Submission Files

Search

▸	49001 OAMJMS.docx	August 12, 2021	Manuscript Main Text
▸	49002 Title OAMJMS.docx	August 12, 2021	Manuscript Title Page

Download All Files

Pre-Review Discussions

Add discussion

Name	From	Last Reply	Replies	Closed

Notifications

[OAMJMS] Editor Decision	2021-08-27 05:28 AM
[OAMJMS] Editor Decision	2021-09-28 12:20 PM
[OAMJMS] Editor Decision	2021-11-02 05:56 AM

Reviewer's Attachments

Search

49183	Commentaries.docx	August 15, 2021

Revisions

Search Upload File

Willingness to Vaccinate against COVID-19 and Related Predictors Among Non-Healthcare Personnel in Indonesia

Abstract

BACKGROUND: Herd immunity against COVID-19 can be realized when a minimum of 62% of the vulnerable population has been vaccinated. However, achieving uptake of recommended vaccination in the targeted population ultimately lies with the community's willingness. Vaccine skepticism varies across demographic characteristics and stems from the perceived threats of being infected with COVID-19 while receiving the vaccine.

AIM: This research was intended to determine the willingness to vaccinate against COVID-19 and its associated factors.

METHODS: It employed a cross-sectional, then the collected data were analyzed using descriptive analytics: difference test and relationship analysis. Study with two online surveys on Google Forms and non-healthcare personnel as the research subjects. Screening with inclusion and exclusion criteria yielded 862 respondents spread over 32 provinces in Indonesia

Results: showed no difference in COVID-19 knowledge scores in surveys 1 and 2 (76.0–77.2; p=0.08). Age and education level are significantly related to COVID-19 knowledge scores (p<0.05). About 42.4% of respondents in survey 1 and 55.6% in survey 2 were willing to receive the vaccine, with 36.8–45.3% feeling hesitant. The main reason for vaccine hesitancy (42.2%) and unwillingness (43.2%) was mistrust in the effects or benefits of the vaccine. Although demographic characteristics are not related to the willingness (p>0.05), the opposite is true for the COVID-19 knowledge level [OR:1.66; 95% CI:1.26–2.18].

Conclusion about half of the non-healthcare personnel (42.4–55.6%) are willing to receive the vaccine, with knowledge of the disease being a predictor (p=0.00).

Keywords: willingness to vaccinate, reason for vaccine hesitancy, predictor of willingness, COVID-19 vaccine.

Commented [L1]: Immunized with natural way and/or with vaccination

Commented [L2]: not only this reason of scepticism exists

Commented [L3]: u should clarify what are 2 studies

Commented [L4]: What was survey 1 and 2? U should explain briefly

Commented [L5]: past tense

Commented [L6]: unclear sentence

Commented [L7]: unclear conclusion

Commented [L8]: please, use mesh terms

Introduction

The coronavirus disease 2019 (COVID-19) caused by coronavirus 2 (SARS-CoV-2) has rapidly developed into a pandemic, posing a threat to public health worldwide [1]. Common symptoms at the onset of illness are fever, cough, and fatigue [2][3]; some have even reported shortness of breath, headache, sore throat, chest pain, nausea, vomiting, diarrhea [4][5], and abdominal pain [6]. People infected with severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) can contribute to the spread of infection [7], and those who do not have the symptoms (asymptomatic) can also transmit the disease [8][9]. Knowledge directly affects attitudes and practice, and trust in efficacy is the most influential and significant factor of preventive behaviors towards COVID-19 [10].

Herd immunity is indirect protection from infectious disease that occurs when a population develops immunity either through vaccination or previous infection. In the context of COVID-19, herd immunity should be achieved through vaccination, as opposed to exposing the population to disease-causing pathogens [11]. Breaking the chain of transmission requires 84–90% herd immunity [12], with at least 62% of the vulnerable population vaccinated against COVID-19 [13]. The development of a vaccine for SARS-CoV-2 infection is a strategy to overcome the COVID-19 pandemic [14][15][16]. An effective vaccine will be beneficial and offer an even greater benefit if used in time to prevent repeated or continuous epidemics [17][18]. Vaccines are given to healthy individuals to prevent diseases caused by infectious agents [19].

COVID-19 vaccine acceptance in the community in several countries has not reached 70% [20][21], while in Indonesia, it is in the range of 45.7–74%[22]. Perceptions of

Commented [L9]: u do not need to clarify here general terms. There is better to add information about vaccines against covid

vaccine efficacy and willingness to protect others play an essential role in vaccine acceptance [23]. The strategy introduced to achieve vaccination uptake in the targeted population depends on several factors, such as community involvement in health promotion to dispel misconceptions [24]. Also, it is imperative to raise awareness and perception of COVID-19 risk among the community [25][26]. Vaccine doubts in some countries are upwards of 25%, with the most expressed reason being concerns about the vaccine's safety [27][28][29] and efficacy [26]. Some significant predictors of vaccine doubts are sex, education, occupation, income, having children, political affiliation, and perceived threat of COVID-19 infection [30][31].

Therefore, this study has been designed to determine the willingness to vaccinate against COVID-19 among non-healthcare workers in Indonesia and the factors that are predicted to be associated with it. This research was conducted when the vaccine was available and was provided free of charge by the Indonesian government, in contrast to a previous study, wherein the willingness was measured when the vaccine was not yet available but with the assumption that the vaccine would be given free of charge by the government [25].

Methods

This cross-sectional study consisted of two online surveys on Google Forms, with non-healthcare personnel in Indonesia as the research subject. The first survey was conducted from January 28 to 30, 2021, during the first stage of vaccination (January-April 2021, for health workers and public service officers), while the second survey was conducted from May 4 to 10, 2021, during the second stage of vaccination (starting in April 2021, for vulnerable population) [32]. This research has received approval from the Research Ethics Committee of the Faculty of Medicine in Indonesia (No. 1230/C.16/FK/2021).

Research Sample and Data Collection

The research samples were the Indonesian community or population who met the inclusion criteria, namely living in Indonesia, aged 18 years and over, had not received the COVID-19 vaccine, and literate in the Indonesian language. Respondents who were engaging in the healthcare sector as health workers were excluded from the survey. The survey targeted 1000 respondents from the entire 34 provinces in the country to produce the most representative result. Data collection in the first and second surveys was conducted online using Google Form, and the link was sent to the respondents via WhatsApp. This online data collection complies with ethical clearance published by the research ethics committee, and this was to avoid direct face-to-face contact to minimize the risk of exposure to COVID-19.

Data Measurement

The research instrument was a questionnaire consisting of a subject information sheet, Informed Consent, demographic profiles, knowledge of COVID-19 and its preventive measures, and willingness to vaccinate against the disease. The questionnaire items concerning COVID-19 knowledge and prevention were developed from the WHO official website [33], while the ones on willingness to receive vaccination referred to similar previous studies [20]. In addition to the subject information sheet and Informed Consent, the questionnaire consists of three aspects: (1) respondent's demographic profile, i.e., gender, age, formal educational attainment, occupation, and family size, (2) knowledge of COVID-19 and preventive measures, comprising ten true or false questions, and (3) willingness to vaccinate against COVID-19 with three response options: willing – hesitant – not willing. It also provides space for respondents to write down the reasons behind their hesitancy and unwillingness.

Data Analysis

The research data were analyzed descriptively to describe and show respondent's demographic characteristics, level of knowledge of COVID-19, willingness to be vaccinated, and reasons for willingness to be vaccinated provided in the first and second surveys. Furthermore, the difference tests (Mann-Whitney and Kruskal-Wallis) of COVID-19 knowledge were performed across

Commented [L10]: Where is aim of the study?

Commented [L11]: What type of sample here?

Commented [L12]: In this section should be information only about data analysis (data base creation, variables, statistical tests, critical level of p-value, soft)

demographic characteristics, i.e., sex, age, education, occupation, and family size. In addition, the chi-square test of independence was carried out to see if the demographic characteristics, COVID-19 knowledge, and willingness to vaccinate against COVID-19 were related.

Results

Demographic Profiles

There were 862 out of 1044 respondents meeting the inclusion and exclusion criteria and participating in the survey. A total of 182 respondents were excluded because 18 respondents were less than 18 years, 28 were health workers, and 136 provided incomplete responses to the questionnaire. As seen in Table 2, the demographic characteristics of the respondents were as follows: 62.9% female, 56.3% within the age range of 18–29 years, 53.1% university graduates, 51.3% employed, and 60.2% living in a family of two to four. A total of 623 respondents were involved in survey 1, and 239 were in survey 2.

COVID-19 Knowledge

Knowledge about COVID-19 includes knowledge of the disease and recommended preventive measures. In this study, a descriptive analysis was conducted to show the average score of respondent's COVID-19 knowledge in surveys 1 and 2; the average score was calculated for each demographic characteristic (i.e., sex, age, education, occupation, and family size). Afterward, the Mann-Whitney test was performed to determine whether or not the average scores in the two surveys were different. Based on the scoring results of the ten questions, the mean scores of COVID-19 knowledge were 76.0 in survey 1 and 77.2 in survey 2. The Mann-Whitney test results showed no difference between the average scores in the two surveys (p=0.08). In addition, the difference tests (Mann-Whitney and Kruskal-Wallis) were performed for each demographic characteristic by combining the results of surveys 1 and 2 because the average scores showed no significant difference. Then, the respondent's demographic characteristics and knowledge of COVID-19 were inputted to the chi-square test of independence. Results of the difference tests and the chi-square test of independence are presented in **Table 1**.

Commented [L14]: what for u need to compare these 2 surveys? what have been changed in society perception?

Commented [L13]: please add information about classification of COVID-19 knowledge, because later u use in tables "poor" and "adequate"

Commented [L15]: unclear and not appropriate statistical test usage

Commented [L16]: unclear idea

Commented [L17]: what was a statistical procedure for ORs calculation and where is description of these results?

Table 1. Respondents' demographic characteristics and knowledge of COVID-19

	Total n (%)	Knowledge of COVID-19						OR (95% CI)
		Mean score	p value[1]	Poor (<80)	Adequate (≥ 80)	p value[2]		
Survey 1	623(72.3)	76.0	0.080					
Survey 2	239(27.7)	77.2						
Demographic characteristics								
Sex								
Male	320(37.1)	75.6	0.165	144(45.0)	176(55.0)	0.639		1.07(0.81–1.41)
Female	542(62.9)	76.8		235(43.4)	307(56.6)			
Age range								
18–29 (a)	485(56.3)	75.3	0.001*	231(47.6)	254(52.4)	0.005*	a vs b	1.57(1.17–2.09)
30–49 (b)	313(36.3)	78.3		115(36.7)	198(63.3)		b vs c	0.55(0.32–0.94)
≥ 50 (c)	64 (7.4)	74.5		33(51.6)	31(48.4)		a vs c	0.85(0.51–1.44)
Education								
Primary school (a)	25(2.9)	72.0	0.009*	14 (56.0)	11 (44.0)	0.022*	a vs b	1.36(0.60–3.08)
Senior high school (b)	379(44.0)	75.5		183(48.3)	196(51.7)		b vs c	1.42(1.08–1.86)
Higher education (c)	458(53.1)	77.2		182(39.7)	276(60.3)		a vs c	1.93(0.86–4.34)
Occupation								
Employed (a)	442(51.3)	76.1	0.827	197(44.6)	245(55.4)	0.715	a vs b**	1.05(0.80–1.38)
Homemakers (b)	103(11.9)	77.2		182(43.3)	238(56.7)			
Students (b)	267(31.0)	76.3						
Unemployed (b)	50(5.8)	76.8						
Family size								
Single (a)	39(4.5)	74.9	0.899	18(46.2)	21(53.8)	0.960	a vs b	1.09(0.57–2.10)
2–4 (b)	519(60.2)	76.5		228(43.9)	291(56.1)		b vs c	1.00(0.76–1.34)
≥ 5 (c)	304(35.3)	76.2		133(43.8)	171(56.3)		a vs c	1.10(0.56–2.15)

Notes: [1]difference tests, [2]correlation test, *significant, **cell merge

Willingness to vaccinate against COVID-19 and reasons for vaccine hesitancy

Willingness to vaccinate against COVID-19 obtained from surveys 1 and 2 is illustrated in **Figure 1**. In survey 1, the respondents who were hesitant and not willing to be vaccinated were 45.5% and 12.4%, respectively. Meanwhile, in survey 2, there were 36.8% 'hesitant' responses and 7.5% 'unwilling' responses. Respondents who were hesitant and unwilling to vaccinate against COVID-19 were asked to include several reasons. **Table 2** presents each of the submitted reasons.

Commented [L18]: no any statistical processing and no idea of comparing this two surveys

Figure 1. Respondents' willingness to vaccinate against COVID-19 in surveys 1 and 2

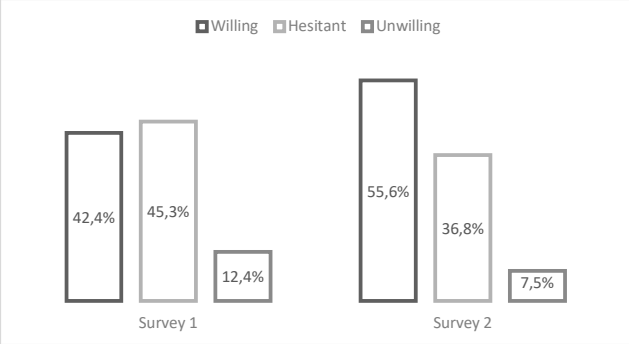

Table 2. Reasons underlying hesitancy and unwillingness to vaccinate against COVID-19

Reasons	Survey 1		Survey 2		Total	
	Hesitant n (%)	Unwilling n (%)	Hesitant n (%)	Unwilling n (%)	Hesitant n (%)	Unwilling n (%)
1) Mistrust in the effects or benefits of the available COVID-19 vaccine (vaccine efficacy)	131 (38.5)	35(35.4)	25(23.4)	6(28.6)	156(34.9)	41(34.2)
2) New diseases arise after being vaccinated (vaccine side effects)	63(18.5)	4(4.0)	30(28.0)	5(23.8)	93(20.8)	9(7.5)
3) Fear of needles	44(12.9)	13(13.1)	15(14.0)	4(19.0)	59(13.2)	17(14.2)
4) I feel healthy and believe that not everyone is susceptible to COVID - 19	36(10.6)	16(16.2)	12(11.2)	3(14.3)	48(10.7)	19(15.8)
5) There is no clear and detailed public dissemination about the effects and side effects of the available COVID-19 vaccine	25(7.4)	8(8.1)	7(6.5)		32(7.2)	8(6.7)
6) I believe some contracted COVID-19 despite having been vaccinated	7(2.1)	7(7.1)	8(7.5)	3 (14.3)	15(3.4)	10(8.3)
7) The COVID -19 vaccine is not halal	7(2.1)	3(3.0)	3(2.8)		10(2.2)	3(2.5)
8) A lot of news on social media is unclear and confusing	7(2.1)		2(1.9)		9(2.0)	
9) I believe simply boosting my immune system is enough	7(2.1)	2(2.0)			7(1.6)	2(1.7)
10) Comorbidities	2(0.6)	9(9.1)	3(2.8)		5(1.1)	9(7.5)
11) Some are paralyzed and even died after receiving the vaccine	4(1.2)	1(1.0)	2(1.9)		6(1.3)	1(0.8)
12) There are more than one type of vaccine	4(1.2)				4(0.9)	
13) I believe drinking herbal beverages is enough to prevent COVID-19	3(0.9)	1(1.0)			3(0.7)	1(0.8)

Notes: Respondents can write more than one reason

Predictors of willingness to vaccinate against COVID-19

This study described the willingness to vaccinate against COVID-19 based on respondents' demographic characteristics and analyzed what factors were related to the willingness. In this case, the predictors were knowledge of the disease and demographic characteristics. Similarly, previous studies [30][31] have also predicted the relationship between respondents' demographic characteristics (i.e., sex, age, education, employment status, and family size) and vaccine doubts. The chi-square test of independence included 'hesitant' and 'unwilling' cell merge to obtain an odd ratio (OR). The analysis results are presented in **Table 3**.

Table 3. Factors predicting to be related with the COVID-19 vaccine

	Total Respondents (%)	Willingness			p value		OR (95% CI)
		Willing n (%)	Hesitant n (%)	Unwilling n (%)			
Knowledge of COVID-19							
Adequate	483(56.0)	249(51.6)	196(40.6)	38(7.9)	0.000*		1.66(1.26–2.18)
Poor	379(44.0)	148(39.1)	174(45.9)	57(15.0)			
Demographic characteristics							
Sex							
Male	320(37.1)	151(47.2)	137(42.8)	32(10.0)	0.732		1.08(0.82–1.42)
Female	542(62.9)	246(45.4)	233(43.0)	63(11.6)			
Age group							
18–29 (a)	485(56.3)	211(43.5)	225(46.4)	49(10.1)	0.118	a vs b	0.83(0.62–1.10)
30–49 (b)	313(36.3)	151(48.2)	121(38.7)	41(13.1)		b vs c	0.77(0.45–1.33)
≥ 50 (c)	64(7.4)	35(54.7)	24(37.5)	5(7.8)		a vs c	0.64(0.38–1.08)
Education							
Primary school (a)	25(2.9)	10(40.0)	12(48.0)	3(12.0)	0.982	a vs b	0.77(0.34–1.78)
Senior high school (b)	379(44.0)	175(46.2)	163(43.0)	41(10.8)		b vs c	0.99(0.76–1.31)
Higher education (c)	458(53.1)	212(46.3)	195(42.6)	51(11.1)		a vs c	0.77(0.34–1.76)
Occupation							
Employed (a)	442(51.3)	209(47.3)	176(39.8)	57(12.9)	0.274	a vs b**	1.11(0.85–1.45) (p=0.458)
Homemakers (b)	103(11.9)	43(41.7)	47(45.6)	13(12.6)			
Students (b)	267(31.0)	122(45.7)	123(46.1)	22(8.2)			
Unemployed (b)	50(5.8)	23(46.0)	24(48.0)	3(6.0)			
Family size							
Single (a)	39(4.5)	18(46.2)	13(33.3)	8(20.5)	0.319	a vs b	0.98(0.51–1.89)
2–4 (b)	519(60.2)	242(46.6)	225(43.4)	52(10.0)		b vs c	1.07(0.80–1.42)
≥ 5 (c)	304(35.3)	137(45.1)	132(43.4)	35(11.5)		a vs c	1.05(0.54–1.42)

Notes: *significant, ** cell merge

Commented [L19]: U should clarify a procedure of OR calculation in methodology section

Discussion

Many respondents of the age 30–49 (78.3%) showed higher average scores of COVID-10 knowledge than the other age groups (see Table 1). This finding corresponds with a previous study in Indonesia [34], where 71% of the well-informed respondents are 30–49 years old. There was a significant difference (p=0.001) in knowledge about COVID-19 in the three age groups, similar to a study in Malaysia [35], which also found a significant score difference between age groups. The current research findings indicate that age and COVID-19 knowledge have a significant relationship (p=0.005), as is the case with a study in Africa [36] that found a significant relationship (p<0.05) between age, education, nationality, background, and the COVID-19 knowledge score. Respondents of the 18–29 age group are 1.57 times more likely to gain less knowledge of COVID-19 than those aged 30–49 [OR:1.57; 95%CI: 1.17–2.09]. However, in another study [36], respondents of 18–29 years old are 1.4 times more likely to gain better knowledge of COVID-19 than other age groups [95%CI: 0.55–0.89; p=0.004].

Respondents with higher education had a higher COVID-19 knowledge score (77.2) than primary and senior high school education. This is in line with [10], which shows that the level of knowledge is higher in individuals with a higher education level. In addition, there was a significant difference (p=0.009) in the

COVID-19 knowledge of the three groups of educational attainment. Results indicate that education level and COVID-19 knowledge are significantly related (p=0.022), where respondents with senior high school education are 1.42 times more likely to have less knowledge than those with higher education [OR:1,42; 95%CI: 1.08–1.86]. In other words, individuals with a higher level of education have better COVID-19 knowledge. Likewise, a study in Africa [36] found that respondents with senior high school education are 4.7 times more likely [95%CI: 0.15–144.7; p=0.73) to have better knowledge about COVID-19 than those who never attended formal education. This also applies to education level and age as significant indicators of COVID-19 knowledge [34].

Sex, employment status, and family size are not predictors of COVID-19 knowledge level (p>0.05), as is the case with the research in Saudi Arabia [37] which concludes that employment status is not a predictor (p=0.09) of COVID-19 knowledge. Furthermore, although the knowledge scores were higher among female respondents (76.8) and homemakers (77.2) than in other respondents, there is no statistical difference between the groups (p>0.05). Similarly, a study in Saudi Arabia [38] found no statistical difference in the knowledge scores of male and female respondents. Also, a previous study in Indonesia [34] supports this finding, that there is no relationship between sex, marital status, and level of COVID-19 knowledge.

More respondents in survey 2 (55.6%) were willing to vaccinate against COVID-19 than survey 1 (42.4%) (see Figure 1), indicating an increase in the positive attitude towards COVID-19 preventive measures among the non-healthcare personnel from the first to the second stage of vaccination. This is in contrast to a study in Hong Kong [39] where the willingness to receive vaccination decreased from 44.2% (survey 1; a local COVID-19 epidemic broke) to 34.8% (survey 2; the local epidemic was coming to an end). Willingness to vaccinate against COVID-19 among non-healthcare personnel must be increased, considering that breaking the chain of transmission requires 84–90% herd immunity [12], with at least 62% of the vulnerable population vaccinated [13]

Results showed 13 reasons for vaccine hesitancy and unwillingness (Table 2), and the most expressed reason was that respondents did not believe in the efficacy of the available vaccines. The second-highest reason for vaccine hesitancy was the vaccine's side effects, but this is in contrast to the second reason most expressed for unwillingness: respondents feel healthy and think that not everyone is susceptible to COVID-19 infections. Similarly, a previous study in Nepal [40] found that 90 health workers and staff in medical colleges were unwilling to vaccinate against COVID-19; 40 of them have concerns about vaccine safety. Likewise, research in Ethiopia [41] showed that respondents are hesitant to take the vaccine due to concerns about its safety and/or side effects (37%), followed by doubts about its efficacy (20.7%), and lack of adequate information (12.7%). Similarly, research in China [42] found that vaccine doubts stem from concerns about the safety of the newly developed vaccine (60.0%) and its efficacy (28.8%); some question the necessity of vaccination (7.5%) and believe that the risk of COVID-19 infections is low (3.7%).

There is a significant relationship (p=0.000) between knowledge of COVID-19 and willingness to vaccinate against the disease (see Table 3). Respondents with a good comprehension of COVID-19 are 1.66 times more likely to be willing than those with lower knowledge scores [OR:1.66; 95% CI: 1.26–2.18]. This finding corresponds to a study in Vietnam [43] showing that willingness to receive the vaccine and level of COVID-19 knowledge are significantly related, with a 1.2-fold increase in the likelihood of getting the vaccine for a 1-unit increase in the total knowledge score [AOR:1.2; 95%CI: 1.1–1.3; p<0.0].

Demographic characteristics, i.e., sex, age, education level, employment status, and family size, are not predictors of willingness to get the COVID-19 vaccine (p>0.05). Although the willingness in men aged 50 with higher education, employment, and family of two to four is higher than in other groups, there is no relationship between these demographic

characteristics and willingness to take the vaccine ($p>0.05$). This is in line with [44], which found that women's willingness to receive the vaccine is lower than their male counterparts, and that willingness is higher in people aged 65 and over and those with higher education than the other groups. Similarly, [45] found that the willingness to get the vaccine does not necessarily vary across demographic profiles, i.e., sex ($p=0.429$) and education level ($p=0.129$). Research in Brazil [46] also confirms the absence of a statistical relationship ($p>0.05$) between the number of household members and vaccine doubts.

Conclusions

Knowledge about COVID-19 is a predictor of willingness to vaccinate against the disease [OR:1.66; 95%CI: 1.26–2.18]. Based on the knowledge score, many non-healthcare workers have less knowledge of the disease and its preventive measures (76.0 in survey 1; 77.2 in survey 2). Therefore, disseminating accurate information and educating the public about this matter becomes necessary. In order for educational materials to be readily accepted by non-health workers, especially in terms of prevention, such as the use of drugs and the importance of vaccines, authorities and relevant stakeholders need to factor in predictors of the knowledge level and decide on the appropriate media of information delivery. The research has found that only half of the respondents (42.4–55.6%) are willing to get the vaccine, meaning that education alone cannot improve these figures, but this must be supported by positive news about the efficacy and side effects of the COVID-19 vaccine to address reasons for vaccine hesitancy and unwillingness.

Research Limitations: The number of respondents is not the same in each province, as well as the number of respondents in survey 1 and survey 2.

Author Contributions**:** Conceptualization, F.B.; Methodology, F.B., F.S., In., S.S.; Formal Analysis, F.B., F.S., In., S.S., Is.; Investigation, F.B., F.S., In., S.S., Is., G.I.H., M.R.N.R.; Data Curation, Is., G.I.H., M.R.N.R.; Writing — Original Draft Preparation, F.B., F.S., In., S.S., Is.; Writing — Review and Editing, F.S., In., S.S. All authors have carefully read and approved the published version of the manuscript.

Data Availability Statement**:** The data used in this study cannot be published for ethical reasons (respondent privacy).

Conflicts of Interest**:** The authors declare that there is no conflict of interest.

References

[1] Wang C, Horby PW, Hayden FG, et al. A novel coronavirus outbreak of global health concern. *Lancet (London, England)* 2020; 395: 470–473.

[2] Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet (London, England)* 2020; 395: 497–506.

[3] Ge H, Wang X, Yuan X, et al. The epidemiology and clinical information about COVID-19. *Eur J Clin Microbiol Infect Dis* 2020; 39: 1011–1019.

[4] Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet (London, England)* 2020; 395: 507–513.

[5] Guan W-J, Ni Z-Y, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med* 2020; 382: 1708–1720.

[6] Wong SH, Lui RNS, Sung JJY. Covid-19 and the digestive system. *J Gastroenterol Hepatol* 2020; 35: 744–748.

[7] Meselson M. Droplets and Aerosols in the Transmission of SARS-CoV-2. *N Engl J Med* 2020; 382: 2063.

[8] Johansson MA, Quandelacy TM, Kada S, et al. SARS-CoV-2 Transmission From People Without COVID-19 Symptoms. *JAMA Netw open* 2021; 4: e2035057–e2035057.

[9] Widders A, Broom A, Broom J. SARS-CoV-2: The viral shedding vs infectivity dilemma. *Infect Dis Heal* 2020; 25: 210–215.

[10] Lee M, Kang BA YM. Knowledge,

attitudes, and practices (KAP) toward COVID-19: a cross-sectional study in South Korea. *BMC Public Heal* 2021; 21: 295.

[11] World Health Organization. Coronavirus disease (COVID-19): Herd immunity, lockdowns and COVID-19, https://www.who.int/news-room/q-a-detail/herd-immunity-lockdowns-and-covid-19 (2020).

[12] Kadkhoda K. Herd Immunity to COVID-19: Alluring and Elusive. *Am J Clin Pathol* 2021; 155: 471–472.

[13] Park H, Kim SH. A Study on Herd Immunity of COVID-19 in South Korea: Using a Stochastic Economic-Epidemiological Model. *Environ Resour Econ* 2020; 1–6.

[14] Liu X, Liu C, Liu G, et al. COVID-19: Progress in diagnostics, therapy and vaccination. *Theranostics* 2020; 10: 7821–7835.

[15] Rahman S, Montero MTV, Rowe K, et al. Epidemiology, pathogenesis, clinical presentations, diagnosis and treatment of COVID-19: a review of current evidence. *Expert Rev Clin Pharmacol* 2021; 1–21.

[16] Rodrigues CMC, Plotkin SA. Impact of Vaccines; Health, Economic and Social Perspectives. *Front Microbiol* 2020; 11: 1526.

[17] Petravić L, Arh R, Gabrovec T, et al. Factors Affecting Attitudes towards COVID-19 Vaccination: An Online Survey in Slovenia. *Vaccines* 2021; 9: 247.

[18] Aldila D, Samiadji BM, Simorangkir GM, et al. Impact of early detection and vaccination strategy in COVID-19 eradication program in Jakarta, Indonesia. *BMC Res Notes* 2021; 14: 132.

[19] Patel SS, Kalma J, Bluman EM. Understanding COVID-19 Vaccines and Their Development. *JBJS*; 102, https://journals.lww.com/jbjsjournal/Fulltext/2020/10210/Understanding_COVID_19_Vaccines_and_Their.1.aspx (2020).

[20] Reiter PL, Pennell ML, Katz ML. Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? *Vaccine* 2020; 38: 6500–6507.

[21] El-Elimat T, AbuAlSamen MM, Almomani BA, et al. Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan. *PLoS One* 2021; 16: e0250555–e0250555.

[22] Ministry of Health of the Republic of Indonesia, ITAGI, UNICEF W. Covid-19 Vaccine Acceptance Survey in Indonesia. *The COVID-19 National Task Force*, https://covid19.go.id/storage/app/media/Hasil Kajian/2020/November/vaccine-acceptance-survey-id-12-11-2020final.pdf (2020).

[23] Machida M, Nakamura I, Kojima T, et al. Acceptance of a COVID-19 Vaccine in Japan during the COVID-19 Pandemic. *Vaccines* 2021; 9: 210.

[24] Wirsiy FS, Nkfusai CN, Ako-Arrey DE, et al. Acceptability of COVID-19 Vaccine in Africa. *Int J MCH AIDS* 2021; 10: 134–138.

[25] Harapan H, Wagner AL, Yufika A, et al. Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. *Front public Heal* 2020; 8: 381.

[26] Almaghaslah D, Alsayari A, Kandasamy G, et al. COVID-19 Vaccine Hesitancy among Young Adults in Saudi Arabia: A Cross-Sectional Web-Based Study. *Vaccines* 2021; 9: 330.

[27] Al-Qerem WA, Jarab AS. COVID-19 Vaccination Acceptance and Its Associated Factors Among a Middle Eastern Population. *Frontiers in Public Health* 2021; 9: 34.

[28] Alabdulla M, Reagu SM, Al-Khal A, et al. COVID-19 vaccine hesitancy and attitudes in Qatar: A national cross-sectional survey of a migrant-majority population. *Influenza Other Respi Viruses* 2021; 15: 361–370.

[29] Griffith J, Marani H, Monkman H. COVID-19 Vaccine Hesitancy in Canada: Content Analysis of Tweets Using the Theoretical Domains Framework. *J Med Internet Res* 2021; 23: e26874–e26874.

[30] Khubchandani J, Sharma S, Price JH, et al. COVID-19 Vaccination Hesitancy in the United States: A Rapid National Assessment. *J Community Health* 2021; 46: 270–277.

[31] Schwarzinger M, Watson V, Arwidson P, et al. COVID-19 vaccine hesitancy in a representative working-age population in France: a survey experiment based on vaccine characteristics. *Lancet Public Heal* 2021; 6: e210–e221.

[32] Ministry of Health of the Republic of Indonesia. Starting in January, here are the number of targets for COVID-19 vaccination in Indonesia. *Bureau of Communications and Community Services, Ministry of Health*, https://www.kemkes.go.id/article/view/20122900009/dimulai-januari-berikut-jumlah-sasaran-vaksinasi-covid-19-di-indonesia.html (2020).

[33] World Health Organization. Coronavirus Disease 2019 (COVID-19), https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19.

[34] Sulistyawati S, Rokhmayanti R, Aji B, Wijayanti SPM, Hastuti SKW, Sukesi TW MS. Knowledge, Attitudes, Practices and Information Needs During the COVID-19 Pandemic in Indonesia. *Risk Manag Heal Policy* 2021; 14: 163–175.

[35] Azlan AA, Hamzah MR, Sern TJ, et al. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLoS One* 2020; 15: e0233668–e0233668.

[36] Hager E, Odetokun IA, Bolarinwa O, Zainab A, Okechukwu O A-MA. Knowledge, attitude, and perceptions towards the 2019 Coronavirus Pandemic: A bi-national survey in Africa. *PLoS One* 2021; 16: e0247351.

[37] Baig M, Jameel T, Alzahrani SH, et al. Predictors of misconceptions, knowledge, attitudes, and practices of COVID-19 pandemic among a sample of Saudi population. *PLoS One* 2020; 15: e0243526–e0243526.

[38] Al-Hanawi MK, Angawi K, Alshareef N, et al. Knowledge, Attitude and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Front public Heal* 2020; 8: 217.

[39] Wang K, Wong EL-Y, Ho K-F, et al. Change of Willingness to Accept COVID-19 Vaccine and Reasons of Vaccine Hesitancy of Working People at Different Waves of Local Epidemic in Hong Kong, China: Repeated Cross-Sectional Surveys. *Vaccines* 2021; 9: 62.

[40] Paudel S, Palaian S, Shankar PR, et al. Risk Perception and Hesitancy Toward COVID-19 Vaccination Among Healthcare Workers and Staff at a Medical College in Nepal. *Risk Manag Healthc Policy* 2021; 14: 2253–2261.

[41] Zewude B, Habtegiorgis T. Willingness to Take COVID-19 Vaccine Among People Most at Risk of Exposure in Southern Ethiopia. *Pragmatic Obs Res* 2021; 12: 37–47.

[42] Zhou Y, Zhang J, Wu W, et al. Willingness to receive future COVID-19 vaccines following the COVID-19 epidemic in Shanghai, China. *BMC Public Health* 2021; 21: 1103.

[43] Huynh G, Nguyen T Van, Nguyen DD, et al. Knowledge About COVID-19, Beliefs and Vaccination Acceptance Against COVID-19 Among High-Risk People in Ho Chi Minh City, Vietnam. *Infect Drug Resist* 2021; 14: 1773–1780.

[44] Szilagyi PG, Thomas K, Shah MD, et al. National Trends in the US Public's Likelihood of Getting a COVID-19 Vaccine—April 1 to December 8, 2020. *JAMA* 2021; 325: 396–398.

[45] Faasse K, Newby J. Public Perceptions of COVID-19 in Australia: Perceived Risk, Knowledge, Health-Protective Behaviors, and Vaccine Intentions. *Front Psychol* 2020; 11: 2553.

[46] Oliveira BLCA de, Campos MAG, Queiroz RC de S, et al. Prevalence and factors associated with covid-19 vaccine hesitancy in Maranhão, Brazil. *Rev Saude Publica* 2021; 55: 12.

Round 2 Status
Submission accepted.

Notifications

[OAMJMS] Editor Decision	2021-08-27 05:28 AM
[OAMJMS] Editor Decision	2021-09-28 12:20 PM
[OAMJMS] Editor Decision	2021-11-02 05:56 AM

Open Access Macedonian Journal of M

← Back to Submissions

Round 1

Roun
Subm

Notifica

[OAMJ
[OAMJ
[OAMJ

:28 AM
:20 PM
:56 AM

Revie

Search

Revisi

ad File

Revie

ussion

Name

Closed

[OAMJ

Notifications

[OAMJMS] Editor Decision

2021-08-27 05:28 AM

Faridah Baroroh (Author):

We have reached a decision regarding your submission to Open Access Macedonian Journal of Medical Sciences, "Willingness to Vaccinate against COVID-19 and Related Predictors Among Non-Healthcare Personnel in Indonesia", Manuscript ID = OJS7056.

Our decision is: Revisions Required

Sincarely,
Prof. Dr Mirko Spiroski,
Editor-in-Chief, OAMJMS

Sasho Stoleski

Reviewer B:
Recommendation: Accept Submission

Comments to the Author

fix your references

Notifications

[OAMJMS] Editor Decision

2021-09-28 12:20 PM

Faridah Baroroh (Author):

We have reached a decision regarding your submission to Open Access Macedonian Journal of Medical Sciences, "Willingness to Vaccinate against COVID-19 and Related Predictors Among Non-Healthcare Personnel in Indonesia", Manuscript ID = OJS7056, submitted {$submission}

Our decision is to: Accept your revised manuscript for publication in OAMJMS.

SciRev (https://scirev.org/) offers you the possibility to share your experience with the scientific review process with your colleagues (left search engine) and to select an efficient journal for submitting your manuscripts (right search engine). Because we would like to increase the quality of the review process, please register and submit your experience with the review process of your article published in Open Access Macedonian Journal of Medical Sciences in the SciRev (https://scirev.org/questionnaire/macedonian-journal-of-medical-sciences/).

[OAMJMS] Editor Decision 2021-09-28 12:20 PM

Notifications

[OAMJMS] Editor Decision

2021-11-02 05:56 AM

Faridah Baroroh (Author):

The editing of your submission, "Willingness to Vaccinate against COVID-19 and Related Predictors Among Non-Healthcare Personnel in Indonesia," Manuscript ID = OJS7056 is complete. We are now sending it to production.

Submission URL: https://oamjms.eu/index.php/mjms/authorDashboard/submission/7056

Reviewer's Attachments Search

49183	Commentaries.docx	August 15, 2021

Revisions Search Upload File

Production Discussions

Add discussion

Name	From	Last Reply	Replies	Closed
[OAMJMS] Proofreading Request (Author)	tfildishevska 2021-11-02 05:57 AM	-	0	
▸ Corrected Galley Proof	fbaroroh 2021-11-04 09:18 AM	-	0	
[OAMJMS] Your Article was Published	ivos 2021-11-07 03:54 PM	-	0	

[OAMJMS] Proofreading Request (Author)

Participants

Faridah Baroroh (fbaroroh)

Teodora Fildishevska (tfildishevska)

Messages

Note	From
Dear Faridah Baroroh: Your submission "Willingness to Vaccinate against COVID-19 and Related Predictors Among Non-Healthcare Personnel in Indonesia" to Open Access Macedonian Journal of Medical Sciences now needs to be proofread by folllowing these steps. 1. Click on the Submission URL below. 2. Log into the journal and view PROOFING INSTRUCTIONS 3. Click on VIEW PROOF in Layout and proof the galley in the one or more formats used. 4. Enter corrections (typographical and format) in Proofreading Corrections using "Mark up text with edits" or "Use annotation and drawing markup tools to add comments in PDFs". 5. Save corrected Galley Proof with the addition "Corrected" to the file name (i.e., OAMJMS-9A-4528.pdf should be saved as OAMJMS-9A-4528-Corrected.pdf). 6. Click on the link "Add Discussion", define Subject "Corrected Galley Proof", write text in the field Message, Upload File in the field Attached Files.	tfildishevska 2021-11-02 05:57 AM

Scientific Foundation SPIROSKI, Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences. 2021 Feb 05; 9(E):1-7.
https://doi.org/10.3889/oamjms.2021.7056
eISSN: 1857-9655
Category: *E - Public Health*
Section: *Public Health Epidemiology*

OPEN ACCESS

Willingness to Vaccinate against Coronavirus Disease 2019 and Related Predictors among Non-Healthcare Personnel in Indonesia

AQ2,7 Faridah Baroroh[1]*, Ferawati Suzalin[2], Indriani[3], Siti Sangadah[4], Istiningrum[1], Guntur Ilham Wahyudi[1], Muhammad Rayhan Nadhil Rafdilla[1]

AQ3 AQ3 [1]*Department of ???, Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta Indonesia;* [2]*Pharmacy Program, Health Polytechnic, Palembang, Indonesia;* [3]*Department of ???, Faculty of Medicine, Alkhairaat University, Palu, Indonesia;* [4]*Department of Health, West Papua, Indonesia*

Edited by: https://publons.com/researcher/391987/mirko-spiroski
Citation: Baroroh F, Suzalin F, Indriani, Sangadah S, Istiningrum, Wahyudi GI, Rafdilla MRN. Willingness to Vaccinate against Coronavirus Disease 2019 and Related Predictors among Non-Healthcare Personnel in Indonesia. Open Access Maced J Med Sci. 2021 Feb 05; 9(E):1-7. https://doi.org/10.3889/oamjms.2021.7056
Keywords: Predictor; Willingness; Coronavirus Disease 2019; Vaccine
***Correspondence:** Faridah Baroroh, Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta Indonesia. E-mail: faridah@pharm.uad.ac.id
AQ4 **Received:** ???
Revised: ???
Accepted: ???
AQ2 **Copyright:** © 2021 Faridah Baroroh, Ferawati Suzalin, Indriani, Siti Sangadah, Istiningrum, Guntur Ilham Wahyudi, Muhammad Rayhan Nadhil Rafdilla
Funding: This research did not receive any financial support
Competing Interests: The authors have declared that no competing interests exist
Open Access: This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

Abstract

BACKGROUND: Willingness to vaccinate against coronavirus disease 2019 (COVID-19) among non-healthcare personnel must be increased, considering that breaking the chain of transmission requires 84–90% herd immunity, with at least 62% of the vulnerable population vaccinated. However, achieving uptake of recommended vaccination in the targeted population ultimately lies with the community's willingness. This decreasing trend may also be an outcome of a high level of concern over vaccine safety.

AIM: This research was intended to determine the willingness to vaccinate against COVID-19 and its associated factors.

METHODS: It employed a cross-sectional study, and the collected data were analyzed using descriptive analytics and categorical comparison analysis. Two online surveys on Google Forms with non-healthcare personnel as the research subjects were conducted at different times (the first and second stage of vaccination). Screening with inclusion and exclusion criteria yielded 862 respondents spread over 32 provinces in Indonesia.

RESULTS: The results actually showed an increase in willingness to receive the vaccine, from 42.4% of the respondents in survey 1–55.6% in survey 2, and a relationship ($p = 0.00$) between the surveys and this variable. About 36.8–45.3% were feeling hesitant; the main reason for vaccine hesitancy (42.2%) and unwillingness (43.2%) was mistrust in the effects or benefits of the vaccine. Although demographic characteristics were not related to the willingness ($p > 0.05$), the opposite was true for the COVID-19 knowledge level (Odds ratio: 1.66; 95% confidence interval: 1.26–2.18).

CONCLUSION: There is an increasing number of people willing to vaccinate against COVID-19 (42.4% in survey 1 and 55.6% in survey 2). The time of the survey and COVID-19 knowledge are two predictors ($p = 0.00$) of this willingness.

Introduction

The coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has rapidly developed into a pandemic, posing a threat to public health worldwide [1]. Common symptoms at the onset of illness are fever, cough, and fatigue [2], [3]; some have even reported shortness of breath, headache, sore throat, chest pain, nausea, vomiting, diarrhea [4], [5], and abdominal pain [6]. People infected with SARS-CoV-2 can contribute to the spread of infection [7], and those who do not have the symptoms (asymptomatic) can also transmit the disease [8], [9]. Knowledge directly affects attitudes and practice, and trust in efficacy is the most influential and significant factor of preventive behaviors towards COVID-19 [10].

Herd immunity is indirect protection from infectious disease that occurs when a population develops immunity either through vaccination or previous infection. In the context of COVID-19, herd immunity should be achieved through vaccination, as opposed to exposing the population to disease-causing pathogens [11]. Breaking the chain of transmission requires 84–90% herd immunity [12], with at least 62% of the vulnerable population vaccinated against COVID-19 [13]. The development of a vaccine for SARS-CoV-2 infection is a strategy to overcome the COVID-19 pandemic [14], [15], [16]. An effective vaccine will be beneficial and offer an even greater benefit if used in time to prevent repeated or continuous epidemics [17], [18].

COVID-19 vaccine acceptance in the community in several countries has not reached 70% [19], [20], while in Indonesia, it is in the range of 45.7–74% [21]. Lower willingness to be vaccinated can be attributed to increasing concerns about vaccine safety [22]. The public can easily access news from social media about vaccine safety, especially the effects that occur after getting the vaccine. Believing in the conspiracy theories regarding the vaccine

Galley Proof

is positively associated with trusting and relying on social media more than health information providers [23]. Perceptions of vaccine efficacy and willingness to protect others play an essential role in vaccine acceptance [24]. The strategy introduced to achieve vaccination uptake in the targeted population depends on several factors, such as community involvement in health promotion to dispel misconceptions [25]. Furthermore, it is imperative to raise awareness and perception of COVID-19 risk among the community [26], [27]. Vaccine doubts in some countries are upwards of 25%, with the most expressed reason being concerns about the vaccine's safety [28], [29], [30] and efficacy [27]. Some significant predictors of vaccine doubts are sex, education, occupation, income, having children, political affiliation, and perceived threat of COVID-19 infection [31], [32].

When the public can access news about the effects of the COVID-19 vaccine, it is necessary to find out if there is a decrease in the willingness to be vaccinated. The purpose of this study was to determine whether there was a decrease in the willingness to vaccinate against COVID-19 among non-healthcare workers in Indonesia and the factors that are predicted to correlate with it (predictors).

Methods

This cross-sectional study consisted of two online surveys on Google Forms, with non-healthcare personnel in Indonesia as the research subject. The first survey was conducted from January 28 to 30, 2021, during the first stage of vaccination (January-April 2021, for health workers and public service officers), while the second survey was conducted from May 4 to 10, 2021, during the second stage of vaccination (starting in April 2021, for vulnerable population) [33]. This research has received approval from the Research Ethics Committee of the Faculty of Medicine in Indonesia (No. 1230/C.16/FK/2021).

Research sample and data collection

The research used multi-stage sampling starting with stratified random sampling to determine which samples would be collected in 34 provinces in Indonesia, followed by purposive sampling for the sample collection. The research samples were the Indonesian community or population who met the inclusion criteria, namely were currently living in Indonesia, aged 18 years and over, had not received the COVID-19 vaccine, and were literate in the Indonesian language. Respondents who were engaging in the healthcare sector as health workers were excluded from the survey. The survey targeted 1000 respondents from the entire 34 provinces in the country to produce the most representative result. Data collection in the first and second surveys was conducted online using Google Form, and the link was sent to the respondents via WhatsApp. This online data collection complies with ethical clearance published by the research ethics committee, and this was to avoid direct face-to-face contact to minimize the risk of exposure to COVID-19.

Data measurement

The research instrument was a questionnaire consisting of a subject information sheet, Informed Consent, demographic profiles, knowledge of COVID-19 and its preventive measures, and willingness to vaccinate against the disease. The questionnaire items concerning COVID-19 knowledge and prevention were developed from the WHO official website [34], while the ones on willingness to receive vaccination referred to similar previous studies [19]. In addition to the subject information sheet and Informed Consent, the questionnaire consists of three aspects: (1) Respondent's demographic profile, that is, gender, age, formal educational attainment, occupation, and family size, (2) knowledge of COVID-19 and preventive measures, comprising ten true or false questions, and (3) willingness to vaccinate against COVID-19 with three response options: willing – hesitant – not willing. It also provides space for respondents to write down the reasons behind their hesitancy and unwillingness.

Data analysis

The research data were analyzed descriptively and analytically. Descriptive analysis was used to describe data in percentage form, namely demographic characteristics, willingness to be vaccinated, reasons for vaccine hesitancy and unwillingness, and the mean score of COVID-19 knowledge. Meanwhile, the analytical data were analyzed using a categorical comparative test, odds ratio (OR), and confidence interval (CI). A categorical comparative test with the Chi-square test was carried out to see if the demographic characteristics (i.e., sex, age, education, occupation, and family size), COVID-19 knowledge, and willingness to vaccinate against COVID-19 were related. OR aimed to measure data relationship in the Chi-square test. In the categorical comparative test, data on COVID-19 knowledge were categorized into two: Good (score equal to or higher than 80) and bad (lower than 80).

Results

Demographic profiles

Of the 1044 respondents, 862 met the inclusion and exclusion criteria and participating in the survey.

Galley Proof

A total of 182 respondents were excluded because 18 respondents were less than 18 years, 28 were health workers, and 136 provided incomplete responses to the questionnaire. The demographic characteristics of the respondents were as follows: 62.9% female, 56.3% within the age range of 18–29 years, 53.1% university graduates, 51.3% employed, and 60.2% living in a family of two to four. A total of 623 respondents were involved in survey 1, and 239 were in survey 2. Respondents spread across 32 provinces of 34 provinces in Indonesia, from Aceh to West Papua, except North Maluku and Papua.

Willingness to vaccinate against COVID-19 and predictors of willingness to vaccinate against COVID-19

In survey 1, the respondents who were hesitant and not willing to be vaccinated were 45.5% and 12.4%, respectively. Meanwhile, in survey 2, there were 36.8% "hesitant" responses and 7.5% 'unwilling' responses. These results indicate an increase in the willingness to be vaccinated. Moreover, the categorical comparative test confirmed the statistical relationship (p = 0.000) between the survey and the willingness.

This study described the willingness to vaccinate against COVID-19 based on respondents' demographic characteristics and analyzed what factors were related to the willingness. In this case, the predictors were knowledge of the disease and demographic characteristics. Similarly, the previous studies [31], [32] have also predicted the relationship between respondents' demographic characteristics (i.e., sex, age, education, employment status, and family size) and vaccine doubts. The Chi-square test of independence included "hesitant" and "unwilling" cell merge to obtain an OR. The analysis results are presented in Table 1. Respondents who were hesitant and unwilling to vaccinate against COVID-19 were asked to include several reasons. Table 2 presents each of the submitted reasons.

COVID-19 knowledge

Based on the analysis results, there was a relationship (p = 0.00) between COVID-19 knowledge

Table 1: Willingness to be vaccinated and factors predicted to correlate with the COVID-19 vaccine

	Total Respondents (%)	Willingness			p-value		Odds ratio (95% confidence interval)
		Willing n (%)	Hesitant n (%)	Unwilling n (%)			
Survey 1	623 (72.3)	264 (42.4)	282 (45.3)	77 (12.4)	0.000*		0.59 (0.43–0.79)
Survey 2	239 (27.7)	133 (55.6)	88 (36.8)	18 (7.5)			
Knowledge of COVID-19							
Adequate	483 (56.0)	249 (51.6)	196 (40.6)	38 (7.9)	0.000*		1.66 (1.26–2.18)
Poor	379 (44.0)	148 (39.1)	174 (45.9)	57 (15.0)			
Demographic characteristics							
Sex							
Male	320 (37.1)	151 (47.2)	137 (42.8)	32 (10.0)	0.732		1.08 (0.82–1.42)
Female	542 (62.9)	246 (45.4)	233 (43.0)	63 (11.6)			
Age group							
18–29 (a)	485 (56.3)	211 (43.5)	225 (46.4)	49 (10.1)	0.118	a vs b	0.83 (0.62–1.10)
30–49 (b)	313 (36.3)	151 (48.2)	121 (38.7)	41 (13.1)		b vs c	0.77 (0.45–1.33)
≥ 50 (c)	64 (7.4)	35 (54.7)	24 (37.5)	5 (7.8)		a vs c	0.64 (0.38–1.08)
Education							
Primary school (a)	25 (2.9)	10 (40.0)	12 (48.0)	3 (12.0)	0.982	a vs b	0.77 (0.34–1.78)
Senior high school (b)	379 (44.0)	175 (46.2)	163 (43.0)	41 (10.8)		b vs c	0.99 (0.76–1.31)
Higher education (c)	458 (53.1)	212 (46.3)	195 (42.6)	51 (11.1)		a vs c	0.77 (0.34–1.76)
Occupation							
Employed (a)	442 (51.3)	209 (47.3)	176 (39.8)	57 (12.9)	0.274	a vs b**	1.11 (0.85–1.45)
Homemakers (b)	103 (11.9)	43 (41.7)	47 (45.6)	13 (12.6)			(p=0.458)
Students (b)	267 (31.0)	122 (45.7)	123 (46.1)	22 (8.2)			
Unemployed (b)	50 (5.8)	23 (46.0)	24 (48.0)	3 (6.0)			
Family size							
Single (a)	39 (4.5)	18 (46.2)	13 (33.3)	8 (20.5)	0.319	a vs b	0.98 (0.51–1.89)
2–4 (b)	519 (60.2)	242 (46.6)	225 (43.4)	52 (10.0)		b vs c	1.07 (0.80–1.42)
≥ 5 (c)	304 (35.3)	137 (45.1)	132 (43.4)	35 (11.5)		a vs c	1.05 (0.54–1.42)

*Significant, **Cell merge.

Table 2: Reasons underlying hesitancy and unwillingness to vaccinate against COVID-19

Reasons	Survey 1		Survey 2		Total	
	Hesitant n (%)	Unwilling n (%)	Hesitant n (%)	Unwilling n (%)	Hesitant n (%)	Unwilling n (%)
Mistrust in the effects or benefits of the available COVID-19 vaccine (vaccine efficacy)	131 (38.5)	35 (35.4)	25 (23.4)	6 (28.6)	156 (34.9)	41 (34.2)
New diseases arise after being vaccinated (vaccine side effects)	63 (18.5)	4 (4.0)	30 (28.0)	5 (23.8)	93 (20.8)	9 (7.5)
Fear of needles	44 (12.9)	13 (13.1)	15 (14.0)	4 (19.0)	59 (13.2)	17 (14.2)
I feel healthy and believe that not everyone is susceptible to COVID-19	36 (10.6)	16 (16.2)	12 (11.2)	3 (14.3)	48 (10.7)	19 (15.8)
There is no clear and detailed public dissemination about the effects and side effects of the available COVID-19 vaccine	25 (7.4)	8 (8.1)	7 (6.5)		32 (7.2)	8 (6.7)
I believe some contracted COVID-19 despite having been vaccinated	7 (2.1)	7 (7.1)	8 (7.5)	3 (14.3)	15 (3.4)	10 (8.3)
The COVID-19 vaccine is not halal	7 (2.1)	3 (3.0)	3 (2.8)		10 (2.2)	3 (2.5)
A lot of news on social media is unclear and confusing	7 (2.1)		2 (1.9)		9 (2.0)	
I believe simply boosting my immune system is enough	7 (2.1)	2 (2.0)			7 (1.6)	2 (1.7)
Comorbidities	2 (0.6)	9 (9.1)	3 (2.8)		5 (1.1)	9 (7.5)
Some are paralyzed and even died after receiving the vaccine	4 (1.2)	1 (1.0)	2 (1.9)		6 (1.3)	1 (0.8)
There is more than one type of vaccine	4 (1.2)				4 (0.9)	
I believe drinking herbal beverages is enough to prevent COVID-19	3 (0.9)	1 (1.0)			3 (0.7)	1 (0.8)

Respondents can write more than one reason.

Galley Proof

and willingness to vaccinate against the disease. Therefore, the research continued to determine if the predictors correlated with COVID-19 knowledge using categorical correlation analysis, that is, the Chi-square test. In this study, a descriptive analysis was conducted to show the average score of respondent's COVID-19 knowledge for each demographic characteristic (i.e., sex, age, education, occupation, and family size). Then, the respondent's demographic characteristics and knowledge of COVID-19 were inputted to the chi-square test of independence. Table 3 shows the factors predicted to correlate with the COVID-19 knowledge.

Discussion

More respondents in survey 2 (55.6%) were willing to vaccinate against COVID-19 than survey 1 (42.4%) (Table 1), indicating an increase in the positive attitude toward COVID-19 preventive measures among the non-healthcare personnel from the first to the second stage of vaccination. This is in contrast to a study in Hong Kong [22] where the willingness to receive vaccination decreased from 44.2% (survey 1; a local COVID-19 epidemic broke) to 34.8% (survey 2; the local epidemic was coming to an end). Willingness to vaccinate against COVID-19 among non-healthcare personnel must be increased, considering that breaking the chain of transmission requires 84–90% herd immunity [12], with at least 62% of the vulnerable population vaccinated [13].

There is a significant relationship (p = 0.000) between knowledge of COVID-19 and willingness to vaccinate against the disease (Table 1). Respondents with a good comprehension of COVID-19 are 1.66 times more likely to be willing than those with lower knowledge scores (OR: 1.66; 95% CI: 1.26–2.18). This finding corresponds to a study in Vietnam [35] showing that willingness to receive the vaccine and level of COVID-19 knowledge is significantly related, with a 1.2-fold increase in the likelihood of getting the vaccine for a 1-unit increase in the total knowledge score (AOR:1.2; 95% CI: 1.1–1.3; p < 0.0).

Demographic characteristics, that is, sex, age, education level, employment status, and family size, are not predictors of willingness to get the COVID-19 vaccine (p>0.05). Although the willingness in men aged 50 with higher education, employment, and family of two to four is higher than in other groups, there is no relationship between these demographic characteristics and willingness to take the vaccine (p > 0.05). This is in line with [36], which found that women's willingness to receive the vaccine is lower than their male counterparts, and that willingness is higher in people aged 65 and over and those with higher education than the other groups. Similarly, [37] found that the willingness to get the vaccine does not necessarily vary across demographic profiles, that is, sex (p = 0.429) and education level (p = 0.129). Research in Brazil [38] also confirms the absence of a statistical relationship (p > 0.05) between the number of household members and vaccine doubts.

Results showed 13 reasons for vaccine hesitancy and unwillingness (Table 2), and the most expressed reason was that respondents did not believe in the efficacy of the available vaccines. The second-highest reason for vaccine hesitancy was the vaccine's side effects, but this is in contrast to the second reason most expressed for unwillingness: respondents feel healthy and think that not everyone is susceptible to COVID-19 infections. Similarly, a previous study in Nepal [39] found that 90 health workers and staff in medical colleges were unwilling to vaccinate against COVID-19; 40 of them have concerns about vaccine safety. Likewise, research in Ethiopia [40] showed that respondents are hesitant to take the vaccine due to concerns about its safety and/or side effects (37%), followed by doubts about its efficacy (20.7%), and lack

Table 3: Factors predicted to correlate with the COVID-19 knowledge

Demographic characteristics	Total n (%)	Knowledge of COVID-19 Mean score	Poor (<80)	Adequate (≥ 80)	p-value		Odds ratio (95% confidence interval)
Sex							
Male	320 (37.1)	75.6	144 (45.0)	176 (55.0)	0.639		1.07 (0.81–1.41)
Female	542 (62.9)	76.8	235 (43.4)	307 (56.6)			
Age range							
18–29 (a)	485 (56.3)	75.3	231 (47.6)	254 (52.4)	0.005*	a vs b	1.57 (1.17–2.09)
30–49 (b)	313 (36.3)	78.3	115 (36.7)	198 (63.3)		b vs c	0.55 (0.32–0.94)
≥ 50 (c)	64 (7.4)	74.5	33 (51.6)	31 (48.4)		a vs c	0.85 (0.51–1.44)
Education							
Primary school (a)	25 (2.9)	72.0	14 (56.0)	11 (44.0)	0.022*	a vs b	1.36 (0.60–3.08)
Senior high school (b)	379 (44.0)	75.5	183 (48.3)	196 (51.7)		b vs c	1.42 (1.08–1.86)
Higher education (c)	458 (53.1)	77.2	182 (39.7)	276 (60.3)		a vs c	1.93 (0.86–4.34)
Occupation							
Employed (a)	442 (51.3)	76.1	197 (44.6)	245 (55.4)	0.715	a vs b**	1.05 (0.80–1.38)
Homemakers (b)	103 (11.9)	77.2	182 (43.3)	238 (56.7)			
Students (b)	267 (31.0)	76.3					
Unemployed (b)	50 (5.8)	76.8					
Family size							
Single (a)	39 (4.5)	74.9	18 (46.2)	21 (53.8)	0.960	a vs b	1.09 (0.57–2.10)
2–4 (b)	519 (60.2)	76.5	228 (43.9)	291 (56.1)		b vs c	1.00 (0.76–1.34)
≥ 5 (c)	304 (35.3)	76.2	133 (43.8)	171 (56.3)		a vs c	1.10 (0.56–2.15)

*Significant, **Cell merge.

Galley Proof

of adequate information (12.7%). Similarly, research in China [41] found that vaccine doubts stem from concerns about the safety of the newly developed vaccine (60.0%) and its efficacy (28.8%); some question the necessity of vaccination (7.5%) and believe that the risk of COVID-19 infections is low (3.7%).

Many respondents of the age 30–49 (78.3%) showed higher average scores of COVID-19 knowledge than the other age groups (Table 3). This finding corresponds with a previous study in Indonesia [42], where 71% of the well-informed respondents are 30–49 years old. There was a significant difference ($p = 0.001$) in knowledge about COVID-19 in the three age groups, similar to a study in Malaysia [43], which also found a significant score difference between age groups. The current research findings indicate that age and COVID-19 knowledge have a significant relationship ($p = 0.005$), as is the case with a study in Africa [44] that found a significant relationship ($p < 0.05$) between age, education, nationality, background, and the COVID-19 knowledge score. Respondents of the 18–29 age group are 1.57 times more likely to gain less knowledge of COVID-19 than those aged 30–49 (OR:1.57; 95% CI: 1.17–2.09). However, in another study [44], respondents of 18–29 years old are 1.4 times more likely to gain better knowledge of COVID-19 than other age groups (95% CI: 0.55–0.89; $p = 0.004$).0

Respondents with higher education had a higher COVID-19 knowledge score (77.2) than primary and senior high school education. This is in line with [10], which shows that the level of knowledge is higher in individuals with a higher education level. In addition, there was a significant difference ($p = 0.009$) in the COVID-19 knowledge of the three groups of educational attainment. Results indicate that education level and COVID-19 knowledge are significantly related ($p = 0.022$), where respondents with senior high school education are 1.42 times more likely to have less knowledge than those with higher education (OR:1,42; 95% CI: 1.08–1.86). In other words, individuals with a higher level of education have better COVID-19 knowledge. Likewise, a study in Africa [44] found that respondents with senior high school education are 4.7 times more likely (95% CI: 0.15–144.7; $p = 0.73$) to have better knowledge about COVID-19 than those who never attended formal education. This also applies to education level and age as significant indicators of COVID-19 knowledge [42].

Sex, employment status, and family size are not predictors of COVID-19 knowledge level ($p > 0.05$), as is the case with the research in Saudi Arabia [45] which concludes that employment status is not a predictor ($p = 0.09$) of COVID-19 knowledge. Furthermore, although the knowledge scores were higher among female respondents (76.8) and homemakers (77.2) than in other respondents, there is no statistical difference between the groups ($p > 0.05$). Similarly, a study in Saudi Arabia [46] found no statistical difference in the knowledge scores of male and female respondents. Furthermore, a previous study in Indonesia [42] supports this finding, that there is no relationship between sex, marital status, and level of COVID-19 knowledge.

Conclusion

Knowledge about COVID-19 is a predictor of willingness to vaccinate against the disease (OR: 1.66; 95% CI: 1.26–2.18). Based on the knowledge score, many non-healthcare workers have less knowledge of the disease and its preventive measures (<80). Therefore, disseminating accurate information and educating the public about this matter becomes necessary. For educational materials to be readily accepted by non-health workers, especially in terms of prevention, such as the use of drugs and the importance of vaccines, authorities, and relevant stakeholders need to factor in predictors of the knowledge level and decide on the appropriate media of information delivery. The research has found that only half of the respondents (42.4–55.6%) are willing to get the vaccine, meaning that education alone cannot improve these figures, but this must be supported by positive news about the efficacy and side effects of the COVID-19 vaccine to address reasons for vaccine hesitancy and unwillingness.

Research Limitations

The number of respondents is not the same in each province, as well as the number of respondents in survey 1 and survey 2.

Author Contributions

Conceptualization, F.B.; Methodology, F.B., F.S., In., S.S.; Formal Analysis, F.B., F.S., In., S.S., Is.; Investigation, F.B., F.S., In., S.S., Is., G.I.H., M.R.N.R.; Data Curation, Is., G.I.H., M.R.N.R.; Writing — Original Draft Preparation, F.B., F.S., In., S.S., Is.; Writing — Review and Editing, F.S., In., S.S. All authors have carefully read and approved the published version of the manuscript.

Data Availability Statement

The data used in this study cannot be published for ethical reasons (respondent privacy).

Galley Proof

Institutional Review Board Statement

The research complies with the research guidelines issued by Universitas Ahmad Dahlan, and the procedure was approved by the Health Research Ethics Committee of the Faculty of Medicine, Duta Wacana Christian University, Indonesia (Ethical Clearance No. 1230/C.16/FK/2021, issued on January 18, 2021).

AQ5 ## Acknowledgments

The authors would like to thank Universitas Ahmad Dahlan for funding this research. Special thanks to all participants involved in this study.

References

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet (London, England). 2020;395:470-3. https://doi.org/10.1016/s0140-6736(20)30185-9
PMid:31986257
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al*. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet (London, England). 2020;395(10223):497-506. https://doi.org/10.1016/s0140-6736(20)30183-5
PMid:31986264
3. Ge H, Wang X, Yuan X, Xiao G, Wang C, Deng T, *et al*. The epidemiology and clinical information about COVID-19. Eur J Clin Microbiol Infect Dis. 2020;39:1011-9. https://doi.org/10.1007/s10096-020-03874-z
PMid:32291542
4. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, *et al*. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet (London, England). 2020;395(10223):507-13. https://doi.org/10.1016/s0140-6736(20)30211-7
PMid:32007143
5. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, *et al*. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med. 2020;382:1708-20. https://doi.org/10.1056/nejmoa2002032
6. Wong SH, Lui RN, Sung JJ. Covid-19 and the digestive system. J Gastroenterol Hepatol. 2020;35(5):744-8. https://doi.org/10.1111/jgh.15047
PMid:32215956
7. Meselson M. Droplets and aerosols in the transmission of SARS-CoV-2. N Engl J Med. 2020;382(21):2063. https://doi.org/10.1056/nejmc2009324
PMid:32294374
8. Johansson MA, Quandelacy TM, Kada S, Prasad PV, Steele M, Brooks JT, *et al*. SARS-CoV-2 Transmission From People Without COVID-19 Symptoms. JAMA Netw Open. 2021;4:e2035057. https://doi.org/10.1001/jamanetworkopen.2020.35057
PMid:33410879
9. Widders A, Broom A, Broom J. SARS-CoV-2: The viral shedding vs infectivity dilemma. Infect Dis Health. 2020;25(3):210-5. https://doi.org/10.1016/j.idh.2020.05.002
PMid:32473952
10. Lee M, Kang BA, You M. Knowledge, attitudes, and practices (KAP) toward COVID-19: A cross-sectional study in South Korea. BMC Public Health. 2021;21:295. https://doi.org/10.1186/s12889-021-10285-y
11. World Health Organization. Coronavirus Disease (COVID-19): Herd Immunity, Lockdowns and COVID-19. Geneva: World Health Organization; 2020. Available from: https://www.who.int/news-room/q-a-detail/herd-immunity-lockdowns-and-covid-19
12. Kadkhoda K. Herd immunity to COVID-19: Alluring and elusive. Am J Clin Pathol. 2021;155(4):471-2. https://doi.org/10.1093/ajcp/aqaa272
PMid:33399182
13. Park H, Kim SH. A study on herd immunity of COVID-19 in South Korea: Using a stochastic economic-epidemiological model. Environ Resour Econ. 2020;13:1-6. https://doi.org/10.1007/s10640-020-00439-8
PMid:32836840
14. Liu X, Liu C, Liu G, Luo W, Xia N. COVID-19: Progress in diagnostics, therapy and vaccination. Theranostics. 2020;10(17):7821-35. https://doi.org/10.7150/thno.47987
PMid:32685022
15. Rahman S, Montero MT, Rowe K, Kirton R, Kunik F Jr. Epidemiology, pathogenesis, clinical presentations, diagnosis and treatment of COVID-19: A review of current evidence. Expert Rev Clin Pharmacol. 2021;14(5):601-21. https://doi.org/10.1080/17512433.2021.1902303
PMid:33705239
16. Rodrigues CM, Plotkin SA. Impact of vaccines; health, economic and social perspectives. Front Microbiol. 2020;11:1526. https://doi.org/10.3389/fmicb.2020.01526
PMid:32760367
17. Petravić L, Arh R, Gabrovec T, Jazbec L, Rupčić N, Zwitter M, *et al*. Factors affecting attitudes towards COVID-19 vaccination: An online survey in slovenia. Vaccines. 2021;9:247. https://doi.org/10.3390/vaccines9030247
18. Aldila D, Samiadji BM, Simorangkir GM, Khosnaw SH, Shahzad M. Impact of early detection and vaccination strategy in COVID-19 eradication program in Jakarta, Indonesia. BMC Res Notes. 2021;14:132. https://doi.org/10.1186/s13104-021-05540-9
19. Reiter PL, Pennell ML, Katz ML. Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? Vaccine. 2020;38:6500-7. https://doi.org/10.1016/j.vaccine.2020.08.043
PMid:32863069
20. El-Elimat T, AbuAlSamen MM, Almomani BA, Al-Sawalha NA, Alali FQ. Acceptance and attitudes toward COVID-19 vaccines: A cross-sectional study from Jordan. PLoS One. 2021;16:e0250555. https://doi.org/10.1101/2020.12.22.20248676
PMid:33891660
21. Ministry of Health of the Republic of Indonesia, ITAGI, UNICEF, WHO. Covid-19 Vaccine Acceptance Survey in Indonesia. The COVID-19 National Task Force; 2020. Available from: https://covid19.go.id/storage/app/media/HasilKajian/2020/November/vaccine-acceptance-survey-id-12-11-2020final.pdf AQ6
22. Wang K, Wong EL, Ho KF, Cheung AW, Yau PS, Dong D, *et al*. Change of willingness to accept COVID-19 vaccine and reasons of vaccine hesitancy of working people at different waves of local epidemic in Hong Kong, China: Repeated cross-sectional surveys. Vaccines. 2021;9(1):62. https://doi.org/10.3390/

Galley Proof

vaccines9010062
PMid:33477725

23. Viswanath K, Bekalu M, Dhawan D, Pinnamaneni R, Lang J, McLoud R. Individual and social determinants of COVID-19 vaccine uptake. BMC Public Health. 2021;21(1):818. https://doi.org/10.1186/s12889-021-10862-1
PMid:33910558
24. Machida M, Nakamura I, Kojima T, Saito R, Nakaya T, Hanibuchi T, *et al*. Acceptance of a COVID-19 vaccine in Japan during the COVID-19 pandemic. Vaccines. 2021;9(3):210. https://doi.org/10.3390/vaccines9030210
PMid:33802285
25. Wirsiy FS, Nkfusai CN, Ako-Arrey DE, *et al*. Acceptability of COVID-19 vaccine in Africa. Int J MCH AIDS. 2021;10(1):134-8. https://doi.org/10.21106/ijma.482
PMid:33868778
26. Harapan H, Wagner AL, Yufika A, Winardi W, Anwar S, Gan AK, *et al*. Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. Front Public Health. 2020;8:381. https://doi.org/10.3389/fpubh.2020.00381
PMid:32760691
27. Almaghaslah D, Alsayari A, Kandasamy G, Vasudevan R. COVID-19 vaccine hesitancy among young adults in Saudi Arabia: A cross-sectional web-based study. Vaccines. 2021;9(4):330. https://doi.org/10.3390/vaccines9040330
PMid:33915890
28. Al-Qerem WA, Jarab AS. COVID-19 vaccination acceptance and its associated factors among a middle Eastern Population. Front Public Health. 2021;9:632914. https://doi.org/10.3389/fpubh.2021.632914
PMid:33643995
29. Alabdulla M, Reagu SM, Al-Khal A, Elzain M, Jones RM. COVID-19 vaccine hesitancy and attitudes in Qatar: A national cross-sectional survey of a migrant-majority population. Influenza Other Respi Viruses. 2021;15(3):361-70. https://doi.org/10.1111/irv.12847
PMid:33605010
30. Griffith J, Marani H, Monkman H. COVID-19 vaccine hesitancy in Canada: Content analysis of tweets using the theoretical domains framework. J Med Internet Res. 2021;23(4):e26874. https://doi.org/10.2196/26874
PMid:33769946
31. Khubchandani J, Sharma S, Price JH, Wiblishauser MJ, Sharma M, Webb FJ. COVID-19 vaccination hesitancy in the United States: A rapid national assessment. J Community Health. 2021;46(2):270-7. https://doi.org/10.1007/s10900-020-00958-x
PMid:33389421
32. Schwarzinger M, Watson V, Arwidson P, Alla F, Luchini S. COVID-19 vaccine hesitancy in a representative working-age population in France: A survey experiment based on vaccine characteristics. Lancet Public Health. 2021;6:e210-21. https://doi.org/10.1016/s2468-2667(21)00012-8
33. Ministry of Health of the Republic of Indonesia. Starting in January, here are the Number of Targets for COVID-19 Vaccination in Indonesia. Bureau of Communications and Community Services, Ministry of Health; 2020. Available AQ6 from: https://www.kemkes.go.id/article/view/20122900009/dimulai-januari-berikut-jumlah-sasaran-vaksinasi-covid-19-di-indonesia.html
34. World Health Organization. Coronavirus Disease 2019 (COVID-19). Geneva: World Health Organization; 2020. AQ6 Available from: https://www.who.int/news-room/q-a-detail/coronavirus-disease-covid-19
35. Huynh G, Nguyen T Van, Nguyen DD, Lam QM, Pham TN, Nguyen HT. Knowledge about COVID-19, beliefs and vaccination acceptance against COVID-19 among high-risk people in Ho Chi Minh City, Vietnam. Infect Drug Resist. 2021;14:1773-80. https://doi.org/10.2147/idr.s308446
PMid:34012276
36. Szilagyi PG, Thomas K, Shah MD, Vizueta N, Cui Y, Vangala S, *et al*. National trends in the US public's likelihood of getting a COVID-19 vaccine April 1 to December 8, 2020. JAMA. 2021;325(4):396-8. https://doi.org/10.1001/jama.2020.26419
PMid:33372943
37. Faasse K, Newby J. Public perceptions of COVID-19 in Australia: Perceived risk, knowledge, health-protective behaviors, and vaccine intentions. Front Psychol. 2020;11:551004. https://doi.org/10.3389/fpsyg.2020.551004
PMid:33117223
38. de Oliveira BL, Campos MA, de Queiroz RC, de Alves MT, de Souza BF, Dos Santos AM, *et al*. Prevalence and factors associated with covid-19 vaccine hesitancy in Maranhão, Brazil. Rev Saude Publica. 2021;55():12. https://doi.org/10.11606/s1518-8787.2021055003417
PMid:33909868
39. Paudel S, Palaian S, Shankar PR, Subedi N. Risk perception and hesitancy toward COVID-19 vaccination among healthcare workers and staff at a medical college in Nepal. Risk Manag Healthc Policy. 2021;14:2253-61. https://doi.org/10.2147/rmhp.s310289
PMid:34104016
40. Zewude B, Habtegiorgis T. Willingness to take COVID-19 vaccine among people most at risk of exposure in Southern Ethiopia. Pragmatic Obs Res. 2021;12:37-47. https://doi.org/10.2147/por.s313991
PMid:34079423
41. Zhou Y, Zhang J, Wu W, Liang M, Wu QS. Willingness to receive future COVID-19 vaccines following the COVID-19 epidemic in Shanghai, China. BMC Public Health. 2021;21(1):1103. https://doi.org/10.1186/s12889-021-11174-0
PMid:34107930
42. Sulistyawati S, Rokhmayanti R, Aji B, Wijayanti SP, Hastuti SK, Sukesi TW, *et al*. Knowledge, attitudes, practices and information needs during the COVID-19 pandemic in indonesia. Risk Manag Health Policy. 2021;14:163-75. https://doi.org/10.2147/rmhp.s288579
PMid:33488129
43. Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. PLoS One. 2020;15(5):e0233668. https://doi.org/10.1371/journal.pone.0233668
PMid:32437434
44. Hager E, Odetokun IA, Bolarinwa O, Zainab A, Okechukwu O, Al-Mustapha AI. Knowledge, attitude, and perceptions towards the 2019 coronavirus pandemic: A bi-national survey in Africa. PLoS One. 2021;16:e0247351. https://doi.org/10.1371/journal.pone.0247351
45. Baig M, Jameel T, Alzahrani SH, Mirza AA, Gazzaz ZJ, Ahmad T, *et al*. Predictors of misconceptions, knowledge, attitudes, and practices of COVID-19 pandemic among a sample of Saudi population. PLoS One. 2020;15:e0243526. https://doi.org/10.1371/journal.pone.0243526
46. Al-Hanawi MK, Angawi K, Alshareef N, Qattan AM, Helmy HZ, Abudawood Y, *et al*. Knowledge, attitude and practice toward COVID-19 among the public in the Kingdom of Saudi Arabia: A cross-sectional study. Front Public Health. 2020;8:217. https://doi.org/10.3389/fpubh.2020.00217
PMid:32574300

Galley Proof

Author Queries???

AQ1: Kindly provide running title

AQ2: Kindly provide author full name

AQ3: Kindly provide department

AQ4: Kindly provide history details

AQ5: Please check the acknowledgments text part.

AQ6: Kindly provide last accessed details

AQ7: Kindly provide ORCID Id for all authors

[OAMJMS] Your Article was Published

Participants

MSc, Eng Ivo Spiroski (ivos)

Faridah Baroroh (fbaroroh)

Messages

Note	From
Dear Faridah Baroroh, Please note that your paper "Willingness to Vaccinate against Coronavirus Disease 2019 and Related Predictors among Non-Healthcare Personnel in Indonesia", was published in Open Access Maced J Med Sci (OAMJMS). DOI: https://doi.org/10.3889/oamjms.2021.7056 Username: Faridah Baroroh Thank you for your fine contribution. On behalf of the Editors of the Open Access Macedonian Journal of Medical Sciences, we look forward to your continued contributions to the Journal. Cordially, Prof. Dr Mirko Spiroski, Editor-in-Chief	ivos 2021-11-07 03:54 PM