

RESEARCH PAPER



Acceptability of COVID-19 vaccination among health care workers: a cross-sectional survey in Morocco

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ABSTRACT

Introduction: This study aimed to evaluate the acceptability of COVID-19 vaccination among health care workers prior to the start of the COVID-19 vaccination campaign in Morocco.

Methods: This cross-sectional study was conducted in the Cheikh Khalifa University Hospital of Casablanca-Morocco. Utilizing a web-based platform surveys were distributed over a 3-week period via professional mailing list and social media. Odds ratios and 95% confidence intervals were estimated by using logistic regression models.

Results: A total of 303 health care workers participated in this study. The results showed a relatively high rate of vaccination acceptability (62.0%) among health care workers included in this study. Participants were more likely to accept the COVID-19 vaccine if they were physician, nurse, or technician (OR 1.79; 95% CI: 1.09–2.95), had high score of confidence in the information circulating about COVID-19 (OR 1.91; 95% CI: 1.36–2.69), or had high score of perceived severity of COVID-19 (OR 1.55; 95% CI: 1.11–2.15). Reasons of hesitation/or refusal of COVID-19 vaccine were fear of the likely side effects of the vaccine for 74.8% of participants, and concern about the effectiveness of the vaccine for 47.8%.

Conclusion: This study showed a relatively high rate of the COVID-19 vaccination acceptance among health care workers in Morocco. Willingness to be vaccinated was significantly associated with job category, confidence in the information circulating about COVID-19, and perceived severity of COVID-19. These results could be useful in the development of educational interventions to increase the acceptance of COVID-19 vaccine among health care workers in Morocco and similar settings.

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Introduction

Vaccination is one of the most important advances in the fight against the spread of infectious diseases. While protective behaviors are important in the management and control of the current COVID-19 pandemic,¹ vaccination is the most effective preventive measure to reduce infections with SARS-CoV-2. As a result, researchers and scientists rushed to develop and test new vaccines to protect against SARS-CoV-2 and the speed of scientific discoveries related COVID-19 is unprecedented.² Several vaccines against COVID-19 were developed recently in multiple countries.^{1,3,4} The newly developed COVID-19 vaccines have generated a considerable debate about effectiveness and adverse events.

Morocco was one of the first countries to launch a COVID-19 vaccination campaign in Africa, starting January 29, 2021. The vaccination campaign in Morocco initially began in areas with high incidence rate of COVID-19. The vaccine was made free of charge for all Moroccan citizens. Priority was given to people over 75 years of age, health professionals over 40 years

of age, teachers over 45 years of age, public authorities, and members of the army. The other demographic groups were vaccinated thereafter.⁵

Acceptance of the vaccine by health care workers (HCWs) is important to prevent nosocomial transmission of the COVID-19 virus.⁶ In addition, HCWs have an important role in the success of immunization programs, and many studies indicated that knowledge and attitudes of HCWs on vaccines determines the acceptance of vaccines by the general public.^{7,8} Given that HCWs have an important role in enhancing the vaccination coverage in general population,^{9,10} and vaccine hesitancy among that sub-group may lead to reduced vaccinations rates among the population in general,^{11,12} it is important to explore acceptance of the COVID-19 vaccine among HCWs.

Many previous studies have investigated the acceptance of the COVID-19 vaccines among HCWs in the world.^{9,13–15} To the best of our knowledge, this is the first study to investigate the acceptability of COVID-19 vaccination among Moroccan HCWs prior to the start of the national COVID-19 vaccination campaign.

Materials and methods

Study design and setting

This cross-sectional study was conducted in the Cheikh Khalifa Ibn Zaid University Hospital of Casablanca-Morocco, during the first 3 weeks of January 2021.

Study population

The study included HCWs at the Cheikh Khalifa Ibn Zaid University Hospital of Casablanca- Morocco, including physicians, nurses, technicians, administrators, managers and clerical/service workers.

The sample size was calculated using the OpenEpi, version 3 software (www.OpenEpi.com).

$$n = \frac{[DEFF * Np(1 - p)]}{[(d^2 / Z^2_{1-\alpha/2} * (N - 1) + p * (1 - p))]}$$

N is Population size (for finite population correction factor or fpc) = 1250; p is the hypothesized (%) frequency of outcome factor in the population (50% +/-5; Confidence limits as % of 100) (absolute +/-%)(d) = 5%; DEFF (design effect = 1); Z is a constant = 1.96 for 95% Confidence interval.

Based on the above parameters the minimum required sample size (n) was 295 participants.

Data collection

The questionnaire used in this study was developed electronically on Google form and distributed over a 3-week period via professional mailing list and social media (WhatsApp). The development of the questionnaire was based on a review of literature and questionnaires used in prior similar studies.^{6,16} The questionnaire was tested in a pilot study, on a group of 12 participants. Participants were asked to provide comments about items that presented a problem of comprehension, and asked to suggest alternative expressions. All data collected during this pilot study were checked for consistency and reliability.

The questionnaire started with a short paragraph describing the purpose of the study and assuring participants the data would be collected anonymously. The questionnaire was composed of three sections with a total of 21 questions: The first section included sociodemographic and general information, including age, gender, occupation, marital status, education level, years of experience, the presence of chronic disease, close contact with COVID-19 patients, personnel history of COVID-19, having family member or friend infected with COVID-19, loss of a loved one/ or a friend due to COVID-19, and confidence in the information circulating about COVID-19. The second section included questions about the perception of COVID-19 vaccine, such as perceived severity of COVID-19, perceived likelihood of COVID-19, and perceived impact of the COVID-19 pandemic on daily routine and on professional life. The third section included question related to the acceptability of COVID-19 vaccination, such as willingness to get a COVID-19 vaccine (yes, no or not sure), reasons of acceptance, and reasons of hesitation /or refusal of COVID-19 vaccination.

We assessed participants' confidence in the information circulating about COVID-19 by calculating a score based on one item, with four responses, and this score ranged from 0 (low confidence) to 4 points (height confidence). Score of perceived severity of COVID-19 (one item, possible range = 1–4 points), score of perceived likelihood of COVID-19 (one item, possible range = 1–4 points), and score of impact of the COVID-19 pandemic (two items, possible range = 2–8 points) were also calculated for each participant.

Statistical analysis

Descriptive analyses were conducted using frequencies (percentages) for categorical variables and means (\pm standard deviation) for continuous variables. Logistic regression models were used to estimate the odds ratio (OR) and 95% confidence interval. Multivariate adjusted odds ratios (ORs) and corresponding 95% confidence intervals (CIs) were estimated, adjusting for occupation, score of confidence in the information circulating about COVID-19 and score of perceived severity of COVID-19. Data analysis was performed using SPSS, version 20 software.

Ethical consideration

The study protocol was reviewed and approved by the ethics committee of the Cheikh Khalifa Ibn Zaid University Hospital of Casablanca. All participants in the study completed an electronic informed consent. Participation in the study was voluntary and without compensation.

Results

Sociodemographic and general information of the participants

Table 1 shows sociodemographic and general information of the participants. A total of 303 HCWs completed the survey. Of the 303 participants, more than half ($n = 157$, 51.8%) were aged under 30 years old. The majority of the participants were female ($n = 148$, 63.2%); 42.6% ($n = 129$) were nurses. Under half, ($n = 144$, 47.5%) of participants were single. The highest proportion of participants had at least a bachelor's degree ($n = 262$, 86.5%). More than half of participants ($n = 171$, 56.4%) had 6 years or more of experience and almost 14.9% ($n = 258$) of them had chronic disease. About 32.2% ($n = 97$) of the respondents indicated that they had not been in close contact with COVID-19 patients. Almost a quarter of the participants ($n = 71$, 23.4%) have been previously infected with COVID-19. A higher proportion of participants lost a friend or close person due to COVID-19 ($n = 195$, 64.4%).

Factors associated with acceptance of COVID-19

Among HCWs participated in this study, about 62.0% indicated acceptance of COVID-19 vaccines.

Table 2 presents univariate and multivariable analysis factors associated with the acceptance of COVID-19 vaccine. In univariate analysis, participants accepting COVID-19 vaccine and

Table 1. Sociodemographic and general information of the participants (n = 303).

Variables	Distribution n (%)
Age (mean)	31.7 ± 8.3
≤ 30	157 (51.8)
> 30	146 (48.2)
Gender	
Female	193 (63.7)
Male	110 (36.3)
Occupation	
Physician	25 (8.3)
Nurse	129 (42.6)
Technician	16 (5.3)
Administrator/Manager	97 (32.0)
Clerical/service worker	36 (11.9)
Marital status	
Single	144 (47.5)
Married	142 (46.9)
Divorced	13 (4.3)
Widowed	4 (1.3)
Education level	
Secondary education	41 (13.5)
Bachelor's degree	144 (47.5)
Master's degree	71 (23.4)
High university degree	47 (15.5)
Experience (years)	
0–5	132 (43.6)
6–10	88 (29.0)
11–15	44 (14.5)
> 15	39 (12.9)
Chronic disease	
No	258 (85.1)
Yes	45 (14.9)
Close contact with COVID-19 patients	
No	97 (32.0)
Yes	206 (68.0)
Previously infected with COVID-19	
I don't know	62 (20.5)
No	170 (56.1)
Yes	71 (23.4)
Family member or friend infected with COVID-19	
No	51 (16.8)
Yes	252 (83.2)
Loss of a loved one, or a friend due to COVID-19	
No	195 (64.4)
Yes	108 (35.6)

those not accepting this vaccine, show differences regarding their job category, confidence in the information circulating about COVID-19, and perceived severity of COVID-19. However, other variables (age, gender, marital status, education level, experience, chronic disease, close contact with COVID-19 patients, previously infected with COVID-19, family member or friend infected with COVID-19, loss of a family member due to COVID-19, score of perceived likelihood of COVID-19, score of impact of the COVID-19 pandemic) were not correlated with the acceptance of COVID-19 vaccine.

In multivariable analysis, participants were more likely to accept the COVID-19 vaccine if they were physician, nurse, or technician (OR 1.79; 95% CI: 1.09–2.95, $p = .02$), had high score of confidence in the information circulating about COVID-19 (OR 1.91; 95% CI: 1.36–2.69, $p < .01$), or had high score of perceived severity of COVID-19 (OR 1.55; 95% CI: 1.11–2.15, $p < .01$).

Reasons of acceptance and hesitation or refusal of COVID-19 vaccine

Table 3 shows the reasons for COVID-19 vaccine acceptance among the HCWs. The reasons for acceptance of the COVID-19 vaccine among participants included the following: protect

themselves from the virus for 75.5%; avoid transmitting the virus to a loved one for 68.6%; avoid transmitting of the virus to patients for 60.6%; participate in the control of the pandemic in my country for 50.5%; fear of the danger of COVID-19 for 43.1%; comply with the recommendations of the WHO and/or the Ministry of Health recommendations for 39.9%; concern for the number of COVID-19 cases and deaths in the city/region for 31.4%; and to follow advice of colleagues for 17.6%.

Table 4 shows the reasons of hesitation/or refusal of COVID-19 vaccine including: fear of the likely side effects of the vaccine for 74.8% of participants; doubt regarding the effectiveness of the vaccine for 47.8%; unknown duration of protection provided by the COVID-19 vaccine for 27.8%; concern about the country of origin of the vaccine for 23.5%; assuming natural protection against COVID-19 due to prior natural infection for 11.3%. Injection phobia was reported by 10.4%, and the belief that acquiring immunity against COVID-19 via natural infection was deemed superior to vaccine-induced immunity by 7.8%. Pregnancy and breastfeeding were reported as reason for hesitation or refusal among 3.5% of participants.

Discussion

Vaccination is the most effective measure for the prevention and control of COVID-19 disease. HCWs play a key role in the success of COVID-19 vaccination programs, as they are a high-risk population and immunity among this group probably reduces the transmission of the of COVID-19 in health-care settings. Moreover, health-care workers are considered a trusted source of COVID-19 vaccine information for the general population, and their vaccination attitudes will impact others.

The aim of this study was to assess the acceptability of COVID-19 vaccine among Moroccan HCWs. Our findings indicated a relatively high rate of vaccination acceptability among HCWs in this single Moroccan health care facility. Physicians, nurses, and technicians, along with high-level confidence in the information circulating about COVID-19 and high perceived severity of COVID-19 were correlated with the acceptance of COVID-19 vaccine.

In this study, approximately 69% of HCWs intended to receive the COVID-19 vaccines. This result is comparable to a study among Saudi Arabian HCWs, 70% of whom were willing to take the vaccine.⁶ Similarly, in a multi-center survey conducted by Verger et al.¹⁰ among HCWs in France, Belgium, and Canada, 72.4% of HCWs were willing to be vaccinated if COVID-19 vaccines available.

High acceptability rate of the COVID-19 vaccines among HCWs has been reported in many other studies. A study conducted in Greece by Papagiannis et al.^{17,18} found a high level (78.5%) of acceptance for COVID-19 vaccine and the majority of the participants reported that the vaccines are generally safe and effective tools for the protection of public. Similarly, in Vietnam study, Huynh G et al. reported that 84.0% of participated HCWs expressed their intention to be vaccinated against COVID-19.¹⁹

The acceptability of the COVID-19 vaccines reflected in this study is higher compared to other countries in the sub-Saharan Africa region. For instance, Martin Wiredu Agyekum et al.¹⁹

Table 2. Univariate and multivariable analysis for factors associated with the acceptance of COVID-19 vaccine (n = 303).

	No/ or NS (n = 115)	Accept (n = 188)	Unadjusted		Adjusted*	
	n (%)	n (%)	OR (95% IC)	p-value	OR (95% IC)	p-value
Age				0.56		0.86
≤ 30	62 (53.9)	95 (50.5)	Ref		Ref	
> 30	53 (46.1)	93 (49.5)	1.14 (0.71–1.82)		1.04 (0.63–1.72)	
Gender				0.95		0.73
Female	73 (63.5)	120 (63.8)	Ref		Ref	
Male	42 (36.5)	68 (36.2)	0.98 (0.60–1.59)		1.09 (0.64–1.84)	
Occupation				<0.01		0.02
Administrator, Manager	64 (55.7)	53 (36.7)	Ref		Ref	
Physician, Nurse, Technician	51 (44.3)	119 (63.3)	2.16 (1.34–3.47)		1.79 (1.09–2.95)	
Marital status				0.65		0.90
Unmarried	63 (54.8)	98 (52.1)	Ref		Ref	
Married	52 (45.2)	90 (47.9)	1.11 (0.69–1.77)		1.03 (0.62–1.71)	
Education level				0.13		0.42
Secondary or Baccalaureate (Bac)	12 (10.4)	29 (15.4)	Ref		Ref	
Bac+2/Bac+3	52 (45.2)	92 (48.9)	0.73 (0.34–1.55)		0.86 (0.39–1.91)	
Bac+4 /Bac+5	35 (30.4)	36 (19.1)	0.42 (0.18–0.96)		0.70 (0.28–1.72)	
Bac+6 et plus	16 (13.9)	31 (16.5)	0.80 (0.32–1.97)		1.41 (0.53–3.75)	
Experience (years)				0.61		0.33
≤5	48 (41.7)	84 (44.7)	Ref		Ref	
>5	67 (58.3)	104 (55.3)	0.88 (0.55–1.41)		0.77 (0.46–1.29)	
Chronic disease ATCD				0.19		0.11
No	94 (81.7)	164 (87.2)	Ref		Ref	
Yes	21 (18.3)	24 (12.8)	0.65 (0.34–1.24)		0.57 (0.28–1.14)	
Close contact with COVID-19 patients				0.06		0.13
No	44 (38.3)	53 (28.2)	Ref		Ref	
Yes	71 (61.7)	135 (71.8)	1.57 (0.96–2.58)		1.52 (0.88–2.62)	
Previously infected with COVID-19				0.58		0.60
No/I don't know	90 (78.3)	142 (75.5)	Ref		Ref	
Yes	25 (21.7)	46 (24.5)	1.16 (0.67–2.02)		1.17 (0.64–2.13)	
Family member or friend infected with COVID-19				0.66		0.41
No	18 (15.7)	33 (17.6)	Ref		Ref	
Yes	97 (84.3)	155 (82.4)	0.87 (0.46–1.63)		0.74 (0.36–1.51)	
Loss of a family member due to COVID-19				0.62		0.85
No	76 (66.1)	119 (63.3)	Ref		Ref	
Yes	39 (33.9)	69 (36.7)	1.13 (0.69–1.83)		1.05 (0.62–1.76)	
Score of confidence in the information circulating about COVID-19	2.35 ± 0.73	2.75 ± 0.75	2.06 (1.48–2.86)	<0.01	1.91 (1.36–2.69)	<0.01
Score of perceived severity of COVID-19	3.24 ± 0.82	3.53 ± 0.71	1.62 (1.19–2.21)	<0.01	1.55 (1.11–2.15)	<0.01
Score of perceived likelihood of COVID-19	3.20 ± 0.65	3.09 ± 0.76	0.79 (0.57–1.11)	0.18	0.74 (0.52–1.07)	0.11
Score of impact of the COVID-19 pandemic	5.96 ± 1.53	5.93 ± 1.40	0.98 (0.84–1.15)	0.88	0.97 (0.80–1.17)	0.78

* Odds ratios adjusted for occupation, score of confidence in the information circulating about COVID-19 and score of perceived severity of COVID-19.

Table 3. Reasons for COVID-19 vaccine acceptance (n = 188).

	Yes n (%)	No n (%)
Fear of the danger of COVID-19	81 (43.1)	107 (56.9)
To protect yourself from the virus	142 (75.5)	46 (24.5)
To avoid transmitting the virus to your loved ones	129 (68.6)	59 (31.4)
To avoid transmitting the virus to patients	114 (60.6)	74 (39.4)
To participate in the control of the pandemic in my country	95 (50.5)	93 (49.5)
To follow advice of your colleagues	33 (17.6)	155 (82.4)
To comply with the recommendations of the WHO and/or the Ministry of Health	75 (39.9)	113 (60.1)
Concern for the number of COVID-19 cases and deaths in your city/region	59 (31.4)	129 (68.6)

found that only about 39% of HCWs in Ghana had intended to be vaccinated against COVID-19. The authors attributed low acceptance of COVID-19 vaccines to safety concerns, fear from adverse effects of the vaccine, or acquiring COVID-19 through the vaccination.¹⁹ Another study in the Democratic Republic of Congo by Nzaji et al.⁷ found that approximately 28% of HCWs were willing to receive the COVID-19 vaccines if available, the authors reported that the low willingness to receive COVID-19 vaccine was related to misinformation on vaccine quality and fears propagated on social media.⁷

Table 4. Reasons of hesitation /or refusal of COVID-19 vaccine (n = 115).

	Yes n (%)	No n (%)
The virus is not dangerous	3 (2.6)	112 (97.4)
Fear of the likely side effects of the vaccine	86 (74.8)	29 (25.2)
Doubt regarding the effectiveness of the vaccine	55 (47.8)	60 (52.2)
Unknown duration of protection provided by the vaccine remains	32 (27.8)	83 (72.2)
Acquiring immunity against COVID-19 naturally is better than acquiring immunity by vaccination	9 (7.8)	106 (92.2)
The number of COVID-19 cases in your area is not worrying	2 (1.7)	113 (98.3)
Concern about the country of origin of the vaccine	27 (23.5)	88 (76.5)
Assuming natural protection against COVID-19 due to prior natural infection	13 (11.3)	102 (88.7)
Injection phobia	12 (10.4)	103 (89.6)
Pregnancy or breastfeeding	4 (3.5)	111 (96.5)

In our study we found that being physician, nurse, or technician (front workers) was associated with the acceptability of COVID-19 vaccine. A significant association between category job and the willingness to be vaccinated against COVID-19 has also been reported in other studies.^{20,21} This may be related to the increased transmission risk faced by HCWs in direct patient care.

The confidence in the information circulating about COVID-19 was statistically associated with the acceptance of COVID-19 vaccine in our study. This finding is consistent with other previous studies.²² In the study by Montagni et al. reported the ability to detect “fake news” and increased health literacy scores were factors associated with SARS-CoV-2 vaccine acceptance.²¹ Some evidence suggests correcting misinformation from individuals and, or, social media, may improve vaccination rates.²³ Other communication and interventions involving loved ones and trusted community figures such as doctors and religious leaders may improve the confidence of people considering vaccination.²⁴

In this study, the score of perceived severity of COVID-19 were also significantly associated with the acceptance of the COVID-19 vaccine. These is reflected in findings by Huynh G et al. indicating people with clear understanding of the severity of the disease were more likely to accept vaccination against COVID-19 (OR 3.37; 95% CI 1.04–10.86).¹⁸ However, in contrast to studies of HCWs, some surveys among the general population did not find an association between the score of perceived severity of COVID-19 infection and acceptance of the COVID-19 vaccine.^{25,26}

In this study, the most common reasons identified for taking the COVID-19 vaccine were to protect themselves from the virus, avoid viral transmission to a loved one, avoid viral transmission to patients, and to participate in the control of the national pandemic. These results align with those of a recent study conducted in Italy, indicating that 82% of health professionals wanted vaccination to protect themselves against COVID-19, while 79% opted for vaccination to protect patients, and 70% taking vaccine to the control the pandemic.²⁷

This survey indicates that almost 38% of participants were hesitant or refused to be vaccinated against COVID-19. Among these individuals 74.8% cited fear of side effects as the principal reason for declination. The same concern is identified frequently cited in other studies.²⁴ However, a study conducted among HCWs in Saudi Arabia found fear of side effects was reported by just 26.73% of participants.²⁸ In others studies the main drivers of hesitancy or reluctance was concern about vaccine safety.^{10,15}

Concern about effectiveness of COVID-19 vaccine was prompted hesitation/or refusal in 47.8% of the participants included in this study. This may be explained by the rapid development and distribution of the COVID-19 vaccine compared with timeline of other vaccines. In Italian and Saudi Arabian studies, the percentages of HCWs who did not intend to be vaccinated against COVID-19 due to concern about the effectiveness of the vaccine were 32%²⁷ and 16.82%²⁸ respectively.

In this study, over 92% of participants believed immunity provided by vaccination is superior compared to that acquiring immunity against COVID-19 disease with natural infection. A similar sentiment was reflected a survey conducted in France and in the French speaking parts of Belgium and Canada indicating 89.13% of health worker participants opted for vaccine-induced protection over immunity via natural infection.¹⁰

This study has some limitations. First, although this study provides, for the first time, insights into COVID-19 vaccine acceptance among Moroccan HCWs, this study is single-center

study and generalization of the results to all Moroccan HCWs should take into account the size of the study population and the fact that all participants were recruited at the same Hospital. Second, perceived theoretical acceptance of the vaccine as is reflected in this survey may differ from actual vaccination adherence and uptake. Finally, there may be self-selection of HCWs familiar with, and acceptance of, vaccinations strategies in general and in the COVID-19 vaccine specifically. This selection bias may lead to an overestimate of the acceptance rate of the COVID-19 vaccine by other HCWs.

In conclusion, the findings of this study showed a relatively high rate of the COVID-19 vaccination acceptance among HCWs in Morocco. Willingness to be vaccinated was significantly associated with job category, confidence in the information circulating about COVID-19, and perceived severity of COVID-19 disease. These results may help governments and policymakers develop relevant educational interventions to increase the acceptance of COVID-19 vaccine among HCWs and hopefully lead to improved COVID-19 vaccination rates in Morocco and similar settings. Further research investigating COVID-19 vaccine hesitancy among non-health care workers is needed to identify potential concerns that may impact achieving COVID-19 herd immunity in Morocco.

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Declarations of interest

The authors declare that there is no conflict of interest.

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