consent was taken from the mothers/head of families after explaining the purposes of the study. Clinical examination was used to assess the children's overall health status, and appropriate measures, including referral, were recommended where required. Following the investigation, mothers received basic health education on breast feeding, vaccination, and nutrition.

RESULTS

This study included a total of 100 children between the ages of 24-47 months, with equal number of children included for both genders. Total of 87 children (87%) were from Hindu families, 12 (12%) from Muslim, while 1 child was from family following Christian religion. A majority of the children (93%) lived in nuclear families while only 7% lived with joint or extended families.

Educational status of the head of the families was found to be mostly either very low or illiterate (53%- middle school to intermediate; 46%- primary level or illiterate). Educational status of mothers was also found to be very low wherein a majority of 76% were primary level or illiterate, 23% were middle school to intermediate level. Table 1 and Table 2 show the distribution between vaccination coverage and educational status of the head of the family and mothers respectively.

Table 1: Distribution of educational status of heads of the families and immunization coverage criteria.

Educational Status	Immunization status				X^2	df	Level of Significance
	Fully Immunized	Partially Immunized	No Immunization	No. of Children			
Illiterate Count % within Group	11 (47.82%)	12 (52.17%)	0 (0%)	23 (100%)	5.24	10	0.87
Primary school or Literate Count % within Group	11 (47.82%)	10 (43.47%)	2 (8.69%)	23 (100%)			
Middle School Count % within Group	15 (42.85%)	17 (48.57%)	3 (8.57%)	35 (100%)			
High School Count % within Group	5 (33.33%)	8 (53.33%)	2 (13.33%)	15 (100%)			
Intermediate & Post High School Count % within Group	1 (33.33%)	2 (66.66%)	0 (0%)	3 (100%)			
Graduation Count % within Group	1 (100%)	0 (0%)	0 (0%)	1 (100%)			
Total Count % within Group	44 (44%)	49 (49%)	7 (7%)	100 (100%)			

Table 2: Distribution of educational status of mothers with immunization coverage criteria.

Educational Status	Immunization status				X^2	df	Level of Significance
	Fully Immunized	Partially Immunized	No Immunization	No. of Children			
Illiterate Count % within Group	22 (43.13%)	25 (49.01%)	4 (7.84%)	51 (100%)	5.37	10	0.86
Primary school or Literate Count % within Group	13 (52%)	11 (44%)	1 (4%)	25 (100%)			
Middle School Count % within Group	6 (31.57%)	11 (57.89%)	2 (10.52%)	19 (100%)			
High School Count % within Group	2 (66.66%)	1 (33.33%)	0 (0%)	3 (100%)			
Intermediate & Post High School Count % within Group	1 (100%)	0 (0%)	0 (0%)	1 (100%)			
Graduation Count % within Group	0 (0%)	1 (100%)	0 (0%)	1 (100%)			
Total Count % within Group	44 (44%)	49 (49%)	7 (7%)	100 (100%)			

Classification was done according to Kuppuswamy's socio-economic status scale-updated for 2007 and the families surveyed were categorized. Majority of the population (73%) was found to be belonging to the upper lower class. Relationship between the socio-economic status and vaccination status was estimated as specified in Table 3 below.

Table 3: Distribution of socioeconomic status with immunization coverage criteria.

Socio-economic status	Immunization status				X^2	df	Level of Significance
	Fully Immunized	Partially Immunized	No Immunization	No. of Children			
Upper Count % within Group	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1.12	8	0.9
Upper Middle Count % within Group	0 (0%)	1 (100%)	0 (0%)	1 (100%)			
Upper Lower Count % within Group	33 (45.20 %)	35 (47.94 %)	5 (6.84%)	73 (100%)			
Lower Middle Count % within Group	11 (42.30 %)	13 (50%)	2 (7.69%)	26 (100%)			
Lower Count % within Group	0 (0%)	0 (0%)	0 (0%)	0 (0%)			
Total Count % within Group	44	49	7	100 (100%)			

When the comparison was made between the immunization coverage between both genders it was found that the coverage of immunization was more in males than in females (Table 4).

Table 4: Distribution of gender of the child with immunization coverage criteria.

Gender	Immunization status			No. of Children	X^2	df	Level of Significance
	Fully Immunized	Partially Immunized	No Immunization				
Male Count % within Group	23 (46%)	25 (50%)	2 (4%)	50 (100%)	1.397	2	0.49
Female Count % within Group	21 (42%)	24 (48%)	5 (10%)	50 (100%)			
Total Count % within Group	44 (44%)	49 (49%)	7 (7%)	100 (100%)			

This study observed that 44 (44%) children were fully immunized, 49 were (49%) partially immunized and seven (7%) not immunized. National Family Health Survey (NFHS -3) conducted in the years 2005-2006 found 44% children of 12-23 months were fully immunized, 51% partially immunized and 5% not immunized. These results are consistent with the results of NFHS-3.[12] A study at ICMR found that fully immunized children were 63.3%, partially immunized 27.1% and not immunized were 9.6%.[13] In the current study, coverage rates for various vaccines were bacille Calmette-Guerin (BCG): 87%, diphtheria-tetanus-pertussis (DPT)- DPT1: 92%, DPT2: 89%, DPT3: 80%, DPT Booster 1: 44%, oral poliovirus vaccine (OPV)- OPV 1: 92%, OPV 2: 89%, OPV 3: 80%, OPV Booster 1: 44%, Measles: 67%, measles, mumps, and rubella combination vaccine (MMR): 64%. (Table 5)

Table 5: Status of immunization coverage of children according to vaccine dosage

S.No.	Vaccine coverage	No. of Children		Total	Percentage
		Male	Female		
1.	BCG	45	42	87	87
2.	DPT-I	48	44	92	92
3.	DPT-II	47	42	89	89
4.	DPT-III	41	39	80	80
5.	DPT Booster–I	23	21	44	44
6.	OPV-I	48	44	92	92
7.	OPV-II	47	42	89	89
8.	OPV-III	41	39	80	80
9.	OPV Booster-I	23	21	44	44
10.	Measles	36	31	67	67
11.	MMR	35	29	64	64
12.	Immunization card available	38	35	73	73

Therefore, more than 80% children were immunized with BCG, DPT I, II, III & OPV I, II, III, but only 44% children were immunized with DPT Booster-I and OPV Booster-I. National Family Health Survey (NFHS-3) 2005-06 data revealed that the BCG coverage was 78%, measles: 59%, DPT 1: 76%, DPT 2: 67%, DPT 3: 55%, OPV 1: 93%, OPV 2: 89% and OPV 3: 78%.

In the current study, the mentioned vaccination coverage rates are better than NFHS-3 which may be due to the fact that the above pocket is a small fraction of national sample. A study observed that the overall coverage for various vaccinations was BCG: 93%, OPT 1: 93.9%, DPT 2: 90.5%, DPT 3: 85.9%, OPV 1: 93.9%, OPV 2: 90.5%, OPV 3: 85.9% and measles: 77%.[14] The immunization cards of 73% children were verified for in this study.

DISCUSSION

Detailed demographic data was collected to assess the relationship between the dependent and independent variables in this study. In the total study subjects, forty-four (44%) children were fully immunized, forty-nine (49%) were partially immunized and seven (7%) were not immunized. The coverage for DPT-I & OPV-I was highest (92%) while coverage for DPT Booster & OPV Booster was lowest (44%). Study reveals immunization gap in the surveyed area.

The association of qualification of head of the family and qualification of mother with immunization status were not found to be statistically significant. Some type of gender bias was also observed during study, female children were less immunized in all vaccine's coverage, although no significant association between gender of the child with coverage levels of immunization was found. Five out of seven were female children who were not immunized for a single vaccine. In the current study no significant association between socio-economic status with coverage levels of immunization was found.

A special immunization drive could be conducted or continuous campaign in the community may be maintained to ensure maximum immunization rate. A similar study with bigger sample size should be conducted for a better picture and to make wider generalization of the study. A longitudinal study with the help of Non-Government Organizations (NGOs) working in the area would also help in assessing effectiveness of nutritional intervention in the area.

To significantly enhance vaccination coverage, regular follow-up as well as health education workshops emphasizing the need of timely vaccines are required. Improving Anganwadi service intervention in low immunization regions would also assist to increase vaccination status. Other methodologies, such as retrospective school surveys, can be used, which involve selecting a random sample of public and private schools and reviewing their vaccination records for dates of vaccine administration and the child's birth date.[15] Direct comparisons can be done with the National level vaccination data, and mitigation efforts need to be put in place to evaluate immunization coverage at various ages.

CONCLUSION

Various larger studies have already shown that the educational status of parents as well as socio-economic status and income has a positive correlation with the children's immunization status. Also, populations living in the urban areas are more educated and have better access to private as well as public immunization facilities. Lack of information in parents should be addressed and the sections living in resettlement colonies should be sensitized more often about the importance of timely vaccinations.

Acknowledgements

The authors acknowledge the valuable support guidance by the Faculty of Unani Medicine, Jamia Hamdard, New Delhi and also the Department of Epidemiology and Public Health, National Institute of TB and Respiratory Diseases, Sri Aurobindo Marg, New Delhi for providing valuable support for this study.

Conflicts of Interest

No conflict of interest declared by the authors.

Sources of funding

No external financial support was received for this Study.

Ethical Committee approval

The study was approved by the Institutional Ethics Committee

REFERENCES

1. Miller MA, Hinman AR. Economic analyses of vaccine policies [Chapter 72] In Plotkin SA, Orenstein WA, Offit PA eds. Vaccines. 6th ed. Philadelphia, PA: Elsevier; 2013:1413-1426p
2. World Health Organization Fact Sheet on Immunization data. July 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/immunization-coverage
3. World Health Organization/UNICEF Global Immunization data. July 2014. Available from: http://www.who.int/immunization/monitoring_surveillance/global_immunization_data.pdf
4. Shefer AM, Luman ET, Lyons BH, Coronado VG, Smith PJ, Stevenson JM, et al. Vaccination status of children in the Women, Infants and Children (WIC) Program: are we doing enough to improve coverage? Am J Prev Med. 2001;20:47–54.
5. Agarwal S, Kumari A. Immunization status of children and the influence of social factors: a hospital-based study in western Uttar Pradesh. Pediatr Infect Dis. 2014;6(1):25–30.
6. International Institute of Population Sciences (IIPS) and ORC Macro. National family Health Survey-III (NFHS-3), 2005-2006: India. Mumbai: IIPS. Available at https://dhsprogram.com/pubs/pdf/frind3/frind3-vol1andvol2.pdf.
7. NHS immunisation statistics, England 2012–13. Available from: https://catalogue.ic.nhs.uk/publications/public-health/immunisation/nhs-immu-stat-eng-2012–2013/nhs-immu-stat-eng-2012–13-rep.pdf
8. Government of Canada Statistics Canada. Childhood National Immunization Coverage Survey (CNICS). Available from: http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5185
9. Park K. Textbook of Preventive & Social Medicine.23rd edition. Jabalpur, India: Banarsidas Bhanot Publications. Chapter 7, Health Programmes in India, Universal Immunization Programme; 2013: 441.
10. Agarwal RK. Routine immunization, India's Achilles heel. Indian Pediatr. 2008;45(8):625–8.
11. Schueller E, Nandi A, Summan A, Chatterjee S, Ray A, Haldar P, et al. Public finance of universal routine childhood immunization in India: district-level cost estimates, Health Policy and Planning, Volume 37, Issue 2, February 2022, Pages 200–208, https://doi.org/10.1093/heapol/czab114
12. International Institute for Population Sciences. NFHS-3 (National Family Health Survey). India. 2005-2006. Available from: https://dhsprogram.com/pubs/pdf/frind3/frind3-vol1andvol2.pdf.
13. Singh P, Yadav J. Immunization Status of children in BIMARU States; Indian Journal of Pediatrics, 2001: 68: 495-499.
14. Bhatia V, Swami HM, Rai S, Gulati S, Verma A, Parashar A, et al. Immunization Status in Children, Indian Journal of Pediatrics, 2004; 71: 313-315.
15. Salmon DA, Smith PJ, Navar AM, Pan WK, Omer SB, Singleton JA, et al. Measuring Immunization Coverage among Preschool Children: Past, Present, and Future Opportunities, Epidemiologic Reviews, Volume 28, Issue 1, August 2006, Pages 27–40, https://doi.org/10.1093/epirev/mxj001