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COVID-19 vaccine hesitancy among health care workers in Palestine: A call for action

Beesan Maraqa [a], Zaher Nazzal [b,*], Razan Rabi [c], Nafez Sarhan [d,e], Kamal Al-Shakhra [a], Mai Al-Kaila [a]

[a] Ministry of Health, Palestine
[b] Faculty of Medicine and Health Sciences, An-Najah National University, Nablus, Palestine
[c] Rafidia Hospital, Ministry of Health, Nublus, Palestine
[d] Palestine Ahliya University, Bethlehem, Palestine
[e] Beit-Jala Governmental Hospital, Ministry of Health, Palestine

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ABSTRACT

With the planned COVID-19 vaccine, vaccine hesitation is a great challenge, particularly for healthcare professionals. In this study, we examined the acceptance of the COVID-19 vaccine by health care workers, their concerns about it, and the reasons that might prevent them from getting vaccinated. We conducted a cross-sectional study using an anonymous online survey from December 25, 2020, to January 6, 2021. The questionnaire consisted of demographic characteristics (age, gender, profession, sector, medical history, and general health), COVID-19 related knowledge, and personal history of influenza vaccination. The intention to get the vaccine once it is available was directly asked, and attitudes towards the diseases and the vaccine were studied using a four-point Likert scale statement based on the health belief model's constructs.

The study included 1159 HCWs; 62.9% were females, and 52.5% were between the ages of 30–49 years. The intention to get vaccinated was only 37.8% [95%CI: 35.0%–40.6%], while 31.5% were undecided, and 30.7% planned to refuse it. Higher levels of intention were reported among males (OR; 2.7, 95%CI: 2.0–3.7), younger ages (OR 1.7, 95%CI: 1.1–2.8), physicians (OR; 2.9, 95%CI: 2.0–4.0), HCWs at non-governmental settings (OR; 1.4, 95%CI: 1.1–1.9), those who previously received the influenza vaccine (OR 4.0, 95%CI: 2.3–7.1), and those who had higher COVID-19 related knowledge (OR; 1.7, 95%CI: 2.3–7.1). In conclusion, vaccine acceptance among HCWs was much lower than expected, which would greatly diminish the role of vaccination in reducing the burden of the COVID-19 pandemic throughout the community.

1. Introduction

Vaccination has significantly decreased the burden of infectious diseases. Its role in disease control, elimination, or eradication has been recognized, and its benefits extend beyond the prevention of particular diseases in individuals (Andre et al., 2008). A high degree of vaccination coverage is needed to meet the global vaccine requirements.

The Severe Acute Respiratory Virus-Covonavirus-2 (SARS-CoV-2) vaccine is considered critical to alleviating the Coronavirus disease (COVID-19) pandemic. Two million deaths were recorded in 2020 due to COVID-19, with millions more infected and many suffering related morbidities (World Health Organization, 2021). The vaccine is expected to introduce herd immunity for at least one year (WHO.World Health Organization, 2020a).

Health care workers (HCWs) are the primary focus for vaccination promotion and advocacy. The CDC and World Health Organization (WHO) had prioritized HCWs to receive the COVID-19 vaccine, particularly when limited resources are a concern (World Health Organization, 2020; Dooling et al., 2020). They are the most likely to contract and subsequently transmit the disease (Gómez-Ochoa et al., 2021). HCWs are three times more at risk of getting COVID-19 than the general population (Nguyen et al., 2020). Gaining buy-in from doctors and nurses is vital for greater public support for vaccines, as patients demonstrate high trust in vaccinators. Some HCWs' reluctance causes challenges to the effectiveness of the accelerating COVID-19 mass vaccination (Paterson et al., 2016).

* Correspondent author.
E-mail address: znazzal@najah.edu (Z. Nazzal).

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COVID-19 vaccination hesitancy has been recorded worldwide (Lazarus et al., 2021; Kabamba Nzaji et al., 2020; Detoc et al., 2020). It is critical that vaccine-resistant providers be identified, their hesitancy causes established, and strategies developed to address their concerns in order to enable successful vaccination initiatives. The explanations for vaccination hesitancy among HCWs are diverse, suggesting that it is vital to consider obstacles to vaccination unique to particular cultural settings and HCWs' subgroups (Hollmeyer et al., 2009). At the root of the flawed opinion among HCWs were misconceptions that vaccines would be unsafe and would not prevent the diseases they were intended to avoid (Vasilevska et al., 2014). They expressed concern about influenza vaccines because of potential adverse side effects (Hollmeyer et al., 2009). The reluctance to be vaccinated against COVID-19 has also been expressed among HCWs. There are differences in occupational categories, as it is more common among nurses (Gagneux-Brunon et al., 2020)., Interestingly, contradictory findings of COVID-19 and the effect on the rate of acceptance of flu vaccinations have been found (Gagneux-Brunon et al., 2020; Domnich et al., 2020).

In low-income countries, like Palestine, new vaccines are geared to the commercial market pressures behind developed countries. However, as part of a global effort to ensure rapid and equal access for all countries to COVID-19 vaccines, COVAX has announced that it has arrangements to access nearly two billion doses of the COVID-19 vaccine for candidates; Palestine is one of them (WHO.World Health Organization, 2020b). By March 2021, the international COVAX scheme had supplied vaccines from Pfizer-BioNTech and AstraZeneca. The Palestinian authorities are releasing vaccinations offered under the global COVAX program as infections in the West Bank and Gaza begin to increase rapidly (BBC News, 2021). The Palestinians also received certain vaccinations in small amounts from other sources, such as Sputnik V, a Russian-made vaccine, and some Moderna vaccines.

The availability of vaccines does not guarantee sufficient vaccination of the population, as shown by the vaccine's hesitancy (Omer et al., 2009). Vaccine hesitance among HCWs was, therefore, assessed in this paper using the Health Belief Model (HBM). Behavioral change theories such as HBM have been used as a tool to define and affect human health behaviors. They have shown successful outcomes in influencing HCWs' behavioral practices (Corace et al., 2016). This study was concerned with finding valuable insights into predicting intentions to vaccinate against SARS-CoV-2 to guide future interventions to address hesitancy.

2. Methods

2.1. Study design and population

The study used a cross-sectional questionnaire-based design. We targeted HCWs in Palestine in the first week of 2021, a period when there was significant vaccine dispute because the media announced that the vaccine would be available within two weeks (Jazeera, 2021).

The study sampled a convenient sample of physicians, nurses, laboratory and radiology technicians from government and non-governmental primary health centers and hospitals. Palestinian HCWs working outside the West Bank or behind Israel's persecution wall were excluded. Calculations of the sample size were determined separately for each position and based on the formula: [n = Z2*P*(1-P)/d2], where Z = 1.96 is the confidence level statistic, P is the estimated proportion of subjects with no vaccine intention, and d is the accuracy. For each specialty (physicians, nurses, and paramedics), the required sample size to meet the research objectives are set at 350 health professionals with an estimated 50% variability, 95% confidence interval (CI), and a 5% absolute precision for both sides of the equation. Considering the three primary specialties, a minimum overall sample size of 1050 HCWs was determined.

2.2. Measures

We created an anonymous online survey that was accessible from December 27, 2020 to January 6, 2021. We sent a web link to the questionnaire using Google forms with an introductory invitation to closed institutional groups (WhatsApp and Messenger) of frontline HCWs. This takes advantage of the high rate of internet use among Palestinians.

The questionnaire addressed: (1) Demographic characteristics (age, gender, profession, work setting, income, frequency of patients contacts per day). (2) Medical background included chronic medical problems, perceived general health, history of COVID-19 infection. (3) Perceived COVID-19 knowledge and history of COVID-19 training. (4) History of vaccination against seasonal influenza in the previous five seasons. (5) Intent to get vaccinated if a COVID-19 vaccine was available was tested using a direct statement "If a vaccine against the new coronavirus was available, would you get vaccinated" and the responses were "Yes" "No," and "I am currently undecided". We used the constructs of the HBM to prepare the attitudes and concerns parts of the questionnaire. As in seasonal influenza vaccination, the HBM offers a helpful theoretical model for researching perceptions and values underlying COVID-19 vaccination (Alhalaseh et al., 2020). Each of the five constructs, perceived risk, perceived severity, perceived benefit, perceived barrier, and cues to action, was assessed using four-point Likert scales. The HBM was tested and used in various languages and cultures, and one was Arabic (Glanz et al., 2008).

The questionnaire was piloted on 30 respondents to determine its comprehensibility, face validity, and estimated completion time, which led to some refining of a few items to enhance the questionnaire. Based on the feedback given, some items were removed and merged with other topics. In selecting the Likert scale, a neutral choice was not included in statements examining attitude to prevent possible bias (Garland, 1991). Cronbach's alpha was calculated for the attitude statements and found to be 92%, indicating excellent reliability.

The research plan was approved by the research committee and by the Institutional Review Board (IRB) at An-Najah National University. Description of the study's purpose, the promise of anonymity and confidentiality were presented to participants before they agreed to complete the survey.

2.3. Data analysis

Statistical analysis was conducted using IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, NY, USA). Initially, the data was cleaned, and input errors were removed. Descriptive and frequency statistics were calculated for individual questionnaire items. The reported HCW intention to get the COVID-19 vaccine was determined using the "yes," "undecided," or "no" responses. We combined those who were undecided and who didn't plan to take the vaccine into a single category called "hesitant", based on the WHO definition (MacDonald, 2015). HBM constructs were grouped into 1) "COVID-19 related attitudes," reflecting disease perceived susceptibility and severity, and 2) "COVID-19 vaccine-related concerns," representing perceived benefits and barriers of the vaccine. Responses to the COVID-19 vaccine-related concern statements were grouped into two categories (strongly agree/agree, disagree/strongly disagree) and presented in total and across genders and professions. We compared the vaccine acceptant and hesitant in relation to HCWs' demographic and background characteristics and attitudes using the Chi-square test and the *t*-test, where necessary. We set the significant level at P value <0.05. Using enter mode set, multivariable logistic regression analysis was used to model predictive variables for directing the COVID-19 vaccine intension. The use of variables in the multivariable regression analysis was dependent on the significance in the univariable analysis.

3. Results

3.1. Background characteristics

We collected 1243 responses from HCWs during the study period; 84 were removed due to insufficient data and unwillingness to participate in the study. Table 1 presents the background characteristics, COVID-19 related information, and influenza vaccination history. In general, participants were located in the three provincial administrative regions of the West-Bank. Among the participants, 373 (32.3%) were physicians, 483 (41.7%) were nurses, and 302 (26.1%) were other health professionals. The majority of the sample (62.9%) were females, and they were between the ages of 30 to 49 (52.5%). Most participants perceived their health as good or excellent, and 251 (21.7%) reported chronic conditions. Concerning COVID-19, 852 HCWs (73.5%) perceived their knowledge as very good to excellent, 262 (22.6%) had been infected with the disease, and 326 (28.1%) reported having received training.

3.2. HCWs' concerns towards COVID-19 vaccine

The results showed that only 438 (37.8%) of the participants [95% CI: 35.0%–40.6%] indicated that they intend to get the COVID-19 vaccine, once it is available in Palestine. Almost one-third of them (31.5%) were undecided to get the vaccine, and 30.7% did not plan to get it.

The majority of HCWs have a high degree of perceived COVID-19 susceptibility and seriousness, with more than 90% agreeing that they are vulnerable to the diseases and that if they contract it, they, their relatives, patients, and families will suffer the consequences.

On the other hand, a significant percentage reported concerns about the vaccine. About two-third of HCWs (66.2%) believed that the vaccine would not have long-lasting immunity, 60.8% thought it would have significant side-effects, 60.1% believed it would have long-term side effects, and 55.2% were concerned they would contract COVID-19 from the vaccine. These concerns were not significantly different a cross gender and profession (Table 2).

3.3. Factors associated with COVID-19 vaccine intention

We examined the HCWs' intention to get the vaccine with regard to their background and demographic characteristics. A higher level of intention was reported among males (*P*-value <0.001, adjusted OR 2.7, 95%CI: 2.0–3.7), younger age groups (*P*-value 0.043, adjusted OR 1.7, 95%CI: 1.1–2.8), physicians (*P*-value <0.001, adjusted OR 2.9, 95%CI: 2.0–4.0), HCWs at non-governmental health care settings (*P*-value 0.044, adjusted OR 1.4, 95%CI: 1.1–1.9), HCWs who got the influenza vaccine regularly in the last five years (P-value <0.001, adjusted OR 4.0, 95%CI: 2.3–7.1), those who perceived their COVID-19 knowledge to be very good to excellent (P-value 0.001, adjusted OR 1.7, 95%CI: 2.3–7.1) and those who perceived susceptible to COVID-19 (P-value 0.015, adjusted OR 0.63, 95%CI: 0.43–0.91) (Table 3).

According to the HBM, cues to action trigger the behavioral performance. HCWs reported a variety of triggers that may influence their intention to receive the vaccine. They would be more optimistic in receiving the vaccine if they learned more about it or if leading authorities or trustworthy individuals recommended it, or if they knew the type of vaccine; 89.9%, 83.3%, and 77.0%, respectively. Additionally, 85.8% thought COVID-19 vaccines were misrepresented in the media and social media (Fig. 1).

4. Discussion

Low rates of COVID-19 vaccine acceptance were reported in the Middle East, Russia, Africa and several European countries. The low COVID-19 vaccine acceptance rate recorded in various countries may present major challenges in global efforts to control the current COVID-19 pandemic (Sallam, 2020; Dubé et al., 2013). The rapidly evolving

Table 1
Background and demographic characteristics of health care workers by profession ($n = 1159$).

Characteristic	Total sample *n(%)*	Health care workers /profession		
		Physicians ($n = 374$) *n(%)*	Nurse ($n = 483$) *n(%)*	Other HCWs* ($n = 302$) *n(%)*
Sex				
Female	729 (62.9%)	145 (38.8%)	384 (79.5%)	200 (66.2%)
Male	430 (37.1%)	229 (61.2%)	99 (20.5%)	102 (33.8%)
Age group				
Under 30 years	392 (33.8%)	156 (41.7%)	124 (25.7%)	112 (37.1%)
30–49 years	609 (52.5%)	184 (49.2%)	265 (54.9%)	160 (53.0%)
Above 50 years	158 (13.6%)	34 (9.1%)	94 (19.5%)	30 (9.9%)
Residency				
North west-bank	526 (45.4%)	178 (47.6%)	216 (44.7%)	132 (43.7%)
South west-bank	403 (34.8%)	63 (16.8%)	114 (23.6%)	53 (17.5%)
North west-bank	230 (19.8%)	133 (35.6%)	153 (31.7%)	117 (38.7%)
Health care setting				
Governmental	814 (70.2%)	240 (64.2%)	408 (84.5%)	166 (55.5%)
Non- governmental	345 (29.8%)	134 (35.8%)	75 (15.5%)	136 (45.5%)
Income level				
Less than 5000 (ILS)	833 (71.9%)	172 (46.0%)	424 (85.9%)	237 (78.5%)
5000-10,000 (ILS)	272 (23.5%)	186 (44.9%)	41 (8.5%)	63 (20.9%)
>10,000 (ILS)	54 (4.7%)	34 (9.1%)	18 (3.7%)	2 (0.7%)
Patients contact per day				
Less than 10 patients	216 (18.6%)	70 (18.7%)	68 (14.1%)	78 (25.8%)
10–40 patients	581 (50.1%)	197 (52.7%)	260 (53.8%)	124 (41.1%)
More than 40 patients	326 (31.2%)	107 (28.6%)	155 (32.1%)	100 (33.1%)
Perceived general health				
Poor or very poor	228 (19.7%)	50 (13.4%)	125 (25.9%)	53 (17.5%)
Excellent or very good	931 (80.3%)	324 (86.6%)	358 (74.1%)	249 (82.5%)
Chronic disease				
No	908 (78.3%)	300 (80.2%)	356 (73.7%)	252 (83.4%)
Yes	251 (21.7%)	74 (19.8%)	127 (26.3%)	50 (16.6%)
Influenza vaccine uptake *(last 5 years)*				
Never	723 (62.4%)	215 (57.5%)	301 (62.3%)	207 (68.5%)
Once or more	355 (30.6%)	133 (35.6%)	141 (29.2%)	81 (26.8%)
Every year	081 (07.0%)	26 (7.0%)	41 (8.5%)	14 (4.6%)
Perceived COVID-19 knowledge				
Poor to good	307 (26.5%)	87 (23.3%)	132 (27.3%)	88 (29.1%)
Very good to excellent	852 (73.5%)	278 (76.7%)	351 (72.7%)	214 (70.9%)
Received COVID-19 training				
No	833 (71.9%)	262 (70.1%)	324 (67.1%)	247 (81.8%)
Yes	326 (28.1%)	112 (29.9%)	159 (32.9%)	55 (18.2%)

(*continued on next page*)

Table 1 (*continued*)

Characteristic	Total sample *n(%)*	Health care workers /profession		
		Physicians (*n* = 374) *n(%)*	Nurse (*n* = 483) *n(%)*	Other HCWs* (*n* = 302) *n(%)*
History of infection with COVID-19				
No	897 (77.4%)	305 (81.6%)	364 (75.4%)	228 (75.5%)
Yes	262 (22.6%)	69 (18.4%)	119 (24.6%)	74 (42.5%)

®Include lab technicians, radiology technicians, and occupational and physiotherapists.

Table 2
HCWs' concerns and attitudes towards COVID-19 vaccines with gender and profession ($n = 1159$).

Vaccine-related attitude	Total (%)	Gender (%)		Profession (%)		
		Female	Male	Physician	Nurse	Other
Long-lasting immunity	767 (66.2%)	34.4%	32.8%	35.0%	34.4%	31.5%
		p-value = 0.56		*p-value = 0.58*		
Get COVID-19 from the vaccine.	640 (55.2%)	55.0%	55.6%	54.0%	56.9%	54.0%
		p-value = 0.84		*p-value = 0.61*		
Effectiveness in COVID-19 prevention	490 (42.3)	57.0%	58.4%	57%	59%	56.6%
		p-value = 0.73		*p-value = 0.75*		
Vaccine long-term side effects.	696 (60.1%)	59.8%	60.1%	59.4%	59.8%	60.1%
		p-value = 0.59		*p-value = 0.87*		
Vaccine significant side-effects	705 (60.8%)	60.1%	62.1%	60.7%	61.9%	59.3%
		p-value = 0.82		*p-value = 0.76*		
Lack of vaccine related information	1012 (87.3%)	88.6%	85.1%	86.4%	89.6%	84.8%
		p-value = 0.08		*p-value = 0.11*		
Painful vaccine	392 (33.8%)	34.4%	32.8%	35%	34.4%	31.5%
		p-value = 0.56		*p-value = 0.58*		

nature of COVID-19 with the subsequent rushing of vaccine development has magnified this issue. In our study, 30.7% of HCW expressed hesitance to receive the COVID-19 vaccine, and 31.5% planned to decline, and only 37.8% intended to take the vaccine once it was available. In the very few studies that examined COVID-19 vaccine intentions among HCWs, the acceptance rate ranged from 27.7% to 78.1% (Sallam, 2020). Apart from the fact that these other studies were carried out before the first release of vaccine safety and reports of almost 90% efficacy (Voysey et al., 2020), we found a low rate of vaccination acceptance. COVID-19 vaccine acceptance rates varied in the general population, with above 90% in the east and south-east Asian countries and less than 60% in Mediterranean countries (Sallam, 2020). While this disparity is not well understood, it may be attributed to political or religious beliefs (Lazarus et al., 2021; Dubé et al., 2013).

Our sample's vaccine acceptance barriers were inadequate knowledge of the COVID-19 vaccine, long-term and severe side-effect concerns, fear of the vaccine causing the disease, and confusion about efficacy. These predictors of vaccine hesitancy were documented in previous vaccination experiences (Vasilevska et al., 2014). In the study by Qattan et al., 50.5% of Saudi HCWs indicated a willingness to get the vaccine when available(Qattan, 2021). Still, the key reasons for hesitancy were insufficient data concerning safety and reservations about side effects (Neumann-Böhme, 2020)(Qattan, 2021)(). Likewise, 76.9% intended to get the vaccine once available in a French cohort, with similar fears (Gagneux-Brunon et al., 2020). While we had lower general vaccine acceptance, our reasons for hesitation were the same; lack of knowledge and safety concerns.

Table 3
Factors predicting HCWs' intention to get the COVID-19 vaccine.

Characteristic	Univariable analysis			Multivariate analysis[c]
	Intend to get vaccine	Hesitant	P-value[b]	Adjusted OR (95% CI)
Sex				
Male	250 (58.1%)	180 (41.9%)	<0.001	2.7 (2.0–3.7)
Female[a]	188 (25.8%)	541 (74.2%)		
Age				
Under 30 years	166 (42.3%)	226 (57.7%)	0.073	1.7 (1.1–2.8)
30–49 years	216 (35.5%)	393 (64.5%)		1.1 (0.7–1.7)
Above 50 years[a]	56 (35.4%)	102 (64.6%)		1
Income level				
Less than 5000[a]	261 (31.3%)	572 (68.7%)	<0.001	1
More than 5000	177 (54.3%)	149 (45.7%)		0.75 (0.5–1.1)
Profession				
Physicians	231 (61.8%)	143 (38.2%)	<0.001	2.9 (2.0–4.2)
Nurse	118 (24.4%)	365 (75.6%)		1.1 (0.7–1.6)
Other HCWs®[a]	89 (29.5%)	213 (70.5%)		1
Health care setting type				
Governmental[a]	265 (32.6%)	549 (67.4%)	<0.001	1
Non-governmental	173 (50.1%)	172 (49.9%)		1.4 (1.1–1.9)
Influenza vaccine uptake last Five years				
Never[a]	238 (32.9%)	485 (67.1%)	<0.001	1
Once or more	153 (43.1%)	202 (56.9%)		1.6 (1.2–2.2)
Every year	47 (58.0%)	34 (42.0%)		4.0 (2.3–7.1)
Patients contact per day				
Less than 10 patients[a]	98 (45.4%)	118 (54.6%)	0.016	
10–40 patients	219 (37.7%)	326 (62.3%)		1.19 (0.56–1.1)
More than 40 patients	121 (33.4%)	241 (66.6%)		1.4(0.47–1.1)
Perceived COVID-19 knowledge				
Poor to good[a]	84 (27.4%)	223 (72.6%)	<0.001	1.7 (1.3–2.4)
Very good to excellent	354 (41.5%)	498 (58.5%)		
Infected with COVID-19				
Yes	90 (34.8%)	172 (65.5%)	0.218	–
No	348 (38.8%)	90 (34.4%)		
COVID-19 perceived susceptibility (Mean ± SD)	3.3 (0.62)	3.4 (0.62)	0.001[d]	0.63 (0.43–0.91)
COVID-19 perceived severity (mean ± SD)	3.3 (0.58)	3.4 (0.55)	0.009[d]	1.2 (0.78–1.7)
Vaccine perceived benefits (mean ± SD)	2.6 (0.63)	2.7 (0.58)	0.289[d]	1.2 (0.80–1.7)
Vaccine perceived barriers (Mean ± SD)	2.7 (0.47)	2.8 (0.0.37)	0.008[d]	0.85 (0.48–1.5)

[a] *Reference group.*
[b] *Chi-square test.*
[c] *Binary logistic regression model.*
[d] *Independent T-test, OR = Odds Ratio, CI=Confidence Interval, ®Include lab technicians, radiology technicians, and occupational and physiotherapists.*

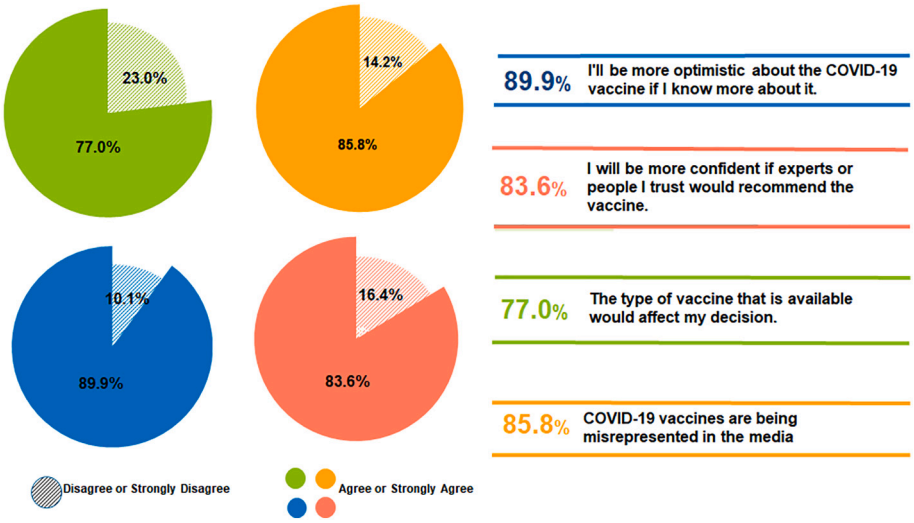

Fig. 1. Distribution of cues to actions expected to affect HCWs intention towards the COVID-19 vaccine.

Additionally, independent factors correlated with the vaccine's hesitancy in this study were age, gender, profession, type of health care setting, and flu vaccine uptake history. Women were more hesitant about getting the COVID vaccine than men, a finding supported by other studies ((Neumann-Böhme, 2020); Dror et al., 2020; Barry et al., 2020). This may be due to differences in risk perception and decision-making between the genders, as men are more likely to take health/safety risks than women (Weber et al., 2002).

Nurses and females were the most hesitant regarding vaccines, while physicians and males were the most supportive, which has been found in other studies (Gagneux-Brunon et al., 2020; Gadoth et al., 2020). Since physicians reported greater knowledge about COVID-19, they may be more likely to accept its vaccine. This is important for policymakers because nurses are more likely to contact patients and be responsible for the vaccination process. Vaccine resistance was present among the public sector employees. Vaccine hesitance among public sector employees would impact the COVID-19 adoption among the general population since the level of patient contact among public sector staff is the highest.

Consequently, our HCWs have a negative perception about vaccinations, as the influenza vaccination rate was low, with only 37.6% having received the vaccine at least once in the past five years. This is in line with the results of a study from 2015, which showed that only 21% of HCWs in Palestinian hospitals were flu-vaccinated. The belief that a healthy person does not need vaccines and that the vaccine is ineffective against influenza are the two most common explanations for HCWs not being vaccinated (Nazzal et al., 2015). The study found a link that was also observed in earlier COVID-19 vaccine studies between influenza vaccination and COVID-19 vaccine acceptance. For instance, in Barry et al., the vaccination acceptance rate was 52.6%, whereas the influenza uptake rate was 83.9% (Barry et al., 2020). In the French study, 76.9% showed acceptance towards the COVID-19 vaccine, while 57.3% took previous influenza (Gagneux-Brunon et al., 2020). This implies that certain shared characteristics with all vaccines determine vaccine acceptance. To some extent, barriers are even greater in terms of the new emerging vaccines, with its new technologies. In contrast, the most reported reasons for influenza vaccine reluctance in Greece were not believing being at risk for influenza and fear of vaccine adverse effects (Maltezou et al., 2008).

Our results emphasize that beyond the inherent understanding of vaccination, which is part of one's decision-making behavior, obstacles exist for both COVID-19 and influenza vaccines. Some barriers need to be examined and addressed since each contributes in some way. Confronting and refuting all misinformation and false news, primarily via social media, is imperative. The prevalence of vaccine hesitancy and negative vaccine attitudes among health professionals will impact the general public's confidence in vaccines (Gagneux-Brunon et al., 2020).

Reasons to be vaccinated included the perceived susceptibility and seriousness of COVID-19. The majority wanted to avoid transmitting COVID-19 to their families or patients and considered themselves vulnerable to COVID-19 and a primary transmission source. While HCWs were suspicious about vaccine safety, its efficacy in preventing disease transmission, and the duration of immunity, they wanted more information. Altogether 90% would be more positive about the vaccine if more details were available about the various types, and 83% would take it if experts recommended it. Hence, this shows the focus of interventions to raise vaccination rates.

As this the first study to assess COVID-19 vaccine hesitancy in Palestine as the COVID-19 vaccine was being introduced globally and is one of the few studies in the world to be conducted shortly after vaccine safety reports were released. The large sample size with economic and geographic distribution and adequate samples of nurses and physicians as well as other HCWs. However, the study has some limitations that should be considered. An online survey is not as accurate as one conducted face to face and is vulnerable to selection bias. The proportion of HCWs over the age of 50 is limited in this study due to the study's electronic nature. Another limitation is that the level of care and place of work were not mentioned in the questionnaire since they were considered to have little impact on intention. Furthermore, attitudes have shifted over time (Sallam, 2020), and may change as vaccines become available in other countries and in Palestine. Longitudinal follow-up would give a complete picture of vaccine hesitancy.

5. Conclusion

Our study showed that hesitancy to get vaccinated was enormous among Palestinian HCWs for both past compliances with influenza vaccines and future willingness to accept the COVID-19 vaccine. Since HCWs influence the general public's attitude, it is urgent to create interventions to alleviate the fear and misunderstandings about the COVID vaccines among health professionals. Unless this is done, poor uptake of vaccination for this once-in-a-century global pandemic is expected.

Ethics and consent

All procedures performed in this study involving human participants were following the institutional and/or national research committee's ethical standards and the 1964 Helsinki Declaration or comparable

ethical standards. The Institutional Review Board of Al-Najah National University approved this study. All subjects included in the study were invited to participate voluntarily after explaining the study aim, risk, and benefit of participation. Informed consent was obtained from all individual participants included in the study.

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

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Author contributions

ZN, BM, MA, and KA participated in conceptualizing the research idea, methodology, project administration, and supervision. BM, RR, and NS contributed to data curation and data analysis. All authors contributed to results interpretation. RR and BM wrote the first draft of the manuscript, and all authors reviewed and edited the previous versions of the manuscript. All authors read and approved the final manuscript.

Declaration of Competing Interest

The authors declare that they have no competing interests in this section.

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