

# Factors affecting nurses' intention to accept the COVID-19 vaccine: A cross-sectional study

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## Abstract

**Objective:** To measure COVID-19 vaccine acceptance and related factors to uncover nurses' concerns and fears.

**Design:** A cross-sectional study.

**Sample:** The study included 639 nurses; 83% were women and 80% under 50 years.

**Measurement:** A self-administered questionnaire was used. It included demographic characteristics, COVID-19-related fears and concerns, COVID-19 vaccine perceived benefits, and intention toward getting the vaccine.

**Results:** Forty percent of the nurses planned to get the vaccine when available, 41% would take it later when adequate protection and safety were presented, and 18% would never take it. Significant factors associated with vaccination intention were as follows: age (adjusted OR 1.42, 95% CI: 1.02–1.99); lack of knowledge about the vaccine (adjusted OR 2.6, 95% CI 1.81–3.8); concern about long-term side effects (adjusted OR 2.0, 95% CI 1.4–2.9); fear of injection (adjusted OR 1.5, 95% CI 1.04–2.13); natural immunity preference (adjusted OR 5.8, 95% CI 4.5–8.3); media misrepresentation (adjusted OR 1.7, 95% CI 1.2–2.4); and getting COVID-19 from the vaccine (adjusted OR 1.5, 95% CI 1.1–2.1).

**Conclusion:** COVID-19 vaccine safety and side-effects concerns impact nurses' intentions to accept the vaccine and may result in low acceptance rates. Urgent action is needed to address these fears and raise confidence, as nurses' vaccine-related decisions can affect the public's vaccine acceptance.

## KEYWORDS

COVID-19, nurses, palestine, vaccine acceptance, vaccine concerns

## 1 | BACKGROUND

After a devastating year, due to the COVID-19 pandemic that has burdened all aspects of life (Keni et al., 2020), vaccines are available. The effectiveness of vaccination depends on a sufficient percentage of the population covered, known as herd immunity, estimated to be 67% (Randolph & Barreiro, 2020). For this purpose, efforts to measure the attitudes and intentions to accept the COVID-19 vaccine have been undertaken, with a special focus on health care providers

who are one of the main stakeholders in this process. They are a high-risk group for contracting COVID-19, a source of virus transmission, and affect public vaccine uptake.

Recent reports showed that the general population's willingness to accept the COVID-19 vaccine was 77.5% (Lazarus et al., 2020), and health care providers ranged from 27.7% to 81.5% (Galanis et al., 2020). In these few studies, nurses were the most reluctant to receive the vaccine compared with other health professions (Gagneux-Brunon et al., 2020; Galanis et al., 2020). This gap

suggested a lack of confidence in the COVID-19 vaccines; however, a study in France showed a suboptimal percentage of vaccine uptake among nurses to all vaccines (Wilson et al., 2020).

Nurses play an integral role in determining the general acceptance rate. They are a source of information to patients, even greater than physicians and other health care providers, often the first to contact patients and administer vaccinations, and frequently contract COVID-19 infection (Gómez-Ochoa et al., 2020). Patients tend to be more satisfied with nurses' care, as studies showed that nurses provide longer consultations, clearer information, more lifestyle advice, and better communication compared to physicians (Laurant et al., 2005). Subsequently, they are trustworthy and closer to patients. Since they are usually responsible for administering vaccines, they are the source for information about vaccine safety, benefits, and side effects. If nurses are unvaccinated, they are unlikely to recommend the vaccine to their patients (Paterson et al., 2016; Wang, Wong, et al., 2020).

Insufficient information about the efficacy and safety of the new COVID-19 vaccines may have been a concern for the general population and health care providers a few months ago (Gagneux-Brunon et al., 2020; Wang, Wong, et al., 2020). Currently, sufficient information about vaccines is available (Polack et al., 2020; Voysey et al., 2021). However, the rapid spread of misinformation may dominate correct information in the media and online networks (Loomba et al., 2020). This occurred with the influenza vaccine and had more influence on nurses than physicians (Abramson & Levi, 2008). Recently, Loomba et al. found that exposure to misinformation regarding the COVID-19 vaccine leads to a drop in the intent to be vaccinated in order to protect oneself or others (Loomba et al., 2020). Another factor in the acceptance of vaccines, such as influenza, was that health care workers thought that their risk of developing influenza was minimal, and this perception was most prominent among nurses. (Abramson & Levi, 2008). Unfortunately, recent COVID-19 vaccine surveys suggest that health care professionals are drawing similar conclusions (Galanis et al., 2020; Wang, Wong, et al., 2020). Given the high prevalence rate of mild-moderate COVID-19 in health care providers (Gómez-Ochoa et al., 2020), the likelihood of low perceived fears against COVID-19 is not surprising.

In Palestine, the Ministry of Health (MOH) plans to follow CDC advice with a phased distribution of the COVID-19 vaccine, prioritizing health care providers (Dooling et al., 2020), and then the entire community. However, if nurses are hesitant to accept the vaccine, this would subvert the whole vaccination process. To address this concern, our study aims to estimate the confidence and willingness to accept the COVID-19 vaccine by nurses and to ascertain the underlying reasons around a potential confidence gap.

## 2 | METHODS

### 2.1 | Study design and population

This research was an online survey of 638 nurses from all the regions of Palestine. It was carried out during the first week of January

2021, before the launch of the COVID-19 vaccine. The survey was distributed to participants with a link sent through individual emails, WhatsApp, Facebook, and other social media accounts or closed professional groups, targeting a sample size of at least 566 considering 95% confidence interval and 4% margin, assuming an anticipated vaccine acceptance rate of 50% (Gagneux-Brunon et al., 2020; Wang, Wong, et al., 2020). The study population included all nurses working at governmental and nongovernmental health care setting.

### 2.2 | Instrument and variables

The questions were derived by reviewing literature and consisted of 36 items divided into three sections: demographic characteristics, COVID-19 infection knowledge and vaccine attitudes, and future views. (1) Age (categorized to <30, 30–49, and >50 years), gender, profession (nurse or midwife), presence of chronic disease, perceived health of participant (Likert scale 1–6, 1 = very poor, and 6 = very good), income, number of patients seen per day, previous positive COVID-19, and influenza vaccine uptake during the last 5 years. (2) COVID-19 knowledge and fears; whether the participant had specialized training or COVID-19 courses (yes–no) and perceived COVID-19 knowledge (Likert scale 1–5, 1 = very good, and 5 = very poor). Fears regarding COVID-19 consequences and severity were assessed by six statements, each with a Likert scale of 1–4 (strongly agree, agree, disagree, and strongly disagree), the higher, the more pronounced the fear. Similarly, four items assessed the benefits of vaccination, and ten items, all with the same Likert scale above, evaluated similar concerns. (3) Future views and potential changes were evaluated by yes–no questions about recommending vaccination and willingness to pay for the vaccine. A four-point Likert scale (strongly agree to strongly disagree) evaluated attitude changes if more vaccine knowledge would be available and if scientific experts recommended it. The outcome variable was presented as “when COVID-19 vaccine would be available, when would you take it?” with three potential answers: (1) as soon as possible, (2) when adequate protection and safety are available, and (3) never. The questionnaire was conducted in Arabic. It was reviewed by four experts and piloted on a group of 20 nurses to ensure its comprehensiveness, reliability, and face validity.

### 2.3 | Statistical analysis

Data variables were represented as frequencies and means for the entire population and each results section. Likert scale items (perceived health, COVID-19 knowledge, fears, encouragements, and concerns) were defined as mean  $\pm$  SD. The higher the average, the more support for items in relation to the total category. Statements of fear, motivation, and concern were summarized as the mean score of 6, 4, and 10, respectively. The outcome variable of vaccine intention was transformed into a dichotomous variable: vaccine acceptors and vaccine reluctant nurses, considering reluctant nurses to be those who replied “later in the future” or “never.” Univariate analysis was performed to

compare these two groups using an independent *t* test for mean comparison and chi-square for categorical variables. The level of significance was set at  $p < .05$ . Significant factors in the univariate analysis were entered into a multivariate binary logistic regression, in addition to age, gender, and previous influenza vaccine uptake, for their relevance with the vaccine reluctance in the literature (Gagneux-Brunon et al., 2020; Galanis et al., 2020). In this model, odds ratios and confidence intervals were recorded with *p*-values less than 0.05. All statistical analyses were done with IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp.). The Institutional Review Board of An-Najah National University has approved the study protocol (Reference no: F. Med. Dec. 2020/30). The questionnaire included a summary of the survey, ensured anonymity and confidentiality, and required the participant's consent before starting the study questions.

### 3 | RESULTS

The demographic characteristics of the 639 respondents are shown in Table 1. Most were under 50 (80%) and female (83%). Overall,

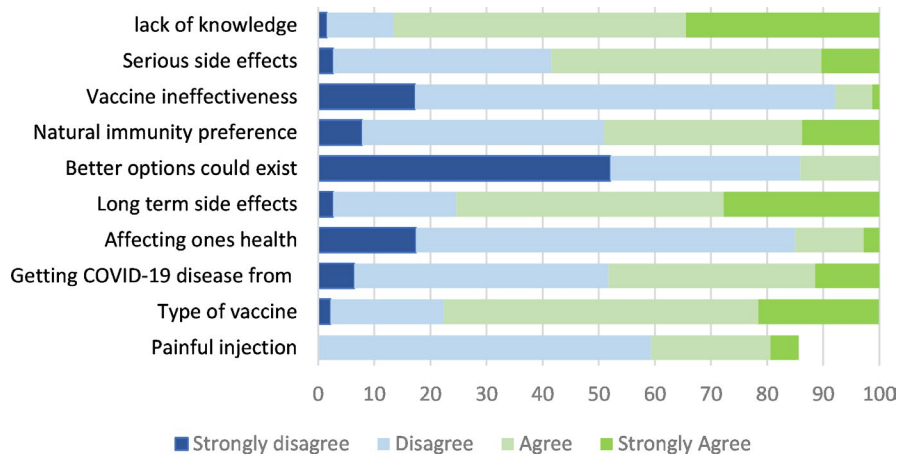
178 (28%) had a chronic illness and perceived their health status to be 4.9/6 (6 = very good). A quarter reported that they had had the COVID-19 virus, and about one third had received flu vaccines in the last 5 years. Most (89%) identified themselves as middle class (US\$600–\$3200/month).

Regarding the COVID-19 vaccine, 40% intended to get it as soon as it would be available, 41% planned to take it later when adequate protection and safety are available, and 18% would never take it. There was no substantial difference in demographic variables between those who reported reluctance and those who reported acceptance. Surprisingly, those who had advanced training were more reluctant to accept the vaccine, although the discrepancies were not statistically significant. The main incentive factors for adopting the vaccine were the avoidance of transmission and the protection of families or patients, while effectiveness and long-term immunity were at a lower level of agreement. As for the four claims, consensus achieved an average of 75% (agreed or strongly agreed) for protection of family statements and 35% for providing long-term immunity. Regarding the vaccine concerns (Figure 1), the highest articulated one was lack of awareness about the new vaccine (86.5%, agreed or

**TABLE 1** Characteristics of respondents and the associations with vaccine intention ( $n = 638$ )

Characteristics	Total ( $n = 638$ )	Reluctance	Acceptance	<i>p</i> -value
Gender: %				
Male	115 (82%)	70 (60.9%)	45 (39.1%)	0.78
Female	523 (18%)	311 (59.5%)	212 (40.5%)	
Age: year, %				
Under 30	160 (25%)	93 (58.1%)	67 (41.9%)	0.14
30–49	355 (55.6%)	223 (62.8%)	132 (37.2%)	
Above 50	123 (19.2%)	65 (52.8%)	58 (47.2%)	
Self-perceived health (mean $\pm$ SD) <sup>a</sup>	4.9 $\pm$ 0.87	4.96 $\pm$ 0.85	4.87 $\pm$ 0.9	0.23
Chronic diseases: %	178 (28%)	104 (58.4%)	74 (41.6%)	0.61
Diabetes	34 (5.3%)	18 (52.9%)	16 (47.1%)	0.41
Hypertension	83 (13%)	53 (63.9%)	30 (36.1%)	0.41
Chronic lung disease/Asthma	42 (6.6%)	24 (57.1%)	18 (42.9%)	0.73
Impaired immunity	9 (1.4%)	6 (66.7%)	3 (33.3%)	0.67
Cancer	11 (1.7%)	7 (63.6%)	4 (36.4%)	0.8
Previous positive COVID-19 test %	160 (25%)	92 (56.9%)	69 (43.1%)	0.4
Previous flu vaccine uptake %				0.4
Never	391 (61.5%)	226 (57.8%)	165 (42.2%)	
Infrequently	196 (30.9%)	124 (63.3%)	72 (36.7%)	
Almost every year	48 (7.6%)	29 (60.4%)	19 (39.6%)	
Frequency of patients seen/day: %				0.22
<10	75 (11.8%)	50 (66.7%)	25 (33.3%)	
10–20	133 (20.8%)	80 (60.2%)	53 (39.8%)	
20–40	212 (33.2%)	133 (62.7%)	79 (37.3%)	
>40	215 (33.7%)	117 (54.4%)	98 (45.6%)	
Received COVID-19 specialized training %	204 (32.1%)	118 (57.8%)	86 (42.2%)	0.52

<sup>a</sup>Score from 1 to 6, the highest score for better perception of health.



**FIGURE 1** Nurses' COVID-19 vaccine-related concerns [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

strongly agreed). Simultaneously, the least reported was uncomfortable about getting a vaccine injection (25% agreed).

Table 2 presents attitudes, knowledge, fears, and concerns about COVID-19 and its vaccine. These were scored using a Likert scale ranging from 1 to 4. The perceived knowledge regarding COVID-19 from a score of 4 was 3.9 in total and was substantially higher among the reluctant nurses than the acceptors.

The average for the six COVID-19 severity/vulnerability items was 3.33. Vaccine acceptance was more common among those worried they might be a vector of transmission to their families and patients, with potentially serious consequences. The only statistically significant factor to affect vaccine adoption was that COVID-19 might cause or potentiate existing chronic diseases ( $p = 0.02$ ).

Univariate analysis indicated that the vaccine reluctant demonstrated more significant total concern about accepting vaccines ( $2.56 \pm 0.27$  vs.  $2.42 \pm 0.26$ ). Significant concerns that tended to be higher among the reluctant were as follows: lack of knowledge ( $3.39 \pm 0.66$  vs.  $2.9 \pm 0.65$ ), better alternative other than vaccine ( $2.73 \pm 0.65$  vs.  $2.45 \pm 0.79$ ), preference of natural immunity ( $2.92 \pm 0.73$  vs.  $2 \pm 0.62$ ), and fear of injection ( $2.31 \pm 0.75$  vs.  $1.96 \pm 0.64$ ). Media misrepresentation plays an essential role in the acceptance of vaccines ( $p = 0.001$ ).

### 3.1 | Factors predicting vaccine acceptance

Significant and related variables were entered in logistic regression analysis. Age ( $p = .04$ ), lack of knowledge of the vaccine ( $p < .001$ ), concern about long-term side effects ( $p < .001$ ), fear of injection ( $p = .03$ ), natural immunity preference ( $p < .001$ ), media misrepresentation ( $p = .003$ ), and vaccine causing COVID-19 ( $p = .016$ ) were independent predictors of vaccine acceptance (Figure 2). Vaccine resistance was higher among older age groups. Those who were reluctant were six times more comfortable with natural immunity than those who accepted the vaccine. They reported a triple increase in lack of knowledge of the vaccine and a twofold increase in fear of long-term complications and thought about the vaccine triggering

COVID-19. Media seem to have played a significant role in intention and had a twofold effect on reluctance to vaccinate.

### 3.2 | Future views and possible changes

Among acceptors, 75.9% ( $n = 195$ ) expressed willingness to pay, and nearly all (98%) would recommend the vaccine to others. Nurses reluctant about the vaccine would have higher confidence in the immunization if more information was available or scientists assured its safety and recommend it, 88.5% and 79%, respectively (Figure 3).

## 4 | DISCUSSION

Vaccine hesitancy is not unique to Palestine's nurses (Gagneux-Brunon et al., 2020; Galanis et al., 2020; Gómez-Ochoa et al., 2020; Kwok et al., 2021; Lazarus et al., 2020; Paterson et al., 2016; Wang, Wong, et al., 2020; Wang, Wong, et al., 2020; Wilson et al., 2020). Still, the high rates in this study, nearly 60% will delay or decline the vaccine, are concerning, given that nurses would be the health professionals delivering vaccines. One of the drawbacks of this study is that the type of COVID-19 vaccine and the vaccine source were not yet determined. Until this is ascertained, it is difficult to address the reasons for vaccine reluctance in this study that included serious and long-term vaccine side effects, more detailed vaccine information and comparison with alternatives, and the injection site pain. Once these details are decided, a campaign of education for health professionals and the public is imperative.

A recent WHO report outlines behavioral considerations for acceptance and uptake of COVID-19 vaccines and describes three drivers: an enabling environment, social influences, and motivation (World Health Organization, 2020). This is a useful construct for examining factors needed to improve the acceptance and uptake among Palestinian nurses. Access and affordability or an enabling environment should be easy to address in Palestine since MOH plans to provide the vaccine at no cost once secured. Vaccines will likely be dispensed at MOH hospitals and primary care health centers, which

**TABLE 2** Attitude, knowledge, fears, and concern regarding COVID-19 and its vaccine ( $n = 639$ )

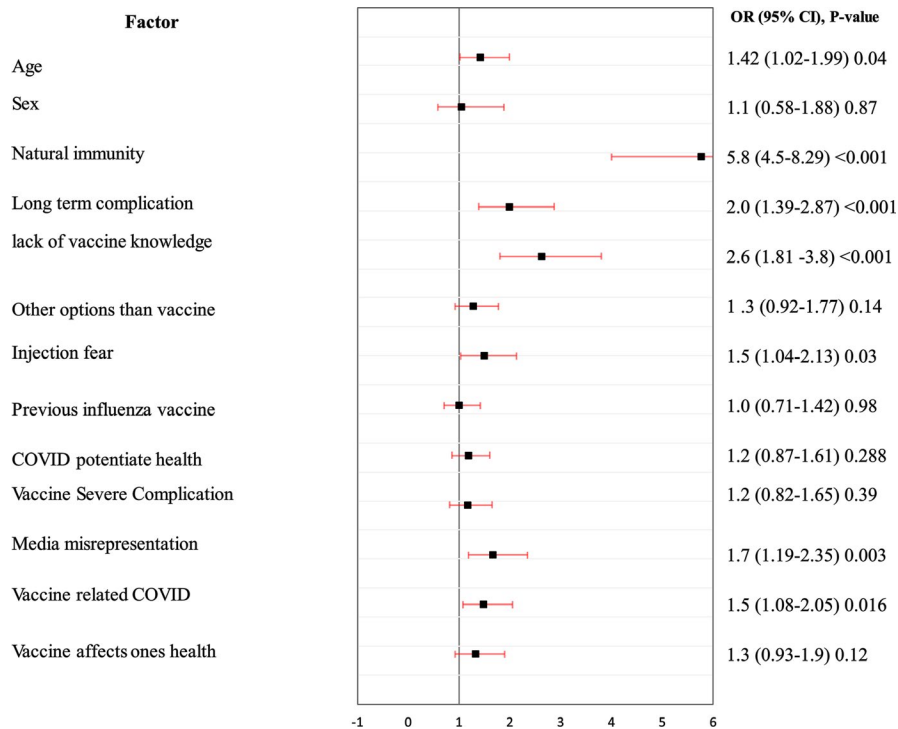
Statements	Total	Reluctance	Acceptance	p-value
Perceived Knowledge COVID-19 <sup>a</sup>	3.9 ± 0.73	3.94 ± 0.73	3.89 ± 0.73	<0.001
Perceived vulnerability and severity <sup>a</sup> (total score)	3.33 ± 0.34	3.32 ± 0.32	3.36 ± 0.32	0.075
Being susceptible	3.44 ± 0.71	3.44 ± 0.73	3.46 ± 0.67	0.73
Being a source of transmission to family and patients	3.63 ± 0.69	3.34 ± 0.68	3.39 ± 0.69	0.36
Is a serious and fatal disease	3.33 ± 0.65	3.33 ± 0.67	3.32 ± 0.63	0.94
Causing serious consequences to families or patients	3.53 ± 0.56	3.52 ± 0.59	3.54 ± 0.52	0.66
Triggering chronic diseases or potentiate existing ones	3.1 ± 0.71	3 ± 0.72	3.13 ± 0.68	0.02
Interfering with one's daily activity	3.29 ± 0.67	3.27 ± 0.7	3.32 ± 0.63	0.36
Vaccine benefits <sup>a</sup> (total score)	2.7 ± 0.7	2.75 ± 0.43	2.7 ± 0.45	0.34
Protection of oneself, family, or patients	3 ± 0.78	3.03 ± 0.77	2.97 ± 0.79	0.31
Prevention of disease transmission	2.73 ± 0.75	2.86 ± 0.79	2.83 ± 0.81	0.62
Believe it would be effective	2.7 ± 0.75	2.75 ± 0.72	2.7 ± 0.77	0.44
Vaccine long-term immunity	2.32 ± 0.67	2.34 ± 0.69	2.28 ± 0.7	0.26
Vaccine-related concerns <sup>a</sup> (total score)	2.45 ± 0.3	2.56 ± 0.27	2.42 ± 0.26	<0.001
Serious side effects	2.66 ± 0.67	2.65 ± 0.64	2.68 ± 0.77	<0.001
Long-term side effects	3.05 ± 0.71	2.84 ± 0.66	2.31 ± 0.63	0.46
Lack of vaccine-related available information	3.19 ± 0.7	3.39 ± 0.66	2.9 ± 0.65	<0.001
Vaccine ineffectiveness	2.27 ± 0.74	2.25 ± 0.72	2.3 ± 0.77	0.45
Affecting one's health conditions	3.33 ± 0.65	1.95 ± 0.59	2.09 ± 0.7	0.01
Getting COVID-19 disease from the vaccine	2.53 ± 0.78	2.41 ± 0.73	2.71 ± 0.82	<0.001
Better alternatives could exist	2.62 ± 0.72	2.73 ± 0.65	2.45 ± 0.79	<0.001
Natural immunity preference	2.55 ± 0.82	2.92 ± 0.73	2 ± 0.62	<0.001
Painful injection	2.17 ± 0.73	2.31 ± 0.75	1.96 ± 0.64	<0.001
Type of vaccine available	2.97 ± 0.71	2.98 ± 0.7	2.94 ± 0.74	0.58
Media misrepresentation	3.13 ± 0.68	3.06 ± 0.65	3.24 ± 0.72	0.001

<sup>a</sup>Each statement had a score from 1 to 4 and presented here as (mean ± SD).

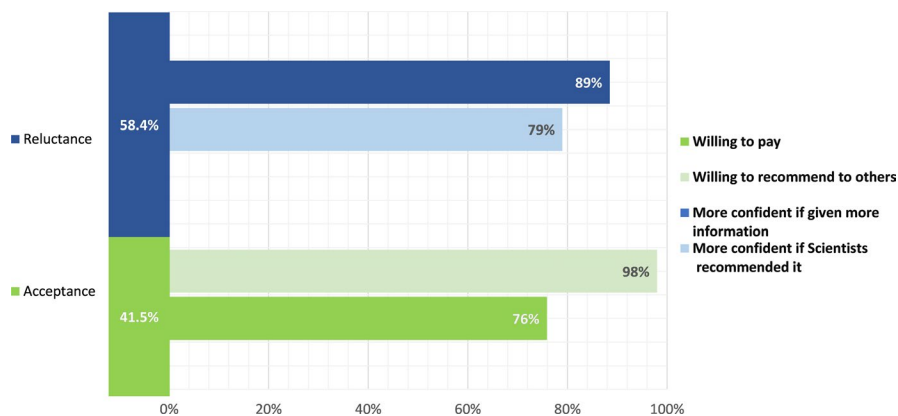
are located across the West Bank. Hence, affordability and access should not be concerns. Besides, in this study, the majority of vaccine acceptors were willing to pay themselves. Social influences include norms such as health care professionals' support, endorsements from trusted experts and community members, and appropriately crafted media messages (World Health Organization, 2020). In this study, significant factors associated with vaccine uptake decisions showed that reluctant nurses were more likely to be older, preferred natural immunity, feared long-term vaccine complications, believed that knowledge about the vaccine was insufficient, feared the injection, and disagreed that media are misrepresenting the vaccine. These findings were consistent with other recent studies that found insufficient knowledge about the new vaccine and fears of long-term side effects were reasons not to vaccinate (Grech et al., 2020; Kwok et al., 2021; Wang, Wong, et al., 2020). Insufficient data regarding safety was the main reason that 40% of our participants chose to

delay vaccination. However, once protection and safety can be assured, this percentage would likely decrease as more data about the vaccine is released. Specifically, 98% of those who chose to delay said they would be more confident when more knowledge became available. Hence, findings from the chosen vaccine's studies should be shared so nurses' fears can be addressed. Furthermore, an innovation known as Rogers' concept of observability indicates that nurses' acceptance rate would improve if they encountered other peers getting the vaccines (Rogers, 2003).

Moreover, our controversy related to age was similar to findings in the Kwok et al study in which older ages were less likely to accept vaccines (Kwok et al., 2021), while other recent reports have shown the opposite (Gagneux-Brunon et al., 2020; Grech et al., 2020). Regardless of the reasons for these differences, it is important to target older populations with awareness campaigns because vaccine distribution schemes give them high priority due to their potential



**FIGURE 2** Multivariable logistic regression of factors predicting vaccine acceptance [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**FIGURE 3** Future views and possible changes regarding COVID 19 vaccine [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

serious risks from a COVID-19 illness (Petrilli et al., 2020). These realities should motivate them to be vaccinated.

Health care professionals will need to have a clear understanding of the chosen vaccine's benefits and risks so they can feel confident in recommending the vaccine to their colleagues and the general public. One of the challenges is the evolving scientific knowledge and nature of the COVID-19 virus. While nurses expressed a preference for natural immunity from having recovered from COVID-19 infection, the length of this immunity is not yet clear (Patel et al., 2020), and the illness is not always asymptomatic or mild. Qualitative research with key stakeholders, including nurses, would help better understand the other misunderstandings about COVID, who are trusted experts, and the best modalities to communicate vaccine benefits and risks, that is, podcasts, Facebook, etc. This would help to shape media messages and to counteract the misinformation and misbeliefs that exist.

Motivations relate to the perceived risk of not being vaccinated, as discussed above, but could also be affected by the need to continue preventive behaviors and misunderstandings about immunity's adequacy after recovering from a COVID-19 infection. Current vaccines and mutating forms of COVID-19 suggest that people will have to continue to engage in preventive behavior (e.g., mask wearing and physical distancing) even if and after they have been vaccinated, and this can undermine vaccine acceptance and uptake (World Health Organization, 2020).

Study limitations may include selection bias of participants who have internet access, although the focus of the study was HCWs who generally do. The dynamic field of study due to the rapidly evolving understanding of COVID-19 and possible vaccines may have already altered respondents' perceptions that are not reflected in these study results. The research was performed in a public health emergency situation which could have limited the

participation of the busiest and most overburdened health workers. Despite these limitations, there was an adequate number of respondents with little statistically significant demographic difference between the vaccine reluctant and the acceptors. Moreover, these results are especially important for nurses working in countries in Africa and Asia where the type of immunizations available are still largely uncertain.

## 5 | CONCLUSION

This study provides essential elements in designing a program to remove barriers to COVID-19 vaccine adherence by nurses in Palestine and outlines critical next steps to ensure a successful campaign. As suggested by Wang, who investigated COVID-19 vaccination acceptance in China, expanded vaccination coverage requires immunization programs designed to remove barriers in vaccine price and vaccination convenience, appropriate health education, and communication from authoritative sources to alleviate public concerns about vaccine safety (Wang, Jing, et al., 2020).

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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