

## Attitude of Healthcare providers to COVID-19 disease prevention – Personal risk perception and vaccine uptake

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### Abstract

**Background:** Vaccine hesitancy remains a barrier to the uptake of vaccines, achieving immunity and prevention of the spread of COVID-19. Healthcare providers are at the forefront in the prevention of COVID-19 and the care of affected individuals; thus, they are at increased risk of contracting the infection. The definitive treatment for COVID-19 is yet unknown; vaccines have been developed and available for the prevention of SARS-CoV-2 infection.

**Objective:** To assess the attitude of healthcare providers to COVID-19 vaccine and factors associated with uptake of the vaccine

**Design and Setting:** A cross-sectional study of healthcare workers in a tertiary health institution using self-administered online Google-survey questionnaire.

**Participants:** Healthcare workers in a tertiary health institution

**Data Collection:** Information obtained included socio-demographic and professional characteristics, knowledge about vaccines, perception, and willingness to get vaccinated. Data was analysed using IBM SPSS version 23. Descriptive statistics and Chi-square tests were done. Level of significance was set at  $p < 0.05$ .

**Result:** About 170 medical healthcare workers participated in the study - medical doctors-62.9%, nurses-34.7% and dentists-2.9%; majority-66.5% had practiced for <10 years. Mean age was 36.86 ( $\pm 7.82$ ) years; mostly female (55.9%) and married (78.2%). About 93.3% considered themselves at risk of infection and 71.2% perceived themselves as high-risk. Routine screening was acceptable to 78.8%; 29.4% had previous positive test, 93.5% had contact with persons positive for coronavirus infection and 80% had managed affected

patients. Majority believed vaccine was safe (82.9%) and prevented infection (80.6%); 27.1% and 67.7% were concerned about the constituents of the vaccine and long-term adverse effects respectively. 73.5% of the respondents were willing to receive vaccination, 70% were vaccinated and 74.7% were willing to recommend it to others. Uptake of vaccine was associated with perceived risk ( $p = 0.035$ ), level of perceived risk ( $p = 0.01$ ) and previous infection/COVID-19 disease ( $p = 0.03$ ).

**Conclusion:** Healthcare workers constitute a high-risk group; and an important source of counselling and health education for the general population. Therefore, positive perception about safety and efficacy, knowledge, and uptake of vaccine among healthcare providers must be optimized.

**Keywords:** COVID-19, COVID-19 healthcare workers, COVID-19 vaccine uptake, Vaccine hesitancy, COVID-19 disease

### Abstrait

**Contexte:** L'hésitation à l'égard de la vaccination reste un obstacle à l'adoption des vaccins, à l'obtention de l'immunité et à la prévention de la propagation du COVID-19. Les prestataires de soins de santé sont à l'avant-garde de la prévention du COVID-19 et de la prise en charge des personnes touchées ; ils courent ainsi un risque accru de contracter l'infection. Le traitement définitif du COVID-19 est encore inconnu ; des vaccins ont été développés et disponibles pour la prévention de l'infection par le SRAS-CoV-2.

**Objectif:** Évaluer l'attitude des prestataires de soins de santé à l'égard du vaccin contre la COVID-19 et les facteurs associés à l'adoption du vaccin.

**Conception et contexte:** une étude transversale menée auprès d'agents de santé dans un établissement de santé tertiaire à l'aide d'un questionnaire d'enquête Google en ligne auto-administré.

*Participants:* Agents de santé dans un établissement de santé tertiaire

*Collecte de données:* les informations obtenues comprenaient les caractéristiques sociodémographiques et professionnelles, les connaissances sur les vaccins, la perception et la volonté de se faire vacciner. Les données ont été analysées à l'aide d'IBM SPSS version 23. Des statistiques descriptives et des tests du chi carré ont été effectués. Le niveau de signification a été fixé à  $p < 0,05$ .

*Résultat:* Environ 170 professionnels de la santé ont participé à l'étude : médecins - 62,9 %, infirmières - 34,7 % et dentistes - 2,9 % ; la majorité - 66,5 % pratiquaient depuis moins de 10 ans. L'âge moyen était de 36,86 ( $\pm 7,82$ ) ans ; majoritairement des femmes (55,9%) et mariées (78,2%). Environ 93,3 % se considéraient à risque d'infection et 71,2 % se considéraient comme à haut risque. Le dépistage de routine était acceptable à 78,8 % ; 29,4% avaient déjà été testés positifs, 93,5% avaient eu des contacts avec des personnes positives à l'infection à coronavirus et 80% avaient pris en charge des patients atteints. La majorité pensait que le vaccin était sûr (82,9 %) et prévenait l'infection (80,6 %) ; 27,1 % et 67,7 % étaient respectivement préoccupés par les constituants du vaccin et par les effets indésirables à long terme. 73,5 % des personnes interrogées étaient prêtes à se faire vacciner, 70 % étaient vaccinées et 74,7 % étaient prêtes à le recommander à d'autres. Le recours au vaccin était associé au risque perçu ( $p = 0,035$ ), au niveau de risque perçu ( $p = 0,01$ ) et à une infection antérieure/maladie COVID-19 ( $p = 0,03$ ).

*Conclusion:* les travailleurs de la santé constituent un groupe à haut risque ; et une source importante de conseils et d'éducation sanitaire pour la population en général. Par conséquent, la perception positive de la sécurité et de l'efficacité, des connaissances et de l'adoption du vaccin par les prestataires de soins de santé doit être optimisée.

*Mots-clés:* COVID-19, travailleurs de la santé atteints de la COVID-19, vaccination contre la COVID-19, hésitation à la vaccination, maladie COVID-19

## Introduction

Health care providers are at the forefront in the prevention of COVID-19 infection, treatment and care of affected individuals; thus, they are at increased risk of contracting and transmitting the Coronavirus infection. Health workers account for about 10% of the global Coronavirus infection.[1] Treatment for COVID-19 is unknown but certain strategies for the control of the spread of SARS-CoV-2 infection is widely disseminated. In addition to these strategies, vaccines have been developed and available for the prevention of SARS-CoV-2 infection through herd immunity.

Despite the efforts and availability of vaccines; vaccine reluctance occurs in various settings including healthcare providers.[2] Vaccine hesitancy is defined as “delay in acceptance or refusal of vaccines despite availability of vaccine services”.[2-4] Safety and efficacy concerns, preference for physiologic immunity, distrust in government health organization; autonomy and personal freedom are some of the reasons for vaccine hesitancy.[2] In a study by Olomofe et al, only 58.2% of respondents were willing to take a COVID-19 vaccine when available, many participants were unwilling to receive a potential vaccine which appears to be a consequence of concerns about the safety of the COVID-19 vaccine.[5] Vaccine hesitancy will threaten the control of the spread disease.[6] Vaccine hesitancy may exist among healthcare providers with huge implications for the healthcare workforce, patients and their relatives. Furthermore, healthcare providers serve as an important source of information for both patients and the general public. Healthcare providers' counselling and recommendations will play an influential role in the patients' vaccine knowledge and may be a key factor in patients' decision to be vaccinated or not.

In a recent study by Nzaji et al., only 28% of the healthcare workers interviewed said they would get a COVID-19 vaccine if available.[7] In another study in Beijing, healthcare workers were willing to get the COVID-19 vaccination before the completion of the phase III vaccine clinical trials; willingness was strongly associated with whether the vaccine is free and safe.[8] The efficacy of the vaccines for disease prevention is between 66-95%; higher efficacy was recorded with the mRNA types of vaccine; and COVID-19 vaccines have proven to be safe, effective and life-saving. Like all vaccines, they do not fully protect everyone who is vaccinated.[9] The refusal of COVID-19 vaccine by healthcare providers sends a negative signal which

may have a negative influence on the patients they come in contact with and the society at large. Vaccine decline will contribute to increased infection rates, increased disease burden with a huge cost on the healthcare systems at the expense of other competing demands. Vaccine refusal will also result in vaccine wastage and loss of resources invested in the manufacture and procurement of the vaccines. This study aims to assess the attitude and perception of healthcare providers on Corona virus vaccine, willingness to be vaccinated and factors that may affect uptake of vaccination.

### Material/Subjects and Methods

This study was a cross-sectional study conducted in a tertiary health institution in South-west Nigeria. The study site is a government-owned tertiary health institution; a referral hospital in South-west, Nigeria with a dedicated COVID-19 treatment unit.

The study was conducted among healthcare providers working at the study site. The study was conducted over a four-week period in June 2021. Out of the 250 healthcare workers that were invited to participate in the study, 170 consented and participated. All consenting healthcare providers were enrolled by informed consent and filling out the online survey form. A total of 170 healthcare workers completed the survey form. Eligibility criteria – healthcare workers at the study site.

The study tool was a semi-structured pretested online survey questionnaire. The information obtained included socio-demographic and professional characteristics, the number of years of practice, knowledge, perception of COVID-19 vaccine and willingness to be vaccinated.

The data collected was analysed using IBM SPSS software version 23. Descriptive analysis – frequency and mean; and bivariate – chi square analyses were conducted. The level of significance was set at  $P < 0.05$ .

**Ethical approval:** This study was approved by the institutional ethics Review Committee of University College Hospital and the College of Medicine, University of Ibadan (UI/UCH Ethics committee – UI/EC/21/0097). Voluntary written informed consent was obtained from the participants and the principles of ethics were observed in handling the data collected during the study. How did you get a written consent when your study was an online survey? It would be most appropriate to include the consent as part of the online survey.

**Statement of Human and Animal Rights:** All procedures in this study were conducted in accordance with the UI/UCH Ethics committee – (UI/EC/21/0097) approved protocol.

**Statement of Informed Consent:** All participants in this study gave voluntary informed consent.

### Results

About 250 healthcare workers from different clinical specialties and ranks were invited to voluntarily participate in the online survey, but only 170 persons consented and participated in the study.

**Table 1: Sociodemographic Characteristics of the respondents**

| Variables                             | Frequency        | Percent |
|---------------------------------------|------------------|---------|
| <b>Mean age (<math>\pm</math> SD)</b> | $36.86 \pm 7.82$ |         |
| <b>Age (Years)</b>                    |                  |         |
| 20 - 29                               | 31               | 18.2    |
| 30 - 39                               | 78               | 45.9    |
| 40 - 49                               | 47               | 27.6    |
| 50 - 59                               | 14               | 8.2     |
| <b>Gender</b>                         |                  |         |
| Female                                | 95               | 55.9    |
| Male                                  | 75               | 44.1    |
| <b>Religion</b>                       |                  |         |
| Christianity                          | 132              | 77.6    |
| Islam                                 | 38               | 22.4    |
| <b>Marital Status</b>                 |                  |         |
| Married                               | 133              | 78.2    |
| Separated                             | 1                | 0.6     |
| Single                                | 36               | 21.2    |
| <b>Specialty</b>                      |                  |         |
| Dentist                               | 5                | 2.9     |
| Medical doctors                       | 106              | 62.4    |
| Nursing                               | 59               | 34.7    |
| <b>Categories of the specialties</b>  |                  |         |
| Medical Consultants                   | 9                | 5.3     |
| Resident Doctors                      | 84               | 49.41   |
| Medical Officers                      | 6                | 3.53    |
| Interns                               | 16               | 9.41    |
| Midwives                              | 23               | 13.53   |
| Nurses (other specialties)            | 32               | 18.82   |
| <b>Years of work experience</b>       |                  |         |
| $\leq 10$                             | 113              | 66.5    |
| 11 – 20                               | 41               | 24.1    |
| 21 – 30                               | 16               | 9.4     |
| <b>Number of living Children</b>      |                  |         |
| 0-1                                   | 67               | 39.4    |
| 2-3                                   | 87               | 51.2    |
| $\geq 4$                              | 16               | 9.4     |

Table 1 shows the sociodemographic characteristics of the respondents. About half (45.9%) of the respondents were aged 30 and 39 years and the average age of the respondents was  $36.86 \pm 7.82$ . The participants were predominantly female (55.9%), Christians (77.6%) and married (78.2%).

About 62.9% of the respondents were medical doctors and 34.7% were nurses. With respect to cadre, 49.41% were resident doctors, 13.53% were midwives, 18.82% were nurses in other specialties. Majority (66.5%) of the respondents had been in practice for less than ten years.

Participants' personal risk assessment and attitude towards testing is depicted in table 2. Over 90% of the respondents considered themselves at risk of coronavirus infection; about 70% perceived

for coronavirus infection, and up to 80% had directly managed COVID-19 disease patients before.

All respondents had the knowledge of at least one type of COVID-19 vaccine including the Pfizer, Moderna, Johnson and Johnson, and AstraZeneca/Oxford vaccines; the most widely known type was the AstraZeneca/Oxford (95.90%) and Moderna was the least known type of vaccine by the respondents (61.80%).

Concerning vaccine constituents, respondents knew of the messenger RNA vaccine (mRNA) (61.80%), live attenuated vaccine (45.90%), viral vector vaccine (23.5%), and protein subunit (32.90%). However, about 13% thought the vaccine could be a DNA type vaccine and majority of the respondents would prefer a single vaccine (67.1%) compared to double dose vaccine (32.9%).

**Table 2: Participants' personal risk perception and attitude towards testing**

| Variables   | Frequency | Percent |
|---|-----------|---------|
| <b>At risk of Coronavirus infection</b>                 |           |         |
| Yes   | 159       | 93.50   |
| No  | 7         | 4.10    |
| Don't know  | 4         | 2.40    |
| <b>Perceived level of risk</b>                          |           |         |
| High  | 121       | 71.2    |
| Moderate  | 33        | 19.4    |
| Low   | 16        | 9.4     |
| <b>Routine testing for Coronavirus infection</b>        |           |         |
| Yes   | 134       | 78.80   |
| No  | 31        | 18.30   |
| Undecided   | 5         | 2.9     |
| <b>Previous positive COVID-19 Test</b>                  |           |         |
| Yes   | 50        | 29.4    |
| No  | 120       | 70.6    |
| <b>Previous contact with a COVID-19 positive person</b> |           |         |
| Yes   | 159       | 93.5    |
| No  | 11        | 6.5     |
| <b>Previously managed COVID-19 positive patient</b>     |           |         |
| Yes   | 136       | 80.0    |
| No  | 34        | 20.0    |

themselves as being at high-risk of infection. Routine screening for Coronavirus was acceptable to majority (78.8%) of the participants. About 29.4% had previous positive test for coronavirus infection, 93.5% had previous contact with persons positive

**Perception of vaccine safety & efficacy of COVID-19 vaccine, and vaccine status of participants**

Table 3 shows the perception of respondents about vaccine safety and efficacy. Majority of the

**Table 3: Perception of vaccine safety & efficacy of COVID-19 vaccine, and vaccine status of participants**

| Variables                                       | Frequency | Percent |
|---|-----------|---------|
| <b>COVID-19 Vaccine is safe</b>                 |           |         |
| Yes   | 141       | 82.9    |
| No  | 29        | 17.1    |
| <b>Can Vaccine prevent COVID-19 infection?</b>  |           |         |
| Yes   | 137       | 80.6    |
| No  | 33        | 19.4    |
| <b>Concerns about vaccine brand and content</b> |           |         |
| Agree   | 46        | 27.1    |
| Disagree  | 71        | 41.8    |
| Undecided                                       | 53        | 31.2    |
| <b>Willingness to receive vaccine</b>           |           |         |
| Yes   | 125       | 73.5    |
| No  | 17        | 10.0    |
| Undecided                                       | 28        | 16.5    |
| <b>COVID-19 Vaccine status</b>                  |           |         |
| Yes   | 119       | 70.0    |
| No  | 51        | 30.0    |
| <b>Recommend COVID vaccine to others</b>        |           |         |
| Yes   | 127       | 74.7    |
| No  | 8         | 4.7     |
| Undecided                                       | 35        | 20.6    |

respondents believed that COVID-19 vaccine was safe (82.9%) and able to prevent COVID-19 infection (80.6%). About 27% of respondents were concerned about the constituents of the brand of the vaccine supplied to Nigeria while 67.7% were concerned about possible long-term adverse effects of the vaccine. Seventy percent of respondents had

received the COVID-19 vaccine and 74.7% would recommend the vaccine to other people. (Table 3) The willingness to have COVID-19 testing was associated with factors such as respondents' occupation ( $p < 0.0001$ ), marital status ( $p < 0.01$ ), perceived risk of coronavirus infection ( $p < 0.0001$ ), and level of perceived risk ( $p < 0.0001$ ) (Table 4).

**Table 4: Factors associated with COVID-19 testing.**

| Variables                                   | Willingness to do COVID-19 test |          |                | P value |
|---|---------------------------------|----------|----------------|---------|
|   | Yes n (%)                       | No n (%) | Undecidedn (%) |         |
| <b>Occupation</b>                           |                                 |          |                | <0.0001 |
| Medical Doctor                              | 81(76.4)                        | 23(21.7) | 2(1.9)         |         |
| Dentist                                     | 2(40.0)                         | 1(20.0)  | 2(40.0)        |         |
| Nurse                                       | 51(86.4)                        | 7(11.9)  | 1(1.7)         |         |
| <b>Marital status</b>                       |                                 |          |                | 0.01    |
| Married                                     | 112(84.2)                       | 17(12.8) | 4(3.0)         |         |
| Separated                                   | 1(100.0)                        | 0(0.0)   | 0(0.0)         |         |
| Single                                      | 21(58.3)                        | 14(38.9) | 1(2.8)         |         |
| <b>Perceived risk of COVID-19 infection</b> |                                 |          |                | <0.0001 |
| At risk                                     | 131(82.4)                       | 25(15.7) | 3(1.9)         |         |
| Not at risk                                 | 2(28.6)                         | 5(71.4)  | 0(0.0)         |         |
| Not sure                                    | 1(25.0)                         | 1(25.0)  | 2(50.0)        |         |
| <b>Perceived level of risk</b>              |                                 |          |                | <0.0001 |
| High  | 108(89.3)                       | 11(9.1)  | 2(1.7)         |         |
| Moderate                                    | 20(60.6)                        | 10(30.3) | 3(9.1)         |         |
| Low   | 6(37.5)                         | 10(62.5) | 0(0.0)         |         |

**Table 5: Factors associated with COVID-19 vaccination status.**

| Variables                                   | COVID-19 vaccine status  |                             | P value |
|---|--------------------------|-----------------------------|---------|
|   | Vaccinated (Yes) – n (%) | Not vaccinated (No) – n (%) |         |
| <b>Occupation</b>                           |                          |                             | 0.48    |
| Medical Doctor                              | 77(72.6)                 | 29(27.4)                    |         |
| Dentist                                     | 4(80.0)                  | 1(20.0)                     |         |
| Nurse                                       | 38(64.4)                 | 21(35.6)                    |         |
| <b>Perceived risk of COVID-19 infection</b> |                          |                             | 0.035   |
| At risk                                     | 115(72.3)                | 44(27.7)                    |         |
| Not at risk                                 | 3(42.9)                  | 4(57.1)                     |         |
| Not sure                                    | 1(25.0)                  | 3(75.0)                     |         |
| <b>Perceived level of risk</b>              |                          |                             | 0.01    |
| High  | 90(74.4)                 | 31(25.6)                    |         |
| Moderate                                    | 23(69.7)                 | 10(30.3)                    |         |
| Low   | 6(37.5)                  | 10(62.5)                    |         |
| <b>Previous Coronavirus infection*</b>      |                          |                             | 0.03    |
| Yes   | 41(82.0)                 | 9(18.0)                     |         |
| No  | 78(65.0)                 | 42(35.0)                    |         |

\*Previous Positive COVID-19 test

The factors associated with uptake of the vaccine among respondents are depicted in Table 5. Respondents' personal risk perception ( $p=0.035$ ), level of perceived risk ( $p=0.01$ ) and previous coronavirus infection/COVID-19 disease ( $p=0.03$ ) were factors associated with being vaccinated for coronavirus infection.

### Discussion:

This study highlights COVID-19 vaccine uptake and hesitancy among healthcare providers at the University College Hospital, Ibadan. In this study, the main findings of the study were- one in three of the health workers had a previous history of coronavirus (SARS-CoV-2) infection, majority (over two-thirds) of the healthcare providers perceived themselves to be at high risk of COVID-19 infection, and more than four in five of the participants had been exposed to persons or patients with COVID-19 disease. Willingness to receive vaccine was as high as almost three-quarters, vaccine hesitancy was less than a third. Majority of the health workers had received COVID-19 vaccines and about three-quarters would recommend the vaccine to other people. About four-fifths of the participants thought the vaccine was safe, while two-thirds were concerned about possible long-term adverse effects. Factors such as perceived personal risk of contracting COVID-19 disease, perceived level of risk previous history of COVID-19 infection were associated with uptake of vaccine.

Majority (nine of ten) of the respondents perceived themselves as being at risk of COVID-19 infection with more than two-thirds rating the level of risk as high. This may be explained by the fact that most (one in four) of the respondents had previously managed COVID-19 positive patients. Despite this, only about a third of the respondents had previous positive test for COVID-19; the low proportion with positive test result could largely be due to inadequate testing or even deliberate avoidance of testing at times in the face of symptoms just to avoid the label and 'stigma' of being coronavirus infection positive, and the fear of being confined to isolation. The willingness or desire to be tested for Coronavirus infection may be because of the fear or thought that they may have been exposed or had contracted the infection. According to the World Health Organization, 10% of the global Coronavirus infection were infection in health workers. [1]

The respondents knew at least one type of COVID-19 vaccine including the Pfizer, Moderna, Johnson and Johnson, and AstraZeneca/Oxford vaccines.

These were the vaccine commonly administered in Nigeria. The most widely known type was the AstraZeneca/Oxford and the Moderna vaccine was the least known type of vaccine by the respondents. This may be because the Moderna vaccine became available much later than other vaccine.

Over four in five respondents think that COVID-19 vaccine is safe, and efficacious (two-thirds). This may be the reason why majority (73.5%) were willing to receive the vaccine. This finding was similar to the report by Dror et al in a study conducted among health workers in Israel where 78% physicians, 61% nurses, and 75% of the general population were willing to receive the vaccine.[3] Verger et al in France (72.4%), and Elhadi et al in Libya (79.6%) reported a high willingness to receive the vaccine.[10,11] Alhassan et al in Ghana, also reported a high acceptance rate of 70%.[12] In previous studies, smaller proportions (50.52%) of the interviewed health workers in Saudi Arabia by Qattan et al[13] and 27.70% in Congo by Nzaji et al[7] were willing to take the vaccine, compared with those in this study. This may be due to the knowledge and level of information about the disease available to the health-workers. Compared to our study, the studies in Saudi Arabia and Congo were conducted earlier when the knowledge of vaccine was still evolving. Also, our study was conducted later during the epidemic when there was more knowledge and information about the disease which could have further motivated the willingness to be vaccinated. Though, about a third of the health workers expressed concerns about the brand of vaccine supplied to Nigeria, this may be due to misconceptions and misinformation from the social media. Healthcare workers are not immune to rumours and maybe at equal risk of the negative effects of misinformation from the social media; hence making late decision for vaccination and late vaccine uptake.

Among the respondents, more than two-thirds had received at least a dose of the vaccine and this was consistent with the high willingness to be vaccinated (73.5%). The high responsiveness to vaccination is likely related to the knowledge of the disease among the respondents, safety and protection conferred the vaccine. The high exposure to patients with COVID-19 disease and involvement in the treatment of these patients may also have influenced the high uptake of vaccine in this group. Medical doctors were more willing to be tested for COVID-19 ( $P<0.0001$ ). Willingness to be vaccinated was associated with factors such as being married,

perceived personal risk of infection and perceived high level of risk of contracting Coronavirus infection. This may be explained by concerns for their families and spread of the infection to spouses, children, or other members of the household. There was no significant difference in the vaccination status among the different categories of healthcare workers interviewed ( $p = 0.48$ ). This is comparable to the findings from a similar study by Ciardi et al. Willingness to accept the vaccine was associated with location, gender, age of the health worker, knowledge about the virus and role in the hospital as demonstrated by Ciardi et al in New York.[14]

Perceived personal risk of infection, level of risk of infection and previous positive COVID test were significant factors that enhanced the uptake of the vaccines. Nzaji and colleagues reported that good knowledge and awareness of the disease increased the willingness to accept the vaccine.[7] These were different from factors identified by Agyekum et al, who reported that willingness to be vaccinated was low, but category of the health worker, sex, relative diagnosed with COVID-19 and trust in accuracy of preventive measures taken by the government were factors associated with acceptability of the vaccine.[15] Willingness to recommend the vaccine to other will also enhance counselling and encouragement of patients and the general populace to receive COVID-19 vaccine, prevent the spread of infection, and reduce the risk of severe infections. This will ultimately reduce the disease burden; COVID-19 disease-related morbidity and mortality.

### Conclusion

In conclusion, the health workers in this study had good vaccine knowledge, high willingness, and responsiveness to vaccination. Vaccine hesitancy was low, and they were willing to recommend the vaccine to other individuals. This attitude will promote vaccine uptake and control of the COVID-19 disease.

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