

Immunization Coverage of Children and its Associated Factors in Chennai, India

Glory Lilly Christy R^{1*}, Dr. Vijayalakshmi K², Dr. LathaVenkatesan L³, Dr Nesa Sathya Satchi⁴.

1-Ph. D Scholar, 2 & 4 Professors -Apollo College of Nursing, The Tamilnadu Dr MGR Medical University, Chennai, 3- Principal, College of Nursing, AIIMS, New Delhi

ABSTRACT

Abstract: Childhood immunization is one of the most valuable public health interventions available for preventing childhood morbidity and mortality. Periodic assessments of immunization status and its associated factors plays a major role in immunization coverage of the children. This study was conducted to assess the Immunization Coverage of Children and its associated factors in Chennai, India **Methods:** This was a cross-sectional study, conducted among 260 under five children who were selected using purposive sampling technique, in 2020-21 in Chennai, India. Children below the age of 5 years were included in the study. Data were collected from the mothers of children by interviews at their homes using a pretested, predetermined and structured questionnaire. Collected data is entered in Excel and analyzed in SPSS 20 using appropriate descriptive (f, %) and inferential statistics (chi square test). **Results:** Regarding immunization coverage, majority of the children were fully immunized in time (84%), followed by delayed immunization (11%) and only 5% were non immunized. There was no sociodemographic variation related to immunization coverage. Reasons reported by the mothers for the delayed or non-immunization were, Child was sick at the time of immunization (26.8%), Mother being too busy (17.1%), Mothers is ill on the appointment day (17.1%), Child too young for immunization (premature/underweight-14.7%), Forgotten or no vaccination appointments (12.2%) and fear of side effects at the time of immunization (9.7%). Collected data is entered in Excel and analyzed in SPSS 20 using appropriate descriptive (f & %,) and inferential statistics (chi square test). **Conclusion:** Educating mothers about immunization focusing on its benefits and cost effectiveness, strengthening outreach services, community engagement, and various strategies should be planned to enhance the immunization coverage.

Keywords: Children, Immunization Coverage, Associated Factors, Reasons

INTRODUCTION

Immunization is the process by which a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. A vaccine is a nonpathogenic antigen that stimulates the body's immune system to produce an antibody to protect the person against later infection. It is the most cost-effective public health intervention that can control and end life threatening infectious

disease^{1,2}. Childhood immunization is one of the most valuable public health interventions available for preventing childhood morbidity and mortality. Universal immunization of children against six preventable diseases (tuberculosis, diphtheria, Pertussis, tetanus, polio, and measles) is crucial to diminish childhood mortality and morbidity across the world³

In May 1974, the WHO launched the Expanded Immunization Program (EPI) globally, with a focus on prevention of 6 vaccine-preventable diseases by the year 2000. In India, EPI was launched in 1978 and it was re-designated as the Universal Immunization Program (UIP) in 1985^{4,5}.

Immunization acts as a protective shield, keeping families and communities safe. By vaccinating our children, we are also protecting the most vulnerable members of our community, including newborn babies⁶. One of the most significant contributions of the medical fraternity to mankind is the advent of vaccines. They are the most powerful, safe and cost-effective measures for prevention/control of a number of diseases.⁷ It is well known fact that small pox which is killing disease is successfully eradicated from world using vaccination. In the last few decades India has made significant efforts and succeeded in improving health indicators, particularly those related to maternal and child health by using effective strategies especially focusing on immunization of children.

According to guidelines developed by the World Health Organization (WHO), children are considered fully immunized when they have received one dose of Bacillus Calmette Guerin (BCG), three doses of DPT, three doses of polio vaccines, and one dose of measles vaccination by the age of 9–12 months^{8,9}

Periodic assessments of immunization coverage across the country in different regions and its associated factors are essential to plan for the effective strategies by the government, and stake holders including the health care professionals. It will also help in assessing the progress towards achieving the goals and planning for the effective strategies to improve the immunization coverage. Therefore this study was conducted to assess the Immunization Coverage of Children and its Associated Factors in Chennai, India.

MATERIAL AND METHODS

This was a cross-sectional study, conducted among 260 mothers who were selected using purposive sampling technique, in 2020-21 in Chennai, India. Children were selected proportionately from Non slum and slum area considering the 30% of slum in Chennai city (70% and 30% respectively). Children below the age of 5 years were included in the study. Data were collected from the mothers, after obtaining oral consent, by interviews at their home using pretested, predetermined tools such as Demographic variables proforma of parents and children, Check list on immunization status, and Reasons for delayed and non-immunization. Delayed vaccination for each vaccine was defined as administration of the vaccine dose after 28 days of the minimum recommended age, as per the national immunization schedule in India. The percentage of children who have received one dose of Bacille Calmette-Guérin (BCG) vaccine, three doses of polio vaccine, three doses of the combined diphtheria, tetanus toxoid and pertussis (DTP3) vaccine, and one dose of measles vaccine in recommended time were considered as full vaccine coverage (in time). When any one of these vaccines is missed it was considered as non-immunization.

Collected data is entered in Excel and analyzed in SPSS 20 using appropriate descriptive (f & %,) and inferential statistics (chi square test).

RESULTS AND DISCUSSION**Tab 1: Frequency and Percentage Distribution of Demographic Variables of Parents (N=260)**

Variables	f	%
Residence		
Non slum	174	70
Slum	86	30
Religion		
Hindu	175	67
Christian	64	24.8
Muslim	21	8.2
Type of Family		
Nuclear	139	54
Joint family	121	46
Educational Status of Father		
Illiterate	16	6.1
High School	40	15.4
Hr Secondary	106	40.8
Graduate	98	37.7
Educational Status of Mother		
Illiterate	13	5
High School	30	11.5
Hr Secondary	114	43.9
Graduate	103	39.6
Occupation (Father)		
Employee	72	27.7
Business	28	10.5
Laborer	150	58
Unemployed	10	3.8
Occupation (Mother)		
Employee	28	10
Home maker	160	62
Laborer	72	28
Monthly Family Income		
Up to 5000	13	5
5001 to 10000	141	54
10001to 20000	50	19.5
20001 to 30000	33	12.7
Above 30000	23	8.8
No of Children		

1 child	73	28.5
2 children	144	55
3 children and more	43	16.5
Place of Delivery		
Primary health centre	53	20.4
Government hospital	135	51.9
Private hospital	66	25.4
House	6	2.3
Source of Information		
Mass media /News paper	2	0.8
Health care workers	181	70
Neighbours	12	4.2
Family members	65	25
Mode of Transport		
On feet by walk	170	65.4
Own vehicle	71	27.3
Auto	15	5.8
Public transport	4	1.5
Time taken to reach Health Care Facility		
<30 Minutes	241	93
30-60 Minutes	17	6.9
> 60 Minutes	2	1.1

Tab 1 reveals that majority of them were from nonslum area (70%), Hindus (67%), from nuclear families (54%), fathers were laborers(58%), mothers were home makers (62%), with monthly income of 5001 to 10,000 (54%), had two children (55%), delivered in hospital (52%), received information on immunization from Health care workers (70%) and health care facility was within 30 minutes reach (93%), had health care facility within walkable distance (65.4 %). Regarding educational status of parents, 40.8% of fathers and 43.9 % of mothers have studied upto Hr Secondary.

Tab 2: Frequency and percentage Distribution of Variables of Children (N= 260)

Variables	f	%
Age in years		
1	58	22.30
2-3	62	23.85
4-5	140	53.84
Gender		
Male	134	51.54
Female	126	48.46
Birth Weight		

Normal	202	77.69
Low Birth Weight	58	22.30
Gestational Age		
Small for Gestational age	28	10.76
Appropriate for Gestational age	232	89.23
Large for Gestational age		
Immunization Card		
Available	256	98.46
Not Available	4	1.54
Vaccinated the child (Atleast once)		
Yes	260	100
No	0	0
Place of Vaccination		
1 Primary Health Center	59	22.69
2 Government hospital	130	50
3 Urban Health Nurse	65	25
4 Private Hospital	6	2.31
Willingness to immunize the child (in Future)		
Yes	260	100
No	0	0

Tab 2 depicts that, around half of the children were aged 1 year (53.84%), male children (51.54%), vaccination was given in government hospital (50%). Majority of the children’s birth weight was normal (77.69%), appropriate for gestational age (89.23%), had immunization card (98.46%). All of them (100%) supported and willing for immunization in future and vaccinated the child at least once).

Table 3: Frequency and percentage Distribution of Immunization Status of the Children (N= 260)

Immunization	f	%
BCG		
Immunized	259	99.6
Delayed immunization	1	0.4
Non immunization	0	0
Pendavalent / DPT and Polio		
Immunized	243	93.5
Delayed immunization	17	6.5
Non immunization		
Measles		
Immunized	229	88.1
Delayed immunization	16	6.2

Non immunization	15	5.8
Full Immunization in time		
Immunized	219	84.2
Delayed immunization	27	10.4
Non immunization	14	5.4

Tab 3 reveals that, majority of the children were immunized for BCG (99.6%), Pentavalent / DPT and Polio (93.5), Measles (88.1%) and fully vaccinated in time (84.2).

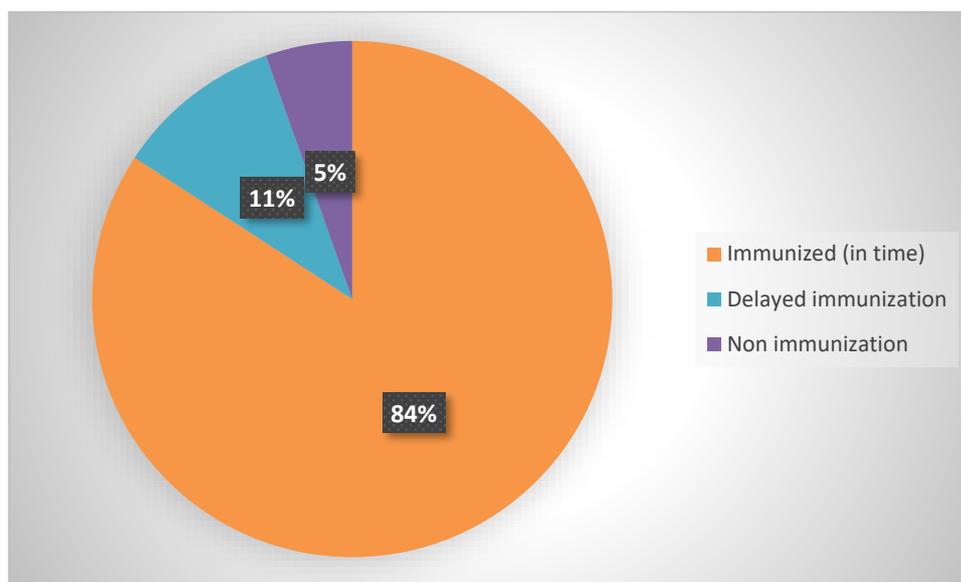


Fig 1: Percentage Distribution of Immunization Coverage of the Children (Overall)

Fig 1 reveals that, majority of the children were fully immunized in time (84%), followed by delayed immunization (11%) and only 5% of them were non immunized.

Tab 4: Frequency and percentage Distribution of Reasons for Immunization and Delayed Immunization (N=41)

S.No	Reasons for Non Immunization And Delayed Immunization	f	%
1	Unawareness for immunization	1	2.5
2	Fear of side effects at the time of immunization	4	9.7
3	Child too young for immunization(premature/under weight)	6	14.7
4	The time for immunization was not convenient	3	7.3
5	Child was sick at the time of immunization	17	41.5
6	Mother being too busy	7	17.1

7	No faith in immunization	0	0
8	There was a family problem in time of immunization	4	9.7
9	Place and time of immunization not known	2	4.9
10	Religious exemption for refusal of vaccination (rumors,myths)	0	0
11	Forgotten or no vaccination appointments	5	12.2
12	Sickness of sibling	2	4.9
13	Mothers is ill on the appointment day	7	17.1
14	Vaccine stock outs	0	0
15	Child was sick at the time of immunization	11	26.8
16	Objection to the Large Number of Injections	1	2.4
17	Lack of Access Due to Cost and Other Reasons	1	2.4
18	Lack of knowledge about vaccination	1	2.4
19	Health worker do not clearly explain to parents what vaccines are due, when they are due and why they are needed.	0	0
20	Health workers do not show respect towards parents or interest in the child health.	0	0

Tab 4, reveals that, reasons for delayed/ non immunization were, Child was sick at the time of immunization (26.8%), Mother being too busy(17.1%), Mothers or child became ill on the appointment day (17.1%), Child was immature for immunization (premature / underweight-14.7%), Forgotten or no vaccination appointments (12.2%) and Fear of side effects at the time of immunization (9.7%).

Table 5: Association Between Selected Variables and immunization status of Children (N= 260)

Variables	Immunization Status		Chi Square Value & df	P value
	Fully Immunized in time	Delayed and Non Immunization		
Residence				
Nonslum	147	27	0.025 df =1	0.874
Slum	72	14		
Religion				
Hindu	147	28	0.721 df =2	0.697
Christian	53	11		
Muslim	19	2		
Educational Status of Father				
Illiterate	11	5	7.117	0.068

Primary	35	5	df =3	
School	95	11		
Graduate	78	20		
Educational Status of Mother				
Illiterate	10	3	2.928 df =4	0.570
Primary	27	3		
School	99	15		
Graduate	78	19		
Monthly Family Income				
Up to 5000	10	3	1.845 df =4	0.764
5001-10,000	122	19		
10001-20,000	42	8		
20001- 30,000	27	6		
Above 30,000	18	5		
No of Children				
1	61	12	0.478 df =2	0.924
2	122	22		
More than 2	36	7		
Gender of the Children				
Male	113	21	0.002 df=1	0.964
Female	106	20		

Tab 5 reveals that, there is no association between immunization status and socio demographic variables ($p > 0.05$).

Discussion

This study was aimed to assess the immunization coverage of children and its associated factors in Chennai. Immunization is one of the most cost-effective measures in public health to date, preventing at an approximately 2 to 3 million fatalities in young children every year. Study findings reveal that, majority of them were from non-slum area (70%), Hindus (67%), from nuclear families (54%), fathers were laborers(58%), mothers were home makers (62%), with monthly income of 5001 to 10,000 (54%), had two children (55%), delivered in hospital (52%), received information on immunization from Health care workers (70%) and health care facility was within 30 minutes reach (93%), had health care facility within walkable distance (65.4 %). Regarding educational status of parents, 40.8% of fathers and 43.9 % of mothers have studied upto Hr Secondary.

With regard to child variables findings revealed that, around half of the children were aged 1 year (53.84%), male children (51.54%), vaccination was given in government hospital (50%). Majority of the children’s birth weight was normal (77.69%), appropriate for gestational age (89.23%) and had immunization card (98.46%). It is encouraging to note that all of them (100%) supported and willing for immunization in future and vaccinated the child at least once.

Study findings also revealed that, majority of the children were immunized in time for BCG (99.6%), Pentavalent / DPT and Polio (93.5%), Measles (88.1%) and fully vaccinated in time (

84.2%). While comparing to NFHS-4 data, this figure is improved to National statistics of immunization, which is 62% of coverage in 2015-2016¹⁰. The research by M. Joy *et al.* in Kochi, Kerala showed that 10% children were partially immunized and 1% children were unimmunized which is almost similar to our study findings¹¹. This improvement on immunization coverage may be due to government's actions and strategies which are planned and implemented in India in recent years. Enhanced immunization coverage in present study also may be attributed to the fact that, since the study is conducted in Chennai which is metropolitan city in the country with better access and utilization of health care facilities and services.

With regard to reasons for delayed / non immunization reported by mothers were, Child was sick at the time of immunization (26.8%), Mother being too busy(17.1%), Mothers is ill on the appointment day (17.1%), Child was immature for immunization (premature / underweight-14.7%), Forgotten or no vaccination appointments (12.2%) and Fear of side effects at the time of immunization (9.7%). However none of them have reported any reasons related to approach of health care workers and its related factors. In present study, the main reason cited by most of the respondents was unavailability of child on the day of vaccination followed by sickness. Madhvi *et al.* from Kakinada, Andhra Pradesh reported that the most common reasons for partial/no immunization are ill child (27.5%) and lack of knowledge about vaccination (25.12%)¹². A study by Singhal *et al.* also reported that, the sickness of the child at the time of vaccination 20 (32.07%) for delayed or non immunization¹³.

In the present study, there was no association between immunization status and socio demographic variables ($p > 0.05$) reflecting the fact that, immunization status is not influenced by socio demographic factors. Similar findings are also reported by Francis *et al* (2017) in study conducted in rural Vellore, Tamil Nadu¹⁴. Non significant association between immunization status and socio demographic variables may be due to the efforts taken by the government, stake holders and other health care professionals in meeting the immunization needs of the children irrespective of their extraneous factors. It was also expressed by some mothers that, currently health care workers especially nurses are very concerned about maternal and child health including the immunization of the mother and babies and they ensure that, mother and child are immunized using various approaches including door step services and following tracking system.

CONCLUSION

Study findings on improvement in immunization coverage are encouraging as it reflects the quality of care provided by the health care professionals and accountability of the stake holders including policy makers and parents in the country especially in Tamil Nadu. However Regular Awareness programmes on immunization (group talks, role plays, posters, pamphlets, exhibitions, SMS alerts and competitions) should be conducted in the community at different levels to ensure that immunization will become a "felt need" of the mothers and achieve the goal that no child will be left out without immunization.

REFERENCE

- [1] Asmamaw A, Getachew T, Gelibo T, et al. Determinants of full valid vaccine dose administration among 12-32 months children in Ethiopia: evidence from the Ethiopian 2012 national immunization coverage survey. *Ethiop J Health Dev.* **2016**;30(3):135–41.
- [2] Koumaré AK, Traore D, Haidara F, et al. Evaluation of immunization coverage within the expanded program on immunization in Kita circle, Mali: a crosssectional survey. *BMC Int Health Hum Rights.* **2009**;9(1):S13.

[3] L. Wolfson, F. Gasse, S. P. Lee-Martin et al., “Estimating the costs of achieving the WHO–unicef global immunization vision and strategy, 2006–2015,” *World Health Organization (WHO), Weekly Epidemiological Record*, vol. 81, no. 9, pp. 189–196, **2006**, Challenges in global immunization and the global immunization vision and strategy 2006–2015.

[4] National Health Mission. Available in

<https://nhm.gov.in/index1.php?lang=1&level=2&sublinkid=824&lid=220>

[5] Angadi, M. M., Jose, A. P., Udgeri, R., Masali, K. A., & Sorganvi, V. (2013). A study of knowledge, attitude and practices on immunization of children in urban slums of bijapur city, karnataka, India. *Journal of clinical and diagnostic research : JCDR*, 7(12), 2803–2806. <https://doi.org/10.7860/JCDR/2013/6565.3763>

[6] UNICEF. India. <https://www.unicef.org/india/what-we-do/immunization#>

[7] Angadi, M. M., Jose, A. P., Udgeri, R., Masali, K. A., & Sorganvi, V. (2013). A study of knowledge, attitude and practices on immunization of children in urban slums of bijapur city, karnataka, India. *Journal of clinical and diagnostic research : JCDR*, 7(12), **2803**–2806. <https://doi.org/10.7860/JCDR/2013/6565.3763>

[8] Animaw W, et al. Expanded program of immunization coverage and associated factors among children age 12–23 months in Arba Minch town and Zuria District, Southern Ethiopia, 2013. *BMC Public Health*. **2014**;14(1):464.

[9] Dessie DB, Negeri MA. Determining factors of full immunization of children among 12-23 months old in rural Ethiopia. *Am J Public Health*. **2018**; 6 (3): 160-5

[10] National family health survey (NFHS4): Available at <http://www.indiaenvironmentportal.org.in/content/440396/national-family-health-survey-2015-16-nfhs-4-indiafact-sheet>.

[11] Joy TM, George S, Paul N, Renjini BA, Rakesh PS, Sreedevi A. Assessment of vaccine coverage and associated factors among children in urban agglomerations of Kochi, Kerala, India. *J Fam Med Prim Care*. **2019**;8:91–6.

[12] Madhavi N, Manikyamba D. Evaluation of immunization status and factors responsible for drop outs in primary immunization in children between 1-2 years – A hospital based study. *Pediatr Rev Int J Pediatr Res*. **2016**;3:332.

Available from: <http://medresearch.in/index.php/IJPR/article/view/747> .

[13] Singhal G, Mathur H, Dixit M, Khandelwal A. Factors affecting immunization among children of rural population of block Malpura, district Tonk, Rajasthan, India. *Int J Community Med Public Health*. **2016**;3:641–6.

[14] Francis MR, Nuorti JP, Kompithra RZ, Larson H, Balraj V, Kang G, Mohan VR. Vaccination coverage and factors associated with routine childhood vaccination uptake in rural Vellore, southern India, 2017. *Vaccine*. **2019** May 21;37(23):3078-3087.