

Social Predictors Of Immunization Outcome In A Tier 3 NUHM City Of West Bengal- Survey Data From A Migratory Slum In A UPHC Area.

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Abstract:

Background: There are many narratives about the determinants of immunization coverage. India has the largest immunization program in the world. COVID-19 outbreak has occurred during the period 2020 -22. A Global Health Emergency was declared during the 1st quarter of 2020 and immunization was affected. Large-scale migration of people, diverting all health resources for COVID-19 response along with other factors, was responsible for the decreased coverage. Services resumed after gradual relaxation of COVID-19 norms. National Family Health Survey 5 and multiple research/survey data have shown that COVID-19 has affected routine immunization in various parts of India. The study aims to determine the proportion of incompletely immunized children and various parental factors associated with poor immunization outcome.

The study also gives a scope to determine the adverse outcomes caused by covid lockdown and post covid immunization recovery from the proportion of children who did not receive their due vaccine doses.

Results: Proportion of children immunized with age-appropriate vaccine being 51 percent, Zero dose children is 1 percent, delayed immunization and incomplete immunization are 47.6 % and 49.6% respectively. Significant relation has been found with the education of parents, occupation, place of delivery, parity and socio-economic status. BG Prasad Scale has been used to categorize income status. Those who belong to higher economic status have a higher probability of getting immunized.

Conclusion- Even though immunization coverage of India improved significantly as the country recovered from covid challenges, many other challenges still remain. Some significant factors are rural to urban migration, zero dose pockets, urban slums with poor health of children, education and diverse religious beliefs, adverse media reports, poor quality of service etc. Understanding these factors can significantly help the service delivery system to improve further.

Keyword- Immunization, COVID 19, social determinants, full immunization, complete immunization,

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I. Introduction

Immunization is one of the most cost-effective methods of reducing mortality and morbidity in children and adults. Currently, vaccines are available for 12 life-threatening diseases (including JE in selected districts), helping people of all ages to live longer and healthier. Immunization currently prevents 3.5 million to 5 million deaths every year from diseases like diphtheria, tetanus, pertussis, polio, and measles. Immunization is key to primary health care, an indisputable human right, and one of the best health investments money can buy. Vaccines are also critical in the prevention and control of VPD outbreaks. They underpin global health security and are a vital tool in the battle against antimicrobial resistance (1). Several demand side or socioeconomic factors like education, occupation, income, lack of awareness and cultural beliefs as well as supply side factors like poor quality of services, inadequate human resource, irregular sessions and irregular supply of vaccines or distance from the session sites etc, have been suggested as potential reasons for the differential immunization coverage in India (2).

Depending on the National Immunization Schedule, there may be few ways to define the immunization status of the child.

Fully immunized child- who has received one dose of BCG, 3 doses of Pentavalent vaccine, three doses of oral polio vaccine and one dose of MR by one year of age.

(Immunization) Due child- who have defaulted one or more recommended doses of any age appropriate vaccine.

Zero dose children will be those children who have not received the first dose of pentavalent vaccine within 1 year of age.(3)

Complete Immunization as per national immunization schedule is receiving all UIP vaccines by 2 years of age .

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. (4)

Moreover, achieving timely vaccination with all due dose of vaccines for urban slum with migration are more challenging as there are factors like inadequate service delivery network, multitude of service providers(vacillating between private and public providers), migration between cities as per income and job needs, poor health of children due to overcrowding and unhealthy surroundings etc. (5)

In the present study, household level determinants of immunization in children living in tier 3 city in slum with migration settings of West Bengal have been explored.(6)

This study includes the birth cohort of 2020-2021 which is the year of covid pandemic.

During various phases of lockdown and social distancing protocol introduction, Government of India imposed a lockdown which resulted in suspending immunization sessions and large migration, reallocating health resources like vaccinators and mobilisers etc. So it hampered immunization services (7). (8).

It was resumed later with various covid measures including limited session mobilisation to prevent overcrowding (8). This happened during “ covid 1st wave” in “June 2020 to December 2020”, and” 2nd wave” from “March 2021 to June 2021”; “3rd wave” from “January- March 2022”. This has already been mentioned in many studies done in India. It was also reflected in NFHS 5 data. (9)

The present study was conducted in the district headquarters of Paschim Medinipur district. This is a tier 3 NUHM city, a city with over a lakh population (6)

The factors assessed were parent-level factors, such as sex of the child, father’s education, mother’s education, place of delivery, parity, family income religion etc and its relation with the immunization status of the child .Other factors that can affect immunization status are related to supply side factors or service delivery related were out of the purview of this paper. (10) ,(11), (12) The present study was conducted 1. to assess the immunization coverage based on MCP card. 2. To study the parental factors associated with immunization outcome. 3. To assess any significant difference between immunization delays in covid versus pre and post covid period.

II. Material And Methods

This is a retrospective cross-sectional study. It was done to assess the immunization status of children in the age group of 2- 4 years, that are born between (March 2020 to March 2022). It is done in a tier 3 city of West Bengal with 6 UPHC catering to a total population of 299683 as per 2011 census. The present study was done in the catering area of UPHC 3, which was selected by simple random selection from 6 UPHCs. The immunization status of the children were recorded using the standard house-to-house routine immunization monitoring format 2023 of Ministry of Health and FW, Government of India. Total data of 118 children belonging to the above mentioned birth cohort was registered. House-to-house visit was done based on the random sampling method and immunization information was collected from MCP cards. Thirteen people did not respond Information pertaining to demand side factors was collected from parents (child’s mother and father) during the interview. The data was entered in excel and analyzed in SPSS VERSION 20 (SPSS INC., CHICAGO, IL version) Standard definition of full and complete immunization and zero dose children was used to define the immunization outcome.

Exclusion criteria: Those who did not want to be interviewed were excluded.

Study Period - September to November 2024.

III. Results

Analysis of Collected Data

Table 1: Age distribution of children

Age distribution	Number (%)
24 months to <25 months	37 (35.2)
25 months -<30 months	29 (27.6)
30 months-<36 months	18 (17.1)

Age distribution	Number (%)
36 months- 48 months	21 (20.1)
Image 1: Distribution of children as per age	

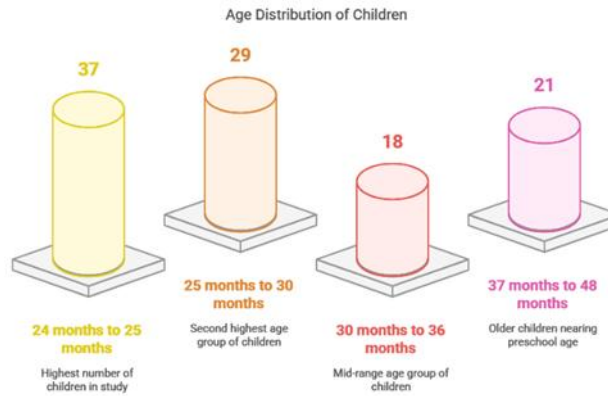


Table 2: Vaccination status of children born between March 2020 to March 2022 (24 months -48 months)

vaccine	Number of children who did not get vaccine
BCG	1 (0.9)
MCV 1	40 (39.9)
MCV 2	46 (43.8)
Pentavalent 1	20 (19.4)
Pentavalent 2	32 (33.3)
Pentavalent 3	35 (33.3)
OPV 1	20 (19.5)
OPV 2	32 (30.5)
OPV 3	35 (33.3)
IPV 1	20 (19.4)
IPV 2	32 (20)
IPV 3	32 (33.3)
Rotavirus Vaccine 1	23 (21.9)
Rotavirus Vaccine 2	32 (33.3)
Rotavirus Vaccine 3	30 (28.5)
PCV 1	41 (31.9)
PCV 2	NA
PCV 3	NA
JE 1	40 (39.9)
JE 2	46 (43.5)
DPT (b)	46 (43.5)
OPV (b)	46 (43.5)

PCV was introduced in West Bengal in October 2021 that is why PCV data was not collected

Table 3: Immunization outcome of Children

	Immunization status	Number (n=105)
1.	Fully Immunization	59 (56.2)
2.	Partial Immunization Or Delayed Immunization	50 (47.6)
3.	Complete immunization	52 (49.5)
4.	No Immunization	01(0.9)

Table 4: Proportion of children receiving age-appropriate vaccination (compared with various predictors mentioned)

Serial No	Indicator	Number (%)	P value
	Sex of the child		
1	Male	57 (54.2)	<0.05
2	Female	48 (45.8)	
	Father's education		
3	Ability to read and write	39 (37.1)	>0.05
4	Class 10 passed	26 (24.8)	
5	Above class 10	40 (38.1)	
	Mother's education		
6	Ability to read and write	51 (48.6)	>0.05
7	Class 10 passed	39 (37.1)	
8	Above class 10	15 (14.3)	
	Place of delivery		
9	Public Sector Hospital	87 (87.0)	>0.05
10	Private Hospital	17 (16.2)	
11	Home delivery	1 (0.9)	
	Parity		
12	1-2 children	78 (74.3)	>0.05
13	3-4 children	23 (21.9)	
14	Above 4 children	4 (3.8)	
	Monthly family income in		
15	Above 15000	1 (0.9)	
16	8000-15000	65 (62.0)	
17	8000	39 (37.5)	>0.05
	Reasons for incomplete immunization		

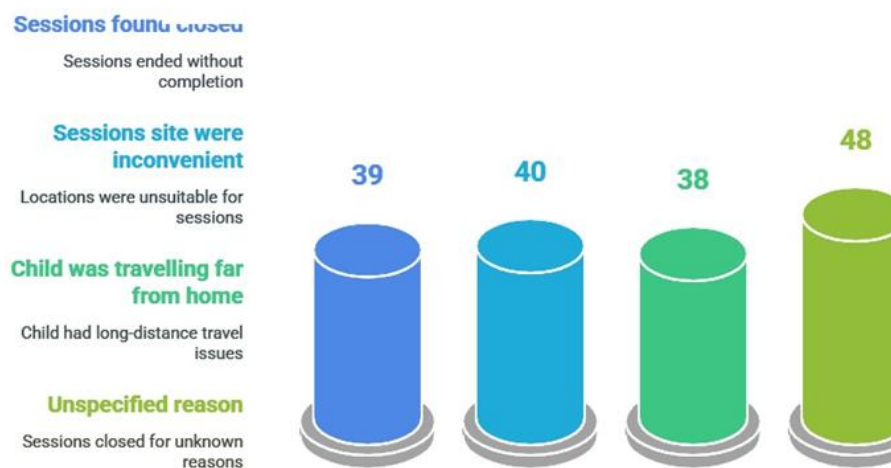


Image 2: Reasons for incomplete immunization

Reasons	number(%)
no one contacted	39 (23.6)
sessions found closed	40 (24.2)
sessions site were inconvenient	38 (23.03)
the child was travelling far from home	48 (29.0)

* Multiple Response (taking the cumulative number of responses are as 165, the percentage calculated this as the cumulative number as the denominator)

IV. Discussion

In this study the proportion of fully immunized children is about 51% . This was lower than 83.6% coverage reported in NFHS 5 survey of Urban West Bengal. It also shows considerable decline compared to NFHS 4 (9)

Religion wise outcome was not analyzed as it was a predominantly Hindu majority area and the other religion's representation was very low.(The sample identified only 3 non Hindu families among 105 respondents) .No significant association was found with immunization outcome and sex of the child. This seems contrary to evidence across various studies where male sex is associated with better immunization outcome.

However, this result may be due to various other socio economic factors, belief in the health system and other contextual factors (10), (13)

A significant association has also been found between parity and immunization outcome. Lower parity is associated with better immunization outcome. Similar outcomes have been observed in various studies across India and other parts of the world. Systematic review of literature in 85 low and middle income countries has shown that there is parity wise decline in immunization uptake(that is immunization declines with higher parity). In this systematic review, the chance that a child not getting a DPT containing vaccine increases from 11.0% first born to 17.1% with five or more children. Also Children who have no sibling has a zero dose prevalence of 10.5% whereas it is 17.2 % for children who have 4 or more siblings (11) ,(12)

The most common reasons observed in this survey for delayed and incomplete immunization were the following 1. No one contacted, followed by 2. AEFI apprehension, 3. no knowledge of immunization

In this survey, only one left-out child(who has not taken any vaccine) has been identified. Since the survey was done among children born between March 2020 and March 2022, therefore delayed vaccination scenario does not arise. (10)

Coverage data from NFHS 4 versus NFHS 5 showed a decline in Pentavalent coverage to 93.7% from 98.1%. MCV 1 coverage also declined to 89.3% from 96.1%. MCV 2 coverage is 40.6% in NFHS 5 but there was no comparative data in NFHS 4, so any improvement or decline can not be commented on. This was found to be higher in the cohort studied in this survey or Coverage is 0% in NFHS 5. Again there can not be any comparative scenario as RVV coverage was not included in In the NFHS 4 survey PCV coverage has not been included in the present study as it was introduced in West Bengal in October 2021. only(9)

Literacy of mother and father, occupation of father, socio economic status of the family were all found to be statistically significant.

Socio economic correlates in this cohort was analysed using BG Prasad scale, which is commonly used as a determinant of an individual's wealth and its relation to public health.(9) This classification purely depends upon the rates of year-on-year inflation and the changes in prices of consumer products such as food products and consumer goods(Last modified in 2023).The Classes defined as per the following monthly income categories

- a.Upper class Rs. 9098 and above
- b.Upper Middle Class Rs.4549 -9097
- c.Middle class Rs.2729- Rs.4550 (this is grade 1 in this study)
- d.Lower Middle Class Rs. 1365-2728
- e.Lower class below Rs.1365

In this study only 1 parent belongs to the upper class , rest belongs to upper middle or lower middle class as per the BG Prasad scale (15). Analysis of NFHS 4 data have shown that parental income in the highest quintile have higher odds of having complete immunization compared to lower income groups. Several factors like better health literacy, structural factors, better attitude to health seeking etc.are some of the factors responsible for better immunization outcome in people with higher income.

Mother's education has also been found to be a factor of favourable immunization outcome. This conforms to similar studies from India and other parts of the world (16)

In states like West Bengal JE vaccines are also part of UIP, but they are not included in NFHS 5 survey. So it can not be compared.

Statistical significance has been found between place of delivery and immunization status. The reason for this may be counseling of mothers during ANC/PNC or delivery by health workers (17).

Sudden lockdown in March 2020 to break the so-called “chain of transmission” had a deleterious effect on immunization coverage.

Many children did not receive their due vaccines in the phase of 1st lockdown (April 2020 to June 2020). The survey identified one home delivered child (with delivery within this period) who did not receive any vaccines including birth dose antigens (left out). BCG Vaccine as per UIP norm can be given till one year of age. On detailed probing it was found that the parents of this child did not get this message. In a tier 3 city of a state like West Bengal, home delivery is rare. Institutional delivery as per NFHS survey is 91.7% (9), This might have been due to apprehension of COVID 19 associated with hospital settings. In fact, Government of India issued guideline for suspension of immunization sessions in this period. Other reasons were that many families were migrating or having other overarching priorities(7). It was found that 34 children who were due for immunization during this period, did not receive their vaccines. There was a marginal improvement in immunization coverage as sessions and mobilisation services gradually resumed. However, the measures taken to resume immunization coverage is not in the purview of this study (18), (19), (20)

V. Conclusion:

Socio economic factors driving the immunization outcome corresponds to many similar studies done both in India and across the world. However, to bridge the immunity gap to prevent vaccine preventable outbreaks and Measles- Rubella elimination remains a major challenge while India is moving from aspiration to realization. NFHS 6 results are still awaited at the time of the conceptualization of the present study, but the gap that remains will be the same as evident by inequality in the coverages found. Better social mobilization measures, skill enhancement of the health workers, targeted IEC, improving the immunization experience as well as infrastructural development are necessary measures that can bring the change. Further, social progress like improvement in educational status, adapting life course vaccination measures through school health and adult immunization program introduction of newer vaccine etc, are all drivers for bringing further changes into the immunization landscape improvement.

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