

Decision-making in childhood vaccination: vaccine hesitancy among caregivers of under-5 children from a tertiary care institution in Eastern India

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Abstract

Background: Acceptance of vaccines has been on a decline in recent times, with vaccine hesitancy being listed as one of the top 10 global health threats. This study analysed vaccine hesitancy and belief towards vaccination among caregivers of children aged below 5 years.

Methods: In this cross-sectional study, 196 caregivers of children aged 6 months to below 5 years who had attended an immunization clinic at a tertiary care institute of Eastern India from March to May 2019 were surveyed. Consecutive sampling was used to recruit eligible study participants. The survey assessed the attitudes of parents towards childhood vaccination by using the Vaccine Hesitancy Scale and their beliefs towards vaccination. Univariate analysis was performed to assess the association of various sociodemographic factors with vaccine hesitancy.

Results: Among the caregivers, most (48%) mothers were aged 26–35 years, literate and homemakers. Vaccine hesitancy was observed in 9.18% of the participants. Only the age of the child was significantly associated with vaccine hesitancy. Nearly half (48.5%) of the participants were concerned about the serious adverse effects of vaccines, and a third (30.6%) agreed that newer vaccines are associated with higher risks than the older ones. Caregivers felt that vaccines are no longer required for uncommon diseases.

Conclusion: Concerns regarding vaccine hesitancy are prevalent even among caregivers attending a tertiary care institute. Thus, additional studies are required to assess hesitancy in urban, rural, remote and inaccessible areas. Policymakers ought to conduct periodic assessments and implement necessary remedial measures for the long-term sustenance of the benefits of the national immunization programme.

Keywords: delay, immunization, tertiary care, under-five, vaccine hesitancy

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Introduction

Vaccination is among the most cost-effective public health interventions, second only to provision of clean water.¹ Vaccination alone can save up to 3 million lives every year.^{2,3} Many communicable diseases, such as smallpox, have been eradicated globally owing to the successful implementation of vaccination strategies, particularly

through government-funded immunization programmes. Many other communicable diseases such as measles and maternal and neonatal tetanus are on the course of elimination. Despite overwhelming evidence that childhood vaccination facilitates the prevention of numerous diseases and deaths, the acceptance of vaccines among the public has been decreasing, particularly in some

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developed countries. For example, people in countries like the United States and the United Kingdom are experiencing a decline in vaccination for diseases such as measles, once considered to be eradicated there. This has resulted in sporadic outbreaks of these diseases in many regions of the world lately.^{4,5} For similar reasons, a resurgence of polio has been reported from Northern Nigeria.⁶ Community concern regarding vaccination has been increasing, leading to disbelief on vaccine efficacy and safety. Movements against vaccination are gaining momentum in several regions of the world.⁷⁻⁹ Therefore, the World Health Organization (WHO) declared vaccine hesitancy as one of the 10 biggest threats to global health in 2019.¹⁰

Vaccine hesitancy is defined by the WHO Strategic Advisory Group of Experts on Immunization (SAGE) as a 'Delay in acceptance or refusal of vaccines despite availability of vaccination services. Vaccine hesitancy is complex and context specific varying across time, place and vaccines. It includes factors such as complacency, convenience and confidence'.¹¹ Vaccine-hesitant individuals lie somewhere in the middle of a continuum from full acceptance to total rejection.¹² Vaccine hesitancy has been mostly investigated in high-income countries, whereas literature from low- and middle-income countries (LMICs) such as India is relatively scant. A systematic review of vaccine hesitancy in LMICs generally noted substantial concern about adverse events following immunization and distrust in health systems.¹³ Several factors such as sociocultural norms, religious beliefs, misinformation spread through social media, historical influences and mistrust, beliefs and attitudes about vaccines, and any specific characteristics of particular vaccines influence vaccine hesitancy.⁹ Under-immunized and nonimmunized children pose a grave threat to herd immunity development, resulting in an increased risk of outbreaks of vaccine-preventable diseases (VPDs) such as measles and pertussis. This also jeopardizes the long-term effects of disease control and elimination.¹⁴

Odisha, a state on the eastern coast of India, is a socioeconomically disadvantaged Indian state, lagging in maternal and child health parameters compared with the national average.^{15,16} According to the Integrated Child Health and Immunization Survey of 2016, the immunization

coverage of Odisha was approximately 84%.¹⁷ Although the immunization coverage rate is encouraging, the latent issue of vaccine hesitancy has not been investigated in detail. With this background, we conducted this study to determine vaccine hesitancy and attitude towards vaccination among caregivers of children aged 6 months to 5 years who attended the immunization clinic of a tertiary care institute in eastern India. The study findings will improve understanding regarding parental beliefs and attitudes towards childhood immunization and enable policymakers to enhance coverage and utilization rates among the population.

Methodology

Study design and population

This cross-sectional study was conducted at the immunization clinic of All India Institute of Medical Sciences Bhubaneswar, Odisha, a tertiary care institute in Eastern India. The clinic operates on all working days, and on an average, 30 beneficiaries are vaccinated per day with vaccines prescribed under the National Immunization Schedule (NIS) and other optional vaccines on demand and payment basis. Caregivers of children aged between 6 and 59 months who visited the immunization clinic between March and May 2019 were approached for study participation. The prevalence of vaccine hesitancy in the Indian population, particularly in Eastern India, has not been documented. Therefore, assuming a prevalence of 50%, and at the 95% confidence level and precision of 7%, the sample size was calculated as 196. Consecutive sampling was used to recruit the participants before the immunization procedure. Sampling was continued until the required sample size was achieved.

Survey tool

Vaccine hesitancy was assessed using a structured questionnaire consisting of three parts: (a) sociodemographic data profile, (b) a WHO SAGE 10-item Vaccine Hesitancy Scale for assessing parental attitude towards childhood vaccines (PACV), and (c) a scale for measuring 'beliefs towards vaccines'.^{18,19}

The PACV Vaccine Hesitancy scale is a valid and reliable measure of parental attitudes and vaccine

hesitancy.¹² This scale has been validated in India and used in hospital and community settings. The scale used for measuring 'belief towards vaccines' is a dichotomous scale that consists of five questions.

Written informed consent was obtained from the participants before the questionnaire was administered. The informants were explained about the study purpose, and the questionnaire was administered by the residents of the community medicine department posted in the immunization clinic. Caregivers who refused to provide consent were excluded. Nonjudgmental attitude and non-responsive body language were followed to minimize bias. Any additional queries, if present, were clarified after receiving the responses to the questionnaire. The ethical approval for the study was taken from the Institutional Ethics Committee, AIIMS Bhubaneswar.

Statistical analysis

Data entry was done in Microsoft excel. Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 20.0 software (SPSS Inc., Chicago, IL, USA). The univariate association between the hesitancy status and independent variables was analysed using the chi-square test/Fisher's exact test for proportions. A *p* value < 0.05 was considered significant.

Results

In total, 196 caregivers of children aged below 5 years were interviewed. Of the total children aged below 5 years, 101 (51.5%) were boys and 95 (48.5%) were girls. Mothers constituted the majority of the caregivers (191; 92.3%). They were aged between 26 and 35 years (48.0%) and were mostly homemakers (64.3%). For the remaining 15 (7.7%) cases, father/grandparents were the informants. Only six (3.0%) mothers were illiterate. Nearly a quarter (26.0%) of the caregiver's families had a monthly income of less than 20,000 rupees (Table 1). Among the study population, 18 caregivers (9.18%) were reluctant or hesitant to give vaccinations to their child. Of them, 10 caregivers had refused/not given one of the recommended vaccinations to their child. The univariate analysis revealed that only the age of the child was significantly associated with

vaccine hesitancy. A majority (55.5%) of these children were aged 6 months to 1 year (Table 2).

A majority of the caregivers strongly agreed that childhood vaccines are crucial for the health of others in the community (80.6%), their child's health (75.5%), effective (63.3%), provide protection (62.8%), given as per doctors'/health care workers' recommendation (62.3%), and beneficial (57.1%) and that the information provided regarding vaccines under the programme is reliable and trustworthy (51%). Nearly a third (30.6%), however, agreed that newer vaccines carried more risks than the older vaccines, which is concerning. Almost half (48.5%) of the participants somewhat or strongly agreed and expressed concern about serious adverse effects of vaccines. A quarter (25.5%) of the participants stated that their children do not need vaccines for diseases that are not common anymore (Figure 1).

Most participants believed that vaccines protect children from serious diseases. One-fourth of the participants (25%) expressed that the main reason for getting their children vaccinated was to get them admitted to schools (Table 3).

Discussion

India has made a steady progress in controlling Vaccine Preventable diseases through the government-funded national expanded programme on immunization. In our study, the prevalence of vaccine hesitancy was 9.18%. This is comparable with that reported by studies conducted in Al Ain city, UAE (12%); Kuala Lumpur, Malaysia (11.6%); and Erbil, Iraq (9.9%).²⁰⁻²² A outpatient-based study involving the paediatric population in Ireland reported a non-vaccination rate of 5.5%, which is lower than that reported in our study.²³ This rate, however, was considerably lower than that outlined in a study conducted in a tertiary hospital in Chennai (21%).¹⁹ These differences could be due to inter-country sociocultural differences, different strata of the population, study setting and the survey tool used. Community-based studies conducted in the slums of West Bengal have reported vaccine hesitancy of as high as 83%.²⁴

Because most of the participants were literate and urban dwelling, vaccine hesitancy might be lower

Table 1. Sociodemographic characteristics of the study participants.

Sl no.	Characteristic	Frequency	%
1.	Age of the child		
	6 months to <1 year	59	30.1
	1-<2 years	81	41.3
	2-5 years	56	28.6
2.	Gender of the child		
	Male	101	51.5
	Female	95	48.5
3.	Age of the mother (in years)		
	18-25	22	11.2
	26-35	94	48.0
	36 and above	80	40.8
4.	Education of mother		
	No schooling/illiterate	6	3.0
	Middle school	31	15.9
	High school	41	20.9
	Higher secondary	63	32.1
	Graduate and above	55	28.1
5.	Occupation of mother		
	Home maker	126	64.3
	Unskilled worker	10	5.1
	Professional/skilled worker	50	25.6
6.	Education of father		
	No schooling/illiterate	4	2.0
	Middle school	21	10.7
	High school	32	16.3
	Higher secondary	75	38.3
	Graduate and above	64	32.7
7.	Monthly family income(in rupees)		
	5000-<20,000	50	26.0
	20000-<50,000	65	33.2
	50000-<10,000	40	20.4
	10,000 and above	40	20.4

in our study. A higher vaccine acceptance was possibly observed because of greater exposure to social, print and electronic media; periodic awareness campaigns; and celebrity endorsements. Moreover, trust on the health system and accessibility can be associated factors.

In our study, only the age of the child was significantly associated with vaccine hesitancy. Both developed and developing countries have extensively reported parental educational status as a critical determinant of vaccine acceptance and compliance.²⁵ No significant association, however, was observed between vaccine hesitancy and sex, occupation, and educational status of the parents. Higher educational status of the parents, particularly of the mother, has been associated with more vaccine acceptance in other Indian studies.^{26,27} Contradictory findings, however, have been reported in some studies, particularly in high-income countries, where higher educational attainment levels and higher socioeconomic status have been associated with increased vaccine hesitancy.²⁸⁻³⁰

Most participants expressed confidence regarding the importance of vaccines for their children and agreed that they are effective. This is in agreement with the results of the study conducted using the WHO SAGE Vaccine Hesitancy Scale among 2265 respondents from LMICs (Bangladesh, China, Ethiopia, Guatemala and India). In that study, 95% respondents agreed that 'childhood vaccines are important for child's health'. In our study, 65.8% caregivers agreed or were neutral with regard to the question 'newer vaccines are associated with higher risks than older vaccines', which is similar to the results of the study involving respondents from LMICs (more than 50% agreed or were neutral).³¹

The responses indicated that the caregivers were concerned about side effects, newer vaccines, and the continued use of vaccines for diseases that have become uncommon. In the wake of the urgency to use new vaccines, care should be taken to maintain the confidence of the community and to ensure that complacency does not set in.¹¹ Communication regarding newer vaccines should be better percolated before their introduction and should consider parental confidence. In particular, tailor-made messages should be provided for addressing their apprehensions. This is more

Table 2. Univariate analysis of VH with sociodemographic variables.

Sl no.	Characteristic	Category	VH present	VH absent	p value
1	Age of the child	6 months to 1 year	10 (16.9)	49 (83.1)	0.047*
		1–2years	(6.2)	76 (93.8)	
		2–5years	3 (5.4)	5 (94.6)	
2.	Gender of the child	Male	6 (5.9)	95 (94.1)	0.244
		Female	12 (12.6)	8 (87.4)	
3.	Age of the mother	18–25	(4.5)	2 (95.5)	0.340
		26–35	1 (12.8)	82 (87.2)	
		35 and above	5 (6.2)	7 (93.8)	
4.	Education of mother	No schooling/illiterate	(16.7)	(83.3)	0.713
		Middle school	(12.9)	2 (87.1)	
		High school	2 (4.9)	3 (95.1)	
		Higher secondary	6 (9.5)	5 (90.5)	
		Graduate and above	(8.9)	51 (91.1)	
5.	Occupation of mother	Home maker	1 (9.5)	12 (90.5)	0.587
		Unskilled worker	(0.0)	1 (100.0)	
		Professional/skilled worker	(12.0)	4 (88.0)	
6.	Education of father	No schooling/illiterate	(25.0)	(75.0)	0.780
		Middle school	(9.5)	1 (90.5)	
		High school	(6.2)	3 (93.8)	
		Higher secondary	(9.3)	6 (90.4)	
		Graduate and above	(9.4)	5 (90.6)	
7.	Monthly family income (in rupees)	5000–20,000	5 (10.0)	4 (90.0)	0.603
		20000–50,000	(12.3)	5 (87.7)	
		50000–10,000	(7.5)	3 (92.5)	
		10,000 and above	(5.0)	3 (95.0)	

VH, vaccine hesitancy.
*Significant.

contextual in the recent introduction of COVID-19 vaccination for children and adolescents worldwide. These vaccines were introduced in a phase-wise manner, starting from the elderly to adults and then to the paediatric population. In global surveys, the caregivers' attitude towards

paediatric COVID-19 vaccination ranged from low hesitancy (2.8%) in Brazil to a higher hesitancy of 23–44% in Italy.^{32–34} Introducing new vaccines for the paediatric population is quite challenging and, at the same time, pivotal as paediatric and adolescent immunization is essential

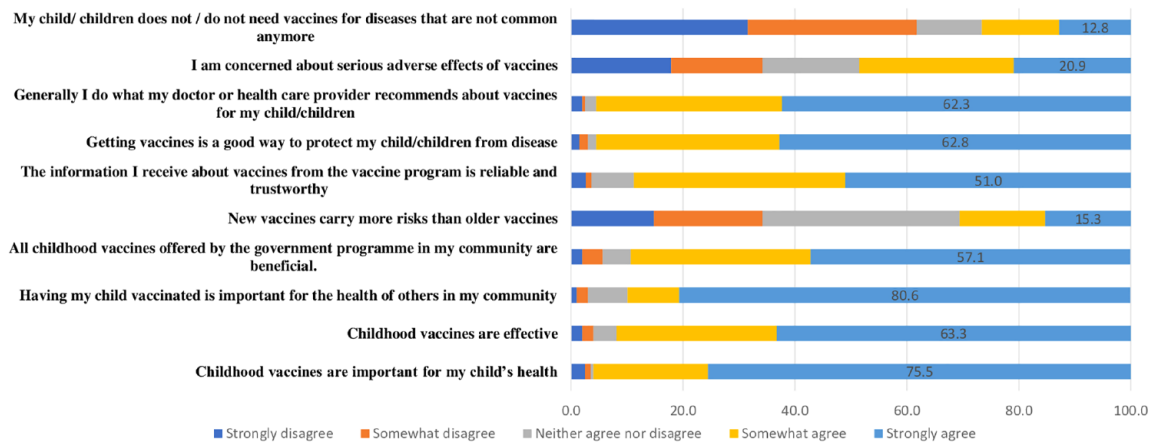


Figure 1. Responses to the PACV Scale.

Table 3. Distribution of participant's responses regarding belief towards vaccination.

Sl no.	Question	Yes n (%)	No n (%)
1	The main reason I have my child get vaccines is so that they can enter school	49 (25)	147 (75)
2	Do you believe that vaccines can protect children from serious diseases?	187 (95.5)	9 (4.5)
3	Do you think that most parents like you have their children vaccinated with all the recommended vaccines?	164 (83.7)	32 (16.3)
4	Have you ever been reluctant or hesitant to get a vaccination for your child?	18 (9.1)	178 (90.9)
5	Have you ever refused a vaccination for your child?	10 (5.1)	186 (94.9)

for achieving a substantial degree of community protection and herd immunity. Primary health-care providers and family physicians need to be offered technical and scientific training so that they can address the concerns rationally and scientifically.³⁵ In addition, paediatricians should counsel regarding the significance of childhood vaccinations, particularly in high-risk children, as parents are more receptive to their advice. They act as the continuous point of contact in case of any childhood illness, and their recommendation can be a decisive factor for increasing immunization coverage rates.³⁶

Therefore, training of healthcare providers to effectively communicate and address immunization-related concerns should be amalgamated in the medical teaching and continuous medical

education curriculum.²⁰ Furthermore, opportunistic counselling of parents, emphasis on timely vaccination, and enquiry of the vaccination status can be conducted by healthcare providers during hospital visits of the children.

From a societal perspective, decrease in vaccine hesitancy depends to a large extent on the education of vaccination providers regarding the benefits of vaccines and best practices, which they need to effectively communicate to parents and other caregivers. Doctors and frontline health workers, being the first point of contact, need to allay the fears and provide correct and justified facts about vaccine safety while carefully explaining the adverse events, if any.³⁷ They also need to counteract the large volumes of irrational information about vaccines on social media platforms

through advocacy. Local and international occurrences of adverse events following immunization receive considerable media attention and have long-lasting effects. Therefore, sensitization of parents about vaccines backed by quality evidence is a must, ideally in early pregnancy.³⁸

Strength and limitations

Our study should be interpreted within the context of limitations and potential generalizability. Because our study participants were caregivers already attending an immunization centre, they more likely to have a positive outlook towards vaccines. Because this was a single-centre study with a cross-sectional design, the ability to infer causation between vaccine attitudes and hesitancy was limited. Moreover, hesitancy towards individual vaccines could not be assessed. Additional community-based studies are required to assess hesitancy towards various vaccines in different settings among individuals with varied health-seeking behaviours.

Conclusions

The study provides evidence that the avertable problem of vaccine hesitancy exists even in tertiary care settings with near universal coverage. The study findings provide evidence for a lucid understanding about caregivers' vaccine hesitancy as knowledge and attitudes directly affect the practice of vaccination. Policymakers need to address the concerns related to this vaccine decision and plan and implement public health strategies to induce vaccine confidence and sustain the benefits of the national immunization programme in the long run.

Authors' note

The manuscript has not been presented in any conference or meeting prior.

Declarations

Ethics approval and consent to participate

The project was approved by the Institutional Ethics Committee, All India Institute of Medical Sciences, Bhubaneswar with the reference number T/IM-NF/CM&FM/18/57.

Consent for publication

Not applicable.

Author contributions

Soumya Swaroop Sahoo: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Writing – original draft; Writing – review & editing.

Swayam Pragyan Parida: Conceptualization; Methodology; Project administration; Supervision; Writing – original draft; Writing – review & editing.

Arvind Kumar Singh: Conceptualization; Investigation; Methodology; Project administration; Supervision; Writing – review & editing.

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Durgesh Prasad Sahoo: Investigation; Methodology; Project administration; Writing – review & editing.

Vikas Bhatia: Conceptualization; Project administration; Supervision; Writing – review & editing.

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Competing interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Availability of data and materials

All the data supporting the findings of this research is available in the form of tables and images within the article.

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