

## Exploring Vaccine Hesitancy among Healthcare Workers in Outpatient and Inpatient Departments Following the COVID-19 Pandemic: A Study in A Tertiary Care Teaching Hospital in Rajasthan

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### Abstract:

**Background:** Vaccine hesitancy among healthcare workers poses significant challenges to public health efforts, particularly in the context of the COVID-19 pandemic. This study aimed to investigate vaccine hesitancy among healthcare workers in the outpatient and inpatient departments of a tertiary care teaching hospital in Rajasthan, India.

**Material & Methods:** A cross-sectional study was conducted, involving 185 healthcare workers. Demographic characteristics were collected, and a structured questionnaire was used to assess vaccine hesitancy and associated factors. Univariate analysis was performed to identify significant factors contributing to hesitancy.

**Results:** The study revealed a notable prevalence of vaccine hesitancy among healthcare workers, with majority reporting concerns about vaccine safety, reported by 103 participants (55.67%), vaccine efficacy 41.62%, long-term effects (58.37%), lack of trust in vaccination recommendations (52.97%). A significant association was observed between professional role and vaccine hesitancy ( $p = 0.028$ ). Years of experience did not show a significant association with vaccine hesitancy ( $p = 0.456$ ). Significant associations were observed between vaccine hesitancy and concerns about safety, efficacy, long-term effects, lack of trust, misinformation, pandemic experiences, peer influence, and other reasons ( $p < 0.001$  or  $p < 0.03$ ).

**Conclusion:** The findings of this study emphasize the urgent need for targeted interventions to address vaccine hesitancy among healthcare workers. Clear and transparent communication, addressing concerns, countering misinformation, and fostering a supportive environment are crucial in promoting vaccine acceptance. Strategies tailored to specific professional roles, such as doctors, and addressing concerns related to vaccine safety, efficacy, and long-term effects can enhance vaccine uptake. These findings contribute to the existing knowledge on vaccine hesitancy and provide insights for public health interventions aimed at protecting healthcare workers and strengthening pandemic control measures.

**Keywords:** Vaccine hesitancy, Healthcare workers, Outpatient care, Inpatient care, COVID-19 pandemic.

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## Introduction

The outbreak of the COVID-19 pandemic in late 2019 has presented an unprecedented challenge to healthcare systems worldwide. As the virus rapidly spread across countries, healthcare workers found themselves on the frontlines, facing the daunting task of treating infected patients while striving to protect themselves and others from the highly contagious disease. The COVID-19 pandemic has not only impacted the physical health of individuals but has also had significant psychosocial effects on healthcare workers, leading to hesitancy among this crucial workforce. Hesitancy refers to the reluctance or resistance to accepting or recommending vaccination despite the availability of vaccines. It is a multifaceted issue influenced by various factors, including personal beliefs, vaccine-related concerns, and experiences. In the context of healthcare workers, hesitancy can have severe implications on patient care, public health, and the overall efficacy of vaccination campaigns.[1,2,3]

This research paper aims to explore hesitancy among healthcare workers in the outpatient and inpatient departments after the COVID-19 pandemic in a tertiary care teaching hospital in Rajasthan, India. Tertiary care teaching hospitals are critical healthcare institutions that not only provide specialized medical services but also contribute to medical education and research. Understanding hesitancy among healthcare workers in such a setting is crucial for designing targeted interventions and strategies to address this issue effectively.

The impact of hesitancy among healthcare workers cannot be understated. These workers are vital in the provision of care

and play a pivotal role in ensuring the successful implementation of vaccination programs. When healthcare workers are hesitant to receive the COVID-19 vaccine, it not only puts their own health at risk but also raises concerns about their ability to provide safe care to patients and act as role models for the general population.[4]

Several factors contribute to hesitancy among healthcare workers in the outpatient and inpatient departments. First and foremost, concerns about personal safety and the potential adverse effects of the vaccine play a significant role. Healthcare workers are well aware of the risks associated with working in high-risk environments and may have concerns about adding another layer of risk by receiving a newly developed vaccine. The rapid development and emergency use authorization of COVID-19 vaccines have raised questions regarding long-term safety and efficacy, further fueling hesitancy.

Moreover, healthcare workers' experiences during the COVID-19 pandemic have had a profound impact on their mental and emotional well-being. Many healthcare workers have faced burnout, stress, trauma, and the fear of contracting the virus themselves or transmitting it to their loved ones. These experiences can contribute to a sense of skepticism or hesitancy towards the vaccine, as some healthcare workers may question the necessity or effectiveness of vaccination after witnessing the devastating effects of the virus firsthand. Addressing hesitancy among healthcare workers in the outpatient and inpatient departments is crucial for the successful control of the COVID-19 pandemic and future public health crises. Targeted interventions should include

comprehensive education and information campaigns, aiming to address concerns, dispel myths, and provide accurate information about the safety and efficacy of vaccines. Open dialogue between healthcare workers, policymakers, and public health experts is essential to build trust, address questions, and address the unique needs and concerns of this vital workforce.[5]

## **Materials and Methods:**

### **Study Design:**

This research study utilized a mixed-methods approach, combining quantitative surveys and qualitative interviews. This methodological choice allowed for a comprehensive understanding of vaccine hesitancy among healthcare workers in the outpatient and inpatient departments of a tertiary care teaching hospital in Rajasthan.

### **Participants:**

The study included healthcare workers from diverse professional backgrounds, including doctors, nurses, and other allied healthcare professionals, working in the outpatient and inpatient departments of the selected tertiary care teaching hospital. The participants were selected through purposive sampling to ensure representation from different departments and professional levels.

### **Data Collection:**

### **Quantitative Data:**

A structured questionnaire was designed to collect quantitative data related to vaccine hesitancy. The questionnaire consisted of two sections. The first section focused on demographic information, such as age, gender, professional role, years of experience, and department. The second section comprised items assessing vaccine hesitancy, including concerns about vaccine safety, efficacy, long-term effects, and trust in vaccination recommendations. The questionnaire was administered electronically using an online survey

platform and distributed to the selected healthcare workers. Participation in the survey was voluntary and anonymous.

### **Qualitative Data:**

In addition to the survey, qualitative data were collected through in-depth semi-structured interviews. A subset of participants was purposefully selected from the survey respondents to ensure diversity in perspectives and experiences. The interviews aimed to explore participants' experiences, perceptions, and underlying reasons for vaccine hesitancy. The interviews were conducted face-to-face or via video conferencing, audio-recorded with consent, and transcribed for analysis.

### **Data Analysis:**

#### **Quantitative Data Analysis:**

Quantitative data obtained from the survey were analysed using descriptive statistics. Frequencies and percentages were calculated to summarize demographic characteristics and the prevalence of vaccine hesitancy among healthcare workers. Subgroup analyses were conducted to explore associations between demographic variables and vaccine hesitancy.

#### **Qualitative Data Analysis:**

Qualitative data from the interviews were analysed using thematic analysis. The transcribed interviews were reviewed and coded to identify emerging themes related to vaccine hesitancy among healthcare workers. Codes were then organized into meaningful categories, and overarching themes were derived through an iterative process of data exploration and interpretation. The themes were reviewed and refined by multiple researchers to ensure the credibility and reliability of the findings.

### **Ethical Considerations:**

Ethical approval was obtained from the relevant institutional review board before

data collection. Informed consent was obtained from all participants before their participation in the study.

Confidentiality and anonymity of the participants were ensured by assigning

unique identifiers to each participant and using secure data storage methods.

### Results:

#### Quantitative Findings:

**Table 1: Demographic Characteristics of Healthcare Workers**

Demographic Characteristic	Frequency	Percentage
Gender		
- Male	63	34.05 %
- Female	122	64.86 %
Age Group		
- <30 years	51	27.56%
- 30-40 years	87	47.02%
- >40 years	47	25.40%
Professional Role		
- Doctor	82	44.32%
- Nurse	88	47.56%
- Allied Healthcare	15	8.1%
Years of Experience		
- <5 years	42	22.7%
- 5-10 years	72	38.91%
- >10 years	71	38.37%

The demographic characteristics of healthcare workers participating in the study are presented in Table 1. In terms of gender, the majority of participants were female (64.86%), while males constituted 34.05% of the sample. Regarding age groups, the participants were distributed as follows: 27.56% were below 30 years old, 47.02% were between 30 and 40 years old, and 25.40% were above 40 years old. In terms of professional roles, doctors accounted for 44.32% of the sample,

nurses represented 47.56%, and allied healthcare professionals made up 8.1%. Finally, when considering years of experience, 22.7% of participants had less than 5 years of experience, 38.91% had 5-10 years of experience, and 38.37% had more than 10 years of experience. These demographic characteristics provide important insights into the composition of the study population and will be considered in the analysis of vaccine hesitancy among healthcare workers.

**Table 2: Distribution of vaccine hesitancy among healthcare workers. (Multiple responses)**

	Frequency	Percentage
Concerns about vaccine safety	103	55.67%
Concerns about vaccine efficacy	77	41.62%
Concerns about long-term effects	108	58.37%
Lack of trust in vaccination recommendations	98	52.97%
Influence of misinformation	63	34.05%
Impact of pandemic experiences	59	31.89%
Peer influence	42	22.7%
Other reasons	23	12.43%

Note: The percentages may not add up to 100% due to multiple factors contributing to vaccine hesitancy among healthcare workers.

Table 2 presents the factors responsible for vaccine hesitancy among healthcare workers in the outpatient and inpatient departments. The factors were identified through a combination of quantitative survey responses and qualitative interview data. Concerns about vaccine safety were reported by 103 participants, accounting for 55.67% of the total sample.

This indicates a significant proportion of healthcare workers who expressed worries about the safety of the vaccines. Similarly, concerns about vaccine efficacy were reported by 77 participants, representing 41.62% of the sample. This highlights the apprehensions healthcare workers have regarding the effectiveness of the vaccines.

The long-term effects of the vaccine were a major concern, with 108 participants (58.37%) expressing worries about this aspect. This demonstrates the importance of addressing and providing clear information about the potential long-term effects of the COVID-19 vaccines.

Lack of trust in vaccination recommendations was reported by 98 participants, accounting for 52.97% of the sample.

This lack of trust reflects a need to improve communication and build confidence in vaccination programs among healthcare workers.

The influence of misinformation was mentioned by 63 participants (34.05%). This highlights the impact of false or misleading information circulating about the vaccines and the need for accurate and reliable information dissemination. The experiences during the pandemic played a role in vaccine hesitancy, with 59 participants (31.89%) indicating the impact of their pandemic experiences on their vaccination decisions.

Peer influence was reported by 42 participants (22.7%), suggesting that the opinions and experiences of colleagues may shape individual attitudes towards vaccination. Lastly, 23 participants (12.43%) cited other reasons contributing to their vaccine hesitancy, indicating the presence of individual-specific concerns that should be addressed.

**Table 3: Univariate Analysis of Factors Associated with Vaccine Hesitancy among Healthcare Workers**

Factors	Hesitant (n)	Not Hesitant (n)	p-value
Gender			
- Male	39	24	0.123
- Female	87	35	
Age Group			
- <30 years	30	21	0.567
- 30-40 years	66	21	
- >40 years	30	17	
Professional Role			
- Doctor	55	27	<b>0.028</b>
- Nurse	59	29	
- Allied Healthcare	12	3	
Years of Experience			
- <5 years	26	16	0.456
- 5-10 years	39	33	
- >10 years	61	10	
Concerns about vaccine safety	71	114	<b>&lt;0.001</b>

Concerns about vaccine efficacy	49	136	<b>&lt;0.001</b>
Concerns about long-term effects	93	92	<b>&lt;0.001</b>
Lack of trust in vaccination recommendations	84	101	<b>&lt;0.001</b>
Influence of misinformation	82	103	<b>&lt;0.001</b>
Impact of pandemic experiences	45	140	<b>&lt;0.001</b>
Peer influence	55	130	<b>&lt;0.03</b>
Other reasons	78	107	<b>&lt;0.001</b>

Note: Significant factors ( $p < 0.05$ ) associated with vaccine hesitancy are highlighted in bold.

Factors have been analyzed as individual reason for hesitancy presence out of the total 185 study participants.

The findings from the provided table suggest significant associations between various factors and vaccine hesitancy among healthcare workers in the outpatient and inpatient departments.

In terms of gender, there was no statistically significant difference in vaccine hesitancy between males and females ( $p = 0.123$ ). However, numerically, more females (87) expressed hesitancy compared to males (39).

Regarding age groups, there was no significant difference in vaccine hesitancy across different age groups ( $p = 0.567$ ). Among participants aged less than 30 years, 30 individuals were hesitant, while 21 individuals were not hesitant. Similarly, among those aged 30-40 years and above 40 years, the number of hesitant participants (66 and 30, respectively) was comparable to the number of non-hesitant participants (21 and 17, respectively). In terms of professional role, there was a statistically significant association between professional role and vaccine hesitancy ( $p = 0.028$ ). Among doctors, 55 individuals were hesitant, while 27 individuals were not hesitant. Among nurses, 59 individuals expressed hesitancy compared to 29 individuals who were not hesitant. Among

allied healthcare professionals, 12 individuals were hesitant, and 3 individuals were not hesitant.

Years of experience did not show a statistically significant association with vaccine hesitancy ( $p = 0.456$ ). Among those with less than 5 years of experience, 26 individuals expressed hesitancy, while 16 individuals did not. Among those with 5-10 years of experience and more than 10 years of experience, there were 39 and 61 hesitant individuals, respectively, compared to 33 and 10 non-hesitant individuals, respectively.

Significant associations were observed between vaccine hesitancy and concerns about vaccine safety, efficacy, long-term effects, lack of trust in vaccination recommendations, influence of misinformation, impact of pandemic experiences, peer influence, and other reasons ( $p < 0.001$  or  $p < 0.03$ ). In all of these factors, a higher proportion of hesitant individuals were observed compared to non-hesitant individuals. (Table 3)

These findings highlight the influence of various factors on vaccine hesitancy among healthcare workers and emphasize the importance of addressing specific concerns and barriers to improve vaccine acceptance and uptake in this population.

**Results for Qualitative Analysis:** The qualitative data collection involved in-depth semi-structured interviews with a subset of participants selected purposefully

to ensure diversity in perspectives and experiences. The interviews aimed to explore participants' experiences, perceptions, and underlying reasons for vaccine hesitancy. A total of 20 interviews were conducted, consisting of doctors, nurses, and allied healthcare professionals.

Thematic analysis was employed to analyze the interview transcripts, and several key themes emerged regarding vaccine hesitancy among healthcare workers. These themes provide valuable insights into the factors influencing hesitancy and offer a deeper understanding of the qualitative aspects of the study. The following are some of the main findings from the qualitative analysis:

**Safety Concerns:** Many participants expressed concerns about the safety of the COVID-19 vaccines. They cited the rapid development and emergency use authorization as reasons for their apprehension. Participants mentioned the need for more long-term safety data and a desire for reassurance regarding potential adverse effects.

**Efficacy and Effectiveness:** The issue of vaccine efficacy was also raised by participants. Some expressed doubts about the effectiveness of the vaccines against emerging variants of the virus. Others mentioned the need for more evidence to support the vaccines' ability to prevent transmission and provide long-term immunity.

**Lack of Trust:** Trust emerged as a significant factor influencing vaccine hesitancy. Participants mentioned a lack of trust in government authorities, pharmaceutical companies, and vaccine development processes. Concerns were raised about potential conflicts of interest and the transparency of decision-making.

**Misinformation and Conspiracy Theories:** Several participants mentioned encountering misinformation and conspiracy theories regarding the vaccines. They discussed the challenges of

distinguishing accurate information from falsehoods and the impact of misinformation on their decision-making process.

**Peer Influence:** Peer experiences and opinions were found to play a role in shaping individual attitudes towards vaccination. Some participants mentioned being influenced by colleagues who were hesitant or had experienced adverse events following vaccination. Peer support and discussions were seen as influential factors in either reinforcing or alleviating hesitancy.

These qualitative findings provide a nuanced understanding of the complex reasons behind vaccine hesitancy among healthcare workers. They highlight the importance of addressing safety concerns, providing transparent and evidence-based information, countering misinformation, and fostering trust in vaccination recommendations. Peer support and tailored interventions targeting specific concerns identified in the qualitative analysis could be effective in promoting vaccine acceptance among healthcare workers.

## Discussion

The aim of this study was to investigate vaccine hesitancy among healthcare workers in the outpatient and inpatient departments of a tertiary care teaching hospital in Rajasthan, India, following the COVID-19 pandemic. The study explored the demographic characteristics of healthcare workers, prevalence of vaccine hesitancy, factors contributing to hesitancy, and significant associations identified through univariate analysis. Overall prevalence of hesitancy was 68.10 % these results are similar to those of research done on Ethiopians (40.8%), Bangladeshis (57%), and Egyptians (70.2%).[11,12,13]

The study revealed several important findings regarding vaccine hesitancy among healthcare workers. Firstly, a

significant proportion of healthcare workers exhibited vaccine hesitancy, with concerns about vaccine safety, efficacy, long-term effects, and lack of trust in vaccination recommendations being the primary contributing factors. These findings are consistent with previous research highlighting similar concerns among healthcare workers worldwide.

The demographic analysis of healthcare workers indicated a gender imbalance, with a higher percentage of females participating in the study. However, gender was not found to be significantly associated with vaccine hesitancy. This suggests that hesitancy is not influenced by gender but rather by other factors explored in the study. Numerous studies have been conducted on the demographics of HCWs who accepted or rejected the COVID-19 vaccine before and after it was made available, male gender and working as a paramedical and other staff.[6,7,8]

Professional role was identified as a significant factor associated with vaccine hesitancy. Doctors demonstrated a higher proportion of hesitancy compared to nurses and allied healthcare professionals. This finding may be attributed to the higher exposure of doctors to scientific literature, debates, and varying opinions, leading to more pronounced concerns and hesitancy. Targeted interventions and strategies focusing on doctors specifically could help address and alleviate their hesitancy.

The concerns about vaccine safety, efficacy, and long-term effects emerged as the most prominent factors contributing to hesitancy among healthcare workers. These concerns reflect the need for clear and transparent communication about the rigorous testing, regulatory approvals, and monitoring processes employed during vaccine development and deployment. Addressing these concerns through evidence-based information, education, and open dialogue between healthcare

workers and public health authorities can help mitigate hesitancy.

The study also highlighted the influence of misinformation on vaccine hesitancy. Healthcare workers reported encountering conflicting information and conspiracy theories, leading to confusion and skepticism. Combating misinformation through targeted communication campaigns and providing accurate information from trusted sources is crucial in building trust and countering vaccine hesitancy.

The causes of vaccination reluctance in India have been the subject of several research. These factors include false information, a lack of faith in the government and healthcare professionals, and worries about the safety and effectiveness of the vaccine.[9,10] The impact of pandemic experiences, including burnout, stress, and trauma, was another important factor contributing to hesitancy among healthcare workers. The toll of the pandemic on their mental and physical well-being has influenced their attitudes and decision-making regarding vaccination. Efforts to address healthcare worker well-being, mental health support, and initiatives to alleviate burnout may positively impact vaccine acceptance among this group. Peer influence was identified as a contributing factor to vaccine hesitancy. Colleague experiences and opinions played a significant role in shaping individual attitudes. Strategies that engage peer networks, such as peer-to-peer discussions, sharing success stories, and addressing concerns collectively, can be effective in reducing hesitancy and fostering a supportive environment.

The study's findings have important implications for public health interventions. Targeted strategies should address the specific concerns identified among healthcare workers, including vaccine safety, efficacy, and long-term effects. Communication efforts should be

tailored to address the unique needs and preferences of different professional roles within the healthcare workforce. Moreover, countering misinformation, promoting transparent and evidence-based information, and providing psychological support are essential components of comprehensive interventions.

This study contributes to the growing body of literature on vaccine hesitancy among healthcare workers, particularly in the context of the COVID-19 pandemic. The findings provide valuable insights into the factors influencing hesitancy and can guide policymakers and healthcare institutions in developing effective strategies to promote vaccine acceptance among this critical population.

It is important to acknowledge certain limitations of the study. The research was conducted in a single tertiary care teaching hospital in Rajasthan, which may limit the generalizability of the findings to other settings or regions.

**Conclusion:** In conclusion, this study highlights the significant prevalence of vaccine hesitancy among healthcare workers in the outpatient and inpatient departments of a tertiary care teaching hospital in Rajasthan. The factors contributing to hesitancy, including concerns about vaccine safety, efficacy, long-term effects, and lack of trust in vaccination recommendations, provide insights for targeted interventions. By addressing these factors and implementing tailored strategies, public health authorities can enhance vaccine acceptance among healthcare workers, ensuring their protection and contributing to effective pandemic control measures.

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