

Research Article

An Assessment of the Acceptability of COVID-19 Vaccine in Uganda: An Online-Based Cross-Sectional Study

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Abstract

Background: Globally, health systems are optimistic about Coronavirus (COVID-19) vaccine introduction as one of the solutions for containment and elimination of the COVID-19 virus. However, the success of the vaccination efforts depends on the number of people who get vaccinated to reach herd immunity. Our study assessed the acceptability of the COVID-19 vaccine among Ugandans and the determinants for acceptability when the vaccine is made available.

Methods: Between October 6, 2020, and November 6, 2020, an anonymous web-based cross-sectional survey was conducted among Ugandans who could access an online semi-structured questionnaire designed using Google forms. The Google form was shared on email and social network platforms including Facebook, Twitter, Instagram, and WhatsApp. Participants that completed the survey received information encouraging them to spread the survey link to all their contacts.

Results: Overall acceptability of the COVID-19 vaccine was 396 of 604 (66%). Acceptability of COVID-19 vaccine was associated with having a Doctor of Philosophy (Ph.D.): APR: 2.90; 95% CI [1.33-6.45]. On the other hand, acceptability of COVID-19 vaccine was negatively associated with female sex: APR: 0.75; 95% CI [0.66-0.85], history of Adverse Events Following Immunization: APR: 0.63; 95% CI [0.42-0.96], not believing that COVID-19 is real: APR: 0.63; 95% CI [0.47-0.84] and not believing that COVID-19 has a vaccine; APR: 0.86; 95% CI [0.76-0.98].

Conclusions: Most participants indicated an intention to accept to receive the COVID-19 vaccine. However, addressing social demographic differences and health education is needed to increase the intention to receive the COVID-19 vaccine when available.

Keywords: Acceptability of COVID-19 Vaccine; COVID-19 vaccination; Health Belief Model; COVID-19 in Uganda

Introduction

The World Health Organization (WHO) declared the Corona Virus Disease 2019 (COVID-19) as a Public Health Emergency of International Concern (PHEIC) on 31st of January 2020, and finally a pandemic on 11th March 2020 [1]. As of September 23, 2020, there were 1,175,271 confirmed cases and 25,825 confirmed death due to COVID-19 in Africa [2]. The COVID-19 pandemic has had a huge impact across societies, with governments worldwide imposing restrictions of movement and other measures such as mandatory use of face coverings or quarantine to prevent the spread of the virus.

Most governments have pinned the hope of returning to normality on the availability of a COVID-19 vaccine [3]. As of November

6, Vaccine trials had reported encouraging results indicating that a COVID-19 vaccine is safe and produces a good immune response [4,5]. Despite being recognized as one of the most successful public health measures, vaccination is perceived as unsafe and unnecessary by a growing number of parents. Anti-vaccination movements have been implicated in lowered vaccine acceptance rates and the increase in vaccine-preventable disease outbreaks and epidemics [6]. The vast spread of COVID-19 misinformation could hinder the public acceptance of the COVID-19 vaccine [7].

Low-income countries like Uganda may not be able to afford to purchase vaccines for all its population. The COVAX plan is unlikely to be enough and Africa will have to be proactive in securing vaccines

[8]. However, the success of a vaccination program will depend on the availability of vaccines for the vaccination program and the rates of uptake among the population. It is important to assess the public acceptance of the COVID-19 vaccine, factors for intention to accept or reject the vaccine, and willingness to pay for the vaccine among Ugandans to prepare and develop effective policies and messaging for vaccination now, to maximize uptake when a vaccine becomes available for Ugandans. In this study, we assessed, the acceptability of the COVID-19 vaccine among Ugandans, the determinants, barriers, and facilitators of acceptability of the COVID-19 vaccine.

Methods

Study Participants and Survey Design

Between October 6, 2020, and November 6, 2020, an anonymous web-based cross-sectional survey was conducted in Uganda. The researchers used a semi-structured questionnaire designed using Google forms. This helped generate a link that was shared on email and social network platforms like Facebook, Twitter, Instagram, and WhatsApp. Using online social media networks was appropriate during this period because of the COVID-19 lockdown and movement restrictions in Uganda. The survey targeted potential respondents of up to 1,000 and 641 were reached. Of these, 604 respondents completed all survey questions and provided written informed consent online. Only participants that were Ugandan residents who had internet access and aged above 18 years were included in the study. Participants that completed the survey received information encouraging them to spread the survey link to all their contacts. The questionnaire was pretested to a similar population and similar observations of the pretested population were eliminated from data analysis.

Instruments

A semi-structured and self-reported survey questionnaire was used to solicit data from participants. This contained informed consent, socio-demographic background, trust issues relating to COVID-19, information source, COVID-19 Beliefs, and COVID-19 vaccine acceptability.

Socio-demographic Measures

Information on sex, residence, marital status, religion, job category, education, and employment status were collected.

COVID-19 Beliefs

The Health Belief Model constructs were used to measure the Beliefs and attitudes [9,10]. Each construct of the model was measured using two questions assessed on a five-level Likert scale; Perceived Susceptibility (you have high chances of getting COVID-19 and the nature of your work puts you at a higher risk of getting COVID-19); Perceived Severity (you can get incapacitated if you contracted COVID-19 and you can die if you contracted COVID-19) Perceived Benefit (vaccination with safe COVID-19 vaccine will safeguard you from COVID-19 and Life will get normal if people get vaccinated) Perceived Barriers (getting COVID-19 vaccine may put you in danger and vaccines are safe for human use); and Cues to Action (

discovery of COVID-19 vaccine makes you want to get it and trust of Information from MoH).

Acceptability of COVID-19 Vaccine

The outcome variable of this study was acceptability for the COVID-19 vaccine. It was measured using the question "Will you accept to receive the COVID-19 vaccine if it becomes available for use?" Acceptability of the COVID-19 vaccine was then computed as the proportion of people who self-reported having accepted the vaccine out of the total number of respondents.

Statistical Analysis

Data cleaning and analysis were performed using Microsoft Excel 2013 and STATA SE version 14 respectively. The results were described using measures of central tendency, dispersion, and associations. For continuous variables, like age, mean (and the standard deviation) was presented, for all categorical variables, frequencies, and percentages were presented. The outcome variable of this study was acceptability for the COVID-19 vaccine; which was computed as the proportion of people who self-reported to accept the vaccine if available out of the total number of respondents. Binary modified Poisson regression analysis was performed with a 95% confidence interval to determine significant associations between categorical dependent and independent variables.

Ethical Considerations

The study was conducted in adherence to the Institutional Research Ethics and the newly set guideline that adhere to UNCST COVID-19 Standard Operating Procedures. Personnel Identifiers of the respondents were not collected and there was no invasive procedure done on the participants. Formal ethical approval was granted by the Multidisciplinary Laboratory Technology Society Research, Science and Technology Committee, (Ref MLTS/RSTS/02/20). An online consent form documented the aims, nature, and procedure of the study. Anonymity and confidentiality were strictly maintained. Respondents who didn't consent to participate in the study were not able to access the rest of the questionnaire. While the respondents who consented to participate in the study were able to access the questionnaire and fill it out.

Results

The median (IQR) age of the study participants was 29 (25-33) years; with the majority aged 25-34 years. More so, more than half of the participants were male; 384 (63.6%), not married; 352 (58.3%), employed; 400 (66.2%) and resided in the central region; 348 (57.6%). About half of the participants had attained undergraduate education; 280 (46.4%) (Table 1).

The majority of the participants had ever been vaccinated; 500(82.8%), had no history of Adverse Event Following Immunization (AEFI); 512 (84.8%); and more than half did not have a friend with a history of AEFI; 400 (66.2%). Majority of the participants perceived COVID-19 to be real; 520 (86.1%). About half believed that COVID-19 neither had a vaccine nor treatment; 288 (47.7%) and 288 (47.7%) respectively. More than half reported to observe COVID-19 ministry of health guidelines; 344 (57.3%) (Table 2).

Table 1: Socio-demographic characteristics.

Characteristics	Frequencies (%) n = 604
Age	
Median (IQR): 29 (25-33) years	
20-24 years	138 (22.9)
25-29 years	200 (33.1)
30-34 years	145 (24.0)
35-39 years	58 (9.6)
40-45 years	26 (4.3)
≥ 45 years	37 (6.1)
Sex	
Male	384 (63.6)
Female	220 (36.4)
Marital status	
Married	252 (41.7)
Not married	352 (58.3)
Region of residence	
Central	348 (57.6)
Eastern	68 (11.3)
Northern	52 (8.6)
Western	136 (22.5)
Education level	
Secondary education	20 (3.3)
Diploma education	16 (2.6)
Undergraduate education	280 (46.4)
Postgraduate education	276 (45.7)
Ph.D. Education	12 (2.0)
Religion	
Anglican	220 (36.4)
Catholic	184 (30.5)
Pentecostal/born again	132 (21.9)
Moslems	40 (6.6)
Other religions	28 (4.6)
Employment status	
Employed	400 (66.2)
Not employed	48 (8.0)
Student	156 (25.8)

A higher percentage of participants trusted all the information sources except for social media and friends and families. A majority (83%) trusted information from international health organizations; followed by 79% who trusted information from the health care providers (Figure 1).

Table 2: Knowledge and perceptions about COVID-19 vaccination.

Characteristics	n (%)
Ever been vaccinated	
Yes	500 (82.8)
No	76 (12.6)
Not sure	28 (4.6)
History of AEFI	
Yes	36 (6.0)
No	512 (84.8)
Not sure	56 (9.2)
Known friend with AEFI	
Yes	204 (33.8)
No	400 (66.2)
The perception that COVID-19 is real	
COVID is real	520 (86.1)
COVID is not real	40 (6.6)
Not sure	44 (7.3)
COVID-19 has treatment	
Yes	124 (20.5)
No	288 (47.7)
Not sure	192 (31.8)
COVID-19 has a vaccine	
Yes	120 (19.9)
No	288 (47.7)
Not sure	196 (32.5)
Observing Ministry of health guidelines	
Yes	344 (57.3)
No	8 (1.3)
Sometimes	252 (41.7)

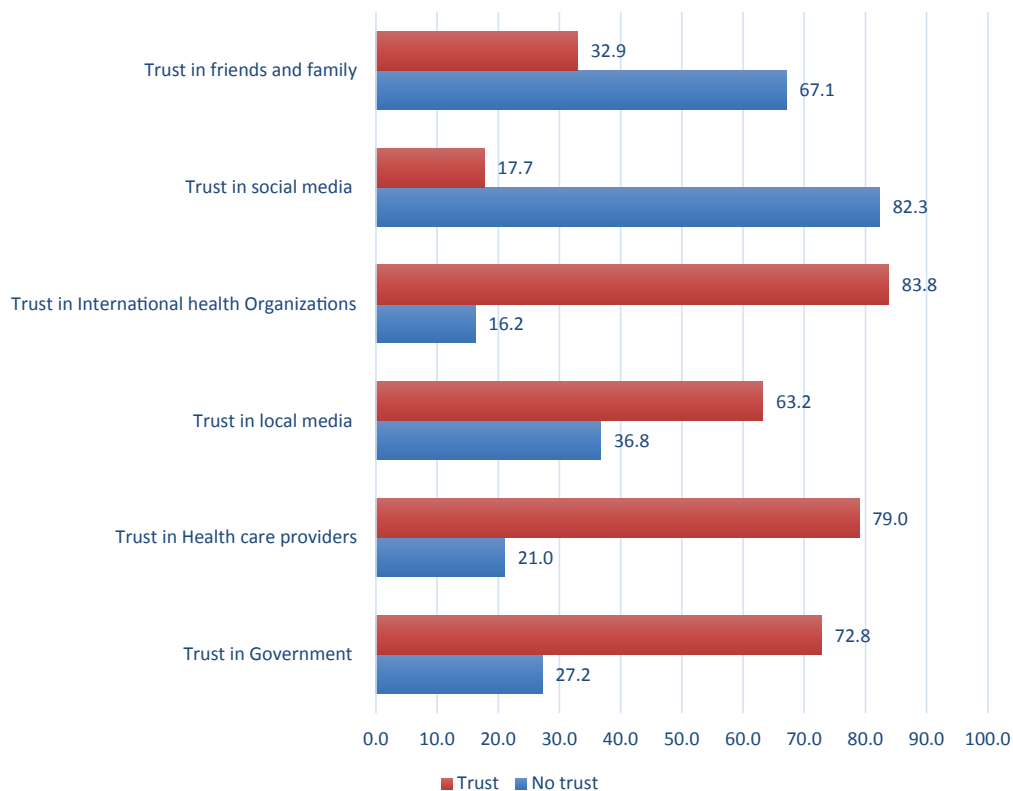


Figure 1: Percentage of participants with trust in COVID-19 information sources.

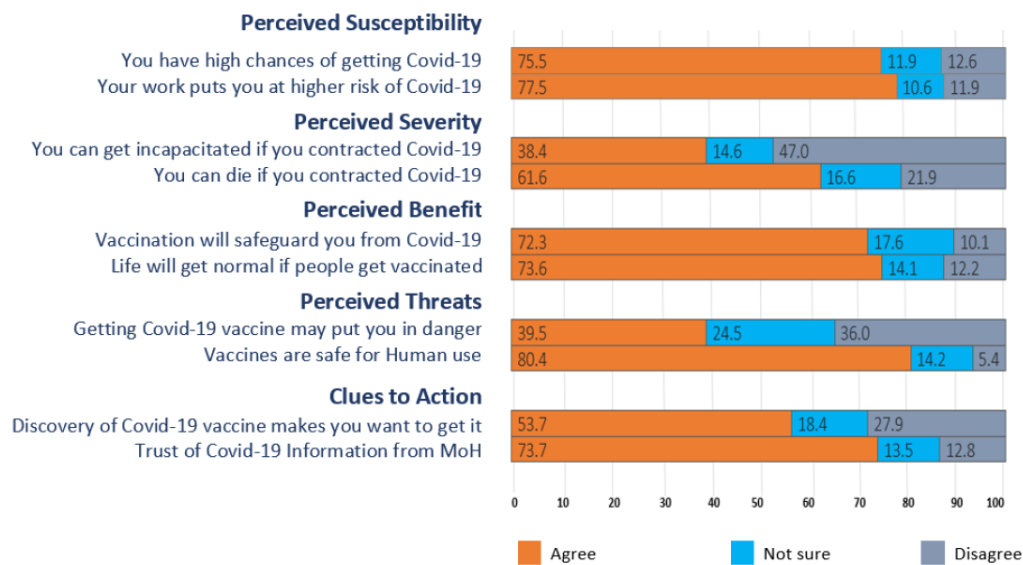


Figure 2: Percentage of Participants' agreement with the Health Belief Model constructs.

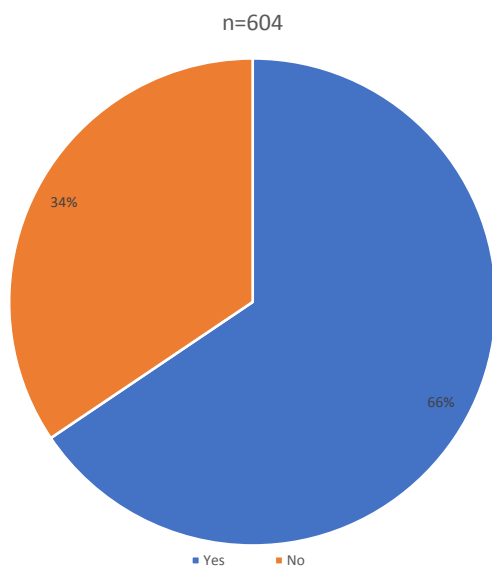


Figure 3: Percentage of Covid-19 Vaccine Acceptability among participants.

A higher percentage of participants perceived they were susceptible to COVID-19 [high chances of getting COVID-19 (75.5%) and work nature puts you at higher risk of getting COVID-19 (77.5%)]. A higher percentage also perceived that the COVID-19 vaccine will benefit them [vaccination will safeguard you from COVID-19 (72.3%) and life will get back to normal if people get vaccinated (73.6%)]. On the perceived threats construct, 39.5% of the participants perceived that the COVID-19 vaccine may be a threat to them while 80.4% perceived vaccines were safe for human use thus not a threat to them (Figure 2).

Out of 604 complete responses, 396 (66%) of the participants indicated an intention to accept to receive the COVID-19 vaccine when it becomes available for use, and 208 (34%) indicated an intention not to accept (Figure 3).

At multivariable analysis, the following factors were significantly associated with acceptability of COVID-19 vaccine: sex, education

level, religion, history of AEFI, perception about COVID-19 and its vaccine, and trust in information from health care providers and the World Health Organization (WHO). There was a positive statistically significant association between acceptability of COVID-19 vaccine and Doctor of Philosophy (Ph.D.) education. Participants who had attained Ph.D. education were 2.9 times as likely to accept the COVID-19 vaccine compared to participants who had attained secondary education. (APR 2.90, 95% CI [1.33-6.45]).

On the other hand, there was a negative statistically significant association between acceptability of COVID-19 vaccine and female sex, Catholic and Pentecostal religions, having a history of AEFI, the perception that COVID-19 is not real and has no vaccine, and lack of trust in health care providers and WHO.

Female participants were 25% less likely to accept the COVID-19 vaccine as compared to male participants, APR: 0.75; 95% CI [0.66-0.85]. Compared to Anglicans, Catholics and Pentecostals were 18% and 16% less likely to accept COVID-19 vaccine, APR: 0.82; 95% CI [0.73-0.92] and APR: 0.84; 95% CI [0.73-0.97] respectively. Participants who had a history of AEFI were 0.63 times as likely to accept the COVID-19 vaccine as individuals who did not have a history of AEFI, APR: 0.63; 95% CI [0.42-0.96]. Participants who didn't believe that COVID-19 is real and those who didn't believe that COVID-19 has a vaccine were 37% and 14% less likely to accept COVID-19 vaccine, APR: 0.63; 95% CI [0.47-0.84] and APR: 0.86; 95% CI [0.76-0.98] respectively. Finally, participants who didn't trust information from health care providers and WHO were 0.75 times and 0.6 times as likely to accept the COVID-19 vaccine as participants who trusted information from health care providers and WHO, APR: 0.75; 95% CI [0.61-0.92] and APR: 0.60; 95% CI [0.45-0.79] respectively (Table 3).

Discussion

The COVID-19 vaccine is considered one of the most outstanding ways to tackle the COVID-19 pandemic. However, the success of the vaccination efforts depends on the number of people who get

Table 3: Bivariate Association for Variables Affecting the Intention to Accept COVID-19 Vaccine.

Background characteristics	Acceptability of vaccine		Crude PR (95% CI)	Adjusted PR (95% CI)
	Yes n=396	No n=208		
Age				
20-24 years	102 (25.8)	36 (17.3)	Ref.	
25-29 years	119 (30.1)	81 (38.9)	0.81 [0.69-0.94]**	
30-34 years	94 (23.7)	51 (24.5)	0.88 [0.75-1.02]	
35-39 years	44 (11.1)	14 (6.7)	1.03 [0.86-1.22]	
40-45 years	16 (4.0)	10 (4.8)	0.83 [0.60-1.15]	
≥ years	21 (5.3)	16 (7.7)	0.77 [0.57-1.03]	
Sex				
Male	286 (72.2)	98 (47.1)	Ref	Ref
Female	110 (27.8)	110 (52.9)	0.67 [0.58-0.78]***	0.75 [0.66-0.85]***
Marital status				
Married	172 (43.4)	80 (38.5)	Ref	
Not married	224 (56.6)	128 (61.5)	0.93 [0.83-1.05]	
Region of residence				
Central	228 (57.6)	122 (57.7)	Ref.	
Eastern	36 (9.1)	32 (15.4)	0.81 [0.64-1.02]	
Northern	44 (11.1)	8 (3.9)	1.29 [1.12-1.48]***	
Western	88 (22.2)	48 (23.1)	0.99 [0.85-1.14]	
Education level				
Secondary	4 (1.0)	16 (7.7)	Ref	Ref
Diploma	16 (4.0)	0 (0)	5.00 [2.08-12.02]***	2.06 [0.94-4.50]
Undergraduate	200 (50.5)	80 (38.4)	3.57 [1.48-8.61]**	1.82 [0.84-3.95]
Postgraduate	164 (41.4)	112 (53.9)	2.97 [1.23-7.18]*	1.43 [0.66-3.10]
PhD	12 (3.0)	0 (0)	5.00 [2.08-12.02]***	2.90 [1.31-6.45]**
Religion				
Anglican	168 (42.4)	52 (25.0)	Ref	Ref
Catholic	112 (28.3)	72 (34.6)	0.80 [0.69-0.91]**	0.82 [0.73-0.92]**
Pentecostal/born again	68 (17.2)	64 (30.8)	0.67 [0.56-0.81]***	0.84 [0.73-0.97]*
Moslems	28 (7.1)	12 (5.8)	0.92 [0.74-1.14]	0.94 [0.71-1.24]
Other religions	20 (5.0)	8 (3.8)	0.94 [0.73-1.20]	0.85 [0.70-1.03]
Employment status				
Employed	260 (65.6)	140 (67.3)	Ref	
Not employed	28 (7.1)	20 (9.6)	0.90 [0.70-1.15]	
Student	108 (27.3)	48 (23.1)	1.07 [0.94-1.21]	
History of AEFI				
No	348 (87.9)	164 (78.9)	Ref	Ref
Yes	12 (3.0)	24 (11.5)	0.49 [0.31-0.78]**	0.63 [0.42-0.96]*
Not sure	36 (9.1)	20 (9.6)	0.95 [0.77-1.16]	0.97 [0.81-1.16]
COVID-19 is real				
Real	372 (93.9)	148 (71.2)	Ref	Ref
Not real	20 (5.1)	20 (9.6)	0.70 [0.51-0.96]*	0.63 [0.47-0.84]**
Not sure	4 (1.0)	40 (19.2)	0.13 [0.05-0.32]	0.22 [0.09-0.55]**
COVID-19 has treatment				
Has treatment	68 (17.2)	56 (26.9)	Ref	
No treatment	196 (49.5)	92 (44.2)	1.24 [1.04-1.48]*	
Not sure	132 (33.3)	60 (28.9)	1.25 [1.04-1.51]*	
COVID-19 has a vaccine				
Has vaccine	84 (21.2)	36 (17.3)	Ref	Ref
No vaccine	188 (47.5)	100 (48.1)	0.93 [0.81-1.08]	0.86 [0.76-0.98]*
Not sure	124 (31.3)	72 (34.6)	0.90 [0.77-1.06]	0.92 [0.80-1.07]
Trust in social media				
Has trust	82 (20.7)	32 (15.4)	Ref	
No trust	314 (79.3)	176 (84.6)	0.89 [0.78-1.02]	
Trust in HCP				
Has trust	350 (88.4)	127 (61.1)	Ref	Ref
No trust	46(11.6)	81 (38.9)	0.49 [0.40-0.63]***	0.75 [0.61-0.92]**
Trust in WHO				
Has trust	366 (92.4)	140 (67.3)	Ref	Ref
No trust	30 (7.6)	68 (32.7)	0.42 [0.31-0.57]***	0.60 [0.45-0.79]***

* <0.05; **<0.01; ***<0.001 level of significance AEFI-Adverse Events Following Immunization HCP-Health care providers, WHO-World Health Organization.

vaccinated to reach herd immunity. Thus, it's crucial to know and understand the acceptability of the vaccine and the factors that included an intention to accept the COVID-19 vaccine. Our study assessed the acceptability of the COVID-19 vaccine and the factors that influenced the intention to accept.

This study found the acceptability of the COVID-19 vaccine to be 65.6%. This is comparable to a survey conducted in 19 countries which found 71.5% of participants reported that they would be very or somewhat likely to take a COVID-19 vaccine [13]; a study in the USA where 69% of the adults indicated an intention to accept the COVID-19 vaccine; [11] a web-based study in Saudi Arabia that revealed 64.7% of participants indicated an intention to uptake the COVID-19 vaccine [12]; and a similar study in western Uganda that found 53.6% intention to accept COVID-19 vaccine. Our findings are one of the first estimates of acceptability of a COVID-19 vaccine in Uganda and can be used together with other similar studies to guide projections of future vaccine uptake and as well understand the reasons for intentions to accept the COVID-19 vaccine.

Participants who had attained Ph.D. education were 2.9 times as likely to accept the COVID-19 vaccine compared to participants who had attained secondary education. This is comparable to a survey conducted in 19 countries which found higher levels of acceptability among participants with higher education [12]. This may be because they have a better understanding and exposure to relevant information regarding the COVID-19 vaccine. During the vaccine roll-out, government and health care providers and community-based social mobilization strategies will need to put more focus to provide more information to people with secondary education and below.

Female participants were 25% less likely to accept the COVID-19 vaccine as compared to male participants. This is similar to the study done in Congo which found more Male health workers were willing to accept COVID-19 Vaccine compared to females health workers [13]. Studies in the USA have indicated similar findings where men were more likely to accept the COVID-19 vaccine than women [11,14]. This could indicate that females may hesitate to receive the COVID-19 vaccine compared to males. Further studies on the general population and key populations may be needed to assess and understand COVID-19 vaccine acceptability [15].

Participants who had a history of AEFI were 0.63 times as likely to accept the COVID-19 vaccine compared to individuals who did not have a history of AEFI. This may be because of fear of suffering from another adverse reaction [16-18].

A higher percentage of participants perceived they were susceptible to COVID-19 and also a high percentage perceived that the COVID-19 vaccine will benefit them. This could explain the 65.6% acceptability of the COVID-19 vaccine [19-21].

Participants who didn't believe that COVID-19 is real and those who didn't believe that COVID-19 has a vaccine were 37% and 14% less likely to accept COVID-19 vaccine. This could be because of their lack of belief that COVID-19 is a serious public health threat to them thus the hesitancy to receive the COVID-19 vaccine.

Our study had some limitations in the design and data collection methods. We used a web-based questionnaire that required internet access and knowledge of how to read. This was because of the movement restrictions and government guidance on social distancing to reduce the spread of the COVID-19 virus. This may have led to selection bias against the individuals who couldn't access the internet and couldn't read the web-based questionnaire as reflected by the majority of the respondents having secondary education and above. However, the inference generated is important in the generation of a picture of the acceptability levels of the COVID-19 vaccine. Evidence from community survey which includes illiterate and non-illiterate class is key to assess sub-group acceptability levels without discriminating in access to web and internet devices.

We asked the participants to report their intention to receive the COVID-19 vaccine if the vaccine became available in the future. This was hypothetical; however, the true intention to take the COVID-19 vaccine may change when the vaccine is made available in Uganda.

We also registered a low response rate of 604 respondents making the findings less generalizable for the entire population in Uganda. Despite the limitations of our findings, our study is among the first studies to be conducted in Uganda and thus will provide a framework from which more studies will be conducted to better understand the acceptability for the COVID-19 vaccine among Ugandans and the determinants for acceptability of COVID-19 vaccine.

Conclusion

Most participants indicated an intention to accept to receive the COVID-19 vaccine. However, Policy Makers; governments; and Health Care Providers need to address Social demographic differences like sex, level of education, and religion, and their influence in intention to receive the COVID-19 vaccine. Other determinants for intention to receive the COVID-19 vaccine-like history of adverse reactions, knowledge on COVID-19 need to be addressed by right and targeted health education before mass vaccination campaign.

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