



ASSESSMENT OF IMMUNIZATION COVERAGE AND CHALLENGES DURING THE COVID-19 PANDEMIC: A CROSS-SECTIONAL STUDY IN LUCKNOW DISTRICT

Dr. Shadma Anwar*	Community Medicine, Integral Institute of Medical Sciences & Research, Lucknow, India. *Corresponding Author
Dr. Sanobar Anwar	Community Medicine, Integral Institute of Medical Sciences & Research, Lucknow, India.
Dr. Ruby Khatoon	Community Medicine, Era's Lucknow Medical College & Hospital, Lucknow, India

(ABSTRACT) The COVID-19 pandemic significantly disrupted essential healthcare services, including routine immunization programs, posing a threat to public health, especially among children and vulnerable populations. This cross-sectional study assesses the impact of the pandemic on immunization coverage in Lucknow District, highlighting key challenges faced by healthcare providers and communities. Data were collected through WHO 30 cluster sampling technique and the participants were mothers/respondents of children 0-2 years and women who became pregnant during this period. The study was carried out in urban and rural areas of Lucknow from February 2021 to December 2022. The study found that 44.3% of urban and 45.2% of rural children were fully immunized, with obstacles being the most common reason for immunization failure, particularly in urban areas. A higher proportion of rural participants (80.5%) utilized government facilities for TT vaccination compared to urban participants (52.1%). Significant differences in immunization barriers and facility utilization were observed between urban and rural areas.

KEYWORDS :

INTRODUCTION:

The COVID-19 pandemic has posed unprecedented challenges to healthcare systems worldwide, affecting the delivery of essential health services, including immunization programs. Immunization is a critical public health intervention that prevents the spread of vaccine-preventable diseases, ensuring the health and well-being of children and communities. However, the disruption caused by the pandemic has led to reduced access to routine immunization services, particularly in vulnerable populations, which could lead to a resurgence of preventable diseases. In addition to raising the risk of mortality among children, lack of immunization among new-borns raises the chance that they would succumb from diseases like polio, measles, diphtheria, etc. The past pandemics provide substantive evidence in this regard.[1] The health pyramid, however, is inefficient due to a lack of resources, slow communication, a lack of motivation on the part of health professionals, and, most importantly, a deficit in administrative capabilities, oversight, and political will. The amount of funds allocated for the healthcare delivery remains elusive. Nevertheless, in spite of obvious constraints, the country has made laudable progress in reducing neonatal mortality in recent years. According to National Family & Health Survey (NFHS-5) the immunization rate of children up to 2 years is 76.4% in country and 69.6% in Uttar Pradesh.[2]

In India, the pandemic significantly impacted immunization coverage, with many individuals facing barriers such as lockdowns, closure of healthcare facilities, and fear of exposure to COVID-19. In Lucknow district, as in many other regions, these challenges may have exacerbated existing gaps in immunization services. It is essential to assess the current immunization coverage, identify barriers to service utilization, and explore facilitating factors to enhance immunization uptake during and after such crises.

Numerous unsettling stories illustrating the sad reality of the nation's healthcare system have also been featured in the media. A very few research works have been done about the Coverage of immunization services during the COVID-19 pandemic period in Lucknow district. This cross-sectional study aims to assess the immunization coverage of children in Lucknow district during the COVID-19 pandemic and identify the challenges faced by families in accessing immunization services. The study also seeks to understand the factors that may have facilitated or hindered immunization, with a focus on both urban and rural populations. By identifying these challenges and solutions, this study will contribute to improving immunization programs and ensuring greater health security for future public health crises.

AIM & OBJECTIVES:

The aim of this study is to assess the immunization coverage and identify the challenges faced by communities in accessing immunization services during the COVID-19 pandemic in Lucknow

district with the following objectives:

1. To determine the immunization coverage among children in Lucknow district during the COVID-19 pandemic.
2. To assess the availability and utilization of immunization services in urban and rural areas of Lucknow during the pandemic.
3. To identify the common barriers to immunization faced by families, including logistical, informational, and healthcare facility-related obstacles.
4. To evaluate the role of socioeconomic factors (such as education, income, and social class) in influencing immunization coverage during the pandemic.

METHODOLOGY:

The present study is a community based cross-sectional study assess the immunization coverage and identify the challenges faced by communities in accessing immunization services during the COVID-19 pandemic in Lucknow district. The study was carried out in urban and rural areas of Lucknow from February 2021 to December 2022. The participants were mothers/respondents of children 0-2 years and women who became pregnant during this period.

WHO 30 Cluster sampling technique [3] was used. Total 60 clusters i.e. 30 clusters from Rural and 30 clusters from Urban areas of Lucknow were taken for the study for assessment of Immunization services. within each cluster 7 mothers/ responders of 0-1-year-old children were interviewed, who were meeting the eligibility criteria of study.

Sampling Technique:

WHO 30 cluster sampling technique was applied. [3] All the subjects falling in sampling frame were invited to participate in the study. Steps to identify clusters are as below:

- 1) A list of all communities i.e. villages and wards along with the population size of each community was obtained.[4]
- 2) Cumulative population was calculated.
- 3) Sampling interval was calculated by using formula: Total population to be surveyed/30 clusters = sampling interval
- 4) A random number was chosen by lottery method which was less or equal to the sampling interval digits.
- 5) The 1st cluster was identified which had cumulative population equal or less than the random number.
- 6) Then by using this formula next clusters was taken: random number (1st cluster) + sampling interval = 2nd cluster, 2nd cluster + sampling interval = 3rd cluster (Continued till all clusters were identified.)
- 7) All the clusters were identified by using the same above-mentioned steps.
- 8) All the (30 x 2) clusters from rural and (30 x 2) clusters from urban areas were identified.
- 9) After obtaining an informed consent, demographic information etc.

were collected.

10) Subjects who fit into the inclusion criteria were interviewed.

Inclusion & Exclusion Criteria:

Mothers with children 0-1 years who are resident of Lucknow were recruited for the assessment of Immunization Service. People who are not willing or not a resident of Lucknow district were excluded from the study. In case of absence of the mother at the time of visit, child was excluded from the study.

pre-tested, pre-structured questionnaire and WHO immunization questionnaire was used as study tool. Door to door survey was done for the collection of necessary information. Each respondent was explained the purpose of study prior to the administration of tools of data collection and informed consent was obtained. The confidentiality of the information was assured. Interview was started with general discussion to gain confidence and it slowly extended to specific points. The questionnaire was pre tested on a sample of 40 respondents for immunization services, 20 each from rural and urban areas.

For immunization status, mothers were asked for immunization card, if it was not available then mothers were asked leading questions and immunization status was ascertained. BCG scar was also seen for verification. Immunization status was assessed as the child is fully/partially/not immunized up-till the date of interview.

Data was tabulated on SPSS-23 software for windows and checked for any inconsistency. The master chart was prepared for data analysis and tables were formed accordingly. Chi- square test was used to make categorical comparisons. The p-value <0.005 was considered as significant.

OBSERVATIONS & RESULTS:

The results observed that most of the mothers were of 25-30 years age group (50.7%) and belong to nuclear family (56.4%). Majority of females belong to muslim community (67.6%) and they got married at the age of 18-30 years age (97.4%). More than one third (40.2%) had two children and male children (52.1%) were slightly more than females. In rural area illiterate were more (22.8%) as compared to urban area (11.2%). Majority of the participants in urban areas were from socioeconomic class II (38.1%) whereas in rural areas more participants belong to socioeconomic class IV (50.0%) according to modified B.G. Prasad socioeconomic scale 2020. (Table-1)

Table – 1 : Distribution Of Respondents According To Socio-demographic Characteristics

Variable		Urban		Rural		Total	
		No.	%	No.	%	No.	%
Age (in years)	20 – 25	60	29.3%	61	28.4%	121	28.8%
	25 – 30	97	47.3%	116	54.0%	213	50.7%
	30 – 35	30	14.6%	35	16.3%	65	15.5%
	35 – 40	18	8.8%	3	1.4%	21	5.0%
Sex of child	Male	102	49.8%	117	54.4%	219	52.1%
	Female	103	50.2%	98	45.6%	201	47.9%
Type of family	Nuclear	124	60.5%	113	52.6%	237	56.4%
	Joint	81	39.5%	102	47.4%	183	43.6%
Religion	Hindu	27	13.2%	109	50.7%	136	32.4%
	Muslim	178	86.8%	106	49.3%	284	67.6%
Age at marriage	<18	2	1.0%	8	3.7%	10	2.4%
	18-30	202	98.5%	207	96.3%	409	97.4%
	30-40	1	.5%	0	0.0%	1	.2%
No. of living children	1	84	41.0%	63	29.3%	147	35.0%
	2	80	39.0%	89	41.4%	169	40.2%
	=/>3	41	20.0%	63	29.3%	104	24.8%
Social class	class1	16	7.8%	0	0.0%	16	3.8%
	class2	80	39.0%	11	5.1%	91	21.7%
	class3	56	27.3%	60	27.9%	116	27.6%
	class4	45	22.0%	106	49.3%	151	36.0%
Education	Illiterate	23	11.2%	49	22.8%	72	17.1%
	just literate	7	3.4%	24	11.2%	31	7.4%
	Primary	6	2.9%	13	6.0%	19	4.5%
	Middle	20	9.8%	44	20.5%	64	15.2%
	high school	42	20.5%	48	22.3%	90	21.4%

Occupation	Intermediate	54	26.3%	30	14.0%	84	20.0%
	Graduate	45	22.0%	7	3.3%	52	12.4%
	post graduate	8	3.9%	0	0.0%	8	1.9%
	Unskilled	1	.5%	0	0.0%	1	.2%
	semi skilled	5	2.4%	0	0.0%	5	1.2%
	Skilled	4	2.0%	0	0.0%	4	1.0%
	clerical/ shop owner/ farmer	2	1.0%	0	0.0%	2	.5%
	semi-professional	3	1.5%	0	0.0%	3	.7%
	Professional	2	1.0%	0	0.0%	2	.5%

Table – 2 : Distribution Of Children According To Vaccines Received

Variable		Urban		Rural		Total	
		No.	%	No.	%	No.	%
BCG	Yes	170	81.0%	171	81.4%	341	81.2%
	No	40	19.0%	39	18.6%	79	18.8%
HEP-B-0 dose	Yes	120	57.1%	117	55.7%	237	56.4%
	No	90	42.8%	93	44.3%	183	43.5%
OPV-0 dose	Yes	123	58.5%	115	54.8%	238	56.7%
	No	87	41.4%	95	45.2%	182	43.3%
PENTA-1	Yes	112	60.5%	124	61.4%	236	56.2%
	No	73	39.5%	78	38.6%	151	36.0%
PENTA-2	Yes	96	58.9%	115	63.2%	211	50.2%
	No	67	41.1%	67	36.8%	134	31.9%
PENTA-3	Yes	96	64.4%	114	63.0%	210	50.0%
	No	53	35.6%	67	37.0%	120	28.6%
f-IPV-1	Yes	96	56.5%	106	54.4%	202	48.1%
	No	74	43.5%	89	45.6%	163	38.8%
f-IPV-2	Yes	85	57.4%	98	54.4%	183	43.6%
	No	63	42.6%	82	45.6%	145	34.5%
ROTA-1	Yes	97	57.7%	108	55.7%	205	48.8%
	No	71	42.3%	86	44.3%	157	37.4%
ROTA-2	Yes	85	56.7%	100	55.6%	185	44.0%
	No	65	43.3%	80	44.4%	145	34.5%
ROTA-3	Yes	96	64.4%	112	61.9%	208	49.5%
	No	53	35.6%	69	38.1%	122	29.0%
PCV-1	Yes	97	58.1%	108	55.4%	205	48.8%
	No	70	41.9%	87	44.6%	157	37.4%
PCV-2	Yes	86	58.1%	100	55.9%	186	44.3%
	No	62	41.9%	79	44.1%	141	33.6%
JE	Yes	78	57.8%	77	53.1%	155	36.9%
	No	57	42.2%	68	46.9%	125	29.8%
MR/Measles	Yes	86	63.7%	85	58.6%	171	40.7%
	No	49	36.3%	60	41.4%	109	26.0%
Vitamin-A Syrup	Yes	83	61.5%	79	54.1%	162	38.6%
	No	52	38.5%	67	45.9%	119	28.3%

Table 2 summarizes the distribution of children according to vaccines received. The results found that 81.0% children in urban and 81.4% children in rural area had received BCG vaccine. 57.1% in urban and 55.7% children in rural area received hepatitis zero dose and almost similar trends were seen for all of the vaccines.

Table 3 illustrates the results based on distribution of children according to immunization status. It was seen that immunization card was present with 53.8% urban and 56.7% rural participants. The result shows that 44.3% children in urban area and 45.2% children in rural area were fully immunized up till the age. 36.7% children in urban and 36.2% children in rural area were partially immunized up till age and it was seen that 19.0% children in urban and 18.6% in rural area were not immunized. It was found in the study that only 45.7% children in urban and 45.2% children in rural area were fully immunized before 1 year of age. Most common reason for failure was obstacles in urban (81.6%) as well as in rural (60.9%) areas. Lack of information was the second common reason of immunization failure in urban (13.2%) as well as rural (31.3%) area with significant **p-value=0.001** depicts the

significant difference in the barriers of immunization between urban and rural area.

Table – 3 : Distribution Of Children According To Immunization Status

Variable		Urban		Rural		Total		chi sq.	p-value
		No.	%	No.	%	No.	%		
Imm uniza tion card	Yes	113	53.8%	119	56.7%	232	55.2%	0.35	0.556
	No	97	46.2%	91	43.3%	188	44.8%		
Imm uniza tion for the age	Not immunized	40	19.0%	39	18.6%	79	18.8%	0.04	0.980
	Partially immunized	77	36.7%	76	36.2%	153	36.4%		
	Fully immunized up till date	93	44.3%	95	45.2%	188	44.8%		
Fully immu nized befor e 1 year	Yes	96	45.7%	95	45.2%	191	45.5%	0.01	0.922
	No	114	54.3%	115	54.8%	229	54.5%		
Reas on For Failu re	Lack of information	15	13.2%	36	31.3%	49	21.7%	14.32	0.001
	Lack of motivation	06	5.3%	09	7.8%	15	6.6%		
	Obstacles	93	81.6%	70	60.9%	162	71.7%		
	Private	67	47.9%	23	17.3%	90	33.0%		
	Other	00	0.0%	03	2.3%	03	1.1%		

DISCUSSION:

In the present study, it was observed that 65.9% of children in urban areas and 68.8% in rural areas were fully immunized, while 32.2% of urban children and 31.2% of rural children were partially immunized, though the difference was not statistically significant. According to the NFHS-5, 67.2% of urban children and 70.2% of rural children in the 12–24-month age group were fully vaccinated, which is slightly higher than the findings of this study, suggesting that the COVID-19 pandemic disrupted immunization services, though not significantly (p-value=0.113). Several studies have reported similar disruptions in immunization coverage during the pandemic. For example, Chandir et al. (2020) in Karachi, Pakistan, found a 52.8% reduction in daily immunization visits during the lockdown, while Mansour et al. (2021) in Lebanon reported a 31% decrease in national-level vaccination services. Similarly, Singh et al. (2021) in Uttar Pradesh, India, observed a decline in immunization services during the pandemic. However, some studies, like that of Desta et al. (2021) in Ethiopia, reported an increase in immunization coverage during the same period. In the present study, immunization rates in both urban and rural areas were similar to those reported in NFHS-5 for most vaccines, though vaccination coverage was slightly higher in some cases, possibly due to improvements in educational status and health-seeking behaviour in Lucknow. Notably, the Pentavalent vaccine's first and second doses showed significant differences (p-values of 0.005 and 0.018, respectively). Studies in South Africa, Ethiopia, and Lebanon have reported similar declines in vaccine coverage, especially for Pentavalent and oral polio vaccines. However, the findings from South Africa (C. Jensen et al., 2021) and Ethiopia (Gebreegziabher et al., 2022) emphasized that declines were less pronounced for some vaccines like BCG and pentavalent, while others, such as measles and OPV, saw more significant reductions. In contrast, a study in Kinshasa by Hategeka et al. (2021) reported no decline in vaccination trends, highlighting geographical variability in pandemic-related disruptions. The most common reason for immunization failure in this study was a lack of information in rural areas (59.1%), while in urban areas, logistical barriers such as lockdowns, transport unavailability, and restrictions were the primary causes (71.0%). The comparison of reasons for failure between urban and rural areas showed significant differences (p-value<0.001). Similar findings were reported by Chandir et al. (2020) in Pakistan, where movement restrictions and fear of COVID-19 transmission led to decreased immunization coverage, as caregivers were reluctant to access vaccination services. O Akaba et al. (2022) in Nigeria also identified multiple factors contributing to the disruption of immunization services during the pandemic.

CONCLUSION & RECOMMENDATIONS:

The study highlights the significant impact of the COVID-19 pandemic on immunization coverage in both urban and rural areas of Lucknow. While immunization rates were relatively similar to pre-pandemic levels, a slight decrease was observed in some areas, suggesting disruptions in routine vaccination services. The most common barriers to immunization included a lack of information in rural areas and logistical challenges such as lockdowns and transport issues in urban areas. Despite these challenges, some vaccines, particularly the Pentavalent vaccine, showed significant variations in coverage, indicating that specific vaccines faced more disruptions than others. These findings align with similar studies worldwide, which reported declines in immunization rates during the pandemic, though some regions experienced recovery or even increased coverage.

Recommendations

1. Strengthening Health Communication: Efforts should be made to improve information dissemination, especially in rural areas, to increase awareness about the importance of vaccination and address misinformation or fear related to COVID-19 and immunization services.

2. Improving Access to Vaccination: Measures should be taken to address logistical barriers, such as transportation issues and the closure of healthcare facilities during pandemics. Mobile vaccination units and community-based vaccination drives could help ensure that immunization services remain accessible.

3. Reinforcing Immunization Infrastructure: It is essential to strengthen the healthcare infrastructure to ensure its preparedness during future pandemics. This includes maintaining stockpiles of vaccines and ensuring that health workers are trained and available to continue services during emergencies.

4. Community Engagement and Education: Community leaders and local organizations should be involved in promoting vaccination and encouraging health-seeking behavior. Special focus should be given to maternal and child health services to improve immunization coverage, especially for vulnerable populations.

5. Monitoring and Evaluation: Ongoing monitoring of immunization trends and timely assessment of vaccination coverage is crucial to detect early signs of decline and implement corrective measures promptly. Continuous evaluation of immunization strategies is necessary to adapt to emerging public health challenges.

6. Collaboration with Private Sector: Collaboration with private healthcare providers should be encouraged to expand the reach of vaccination services, especially during emergencies when public facilities may be overwhelmed.

Conflicts Of Interest: There is no conflict of interest.

Financial Support: nil

REFERENCES:

- Mehta, K., Zodepy, S., Banerjee, P., Pocius, S. L., Dhaliwal, B. K., DeLuca, A., ... Shet, A. (2021). Shifting research priorities in maternal and child health in the COVID-19 pandemic era in India: A renewed focus on systems strengthening. *PloS One*, 16(8), e0256099. doi: 10.1371/journal.pone.0256099
- (N.d.). Retrieved December 25, 2024, from Gov.in website: https://mohfw.gov.in/sites/default/files/NFHS-5_Phase-II_0.pdf
- World Health Organization. (2020). *Training for mid-level managers (MLM): module 7: the EPI coverage survey*. Genève, Switzerland: World Health Organization.
- Villages. (n.d.). Retrieved December 25, 2024, from Nic.in website: <https://lucknow.nic.in/villages/>