

COVID-19 vaccination hesitancy and associated factors among the business community in Lira City, Uganda: a cross-sectional research

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SUMMARY

Background: As of November 26, 2021, at least seven different vaccines across three platforms have been distributed globally. These vaccines include Pfizer/BioNTech released on December 31, 2020, AstraZeneca on February 16, 2021, Janssen by Johnson and Johnson on March 12, 2021, Moderna on April 30, 2021, Sinopharm on May 7, 2021, Sinovac CoronaVac on July 1, 2021, and COVAXIN on November 3, 2021. Despite this unprecedented scientific discovery, vaccine hesitancy is seen as a stumbling block towards achieving herd immunity in the battle to control this global pandemic. The effectiveness of vaccines has been based on the principle that the community was willing to take up the vaccine to achieve herd immunity. This study aimed to assess COVID-19 vaccination hesitancy and associated factors among the business community in Lira City, Uganda.

Methods: Descriptive cross-sectional design was conducted among the business community from Lira City in Northern Uganda. The sample size was 421, however, only 407 members of the business community who responded were included in the analysis.

Results: Of the 407 participants, 57.3% were females, 52.5% were married, 88.4% were Langi by Tribe, 43.5% had tertiary education, 33.4% were Anglicans, and 40.1% were market vendors. Results also show that about 32.3% of the respondents had either delayed or refused to take the COVID-19 vaccine. The correlates of vaccination hesitance were education level (aOR; 3.63, 95%CI; 1.49-8.79, p=0.04), having a chronic medical condition (aOR; 2.7, 95%CI; 1.39-5.38, p=0.04) and certainty in the COVID-19 vaccines (aOR; 0.27, 95%CI; 0.017-0.51, p=0.02). Respondents who had primary level education had a more than 2-fold increased odds of acceptance of COVID-19 vaccination compared to those who had not attained any formal education. Individuals who had chronic medical conditions had more than 2-fold increased odds of accepting the COVID-19 vaccine compared to those who did not have any chronic medical conditions. Those who were certain about the COVID-19 vaccine were 73% less likely to hesitate vaccination as compared to their counterparts who were uncertain.

Conclusion: The study found a substantially high level of COVID-19 vaccination hesitancy in Lira City and its predictors were level of education, chronic medical conditions and certainty in COVID-19 vaccines. For this reason, it is important to raise awareness among the business community about the vaccine. To increase uptake, policymakers and other stakeholders need to create effective communication techniques for behavior change.

Keywords: Acceptancy; COVID-19; Hesitancy; Vaccination; Vaccines.

DOI: 10.54103/2282-0930/20754

Accepted: 11th March 2023

BACKGROUND

The 2019 coronavirus disease (COVID-19) caused by the novel Coronavirus (SARS-CoV-2) began in the city of Wuhan in China and spread quickly across the world, generating a global health crisis of massive proportions [1]. The development of a vaccine against the virus is considered a pivotal moment in the efforts to curb disease spread and begin the resumption of normalcy in everyday life. As of November 26, 2021, at least seven different vaccines across three platforms have been distributed globally [2]. These vaccines include Pfizer/BioNTech released on December 31, 2020, AstraZeneca on February 16, 2021, Janssen by Johnson and Johnson on March 12, 2021, Moderna on April 30, 2021, Sinopharm on May 7, 2021, Sinovac CoronaVac on July 1, 2021, and COVAXIN on November 3, 2021 [3]. Despite this unprecedented scientific discovery, vaccine hesitancy is seen as a stumbling block toward achieving herd immunity in the battle to control this global pandemic. The effectiveness of vaccines has been based on the principle that the community is willing to take up the vaccine to achieve herd immunity [4].

While the World Health Organization (WHO) targeted to provide at least 2 billion doses of the vaccine by the end of 2021, [2] there has been general apathy. Only 3% of the vulnerable population in Africa including health workers had been vaccinated by June 2021 [2]. The Pew Research Center reported on December 3rd, 2020 that 39% of Americans would probably, or definitely, not get a vaccine against COVID-19 [5]. In Uganda, the Ministry of Health planned to vaccinate 49.6% of the population by the end of 2021 but only 3.1% of the population has been fully vaccinated by 7th January 2022 [6]. Emerging studies show that attitude towards vaccines, low levels of health literacy, ill-health, lack of trust in the pharmaceutical industries producing the vaccines, gender, education level, age, and lack of knowledge were predictors of COVID-19 vaccination hesitancy [7], [8]. However, these factors are likely to differ from culture to culture and settings. A rapid survey of businesses in Uganda reveals that three-quarters of the surveyed businesses laid off employees due to the risks presented by COVID-19 and subsequent containment measures [9]. The results suggest that COVID-19 measures have reduced business activity by more than half [9]. Thus, it is important to understand the vaccination status of the business community in Uganda as livelihood depends on business continuity.

The COVID-19 pandemic has posed a substantial threat to the business community because it is a high-risk group due to its day-to-day interactions with the wider community [6]. They make cross-border movements and operated in settings with poor enforcement of standard operating procedures (SOPs), which practice threatens the success of the vaccination program. Thus, vaccination acceptance among the business community

can reduce the threat. The delay in acceptance of the vaccine despite the availability of vaccination services is likely to increase transmission. The business community in Uganda in general and Lira City in particular in northern Uganda is not exceptional. Lira City is strategically located and serves as a business hub for the northern districts of Uganda. The district harbors people from all walks of life with various business ventures interacting with minimum adherence to the COVID-19 standard operating procedures (SOPs). A recent report in Western Uganda among the general population indicates that 53.6% were willing to accept vaccination [10]. However, few studies have been conducted among other high-risk groups including the business members in Uganda. Therefore, this study examined the level of COVID-19 vaccination hesitancy and its associated factors in the business community in Lira City.

METHODS

Study design and data collection

The study employed a cross-sectional design among 421 members of the business community from Lira City in northern Uganda. The study was conducted among the two divisions, East and West divisions of Lira city between November and December 2021. Data was collected using a questionnaire to measure the level of COVID-19 vaccination hesitancy and associated factors. Sampling was done and study participants were identified and approached to participate in the study after signing informed consent forms. Data were collected physically by five trained research assistants, and the process took around 20 minutes.

Study participants

A consecutive random sampling technique was employed to select a sample of 421 members of the business community including market vendors, retailers, and mobile money agents operating in Lira City. The sample size of the study was calculated using the Kish Leslie formula [11] for single proportions using a Z score of 1.96 at a 95% confidence interval, the level of COVID-19 vaccination hesitancy ($p=46.4\%$) from a community study in south-western Uganda by [10], and an error margin of 5%, generating a sample size of 421 participants.

Ethical considerations

The present study was done in accordance with the Declaration of Helsinki. The study was also approved by Gulu University Research and Ethics Committee (GUREC-2021-115). Study participants were recruited based on written informed consent, and confidentiality

was maintained throughout the entire research process.

Study variables

Hesitancy to vaccinate was measured as a composite variable based on a six-items tool developed by the Strategic Advisory Group of Experts (SAGE) on a 5-point Likert scale [12]. The tool is based on the 3Cs model of complacency, confidence, and convenience of vaccines which are determinants of vaccination hesitancy [12]. Regarding the score of the tool, an average of the 6 items was obtained which generated a range of 1 to 5. These scores were categorized as hesitant and non-hesitant. An average score of ≤ 3.0 was considered non-hesitant and an average score of ≥ 3.0 was considered hesitant. The first section had demographic and factors associated with vaccine hesitancy. The Cronbach's alpha for the tool was 0.81. The study was conducted between November and December 2021. After approval of the study protocol, the city health authorities were approached and informed about the study.

Statistical analysis

The data were entered into a Microsoft Excel worksheet where pre-analysis cleaning was conducted. The Excel data was exported to STATA (Stata Corp LLC, TX, USA) version 15 software for analysis. Univariable, bivariable, and multivariable

analyses were conducted. In univariable analysis, all variables were described and presented. Descriptive statistics including means, standard deviations, frequencies, and others were used to summarize the data. Univariate logistic regression was used to test the association at bivariable analysis and a p-value of less than 0.2 was considered significant. This was followed by binary logistic regression to identify predictors. This was performed at a 95% confidence interval and variables with a p-value of less than 0.05 were deemed significant.

RESULTS

Socio-demographic characteristics of study participants

Of the 421 respondents, only 407 responded generating a response rate of 96.7%. Therefore, only 407 responses were included in the final analysis. Table 1 shows that 57.3% of the respondents were females, 52.5% were married, 88.4% were Langi by tribe, 43.5% had tertiary education, 33.4% were Anglicans, and 40.1% were market vendors. Results in Table 1 also indicate that COVID-19 vaccination hesitancy was associated with chronic medical conditions ($p=0.002$), living in Lira City west ($p<0.001$), and single status ($p=0.04$).

Table 1: Socio-demographic characteristics of respondents (N=407)

Variable	Frequency (%)	COVID-19 vaccine hesitancy		P value
		Non-Hesitant n (%)	Hesitant n (%)	
Age category				
18-35	289(71.0)	196(71.0)	93(71.0)	Ref
36-65	114(28.0)	77(27.9)	37(28.2)	0.58
65 plus	4(1.0)	3(1.1)	1(0.8)	0.58
Gender				
Male	174(42.8)	118(42.8)	56(42.7)	Ref
Female	233(57.3)	158(57.2)	75(57.3)	0.53
Marital status*				
Separated or divorced	22(5.4)	15(5.5)	6(4.6)	Ref
Married	213(52.5)	144(52.6)	69(52.7)	0.18
Widowed	14(3.5)	9(3.3)	5(3.8)	0.67
Single	157(38.7)	106(38.7)	51(38.9)	0.04
Residence*				
City East	140(35.2)	95(35.2)	45(35.2)	Ref
City West	258(64.8)	175(64.8)	83(64.8)	<0.001
Level of education				
No education	47(11.6)	31(11.2)	16(12.2)	Ref
Primary	107(26.3)	73(26.4)	34(26.0)	0.007
Secondary	177(43.5)	120(43.5)	57(43.5)	0.92
Tertiary	76(18.7)	52(18.8)	24(18.3)	0.61
Have medical condition*				
No	343(84.5)	233(84.4)	110(84.6)	Ref
Yes	63(15.5)	43(15.6)	20(15.4)	0.002
Had COVID-19*				
No	356(87.9)	241(88.0)	115(87.8)	Ref
Yes	49(12.1)	33(12.0)	16(12.2)	<0.001

*has missing values; Ref=reference category

COVID-19 Vaccination Hesitancy

Table 2 shows that out of the 407 respondents, only 131 (32.2%) were hesitant against COVID-19 vaccination, 267(67.8%) were non-hesitant.

Table 2: COVID-19 Vaccination Hesitancy

COVID-19 Vaccination Hesitance	Frequency (n)	Percentage (%)
Hesitant	131	32.2
Non Hesitant	276	67.8
Total	407	100

Attitudes of respondents towards COVID-19 vaccination hesitancy

A bivariate analysis of attitudes about COVID-19 vaccination hesitancy was conducted. The COVID-19 vaccine is the best way to protect against COVID-19 (p<0.001) (Table 3).

Table 3: Attitudes of respondents towards COVID-19 vaccination hesitancy (n=407)

Variable	COVID-19 vaccine hesitancy		P value
	Non-Hesitant n (%)	Hesitant n (%)	
Vaccine is safe			
No	99(71.4)	39(28.6)	Ref
Yes	177(66.0)	92(34.0)	0.35
Vaccine is essential			
No	87(75.3)	29(24.7)	Ref
Yes	189(65.1)	102(34.9)	0.09
The best way to protection			
No	157(80.4)	38(19.6)	Ref
Yes	122(57.3)	90(42.7)	<0.001
Awareness required			
No	13(64.3)	7(35.7)	Ref
Yes	264(68.2)	123(31.8)	0.76
COVID-19 causes serious complications			
Yes	35(67.6)	17(32.4)	Ref
No	241(67.9)	114(32.1)	0.97
COVID-19 is human-made			
No	129(68.5)	60(31.5)	Ref
Yes	156(71.4)	62(28.6)	0.59
Recommend vaccine			
No	52(60.3)	35(39.7)	Ref
Yes	222(69.4)	98(30.6)	0.19
Vaccine reduces transmission			
No	113(77.8)	32(22.1)	Ref
Yes	163(62.0)	99(38)	0.006
Vaccine was rushed			
No	155(66.0)	80(34.0)	Ref
Yes	123(71.5)	49(28.5)	0.31

Beliefs of respondents towards COVID-19 vaccination hesitancy

A bivariate analysis of beliefs about COVID-19 vaccination hesitancy was conducted. The vaccine reduces the risk of transmission ($p=0.006$), confidence in vaccine safety ($p=0.05$), and protection from hospitalization due to COVID-19 ($p=0.01$) were associated with COVID-19 vaccination hesitancy (Table 4).

Table 4: Beliefs of respondents towards COVID-19 vaccination hesitancy (n=407)

Variable	COVID-19 vaccination hesitancy		P value
	Non-Hesitant n (%)	Hesitant n (%)	
The vaccine protects from severe disease			
No	198(74.4)	98(25.6)	Ref
Yes	169(65.3)	89(34.7)	0.13
Vaccine prevents transmission			
No	93(71.0)	38(29.0)	Ref
Yes	184(66.5)	92(33.5)	0.45

Confidence in vaccine safety			
No	104(75.5)	34(24.6)	Ref
Yes	173(64.4)	96(35.6)	0.05
The vaccine can protect from COVID-19			
No	181(76.2)	57(23.8)	Ref
Yes	212(61.9)	130(38.1)	0.01
Vaccine protects hospitalization			
No	118(66.8)	56(33.2)	Ref
Yes	159(68.2)	74(31.8)	0.92
COVID-19 manufactured			
No	172(66.5)	86(33.5)	Ref
Yes	110(73.5)	39(26.5)	0.22
The vaccine helps those who already suffered from COVID-19			
No	172(68.2)	76(31.8)	Ref
Yes	106(68.5)	49(31.5)	0.95
Vaccine cause infertility			
No	237(71.4)	95(28.6)	Ref
Yes	44(59.1)	31(40.8)	0.09

Multivariate logistic regression analysis

In the multivariate analysis (Table 4), only factors that were significant at bivariate level with $p \leq 0.2$ were considered. The final model reported primary level of education (AOR; 3.63; 1.49-8.79; $p=0.09$), having a chronic medical condition (AOR; 2.12; 1.016-4.44; $p=0.04$), and certainty in COVID-19 vaccine (AOR; 0.27; 0.017-0.51; $p=0.02$) as correlates of COVID-19 vaccination hesitancy.

Table 4: Correlates of COVID-19 vaccination hesitancy in the business community

COVID-19 vaccination hesitancy	AOR [95% confidence interval]	P value
Education level		
No education	Ref	
Primary level	3.63[1.49-8.79]	0.04*
Secondary level	0.90[0.54-3.00]	0.84
Tertiary level	1.38[0.44-4.34]	0.58
Have a chronic medical condition		
No	Ref	
Yes	2.70[1.39-5.38]	0.04*
Certainty in COVID-19 vaccine		
No	Ref	
Yes	0.27[0.017-0.51]	0.02*

*=Statistically significant attribute, Ref=reference category, AOR=adjusted odds ratio

DISCUSSION

We assessed factors associated with COVID-19 vaccination hesitancy among the business community in Lira City. About 32.3% had either delayed or refused to take the COVID-19 vaccine. Admittedly, the vaccine is the only effective intervention that prevents the death of people [13]. Our results indicate that a substantial number were hesitant. This may be attributed to the negative attitude towards the vaccine exhibited in the current study (Table 3), a point of view supported by other studies [14]. In addition, vaccine hesitancy is influenced by several factors including lack of confidence in the vaccine itself, lack of or misinformation about the vaccine, and a fear of side effects [15]. These findings are favorably comparable to the 30.7% hesitancy level observed among medical students in Uganda [16]. The differences in results may be attributed to the differences in attitude, sample size, settings, population, and time-lapse. These results imply more community education is needed and increase the uptake of the vaccine to achieve the herd immunity threshold of 80.3% [17].

Our results indicated that those with primary level education had a more than 3-fold increased odds of being hesitant to receive the COVID-19 vaccination compared to those who had not attained any formal education. Although this may be a surprising finding, other studies with a similar focus support it [18]. This result implies that those with primary education are a group who may be difficult to convince to get vaccinated, necessitating further vaccination efforts. The study's findings are exactly in contrast with US and German studies that found that low education level was a predictor of COVID-19 vaccination hesitancy [19], [20]. Similarly, a study in Southeast Asian countries indicated that a low level of education contributed to vaccination hesitancy [21].

Results in our study also show that individuals who had chronic medical conditions had a more than 2-fold increased odds of hesitating the COVID-19 vaccine compared to those who did not have any chronic medical conditions. Skepticism is more frequent among individuals with chronic diseases [22]. There is an assumption that vaccination, higher rates of side effects, and the interaction of vaccine and medication may worsen the condition [23]. Similar to our results, one study in Pakistan shows that chronic diseases are predictors of COVID-19 vaccination hesitancy [24].

Additionally, according to the results of our study, those who were certain about COVID-19 vaccines were 73% less likely to vaccinate as compared to their counterparts who were uncertain. Certainty in vaccines is key in decision-making and may be a great determinant in COVID-19 vaccine uptake [13], [25]. Uncertainty about the vaccine is likely to culminate in the non-acceptance of the COVID-19 vaccine. Studies have shown that attitude determine COVID-19 vaccine uptake [13], [25].

LIMITATIONS

The study has some limitations. The sample size is large but may not be adequate to generalize the study findings. The study also is limited by geography as it was only conducted in Lira City, therefore, a cross-national study is highly recommended. Lastly, the study was also cross-sectional so we cannot conclude causality.

CONCLUSION

The study reports a substantially high level of COVID-19 vaccination hesitancy in Lira City and its predictors were level of education, chronic medical condition, and certainty in COVID-19 vaccines. Therefore, there is a need to sensitize the business community about the vaccine to increase uptake. Policymakers and other stakeholders also need to develop effective behavior change communication strategies to improve uptake.

ACKNOWLEDGMENTS

The authors wish to acknowledge the participants in this study.

FUNDING

There is no funding source for this publication.

AUTHORS' CONTRIBUTIONS

EK, SSP, EA, and AK conceptualized and planned the study. EK and BO wrote the methodology and performed the statistical analysis. MM, RT and EA prepared questionnaires and conducted the survey. RT and ARA edited the manuscript for important intellectual content. AK drafted the manuscript for publication. All authors contributed to the article and gave final approval for publication.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

The study was also approved by Gulu University Research and Ethics Committee (GUREC-2021-115). Study participants were recruited based on written informed consent, and confidentiality was maintained throughout the entire research process. Study

participants were identified and approached to participate in the study after signing informed consent forms.

COMPETING INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article.

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