



COVID-19 Vaccine Acceptance and Hesitancy among Healthcare Workers at a Teaching Hospital in Zambia: Findings and Implications

Steward Mudenda^{1*}, Banji Moonga¹, Maisa Kasanga², Victor Daka³, Ngoni Veddie Muzondo⁴, Ruth Lindizyani Mfuno³, Shafiq Mohamed⁵, Nathan Mugenyi⁶, Manal Hadi Ghaffoori Kanaan⁷, Billy Chabalenge⁸

¹Department of Pharmacy, School of Health Sciences, University of Zambia, Lusaka, Zambia

²Department of Epidemiology and Biostatistics, School of Public Health, Zhengzhou University, Zhengzhou, China

³Department of Public Health, Michael Chilufya Sata School of Medicine, Copperbelt University, Ndola, Zambia

⁴Harare Institute of Technology, Ganges Road, Harare, Zimbabwe

⁵Medicines Management and Pharmacy Services, St. James University Hospital, Leeds Teaching Hospitals NHS Trust, Leeds, UK

⁶Faculty of Medicine, Mbarara University of Science and Technology, Mbarara, Uganda

⁷Department of Agriculture, Technical Institute of Suwaria, Middle Technical University, Baghdad, Iraq

⁸Department of Medicines Control, Zambia Medicines Regulatory Authority, Lusaka, Zambia

Email: *steward.mudenda@unza.zm

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Abstract

Introduction: The coronavirus disease (COVID-19) vaccines provided renewed hope in the fight against the COVID-19 pandemic. To promote extensive vaccination coverage, it is imperative to assess the inclination towards receiving vaccines and examine the influencing factors among healthcare workers (HCWs). This study evaluated COVID-19 vaccine acceptance and hesitancy among HCWs at a Teaching Hospital in Zambia. **Materials and Methods:** This cross-sectional study was conducted among 200 HCWs at the University Teaching Hospital in Lusaka, Zambia from August 2022 to October 2022 using a structured questionnaire. Data analysis was performed using IBM SPSS version 23.0. Statistical significance was determined at a 95% confidence level. **Results:** A total of 200 participants were enrolled in the study of which 71.5% (n = 143) were female and 57% (n = 114) were aged between 20 and 30 years. The overall vaccine acceptance was 73% and was higher among medical doctors and nurses than pharmacists. Of the 146 HCWs that had been vaccinated, 69.2% had received the Johnson and Johnson vaccine. Vaccine hesitancy was due to the fear of side effects, concerns about vaccine effectiveness, and rushed development of the COVID-19 vaccines. Vaccine acceptance was influenced by age (p = 0.037), profession (p = 0.001) and providing direct care to COVID-19 patients (p = 0.001). **Conclusion:** This study

found a high acceptance and uptake of the COVID-19 vaccines among frontline HCWs, especially among medical doctors and nurses which is key due to their clinical role of providing direct care to COVID-19 patients. There is a need to address the factors that cause vaccine hesitancy among some HCWs.

Subject Areas

Epidemiology, Health Policy, Immunology

Keywords

COVID-19, Healthcare Workers, Vaccination, Vaccine Hesitancy, Vaccine Uptake, Zambia

1. Introduction

The coronavirus disease 2019 (COVID-19) emerged as a global public health threat in December 2019 and was declared a pandemic on 11th March 2020 by the World Health Organization (WHO) [1] [2]. The pandemic affected many human activities leading to the closure of schools, a ban on public gatherings, and reduced trade [3]-[6]. This caused a substantial stoppage to key sectors of world economies and put many communities at risk of infection [7] [8]. Consequently, the pandemic caused an increase in morbidity and mortality worldwide [9]-[11].

The WHO recommended that countries implement various COVID-19 preventive measures including wearing face masks, social and physical distancing, adequate hand washing, and quarantine [12]-[14]. These measures are important in preventing the transmission of COVID-19, especially amongst high-risk groups such as healthcare workers (HCWs) who are in frequent close contact with patients [15]-[17]. COVID-19 vaccines were developed in record time to promote immunity against COVID-19 and prevent severe manifestations of the disease [18] [19]. The development of COVID-19 vaccines and their widespread implementation was a huge milestone in the fight against COVID-19, especially with the SARS-CoV-2 rapidly mutating [20]. However, COVID-19 vaccines were received with mixed feelings due to their speed of development thereby leading to low acceptance in some populations [21]-[24].

Vaccine hesitancy is used to describe a situation where people refuse or delay being vaccinated despite the availability of vaccines and related services [25]-[27]. Global studies have reported COVID-19 vaccine hesitancy among HCWs, students, and the general population [28]-[35]. Growing misinformation about vaccines has fueled vaccine hesitancy [36]-[40]. Additionally, vaccine hesitancy has also been accelerated by the belief that vaccines have side effects, may not be effective, and a lack of confidence in their source [41]-[43]. Certain religious beliefs and fear of side effects have contributed to increased

vaccine hesitancy among different populations [44] [45]. HCWs are critical in the fight against COVID-19 and vaccine hesitancy [46]. Hence, their high acceptance of COVID-19 vaccines would serve as an example for other people to be vaccinated [46] [47]. While some studies have reported high acceptance of COVID-19 vaccines among HCWs [47]-[52], there is also a wealth of studies that have reported a low acceptance of COVID-19 vaccines among HCWs [31] [53]-[57]. Therefore, there is a need to develop strategies to address vaccine hesitancy [58] [59].

In Zambia, the first cases of COVID-19 were reported on March 18, 2020 [9] [60] [61]. Zambia's response to the COVID-19 outbreak involved implementing the recommended preventive measures and instigating vaccination programs [13] [62]. Five vaccines were approved for use in Zambia including Pfizer/BioNTech, Johnson and Johnson, AstraZeneca Covishield, AZD 12225-Korea AstraZeneca, and Sinopharm [62] [63]. The vaccines were deployed extensively across the country, with priority given to high-risk groups such as HCWs [48]. Some studies regarding COVID-19 vaccine acceptance have been conducted among the general population, pregnant women, students, adolescents, youths, and pupils than among HCWs [48] [64]-[68]. Conversely, there is still little information on the acceptance and uptake of COVID-19 vaccines among HCWs in Zambia. Here, we conducted a study to assess the acceptance and uptake of the COVID-19 vaccines among HCWs at the University Teaching Hospitals in Lusaka, Zambia.

2. Materials and Methods

2.1. Study Design, Population, Site, and Period

A cross-sectional study was conducted among HCWs from August 2022 to October 2022 at the University Teaching Hospital in Lusaka, Zambia. The hospital is the largest tertiary specialist referral hospital in Zambia with a bed capacity of approximately 2000 [69]. The study included nurses, pharmacists, and medical doctors who were present at the time of the study and provided informed and written consent. These HCWs were selected because they were involved in the frontline fight against COVID-19 in Zambia. Consequently, this study excluded all HCWs who were not available during the data collection period at the study site.

2.2. Sample Size Estimation and Sampling Criteria

Before the study, we estimated a sample size using Cochran's formula [70]. We used a 95% confidence level, a conservative proportion of 50%, and a 5% margin of error to arrive at a minimum sample size of 385 HCWs. We employed a conservative proportion of 50% due to the lack of studies done among HCWs before this study. A content sampling technique was used to select the participants in the study. This was due to challenges in finding HCWs as a result of measures that had been put in place to prevent COVID-19.

2.3. Data Collection

Data collection was done using an adapted questionnaire from a previous study on vaccine acceptance and hesitancy among HCWs [53]. The questionnaire was divided into five sections: Section A had questions on the sociodemographic characteristics of participants including their gender, age, religion, profession, nationality, marital status and acceptance of COVID-19. Section B had questions on the experiences of HCWs during the COVID-19 pandemic. Section C had questions on the acceptance of COVID-19 vaccines by profession type. Section D had questions on the acceptance of COVID-19 vaccines by type. Section E had questions on the reasons for accepting and refusing to be vaccinated.

2.4. Data Analysis

The collected data were entered in Microsoft Excel and coded and cleaned. After coding, the data were transferred into IBM Statistical Package for Social Sciences (SPSS) version 23.0 for statistical analysis. Descriptive statistics were performed on the sociodemographic characteristics, and these were presented in the form of a table. Our primary outcome was vaccine acceptance. A chi-square test was used to examine the relationship between sociodemographic variables and vaccine acceptance/hesitancy. A p-value less than 0.05 was considered statistically significant at a 95% confidence level.

2.5. Ethical Approval

We obtained ethical approval from the University of Zambia Health Sciences Research Ethics Committee (UNZAHSREC) with an approval number of 2022112301127. We obtained permission to conduct the study at the University Teaching Hospital from the Senior Medical Superintendent. The purpose of the study was explained to the participants at the study site. Participation in the study was voluntary and only involved HCWs who provided informed and written consent. No participant identifiers were used to maintain confidentiality and anonymity. All the collected data was restricted to the investigators and secured in lockable cabinets in the study office.

3. Results

3.1. Sociodemographic Characteristics of Participants

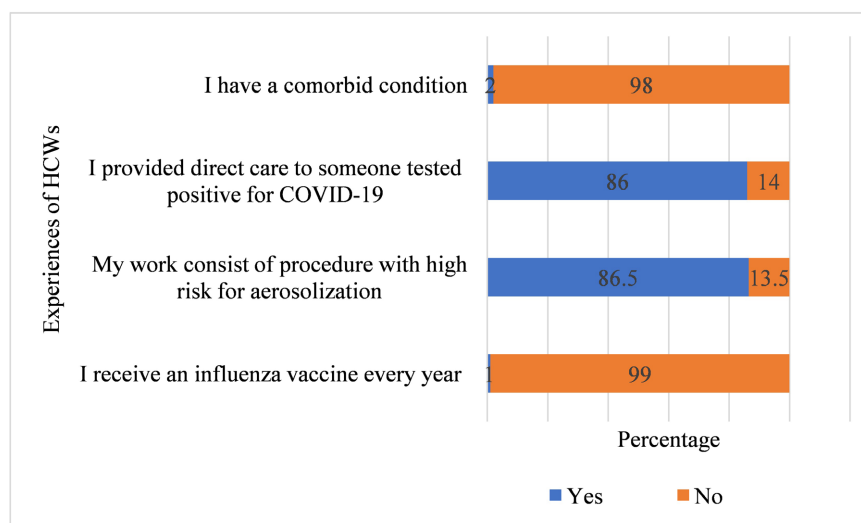
From a total of 200 participants, 71.5% were female, 57% were aged between 20 and 30 years, and the majority (72%) were nurses. Of the 200 participants, 73% (n = 146/200) had accepted the COVID-19 vaccines and were vaccinated as it was readily available at the hospital (**Table 1**).

3.2. Experiences of HCWs during the COVID-19 Pandemic

Most of the participants (98%) did not have comorbidities but 86% were involved in the direct care of COVID-19 patients and their work involved a high risk of transmission of COVID-19 (**Figure 1**).

Table 1. Baseline socio-demographic characteristics of participants.

Variable	Characteristics	Frequency (n = 200)	Percent (%)
Gender	Female	143	71.5
	Male	57	28.5
Age (years)	20 - 30	114	57.0
	31 - 40	58	29.0
	41 - 50	26	13.0
	>50	2	1.0
Religion	Christian	198	99.0
	Muslim	2	1.0
Profession	Medical doctor	23	11.5
	Pharmacist	33	16.5
	Nurses	144	72.0
Nationality	Zambian	195	97.5
	Non-Zambian	5	2.5
Marital Status	Married	91	45.5
	Single	102	51.2
	Divorced	2	1.0
	Widowed	5	2.5
Acceptance of COVID-19 vaccines	Yes	146	73
	No	54	27

**Figure 1.** Experiences of participants during the COVID-19 pandemic.

3.3. COVID-19 Vaccine Acceptance among Healthcare Workers

This study found that vaccine acceptance and uptake were higher among medical doctors 23/23 (100%) and nurses 106/144 (73.6%) than among pharmacists

17/33 (51.5%) (Figure 2).

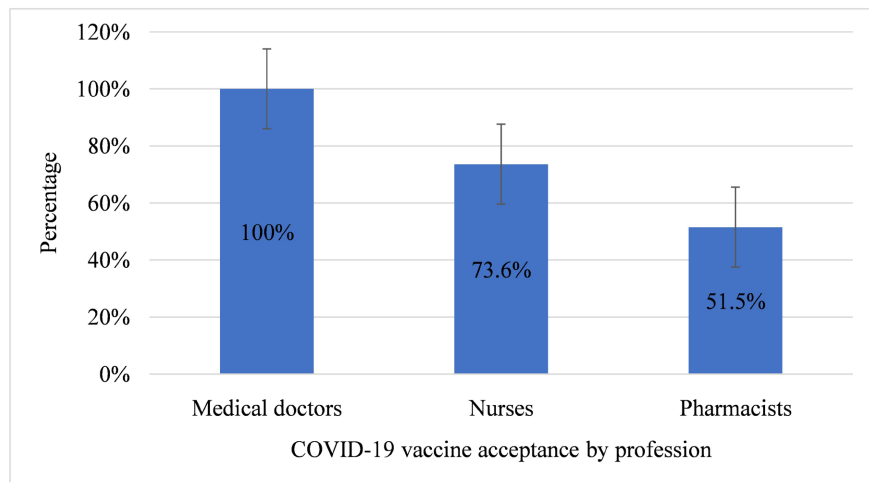


Figure 2. COVID-19 vaccine acceptance by profession.

3.4. Acceptance and Uptake of Vaccination by Vaccine Type

Out of the 146 vaccinated participants, the majority 101/146 (69.2%) had accepted and received the Johnson and Johnson vaccine and AstraZeneca 32/146 (21.9%). Few HCWs had accepted Pfizer 12/146 (8.2%) and Sinopharm 1/146 (0.7%) (Figure 3).

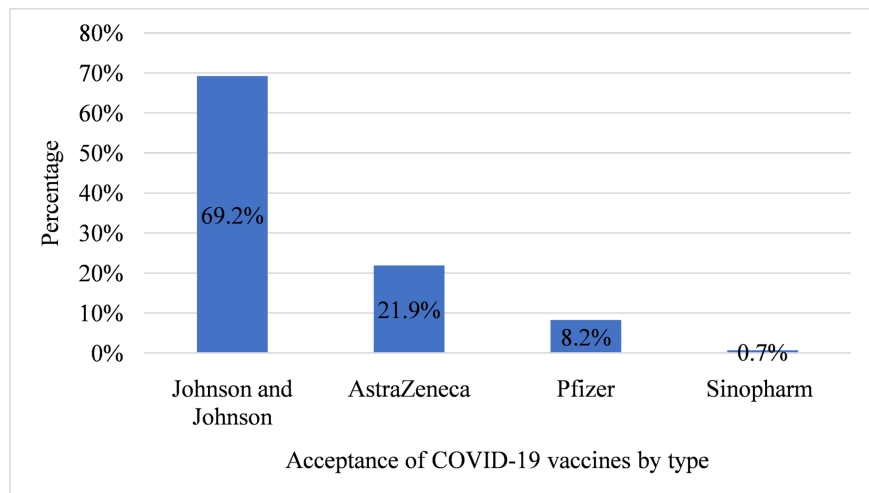


Figure 3. The acceptance rate by vaccine type among frontline healthcare workers.

3.5. Reasons for Accepting or Refusing to be Vaccinated Against COVID-19 among Healthcare Workers

The majority of the participants (60.2%) had accepted the vaccine to prevent COVID-19 while 34.2% had done so because they were at a high risk of infection from work. Further, 33.3% of HCWs refused to be vaccinated due to perceptions of low vaccine safety due to rushed development, 29.6% had fears of side effects, and 25.9% had concerns regarding vaccine efficacy (Table 2).

Table 2. Reasons for accepting and refusing to be vaccinated against COVID-19 among healthcare workers.

Variable	Attributes	Frequency (n)	Percent (%)
Acceptance of the COVID-19 vaccines	To prevent COVID-19	88	60.2
	Having a high risk of contracting COVID-19 at work	50	34.2
	Organization support	2	1.4
	No charge involved (free)	2	1.4
	Living with someone at high risk of contracting COVID-19	3	2.1
	Peer pressure	1	0.7
	Uncertain of vaccine efficacy	14	25.9
Refusal of the COVID-19 vaccines	Concerns about side effects	16	29.6
	Low vaccine safety due to rushed development	18	33.3
	Low confidence in vaccine	1	1.9
	Not just decided yet	3	5.6
	Lack of vaccine information	2	3.7

3.6. Factors Influencing COVID-19 Vaccine Uptake among Healthcare Workers

Some of the factors that significantly influenced vaccine acceptance included age ($p = 0.037$), profession ($p = 0.001$), and providing direct care to COVID-19 patients ($p = 0.001$) (Table 3).

Table 3. Relationship between sociodemographics and COVID-19 vaccine acceptance.

Characteristics	Category	Frequency (%) (Accepted)	Frequency (%) (Hesitant)	p-value
Gender	Female	108 (74.0)	35 (64.8)	0.405
	Male	38 (26.0)	19 (35.1)	
Age	20 - 30	73 (50.0)	41 (75.9)	0.037
	31 - 40	47 (32.2)	11 (20.3)	
	41 - 50	24 (16.4)	2 (3.7)	
	>50	2 (1.4)	0 (0.0)	
Religion	Christian	145 (99.3)	53 (98.1)	0.468
	Muslim	1 (0.7)	1 (0.7)	0.468
Profession	Doctor	23 (15.8)	0 (0.0%)	0.001
	Nurse	106 (72.6)	38 (70.3)	
	Pharmacist	17 (11.6)	16 (29.6)	

Continued

Nationality	Zambian	144 (98.6)	51 (94.4)	0.139
	Non-Zambian	2 (1.4)	3 (5.5)	0.139
Marital status	Married	74 (50.7)	17 (31.4)	0.122
	Single	65 (44.5)	37 (68.5)	
	Divorced	2 (1.4)	0 (0.0)	
	Widowed	5 (3.4)	0 (0.0)	
Do you have a comorbidity?	Yes	4 (2.7)	0 (0.0)	0.678
	No	142 (97.3)	54 (0.0)	
Do provide direct care to patients who tested positive for COVID-19?	Yes	135 (92.5)	37 (68.5)	0.001
	No	11 (7.5)	17 (31.4)	
Does your work consist of procedures with a high risk of aerosolization?	Yes	131 (89.7)	42 (77.7)	0.061
	No	15 (10.3)	12 (22.2)	
Do you receive an influenza vaccine annually?	No	145 (99.3)	5 (98.1)	0.169
	Yes	1 (0.7)	1 (1.8)	

4. Discussion

This study evaluated the acceptance of the COVID-19 vaccines among HCWs at the University Teaching Hospitals in Lusaka, Zambia. Our study found that 73% of the HCWs accepted to be vaccinated and received a vaccine at the time of the study with all the medical doctors who participated responding that they got the COVID-19 vaccine. Most of the HCWs accepted to be vaccinated to prevent COVID-19 because they are at a high risk of contracting COVID-19 at work. For those who were hesitant to be vaccinated, the reasons were the uncertainty of the vaccine's efficacy and side effects alongside concerns of low vaccine safety due to rushed development.

Our study found that the majority (73%) of HCWs were willing to be vaccinated and that the majority were already vaccinated. Most of the HCWs in the current study accepted and received the COVID-19 vaccine to prevent COVID-19 at work or home, and because of organizational support, and the vaccine being given for free. An earlier study conducted in two General Hospitals in Zambia found that 72.1% of HCWs were willing to receive the COVID-19 vaccines [48]. Our findings are similar to studies that reported high acceptance and uptake of COVID-19 vaccines [71]-[73]. A high vaccine acceptance rate of 80.4% was also reported among HCWs in Spain [74]. Similarly, another study done in Thailand found a very high vaccine COVID-19 acceptance rate of 95.6%

among HCWs compared to the present study [75]. Other studies with high vaccine acceptance rates have been reported in various countries including 90% in Nigeria [47], 89.2% and 86.6% in the United Arab Emirates (UAE) [76] [77] and 86.8% in Lebanon [77].

The present study revealed that all (100%) of the enrolled medical doctors in the study were vaccinated, followed by 73.6% of nurses, and 51.5% of pharmacists. These findings could be due to the interaction between HCWs and patients as medical doctors and nurses are usually in constant direct contact with patients in contrast to pharmacists. A recent study in Zambia also found that the majority of medical doctors were willing to be vaccinated against COVID-19 compared to other HCWs like nurses and pharmacists [48]. A study in Spain also found that physicians had higher rates of accepting COVID-19 vaccines compared to other HCWs [74]. Further, a study among HCWs in Poland found that 80.6% of medical doctors had accepted to be vaccinated followed by pharmacists (65.7%) and finally nurses (43.1%) [78]. Medical doctors tend to have positive attitudes towards COVID-19 vaccines which in turn makes them accept vaccinations [31] [78]. Finally, HCWs accept to be vaccinated against COVID-19 to protect themselves, their families and their communities [41].

The present study found that a few HCWs were not willing to be vaccinated against COVID-19. Vaccine hesitancy has been reported among HCWs globally [28] [29] [79]-[82]. For instance, a study in the United States found a low vaccine acceptance of 36% among HCWs [53]. In a similar circumstance, only 27.7% of HCWs in the DRC were willing to be vaccinated against COVID-19 [31]. Our study found that some HCWs were unwilling to be vaccinated due to being uncertain of the vaccine's efficacy and side effects, alongside concerns of low vaccine safety attributed to rushed development, lack of confidence and information concerning COVID-19 vaccines. The fear of side effects, concerns about vaccine effectiveness, and speed of vaccine development and approval have been reported in other studies as the drivers of vaccine hesitancy among HCWs [53] [83]-[86]. A study in Ethiopia found that 25.2% of the HCWs were unwilling to receive the COVID-19 vaccine due to considering vaccines to be unsafe, being concerned about the safety of the vaccine, and being unconcerned about contracting COVID-19 at work [87]. Some studies have reported lower than the expected COVID-19 vaccine acceptance among HCWs including 66.5% reported in Palestine [88], 64.9% in the UAE [89], and 65.4% in the UAE [90]. Consequently, evidence has shown that the level of vaccine acceptance among HCWs is lower than what is expected [91]. HCWs must be ambassadors of vaccine acceptance and uptake to motivate the general population to accept and receive the vaccine [46].

Our study found that most HCWs highly accepted being vaccinated with the Johnson and Johnson vaccine followed by AstraZeneca. This is contrary to study findings reported in Sudan where most HCWs accepted and received AstraZeneca followed by Pfizer vaccines [73]. Intriguingly, HCWs are likely to receive a vaccine that they have more information and knowledge about as reported in

Ethiopia where HCWs had good knowledge and attitudes towards AstraZeneca compared to other vaccines [90].

Our study found that vaccine acceptance was associated with participants' age, profession, and providing direct care to someone who tested positive for COVID-19. Our findings indicate the need to target the sociodemo graphics of HCWs when developing strategies to address vaccine hesitance. For instance, all medical doctors accepted and received the COVID-19 vaccines due to their close contact with COVID-19 patients during direct care service. Hence, addressing COVID-19 vaccine hesitancy would be more appropriate for target pharmacists and nurses. This is because physicians are less hesitant compared to other HCWs [22]. Finally, an increase in the age of HCWs has been reported to be associated with high vaccine uptake [86] [90] [92]. Older HCWs tend to accept the COVID-19 vaccines due to their high-risk perceptions of the disease and fear of contracting COVID-19 as it may manifest severely in this age group [93]. This information is critical to the development and implementation of strategies to address vaccine hesitancy.

Limitations and Strengths of the Study

We are aware that our study had limitations. First, this was a single-centre study, therefore, generalization of the findings may not apply to all HCWs in Zambia. Secondly, our sample size was small due to challenges in finding HCWs working during the pandemic, as there were restrictions in hospital environments. Consequently, the cross-sectional nature of the study may not provide adequate details of the reasons for accepting to be vaccinated against COVID-19 among HCWs. Nevertheless, our study provided insights regarding the acceptance of COVID-19 vaccines among HCWs who happen to be ambassadors in promoting vaccine acceptance and uptake.

5. Conclusion

This study found a high acceptance rate of the COVID-19 vaccines among frontline HCWs, especially among medical doctors. Consequently, the study revealed that despite the COVID-19 vaccines being available, some HCWs were still hesitant to be vaccinated. Our findings underscore the need to provide adequate information about COVID-19 vaccines, their side effects, and their effectiveness. There is a need to promote vaccine acceptance and uptake among HCWs and address vaccine hesitance and associated factors.

Conflicts of Interest

The authors declare no conflicts of interest.

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