Knowledge, Attitudes, and Beliefs About COVID-19 Vaccine Acceptance During Early Rollout in Urban and Rural Communities of Lampung Province

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ABSTRACT

The COVID-19 pandemic has posed significant challenges for countries worldwide, requiring rapid and extensive vaccination efforts to control virus transmission. Public acceptance of vaccines is a key factor in the success of vaccination programs, especially during the early rollout phase. This study aimed to analyze the relationship between knowledge, attitude, and belief with the acceptance of the COVID-19 vaccine among the community in Umbul Niti Village, Jati Agung Sub-district, South Lampung. Umbul Niti Village, located near Bandar Lampung City, represents the response of a rural community during Indonesia's initial COVID-19 vaccination campaign. This analytical observational study used a cross-sectional design and a structured questionnaire covering knowledge, attitude, and belief aspects. A total of 350 respondents participated, with 62.85% having good knowledge and 94% showing a positive attitude towards vaccination. The survey revealed that 64.8% accepted the vaccine, 27.6% were undecided, and 7.6% refused. Statistical analysis found that attitude and belief were significantly associated with vaccine acceptance ($p < 0.05$), while knowledge alone was not. Most respondents believed the vaccine was safe. These findings suggest that attitude and belief play a crucial role in shaping vaccine acceptance and should be prioritized in public health risk communication to strengthen trust and preparedness for future pandemics.

Keywords: Acceptability, Attitude belief, COVID-19 Vaccine, Knowledge

INTRODUCTION

In mid-2020, when the COVID-19 vaccine was still in its early stages of development, the COVID-19 pandemic declared a global health emergency by the World Health Organization (WHO) in 2020 posed major challenges to global health and socio-economic sectors (Reiter et al., 2020). At that time, the COVID-19 virus had infected more than 5.5 million people across 144 countries (Al-Mohaithef & Padhi, 2020). The prolonged pandemic has had significant negative impacts on the health sector and the Indonesian economy. To address these challenges, the Indonesian government launched a national vaccination program as a key strategy to curb COVID-19 transmission (Kemenkes, 2020). Vaccination remains one of the most successful public health interventions to prevent infectious diseases (Puri et al., 2020).

In mid-2020, scientists and healthcare professionals began developing vaccines specifically targeting COVID-19. This effort was generally welcomed by the public, although doubts and hesitancy also emerged. Concerns about vaccine effectiveness, possible side effects, and cost were among the main reasons for vaccine hesitancy. By the end of 2020, several phase III clinical trials had been completed to evaluate vaccine efficacy. Based on results of local trials in Indonesia, the CoronaVac vaccine (Sinovac) demonstrated an efficacy rate of 65.3%, surpassing the minimum efficacy threshold of 50% set by the WHO and Indonesia's National Agency of Drug and Food Control (BPOM). Consequently, on January 11, 2021, BPOM officially granted an Emergency Use Authorization (EUA) for this vaccine for individuals aged 18–59 years (Kompas, 2021).

Despite vaccine availability, public acceptance of COVID-19 vaccination was not universal. A national survey found that 64.8% of respondents were willing to be vaccinated, 27.6% were undecided, and 7.6% refused vaccination (Kemenkes et al., 2020). Similar studies in other countries reported varying acceptance rates. In the United States, the acceptance rate reached 80%, while in Saudi Arabia and China it was 64.7% and 72.5%, respectively (Al-Mohaithef & Padhi, 2020; Fu et al., 2020)Factors influencing vaccine acceptance include knowledge and perception. Assessing knowledge, attitudes, and practices (KAP) related to vaccination is essential to inform future strategies for improving vaccine uptake and supporting the government's immunization programs. The cognitive (knowledge), affective (attitude), and behavioral (practice) dimensions all play crucial roles in shaping public acceptance of vaccines, thereby influencing the overall success of vaccination programs (Sengupta et al., 2022).

The Ministry of Health of the Republic of Indonesia has stated that better economic conditions are associated with greater willingness to pay for vaccines. The highest vaccine acceptance rates were found among the 56–65 and >65 age groups. In terms of age, older respondents demonstrated higher willingness to receive vaccines. The need for accurate information was also high: 79% of respondents expressed a

desire to learn more about vaccines, with healthcare workers expected to be the primary information source (57%), followed by family (32%), and other sources such as friends or community leaders (Kemenkes et al., 2020). These data highlight the crucial role of healthcare workers as trusted sources of health information.

However, trends in vaccine acceptance show significant variation across countries and occupational groups. For example, only 27.7% of healthcare workers in 63 hospitals in Ecuador were willing to be vaccinated, compared to 27% in the Congo and 77% in France (Kabamba Nzaji et al., 2020). In contrast, in Italy, the majority of respondents refused vaccination, citing concerns about safety (83%) and the belief that natural immunity was sufficient (84%)(Biasio et al., 2020). Low acceptance in some countries is thought to be influenced by misinformation and negative rumors about vaccines, which affect the decisions of both healthcare workers and the general public.

In Indonesia, issues of vaccine acceptance are closely tied to the country's demographic diversity and unique population characteristics. National data released by the Ministry of Health and the Central Statistics Agency during the early stages of the COVID-19 vaccination program showed notable differences in vaccine acceptance between urban and rural areas. Urban residents generally have better access to health information, healthcare facilities, and higher levels of health literacy compared to those in rural areas (Harapan et al., 2019). Lampung Province, which encompasses both urban and rural areas, serves as a representative example to understand the dynamics of vaccine acceptance in regions with demographic heterogeneity. The province is largely rural, which affects information dissemination and acceptance of vaccination programs. Differences in education levels and health literacy between urban and rural residents are also important factors influencing public perceptions and attitudes towards COVID-19 vaccination (Soyannwo et al., 2022; Wu et al., 2023). Overall, Indonesia's socio-demographic diversity presents both challenges and opportunities for the government in designing contextualized risk communication strategies and targeted health interventions to increase vaccine coverage and acceptance.

This study was conducted during the initial phase of vaccine rollout, a critical period characterized by dynamic social and psychological responses. Although the COVID-19 pandemic has ended, understanding the factors that influence vaccine acceptance remains relevant. Findings from this study can serve as a reference for designing future health communication strategies and for preparing response systems for potential future pandemics. Furthermore, this study provides a basis for strategies to reduce healthcare access gaps between urban and rural communities. Knowledge, attitude, and belief (KAB) studies are essential to assess community readiness and acceptance of COVID-19 vaccination as a preventive and control measure. By understanding the community's knowledge, attitudes, and beliefs regarding COVID-19 vaccination, policymakers and health authorities can design more targeted policies and strategies to increase vaccination coverage and build public trust. Umbul Niti Village in Jati Agung Sub-district, South Lampung, represents a rural community located near Bandar Lampung City, making it an illustration of community acceptance during the early phase of the COVID-19 vaccine rollout in Indonesia. Based on this background, this study aims to analyze the relationship between knowledge, attitude, and belief with the acceptance of the COVID-19 vaccine in this community

METHODS

This cross-sectional study was conducted from January to March 2021 in Umbul Niti Village, South Lampung, using a structured questionnaire to assess respondents' knowledge, attitudes, and beliefs about COVID-19 vaccination. The questionnaire was validated through expert judgment and item analysis, with a reliability coefficient (Cronbach's Alpha) of 0.82. Adults aged ≥18 years who could communicate in Indonesian, read and write, and gave informed consent were included. Respondents unable to complete the questionnaire independently or who provided incomplete answers were excluded. A total of 350 respondents met the inclusion criteria and completed the questionnaire. Ethical approval was obtained from the Faculty of Medicine, University of Lampung (No. 1823/UN26.18/PP.05.02.00/2021). Data were analyzed using Chi-square, Fisher Exact, and logistic regression tests.

RESULTS

A total of 350 respondents completely filled out the questionnaire. Based on gender, 34.57% of respondents were male and 65.43% were female. The majority of respondents had a high school level of education (74.9%), followed by elementary school (13.1%) and college education (12%). Most respondents were married (74.57%), while the rest were single (21.14%) or widowed/widower (4.28%). Regarding health insurance, 62.28% of respondents did not have health insurance, 37.14% were covered by the Social Security Administering Body (BPJS), and only 0.05% had private health insurance, indicating a generally low level of health insurance ownership. In terms of employment, 84.47% of respondents reported having a job, with the majority working in sectors unrelated to health (93.14%). Furthermore, 74% of respondents had never received a COVID-19 vaccination at the time of the study, while 10.86% had received the first dose and 15.14% had completed the second dose. Based on Figure 1, 177 respondents (50.57%) answered "Yes", 76 respondents (21.43%) answered "No", and 97 respondents (27.71%) answered "Don't Know" regarding the statement that COVID-19 vaccination is mandatory.

These results indicate that approximately half of the respondents perceive COVID-19 vaccination as mandatory. Table 2 presents nine questions assessing respondents' knowledge about groups eligible or ineligible for COVID-19 vaccination. Each correct answer was scored as 1 and each incorrect answer as 0. Respondents who scored ≥50% were categorized as having good knowledge, while those who scored <50% were categorized as having poor knowledge. The results showed that 220 respondents (62.85%) had good knowledge, whereas 130 respondents (37.14%) had poor

knowledge. This indicates that more than half of the respondents demonstrated adequate knowledge regarding COVID-19 vaccination eligibility. Based on Table 3, respondents' positive attitudes regarding their willingness to get vaccinated were reflected in question A1, where 78% agreed or strongly agreed to be vaccinated (49.71% agreed and 28.29% strongly agreed). For question A2, 36.29% of respondents disagreed with the statement that natural immunity alone was sufficient, while 36.29% were neutral, 18.29% agreed, and 8.86% strongly agreed.

Table 1 . Respondent Demographics

Category	Total (n=350)	Percentage (%)
Gender		
Man	121	34.57
Woman	229	65.43
Education		
Elementary school/no school	46	13.1
Secondary school	262	74.9
College	42	12
Marital status		
Bachelor	74	21.14
Marry	261	74.57
Widower/Widow	15	4.28
Insurance		
BPJS	130	37.14
Private	2	0.05
No Insurance	218	62.28
Work		
Work	296	84.47
Doesn't work	54	15.43
Profession		
Not related to health	326	93.14
Health related	24	6.86
Vaccine		
Dose 1	38	10.86
Dose 2	53	15.14
No/Not Yet	259	74

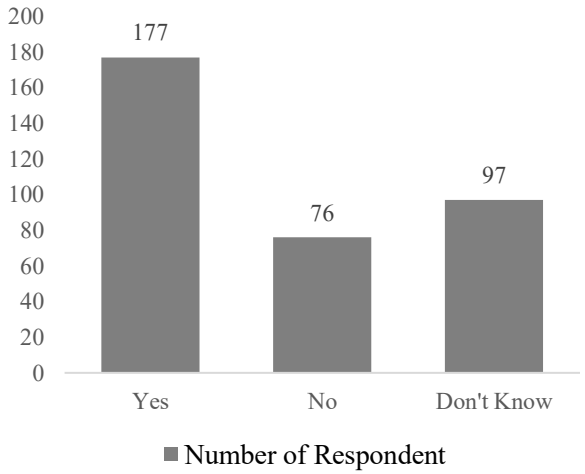

Figure 1. Respondents' Answers Regarding the Mandatory COVID-19 Vaccination

Table 2. Respondents ' Knowledge About Groups Eligible to Receive Vaccines/Not Eligible to Receive Vaccines

No	Questions	Eligible	Not eligible	Don't know
P1	Infants under 1 year. *	19	255	76
P2	Children and adolescents under 18 years. ***	128	161	61
P3	Adults aged at least 18 years *	300	26	24
P4	Pregnant women and nursing mothers **	78	193	79
P5	People with chronic diseases such as diabetes, hypertension and heart disease ***	23	282	45
P6	People who are suffering from COVID-19. **	132	147	71
P7	People who have recovered from COVID-19 ***	235	53	62
P8	People who have allergies or medications ***	36	241	73
P9	A person with impaired immune system **	32	244	74
P10	Protective immunity against Covid-19 infection will be achieved after			
	First dose of vaccination	12%		
	Second dose of vaccination	25%		
	14 days after first vaccination	23%		
	Don't know	40%		

Eligible ***, Not eligible **, don't know *

In question A3, 45.71% of respondents stated their willingness to pay if required to obtain the COVID-19 vaccine, while 28.57% were undecided, 18.57% disagreed, and 6.68% strongly disagreed. Regarding question A4, which assessed respondents' willingness to encourage others and family members to get vaccinated, 62% showed a positive attitude (43.14% agreed and 18.86% strongly agreed), while 31.14% were undecided, 5.72% disagreed, and 0.86% strongly disagreed. Overall, these results indicate that the majority of respondents (94%) demonstrated a positive attitude toward accepting the COVID-19 vaccine, with only 5.1% showing a negative attitude.

Table 3. Respondents' Attitudes Towards Accepting Vaccination

Question	Frequency (n=350)	Percentage (%)
A1. When my turn of vaccination comes, I am willing to take the Covid-19 vaccine.		
Strongly agree	99	28.29
Agree	174	48.71
Neither agree nor disagree	59	16.86
Disagree	14	4
Strongly disagree	3	0.86
A2. I will prefer to acquire immunity against Covid-19 naturally (by having the disease/subclinical infection) rather than by vaccination.		
Strongly agree	31	8.86
Agree	64	18.29
Neither agree nor disagree	127	36.29
Disagree	113	32.29
Strongly disagree	14	4
A3.I am willing to get the Covid-19 vaccine, even if I have to pay to get it.	24	6.86
Strongly agree	65	18.57
Agree	100	28.57
Neither agree nor disagree	133	38
Disagree	27	7.71
Strongly disagree		
A4. I will recommend my family and friends to get vaccinated against Covid-19		
Strongly agree	66	18.86
Agree	151	43.14
Neither agree nor disagree	109	31.14
Disagree	20	5.71
Strongly disagree	3	0.86

Table 4. Sources of Information Influencing Respondents' Opinions Regarding Vaccines

Resources	No influential	Somewhat influential	Highly influential
TV or radio news	35	119	196
Government (Ministries, Regional Governments, etc.)	25	92	233
Social media (Facebook, Instagram and WhatsApp)	45	103	202
Discussion with friends and family	47	139	164
Health service providers (health centers, clinics, hospitals)	20	65	265

Based on the data presented in Table 4, it can be seen that all types of information sources including television or radio news, government institutions, social media, discussions with friends and family, and health service providers have an influence on respondents' opinions regarding vaccines, although to varying degrees. Notably, the Government (233 respondents) and Health Service Providers (265 respondents) were perceived as 'Highly influential' by the majority of respondents. This finding indicates that official and professional sources remain the most trusted and play a crucial role in shaping public perceptions of the COVID-19 vaccine. Furthermore, when linked to Table 5, which examines the reasons, motivations, and beliefs of respondents who are willing or planning to receive the vaccine, it is evident that questions P1, P2, P5, P7, and P9 reflect respondents' beliefs about the vaccine's safety, effectiveness, and overall trustworthiness. The alignment between the most influential information sources and the belief component suggests that clear, accurate information from credible sources significantly strengthens public trust and willingness to accept vaccination. Therefore, it is essential for the government and health service providers to continue to act as reliable sources of vaccine-related information to maintain and improve public confidence.

Table 5. Respondents' Reasons and Beliefs in Deciding to Get Vaccinated for COVID-19

Question : I have taken/will take the covid-19 vaccine because:	Frequency (n=350)	Percentage (%)
B1. I think there is no harm in taking the Covid-19 vaccine		
Strongly agree	61	17.42
Agree	169	48.28
Neither agree nor disagree	85	24.86
Disagree	34	9.7
Strongly disagree	1	0
B2. I believe the Covid-19 vaccine will be useful in protecting me from the Covid-19 infection.		
Strongly agree	49	14
Agree	166	47.43
Neither agree nor disagree	87	24.86
Disagree	47	13.44
Strongly disagree	1	0
B3. Covid-19 vaccine is available free of cost		
Strongly agree	126	36
Agree	181	51.71
Neither agree nor disagree	40	11.43
Disagree	3	1
Strongly disagree	0	0
B4. My healthcare professional/doctor has recommended me		
Strongly agree	58	16.57
Agree	217	62
Neither agree nor disagree	67	19.14
Disagree	7	2
Strongly disagree	1	0
B4. My healthcare professional/doctor has recommended me		
Strongly agree	58	16.57
Agree	217	62
Neither agree nor disagree	67	19.14
Disagree	7	2
Strongly disagree	1	0
B5 I feel the benefits of taking the Covid-19 vaccine outweigh the risks involved.		
Strongly agree	50	14.28
Agree	134	38.28
Neither agree nor disagree	150	42.86

Question : I have taken/will take the covid-19 vaccine because:	Frequency (n=350)	Percentage (%)
Disagree	14	4
Strongly disagree	2	1
B6. I believe that taking the Covid-19 vaccine is a societal responsibility.		
Strongly agree	58	16.57
Agree	177	50.57
Neither agree nor disagree	87	24.86
Disagree	22	6.28
Strongly disagree	6	1.7
B7. There is sufficient data regarding the vaccine's safety and efficacy released by the government.		
Strongly agree	51	14.57
Agree	145	41.43
Neither agree nor disagree	107	30.57
Disagree	46	13.14
Strongly disagree	1	0.02
B8.Many people are taking the covid-19 vaccine.		
Strongly agree	73	20.86
Agree	201	57.42
Neither agree nor disagree	71	20.28
Disagree	4	1.1
Strongly disagree	1	0.02
B9. I think it will help in eradicating Covid-19 infection.		
Strongly agree	50	14.26
Agree	134	38.28
Neither agree nor disagree	119	34
Disagree	44	12.57
Strongly disagree	3	0.08
B10. My role models/political leaders/senior doctors/scientists have taken the Covid-19 vaccine.		
Strongly agree	33	9.4
Agree	103	29.43
Neither agree nor disagree	196	56
Disagree	14	4
Strongly disagree	4	1.1

Table 6 presents respondents' answers to various statements related to concerns that could potentially influence their decision to receive the COVID-19 vaccine. The findings indicate that for several statements such as B11 (accessibility), B12 (immediate side effects), B13 (risk of defective or fake vaccines), B14 (speed of development), and B15 (undetected long-term side effects) a considerable proportion of respondents chose a neutral or uncertain stance. For example, in B11, the majority (40.29%) answered neutral/don't know about whether the COVID-19 vaccine may not be easily accessible, while only 32.95% agreed and 4.3% strongly agreed, showing that access concerns were not strongly perceived as barriers. Similarly, for B12 and B13, most respondents remained neutral or disagreed, suggesting that immediate side effects and the authenticity of vaccines were not major deterrents for vaccination uptake.

Statement B14 shows that while some respondents still consider the rapid development and approval of the vaccine as a factor (33.7% agreed), a significant portion (35.14%) remain neutral, indicating lingering uncertainty. For B15, concerns about undetected long-term side effects were also met with neutrality (42.86%), showing that many respondents have yet to form a definite opinion on this matter. Interestingly, for B16, the majority of respondents disagreed (25.71%) or strongly disagreed (20.57%) with the idea that the vaccine is being promoted solely for commercial pharmaceutical interests, indicating public skepticism towards conspiracy-based narratives. Overall, these results demonstrate that despite some areas of doubt and uncertainty, respondents generally show a positive and open attitude towards the COVID-19 vaccination program, supported by trust in the vaccine's quality, safety, and underlying public health goals.

Table 7 shows the results of the bivariate analysis between various demographic and psychosocial variables and the acceptability of the COVID-19 vaccine. The results indicate that education level ($p = 0.003$) and insurance status ($p = 0.034$) are significantly associated with vaccine acceptability. Respondents with a secondary school or college education tend to show higher vaccine acceptance than those with only elementary education, suggesting that higher educational attainment may increase awareness and trust in vaccination programs. Likewise, respondents with BPJS insurance show higher vaccine acceptance compared to those without any insurance, indicating that having access to healthcare coverage could encourage confidence in obtaining vaccines safely and affordably. On the other hand,

variables such as gender (p = 0.916), marital status (p = 0.087), and employment status (p = 0.920) do not have a statistically significant relationship with vaccine acceptability. This shows that these demographic factors may not play a dominant role in influencing respondents' decisions to accept the COVID-19 vaccine.

Table 6 . Respondent Concerned Regarding the COVID-19 Vaccine that May Influence the Respondent's Decision (make hesitancy) to Get COVID-19 Vaccine.

Section B Belief I am concerned about that	**Frequency (n=350)**	**Percentage (%)**
B11. C-19 vaccine might not be easily available to me		
Strongly agree	15	4.3
Agree	115	32.95
Neither agree nor disagree	141	40.29
Disagree	76	22.57
Strongly disagree	3	0.86
B12.I might have immediate serious side effects after taking Covid-19 vaccine.		8
Strongly agree	28	16.86
Agree	59	40.86
Neither agree nor disagree	143	31.43
Disagree	110	2.6
Strongly disagree	9	
B13. Covid-19 vaccine may be faulty or fake		
Strongly agree	12	3.4
Agree	29	8.3
Neither agree nor disagree	164	45.71
Disagree	133	38
Strongly disagree	12	3.4
B14. Covid-19 vaccine was rapidly developed and approved		
Strongly agree	24	6.86
Agree	118	33.7
Neither agree nor disagree	123	35.14
Disagree	83	23.43
Strongly disagree	3	0.8
B15. I might have some unforeseen future effects of the Covid-19 vaccine.		
Strongly agree	15	4.3
Agree	53	15.14
Neither agree nor disagree	150	42.86
Disagree	112	32
Strongly disagree	10	2.8
B16. Covid-19 vaccine is being promoted for commercial gains of pharmaceutical companies.		
Strongly agree	15	4.3
Agree	53	13.7
Neither agree nor disagree	150	35.71
Disagree	112	25.71
Strongly disagree	10	20.57

Furthermore, among psychosocial factors, the analysis reveals that knowledge about COVID-19 vaccination is not significantly related to vaccine acceptance (p = 0.294). However, attitude (p < 0.001) and belief (p < 0.001) show strong significant relationships with vaccine acceptability. This indicates that positive attitudes and strong beliefs about the benefits and safety of the vaccine are key drivers of acceptance. These findings highlight the importance of not only providing factual information but also actively building positive perceptions and strengthening public trust to increase vaccine uptake. Although demographic factors like education and insurance status do play a role, shaping attitudes and beliefs appears to be the most influential strategy to enhance public acceptance of COVID-19 vaccination programs.

Table 7. Bivariate Analysis among Variables Toward *Acceptability* of COVID-19 Vaccine

Category	**COVID-19 Vaccine Acceptance (n=350)**	**P value**

	Yes	Neutral	No	
Gender				
Man	96	19	6	0.916
Woman	178	40	11	
Education				
Elementary school	29	10	7	
Secondary school	208	45	9	0.003
College	37	4	1	
Marital status				
Bachelor	66	6	2	
Married	195	51	15	0.087
Widower/Widow	13	2	0	
Insurance				
BPJS	105	19	6	
Private	0	2	0	0.034
No Insurance	38	169	6	
Employment Status				
Work	151	31	9	0.920
Doesn't work	123	28	8	
Knowledge				
Good				0.294
Not enough	178	33	9	
Attitude	96	26	8	
Positive	272	54	6	<0.001
Negative	2	5	11	
Belief				
Positive	247	17	10	<0.001
Negative	27	42	7	

DISCUSSION

This study was conducted on 350 respondents in Umbul Niti Village, Jatimulyo Village, Jati Agung District, South Lampung. Based on the Fisher exact statistical test in Table 7, it shows that attitudes ($p< 0.001$) and beliefs ($p< 0.001$) are significantly related to the acceptance of the COVID-19 vaccine, while knowledge ($p=0.278$) is not significantly related. This indicates that attitudes and beliefs play a decisive role in determining the acceptability of the COVID-19 vaccine among the study population.

Knowledge is generally the foundation that shapes a person's attitude, but this study shows that knowledge alone does not guarantee acceptance. Some respondents with good knowledge still showed hesitancy or neutrality toward vaccination. This may suggest that knowledge must be supported by other factors such as trust in credible information, cultural influences, social norms, and the absence of misinformation. Similar findings have been reported in Malaysia, where good knowledge tends to increase acceptance (Azmawati Mohamed et al., 2021), however, without supportive attitudes and beliefs, knowledge may not translate into actual acceptance.

Attitude is one of the strongest predictors of COVID-19 vaccine acceptance, as shown in this study where the majority of respondents had positive attitudes. Positive attitudes can reflect trust in health authorities, satisfaction with available information, and perceived benefits of vaccination (Pogue et al., 2020). Similarly, beliefs about vaccine safety and effectiveness also strongly influence acceptance. In this study, the majority of respondents agreed that the COVID-19 vaccine is safe, and almost half believed that it can protect against infection. These positive beliefs provide an internal motivation for respondents to accept vaccination, aligning with findings from South Asian countries where attitudes and beliefs were significant predictors of vaccine acceptance (Delwer Hossain Hawlader et al., 2021; Hawlader et al., 2021).

Demographic factors can also affect vaccine acceptability. In this study, only education ($p=0.003$) and health insurance ($p=0.034$) showed significant relationships with acceptance. Higher education levels may reflect better access to accurate information, stronger critical thinking skills, and greater trust in scientific evidence. Likewise, having health insurance may indicate closer engagement with health services and better health-seeking behavior. In contrast, gender ($p=0.916$), marital status ($p=0.087$), and occupation ($p=0.920$) were not significantly related, which differs from studies in Syria that reported significant associations with gender, age, and marital status (Mohamad et al., 2021). The variation in demographic effects across studies indicates that the local social context matters. In rural areas like Umbul Niti Village, the role of local leaders, community norms, and social trust can shape acceptance more strongly than individual demographics alone. Trusted information sources also play a crucial role highlighted that government recommendations significantly influence vaccine

acceptance, which is consistent with this study where government channels, health service providers, and social media were the main sources shaping community trust (Wong et al., 2021).

Overall, the acceptance rate in this study was relatively high at 78%, with only 17% uncertain and 5% unwilling. This percentage is higher than that found in Saudi Arabia in 2020 (44.7%) in the UK (64%). This demonstrates that in this population, positive attitudes and beliefs help achieve higher acceptance levels (Magadmi & Kamel, 2021; Sherman et al., 2020). These findings highlight the importance of designing health promotion strategies that not only provide accurate information but also strengthen positive attitudes and beliefs. Programs should focus on clear and trustworthy communication through credible sources and community-based approaches, especially involving local leaders to build trust. From a policy perspective, this evidence underlines the need for comprehensive preparedness plans that go beyond logistical aspects of vaccination. Governments and health authorities must ensure that future vaccination programs are supported by robust risk communication strategies, continuous community engagement, and proactive management of misinformation. Strengthening community trust, improving health literacy, and integrating behavioral and cultural considerations into health promotion will be crucial in responding quickly and effectively to future pandemics or public health emergencies. Policies should also emphasize collaboration between government, health professionals, media, and community leaders to maintain public confidence and reduce vaccine hesitancy (Bjegovic-Mikanovic, 2022; Macnab, 2023; Tan et al., 2022). Limitation: This study did not explore in depth the psychosocial or cultural factors that might underlie hesitancy. Future research could use qualitative methods to capture deeper insights and design more targeted interventions to inform evidence-based policy making.

CONCLUSION

This study shows that attitudes and beliefs significantly influence COVID-19 vaccine acceptance, while knowledge alone does not. Education and health insurance are also related factors. These findings highlight the need for clear information, trust in credible sources, and policies that strengthen positive attitudes and beliefs to prepare for similar health crises in the future.

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REFERENCES

Al-Mohaithef, M., & Padhi, B. K. (2020). Determinants of covid-19 vaccine acceptance in saudi arabia: A web-based national survey. *Journal of Multidisciplinary Healthcare*. https://doi.org/10.2147/JMDH.S276771

Azmawati Mohamed, N., Maizuliana Solehan, H. I., Dzulkhairi Mohd Rani, M., IthninID, M., & Ilina Che Isahak, C. (2021). *Knowledge, acceptance and perception on COVID-19 vaccine among Malaysians: A web-based survey*. https://doi.org/10.1371/journal.pone.0256110

Biasio, L. R., Bonaccorsi, G., Lorini, C., & Pecorelli, S. (2020). Assessing COVID-19 vaccine literacy: a preliminary online survey. *Human Vaccines and Immunotherapeutics*. https://doi.org/10.1080/21645515.2020.1829315

Bjegovic-Mikanovic, V. (2022). Inclusive governance: Enhance health literacy to reduce vaccine hesitancy. *European Journal of Public Health*, *32*(Supplement_3). https://doi.org/10.1093/eurpub/ckac129.738

Delwer Hossain Hawlader, M., Lutfor Rahman, M., Nazir, A., Ara, T., Md Akiful Haque, M., Saha, S., Yesmin Barsha, S., Hossian, M., Farhana Matin, K., Raihana Siddiquea, S., Utba Rashid, M., Abdullah Saeed Khan, M., Ali Hossain, M., Ara Rahman, M., Giri, M., Maher Manna, R., Yeasin Arafat, M., Rezwanul Hasan, S., Maliha, R., … Hayatun Nabi, M. (2021). Belief, Attitude, and Intention to take COVID-19 Vaccine among South Asian Population: A Multi-country Study. *International Journal of Infectious Diseases Belief*. https://doi.org/10.1016/j.ijid.2021.09.056

Fu, C., Wei, Z., Pei, S., Li, S., Sun, X., & Liu, P. (2020). Acceptance and preference for COVID-19 vaccination in health-care workers (HCWs). In *medRxiv*. https://doi.org/10.1101/2020.04.09.20060103

Harapan, H., Anwar, S., Dimiati, H., Hayati, Z., & Mudatsir, M. (2019). Diphtheria outbreak in Indonesia, 2017: An outbreak of an ancient and vaccine-preventable disease in the third millennium. In *Clinical Epidemiology and Global Health*. https://doi.org/10.1016/j.cegh.2018.03.007

Hawlader, M. D. H., Rahman, M. L., Nazir, A., Ara, T., Haque, M. Md. A., Saha, S., Barsha, S. Y., Hossian, M., Matin, K. F., Siddiquea, S. R., Rashid, M. U., Khan, M. A. S., Hossain, M. A., Rahman, M. A., Giri, M., Manna, R. M., Arafat, Md. Y., Hasan, S. M. R., Maliha, R., … Nabi, M. H. (2021). Belief, Attitude, and Intention to take COVID-19 Vaccine among South Asian Population: A Multi-country Study. *International Journal of Infectious Diseases*, *0*(0). https://doi.org/10.1016/J.IJID.2021.09.056

Kabamba Nzaji, M., Kabamba Ngombe, L., Ngoie Mwamba, G., Banza Ndala, D. B., Mbidi Miema, J., Luhata Lungoyo, C., Lora Mwimba, B., Cikomola Mwana Bene, A., & Mukamba Musenga, E. (2020). Acceptability of Vaccination Against COVID-19 Among Healthcare Workers in the Democratic Republic of the Congo . *Pragmatic and Observational Research*. https://doi.org/10.2147/por.s271096

Kemenkes. (2020). *Peraturan Menteri Kesehatan RI Nomor 84 Tahun 2020 Tentang Pelaksanaan Vaksinasi dalam Rangka Penanggulangan Pandemi*. *2019*.

Kemenkes, NITAG, UNICEF, & WHO. (2020). Covid-19 Vaccine Acceptance Survey in Indonesia. *The Comunication Initative Network*, *November*.

https://www.comminit.com/global/content/covid-19-vaccine-acceptance-survey-indonesia

Kompas. (2021). BPOM Sebut Efikasi Vaksin Covid-19 Sinovac 65,3 Persen, Apa Artinya? *Kompas.Com*. https://www.kompas.com/tren/read/2021/01/12/071955565/bpom-sebut-efikasi-vaksin-covid-19-sinovac-653-persen-apa-artinya

Macnab, A. J. (2023). Innovative strategies to promote global health: Lessons from the Covid-19 pandemic. *GHMJ (Global Health Management Journal)*, *6*(1). https://doi.org/10.35898/ghmj-61956

Magadmi, R. M., & Kamel, F. O. (2021). Beliefs and barriers associated with COVID-19 vaccination among the general population in Saudi Arabia. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-11501-5

Mohamad, O., Zamlout, A., AlKhoury, N., Mazloum, A. A., Alsalkini, M., & Shaaban, R. (2021). Factors associated with the intention of Syrian adult population to accept COVID19 vaccination: a cross-sectional study. *BMC Public Health*, *21*(1). https://doi.org/10.1186/S12889-021-11361-Z

Pogue, K., Jensen, J. L., Stancil, C. K., Ferguson, D. G., Hughes, S. J., Mello, E. J., Burgess, R., Berges, B. K., Quaye, A., & Poole, B. D. (2020). Influences on attitudes regarding potential covid-19 vaccination in the united states. *Vaccines*, *8*(4). https://doi.org/10.3390/vaccines8040582

Puri, N., Coomes, E. A., Haghbayan, H., & Gunaratne, K. (2020). Social media and vaccine hesitancy: new updates for the era of COVID-19 and globalized infectious diseases. *Human Vaccines and Immunotherapeutics*. https://doi.org/10.1080/21645515.2020.1780846

Reiter, P. L., Pennell, M. L., & Katz, M. L. (2020). Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? *Vaccine*. https://doi.org/10.1016/j.vaccine.2020.08.043

Sengupta, M., Dutta, S., Roy, A., Chakrabarti, S., & Mukhopadhyay, I. (2022). Knowledge, attitude and practice survey towards COVID-19 vaccination: A mediation analysis. *International Journal of Health Planning and Management*, *37*(4). https://doi.org/10.1002/hpm.3449

Sherman, S. M., Smith, L. E., Sim, J., Amlôt, R., Cutts, M., Dasch, H., Rubin, G. J., & Sevdalis, N. (2020). COVID-19 vaccination intention in the UK: results from the COVID-19 vaccination acceptability study (CoVAccS), a nationally representative cross-sectional survey. *Human Vaccines and Immunotherapeutics*. https://doi.org/10.1080/21645515.2020.1846397

Soyannwo, T., Osinubi, M. O., Abdulsalam, A., Ahmed, A. K., Imhonopi, G. B., Adebisi, O. I., Ajadi, O. R., Mohammed, S. N., Erinoso, M. A., & Alausa, K. O. (2022). A Comparative Study of COVID-19 Vaccine Acceptability and its Determinants among Urban and Rural Community Residents in Ogun State. *Journal of Community Medicine and Primary Health Care*, *34*(2). https://doi.org/10.4314/jcmphc.v34i2.9

Tan, Y. R., Agrawal, A., Matsoso, M. P., Katz, R., Davis, S. L. M., Winkler, A. S., Huber, A., Joshi, A., El-Mohandes, A., Mellado, B., Mubaira, C. A., Canlas, F. C., Asiki, G., Khosa, H., Lazarus, J. V., Choisy, M., Recamonde-Mendoza, M., Keiser, O., Okwen, P., … Yap, P. (2022). A call for citizen science in pandemic preparedness and response: Beyond data collection. In *BMJ Global Health* (Vol. 7, Issue 6). https://doi.org/10.1136/bmjgh-2022-009389

Wong, M. C. S., Wong, E. L. Y., Huang, J., Cheung, A. W. L., Law, K., Chong, M. K. C., Ng, R. W. Y., Lai, C. K. C., Boon, S. S., Lau, J. T. F., Chen, Z., & Chan, P. K. S. (2021). Acceptance of the COVID-19 vaccine based on the health belief model: A population-based survey in Hong Kong. *Vaccine*, *39*(7), 1148–1156. https://doi.org/10.1016/j.vaccine.2020.12.083

Wu, J., Shen, Z., Li, Q., Tarimo, C. S., Wang, M., Gu, J., Wei, W., Zhang, X., Huang, Y., Ma, M., Xu, D., Ojangba, T., & Miao, Y. (2023). How urban versus rural residency relates to COVID-19 vaccine hesitancy: A large-scale national Chinese study. *Social Science & Medicine (1982)*, *320*, 115695. https://doi.org/10.1016/J.SOCSCIMED.2023.115695