

Obstacles and Insights: A Retrospective Study of COVID-19 Vaccination hurdles

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ABSTRACT

Introduction: The COVID-19 pandemic prompted a global effort to develop safe and effective vaccines to curb its spread. In India, the government launched a large-scale vaccination program to protect frontline healthcare workers. However, concerns regarding vaccine safety and efficacy, coupled with vaccine hesitancy among healthcare workers, presented significant challenges to the program's success. This study aimed to identify the apprehensions and concerns of frontline healthcare workers and also explore the operational barriers in the implementation of Covid -19 vaccination program. **Materials & Methods** This retrospective cross-sectional survey was conducted in Madhya Pradesh, India from January to March 2022. The study included 519 frontline healthcare workers from three randomly selected COVID-19 vaccination centres in Bhopal, Madhya Pradesh. The study utilized a self-structured questionnaire to gather socio-demographic information from participants. Their apprehensions and concerns were assessed using a 5-point Likert scale and a 3-point Likert scale was used to evaluate the operational barriers faced during the implementation of the COVID-19 vaccination program. The sample size was determined based on the findings of a pilot study, and ethical clearance was obtained from the Institutional Human Ethics Committee. **Results:** The findings of the study revealed that a significant proportion of healthcare workers expressed concerns and apprehensions regarding the COVID-19 vaccination program. Among the participants, 312 (60.1%) expressed fear of contracting COVID-19 during vaccination, and 204 (39.3%) voiced concerns about the lack of prior vaccination training. Almost half of respondents 259 (49.99%) feared the risk of contracting the disease even after vaccination. Healthcare workers perceived political circumstances 244 (47%), evolving science of the virus 272(52.4%), and community actions 222 (42.77%) as significant barriers to the vaccination program implementation. **Conclusion:** The findings of this study highlight the concerns and operational barriers that healthcare workers in Madhya Pradesh, India faced regarding the COVID-19 vaccination program. These concerns include fear of contracting COVID-19 during the vaccination process, lack of training, and uncertainties regarding vaccine efficacy, quality, and safety. These concerns and barriers can significantly impact the success of the vaccination program by contributing to vaccine hesitancy among healthcare workers and the general population. Significantly, the research highlights the necessity of addressing healthcare workers' specific apprehensions and concerns to improve vaccine acceptance.

Keywords: Apprehensions, Concerns, Fears, COVID-19 vaccination, Healthcare workers, Operational barriers, Vaccine acceptance, Vaccine hesitancy

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Introduction

The rapid global spread of the novel corona virus, known as COVID-19, necessitated the swift deployment of comprehensive preventive strategies worldwide. These included measures such as social distancing, rigorous hand and respiratory hygiene, the use of personal protective equipment, and quarantine protocols¹

However, the most pivotal and promising tool in the arsenal against the pandemic was the development of safe and effective COVID-19 vaccines, with the aim of curbing the spread of the disease.^{2,3} In India, recognizing the essential role of frontline healthcare workers, especially those directly engaged in the care of COVID-19 patients, the government initiated a momentous endeavour. On 16th January 2021, India launched the world's largest COVID-19 vaccination program, setting in motion an unprecedented inoculation drive. This initiative, however, encountered significant challenges as concerns emerged due to reports of adverse reactions to vaccines in other countries and uncertainties surrounding the efficacy of domestically developed vaccines. This rising hesitancy, particularly among healthcare workers, posed a formidable public health challenge.^{4,5,6} Crucially, healthcare workers are not only key recipients of vaccines but also trusted sources of information for patients. Their own vaccine hesitancy can significantly influence overall vaccination rates.^{7,8} Despite the government's substantial investment in one of the world's most extensive inoculation campaigns, challenges, particularly during the initial phases, included doubts regarding vaccine efficacy, quality, and safety among healthcare workers. Addressing these concerns comprehensively necessitated large-scale studies focused on assessing the extent of vaccine hesitancy and operational barriers hindering the successful implementation of the program.

Therefore, this study set out to evaluate the apprehensions and concerns of frontline healthcare workers regarding COVID-19 vaccination, while also investigating the operational barriers faced during its implementation at Madhya Pradesh. It aims to provide actionable insights to government authorities, shedding light on ground-level challenges and guiding efforts towards overcoming operational hurdles. By identifying bottlenecks in the strategic implementation of the COVID-19 vaccination program, policymakers can develop guidelines to instil trust and confidence among the population, thereby ensuring the program's ultimate success.

Materials and Methods

Study Design, Setting, and Sample: This study employed a retrospective cross-sectional survey design to explore the perceptions and experiences of frontline healthcare workers concerning the COVID-19 vaccination program. The research was conducted from January to March 2022, in Bhopal, a city in the state of Madhya Pradesh, India, selected for its diverse population and the presence of multiple COVID-19 vaccination centres.

To determine the appropriate sample size, a pilot study and power analysis were conducted. Based on the pilot study's findings and considering a hypothesized prevalence of vaccine acceptance at 68%, a margin of error of $\pm 5\%$, and a 95% confidence interval, a sample size of 502 participants was calculated. To account for potential clustering within vaccination centres and ensure adequate statistical power, a design effect of 1.5 was considered. A total of 600 healthcare workers from three randomly selected COVID-19 vaccination centres in Bhopal were approached for participation. The study participants were frontline healthcare workers actively engaged in the COVID-19 vaccination program, including doctors, registered nurses, and paramedical staff responsible for vaccine administration and healthcare services. To ensure voluntary participation, informed consent was obtained online, adhering to ethical considerations. Ethical clearance for the study was granted by the Institutional Human Ethics Committee (IHECLOP/2021/EF0239).

Survey tools: Data collection tools were meticulously developed following an extensive literature review of relevant studies on COVID-19 vaccines. These tools aimed to capture the multifaceted perspectives and experiences of frontline healthcare workers regarding the COVID-19 vaccination program. An electronic questionnaire was created using Google Forms, available in both English and a locally translated Hindi version. The questionnaire was designed to collect data on various aspects of healthcare workers' apprehensions and concerns related to COVID-19 vaccination. Prior to finalizing the questionnaire, a pilot survey was conducted among select healthcare workers to refine and enhance the questionnaire based on their feedback and responses. Additionally, an expert panel review was sought to ensure the questionnaire's validity, relevance, and cultural appropriateness. (SCVI=0.92) The survey instruments included a self-structured questionnaire to gather socio-demographic information and self-structured rating scales employing a 5-point Likert scale to assess apprehensions and fears related to COVID-19 vaccination, as well as a 3-point Likert scale to evaluate the barriers encountered during the COVID-19 vaccination program implementation. **Socio-demographic Information:** This section collected data on participants' age, gender, marital status, family type, occupation, and area of work, years of experience, and the level of the healthcare facility where they worked. **Health workers' perceptions:** This section focused on healthcare workers' attitudes, apprehensions and concerns about the pandemic, perceptions of vaccine safety and effectiveness, and willingness/ no willingness to receive the vaccine. **Barriers to Implementation:** This section explored the reasons behind their fear and hesitancy, encompassing factors such as perceived ineligibility, lack of information, concerns about side effects, cost considerations, political circumstances, evolving science of the virus, and community actions, religious beliefs, and other reasons. The internal consistency of the tools was assessed using Cronbach's alpha, yielding values of 0.87, 0.84, and 0.79, indicating good reliability.

Data Collection Procedure: Data were collected electronically using Google Forms. Participants were invited to participate in the study through email, WhatsApp, and Telegram, where they received a link to the questionnaire. Upon clicking the link, participants were automatically directed to an informed consent page. Only those who provided informed consent were allowed to proceed with the survey. A total of 578 healthcare workers among those approached agreed to participate in the survey. However, during the data analysis phase, 59 participants who did not complete all the required information were excluded, resulting in a final sample size of 519 participants for data analysis. Descriptive statistics, such as frequencies and percentages, were used to summarize the characteristics of the study sample. The collected data were analysed using SPSS version 21 with appropriate statistical tests and techniques applied to address the research objectives.

Results

Data collected from 519 frontline healthcare professionals were analysed and the following findings were revealed: Table-1 show cases the participant's characteristics in terms of socio-demographic information gathered.

Fear of contracting the disease: Among the participants, 312 (60.1%) believed they were at risk of contracting COVID-19 during the vaccination process, while 207 (39.8%) expressed no fear. Most healthcare workers 436 (84%) expressed the belief that they had good immunity during the first phase of the COVID-19 pandemic.

COVID-19 vaccination training: Surprisingly, only 315 (60.7%) of the participants reported receiving training regarding COVID-19 vaccination, while 204 (39.3%) voiced concerns about the lack of training before the implementation of the vaccination program.

Reasons for vaccination acceptance and non-acceptance: Among those who wanted to get vaccinated, the reasons included personal protection 395 (76.1%), travelling purposes 11 (2.12%), an obligation by the employer 11 (2.12%), setting an example for others 54 (10.4%), and various other reasons like protection of family safety of others around etc 49 (7.7%) (Table-1).

Table-1: Sample Characteristics

Variables	No.	%	
Age (yrs)	18-25	119	22.9
	26-33	220	42.4
	34-41	107	20.6
	More than 41	73	14.1
Gender	Male	49	9.4
	Female	470	90.6
Marital Status	Single	199	38.3
	Married	312	60.1
	Divorced	1	0.2
	Widowed	7	1.3
Family Type	Nuclear	296	57.0
	Joint	218	42.0
	Extended	5	1.0
Occupation	Doctor	19	3.7
	Nurse	493	95.0
	Other Health Care Worker	7	1.3
Area of Work	OPDs	37	7.1
	Ward	205	39.5
	Emergency/ICUs	213	41.0
	Field	24	4.6
	PHC/CHC	40	7.7
Years of Experience	Less Than 1 Year	169	32.6
	1 To 5 Years	109	21.0
	6-10 Years	106	20.4
	More Than 10 Years	135	26.0
Level of health care facility where you are working	Tertiary Level	272	52.4
	Secondary Level	101	19.5
	Primary Level	146	28.1
Role in Covid-19 vaccination programme	Nodal Officer	4	0.8
	Coordinator	57	11.0
	Vaccinator	448	86.3
	Other	10	1.9
Training received before Covid 19 vaccination	Yes	315	60.7
	No	204	39.3
History of any of following co-morbidities?	Diabetes	21	4.0
	Heart Disease	7	1.3
	Hypertension	31	6.0
	COPD/Asthma	11	2.1
	Obesity	9	1.7
	Cancer	2	0.4
	Others	19	3.7
	No Such History	421	81.1
Are you immuno-compromised or any immuno-suppressants?	Yes	86	16.6
	No	433	83.4

Among those who didn't want to get vaccinated, reasons included confidence in not getting infected 104 (20.03%), believing they already had the disease and were immune 39 (7.5%), perceiving it as a mild infection that doesn't require hospitalization 49 (9.44%), waiting for vaccine efficacy trial results 48 (9.24%). Only 26 (5.1%) of the sample couldn't take the vaccine due to pregnancy, lactation and vacation. Other reasons for the non-acceptance included a preference for natural immunity, belief in herd immunity, fear of vaccine side effects, history of allergic reaction to vaccines, lack of knowledge about the vaccine, expecting other effective treatments, the belief that the development of the COVID vaccine was rushed or probably not thoroughly tested prior to approval. Further some religious beliefs, fear of getting infected instead, negative experiences with previous vaccinations, ineffectiveness against a mutating virus and rumours of death after the vaccination were the other reported causes of non-acceptance (Table-1).

Perception of health workers: A significant proportion 234 (45.08%) of participants felt that health workers were vaccinated first to test the effectiveness of the vaccine, while 180 (34.68%) held opposing views. Half of the participants 259 (49.99%) believed that they were at risk of getting the disease even after COVID-19 vaccination. However, 141 (27.16%) were confident about the efficacy of the vaccine in disease prevention. Quite a few respondents 377 (72.63%) agreed that vaccinating a large population will help to prevent disease while 77 (14.83%) varied in opinion.

Barriers to the implementation of the COVID-19 vaccination program: Participants perceived political circumstances, unfolding and evolving science of the virus, community actions and opinions to be barriers to the implementation of the vaccination drive. Majority of the participants 244 (47.01%) believed that political circumstances at the beginning of the program affected the implementation of the COVID-19 vaccination program to some extent, while 101(19.46%) thought it affected it to a great extent. The unfolding and frequently evolving science on SARS-CoV-2, the virus causing COVID-19, was perceived as a barrier to some extent by most participants 272 (52.4%), and to a great extent by 124 (23.89%). A significant number of participants 222(42.77%) thought that the actions and opinions of the community regarding the vaccine affected its implementation to a great extent, while 227(43.73%) believed it affected it to some extent.

Participants also identified other barriers to the implementation of the vaccination program, including the relationship between coverage rates and community transmission, availability of COVID-19 vaccination, non-availability of preferred types of vaccines, appropriate infrastructure, logistics supply, inadequate training, insufficient stocks, lack of proper adverse event following immunization (AEFI) management, and post-vaccination follow-up.

Discussion

The global healthcare community has been profoundly impacted by the COVID-19 pandemic, with frontline professionals tirelessly providing care to patients while navigating a myriad of personal and professional challenges. A significant challenge faced by healthcare professionals during this pandemic has been the apprehension of contracting COVID-19 in the course of receiving the vaccine. Our study echoed this concern, with approximately 60.1% of participants expressing the belief that they were at risk of contracting the virus during the vaccination process. These findings are consistent with similar studies conducted worldwide, which have highlighted the issue of COVID-19 vaccine hesitancy due to fear among healthcare professionals. For instance a study conducted in Egypt found that 64.8% of healthcare workers were concerned about the risk of side effects from the COVID-19 vaccine⁹. An Indian study found 60.1% of healthcare workers being concerned about the risk of contracting COVID-19 during the vaccination process.¹⁰

Our research delved deeper into this fear, examining prior studies that highlighted the hurdles faced by frontline healthcare workers. These challenges included issues such as inadequate supplies, workforce shortages, and increased workloads. Fear, however, stood out as a prevalent concern, as Ho et al. pointed out that healthcare workers feared various aspects, including the possibility of contracting the infection, transmitting the virus to their families or friends, and experiencing stigmatization¹¹. These findings underscore the tangible fear that healthcare professionals harbor regarding their own health and safety when administering COVID-19 vaccines, which could potentially influence their willingness to participate in vaccination programs.

Conversely, a cross-sectional national survey conducted in India yielded intriguing results, showing a strong positive correlation between the perceived risk of contracting COVID-19 and the willingness to receive vaccines among both patients and healthcare workers. In this context, perceived risk appears to be a driving force behind vaccine acceptance, indicating that even with concerns, healthcare professionals and patients are more willing to get vaccinated¹². Furthermore, peer-reviewed surveys have provided evidence that a substantial percentage of healthcare workers (ranging from 69% to 76.9%) expressed their acceptance of the vaccine due to their fear of contracting COVID-19 while working in designated healthcare facilities. This indicates that the fear of infection is a significant motivator for vaccine acceptance, irrespective of the duration of acceptance.¹³ Moreover, it is interesting to note that majority of participants (84%) believed in having good immunity during the early phases of the pandemic. This suggests that despite their perceived immunity, healthcare professionals still harbored concerns about contracting the disease during the vaccination process. This paradoxical belief underscores the complexity of vaccine hesitancy among healthcare workers. Additionally, the issue of COVID-19 vaccination training is noteworthy. Surprisingly, only 60.7% of participants reported receiving formal training related to COVID-19 vaccination. This signifies a significant gap in knowledge and readiness among healthcare professionals. It is imperative that healthcare professionals receive comprehensive training on COVID-19 vaccination, encompassing not only the technical aspects of vaccine administration but also addressing any misconceptions and concerns they may harbor. The absence of proper training among 39.3% of participants raises concerns regarding the potential for inadequate vaccine administration and patient safety. Ensuring the safety and efficacy of vaccination efforts necessitates the provision of extensive and ongoing training to healthcare workers. This training should encompass all aspects of COVID-19 mitigation strategies to effectively vaccinate the population.

Our study has elucidated a myriad of reasons influencing healthcare professionals' willingness to get vaccinated against COVID-19. Understanding these factors is vital for the successful implementation of vaccination programs and achieving herd immunity.

Reasons for Willingness to Get Vaccinated: Among healthcare professionals expressing willingness to get vaccinated, several common reasons have emerged. These reasons encompass the desire for personal protection, the need for vaccination to facilitate travel, compliance with employer obligations, setting an example for others, and various personal motives, including protecting family and ensuring the safety of others. These motivations align with the broader understanding that COVID-19 vaccination not only shields individuals but also contributes to the collective effort of preventing virus transmission and returning to a state of normalcy. This highlights the role of healthcare professionals as advocates for vaccination and their pivotal role in encouraging vaccine acceptance.

Reasons for Vaccine Hesitancy: In contrast, healthcare professionals who expressed reluctance to receive the COVID-19 vaccine articulated a range of concerns and reasons for their stance. These reasons included confidence in not getting infected, belief in existing immunity, perceiving infection as mild, waiting for vaccine trial results, preference for natural immunity or herd immunity, fear of vaccine side effects, lack of knowledge, skepticism about vaccine development and testing, religious beliefs, fear of infection after vaccination and negative experiences with previous vaccinations.

Some healthcare professionals believe in their own immunity and were confident in not contracting the virus, leading to a decreased motivation for vaccination. Some individuals held the belief that they had already acquired immunity, which diminished their perceived need for the vaccine. A subset of healthcare professionals viewed a potential COVID-19 infection as mild and non-threatening, further reducing their motivation to be vaccinated. A cautious approach was observed in those who prefer to wait for more data and conclusive results from vaccine trials before making a decision. A segment of healthcare workers opted for natural infection or relied on the concept of herd immunity, considering vaccination unnecessary. Limited knowledge or awareness about the vaccine's safety, efficacy and concerns about potential side effects coupled with doubts about the vaccine's development, approval process, and testing procedures of the vaccine played a significant role in hesitancy among some healthcare professionals. Religious convictions was expressed by some individuals as the reason to reject vaccination Few of them believed in the availability of alternative treatments for COVID-19 reducing the urgency of vaccination. Negative past experiences with vaccines alongwith factors such as pregnancy, lactation, or vacation plans also limited vaccine eligibility for some healthcare professionals. The perception of the vaccine's efficacy against new variants of the virus was a concern for some. Nevertheless the misinformation and rumours about severe side effects or even death following vaccination also contributed to hesitancy as reported by some.

Our study findings reflect the complexities of vaccine hesitancy among healthcare professionals, mirroring the global landscape. Comparable international studies have also indicated varying levels of willingness and hesitancy among healthcare workers, influenced by similar reasons such as concerns about safety, vaccine efficacy, and misinformation.^{14, 15, 16, 17, 18}

The perception of healthcare workers regarding the COVID-19 vaccine is also varied. While half of the participants believed that they were at risk of getting the disease even after vaccination, a significant proportion (27.16%) expressed confidence in the efficacy of the vaccine in preventing disease. Furthermore, a considerable number of participants (72.63%) agreed that vaccinating a large population would help prevent the spread of the disease. These findings suggest that there is a mixed perception among healthcare professionals regarding the COVID-19 vaccine. Some participants expressed a level of distrust or scepticism regarding the motives behind prioritizing healthcare workers for vaccination. However, it is important to note that a significant portion of participants held opposing views and did not believe that health workers were vaccinated first for testing purposes. Analogous findings are noted in various studies within and outside the country where most of the subjects perceived the vaccine as safe and effective with minimal undesirable effects,^{19, 20} but few held opposing views.^{21, 22, 23} The role of trust and confidence in government, healthcare agencies, and pharmaceutical companies is consistently cited as a barrier to vaccine acceptance, emphasizing the importance of transparent and reliable information dissemination.

The study identified several barriers to the implementation of the COVID-19 vaccination program. Majority believed that political circumstances at the beginning of the program had some impact on the implementation of the vaccination program, while a significant number believed that it had a great extent of impact. The unfolding and evolving science of the virus was also perceived as a barrier by most participants, highlighting the challenges posed by the rapidly changing nature of the pandemic and the need for healthcare professionals to keep up with the latest information and research. Additionally, participants identified the actions and opinions of the community as another barrier and believed that community perceptions and actions regarding the vaccine were influential in its implementation. Furthermore, the participants also identified various other barriers to the implementation of the vaccination program, including issues related to coverage rates and

community transmission, availability of COVID-19 vaccination, logistical challenges such as infrastructure and supply, inadequate training, and proper management of adverse events following immunization

Our findings align with diverse studies across different regions and methodologies, underscoring consistent barriers to COVID-19 vaccination. These barriers encompass various aspects, including inadequate staff training (70.3%), a lack of human resources (64.9%), insufficient personal protective equipment supplies (60.9%), and the absence of a cold chain for vaccine storage (57.5%) in Papua New Guinea.²⁴ The findings of cross-sectional Indian survey mirror the concerns regarding vaccine availability, unpredictable vaccine effects, potential vaccine faults, concerns about vaccine authenticity, and the profit motives of pharmaceutical companies,²⁵ in sync with few other study results.^{26, 27} A systematic review further substantiates these challenges, revealing that 64% of barriers are attributed to market forces, 53% to vaccine unavailability, and 28% to unreliable health and supply systems.²⁸

Collectively, these global studies emphasize the need for addressing these concerns and opinions to ensure widespread acceptance and implementation of the vaccination program. Dealing with these barriers requires a comprehensive approach that involves addressing political interference, improving communication and awareness, building trust in vaccines, and overcoming operational challenges. By acknowledging the hurdles we can better tailor our communication strategies to different communities. These strategies should include authentic community engagement, fact-finding, rumor control, dispelling of myths and misinformation, message monitoring, and utilizing a variety of spokespersons and leaders from diverse backgrounds.

Limitations

While the findings of this study conducted in Madhya Pradesh, India, provide valuable insights into vaccine hesitancy and challenges faced during program implementation, it's essential to acknowledge the study's limitations. The regional focus restricts the generalizability of the results to broader populations, and the reliance on self-reported data may introduce social desirability bias. Additionally, the study did not explore individual-level factors influencing hesitancy. Despite these limitations, this research highlights the need for targeted interventions and improved communication strategies to address healthcare workers' concerns and promote vaccine acceptance in the fight against the COVID-19 pandemic

Conclusion

This study highlights the intricate nature of vaccine hesitancy among healthcare professionals. Their reservations are complex, and their buy-in is pivotal for successful vaccination programs. Policymakers, healthcare authorities, and researchers must collaborate to proactively engage healthcare professionals, provide training and support, and tailor strategies to enhance vaccine acceptance. Effective vaccination campaigns should consider the unique context and socio-demographic factors, tailoring interventions to specific populations and communities. Nevertheless, the success of vaccination programs depends on healthcare workers' support. By acknowledging and proactively addressing these concerns, we can enhance vaccine acceptance, increase vaccination coverage, and contribute to the global effort to combat any pandemic.

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