A descriptive-multivariate analysis of community knowledge, confidence, and trust in COVID-19 clinical trials amongst Ugandans working in healthcare settings

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ABSTRACT

Background: Misinformation often undermines community vaccine uptake, yet information in rural communities, especially of developing countries, is scarce. This study was to identify major challenges associated with COVID-19 vaccine clinical trials amongst Ugandans employed in healthcare settings. **Methods:** A rapid exploratory survey with 27 questions was conducted over 5 weeks at multiple health care centers across the country using an online platform. Questions assessed knowledge, confidence, and trust scores on COVID-19 vaccine clinical trials (KCTCOVacTrials), and the social demographics in the community. **Results:** A low level on the KCTCOVacTrials was reported amongst healthcare workers in Uganda, thus highlighting challenges for the upcoming Oxford-AstraZeneca clinical trials. Inadequate human resource to handle COVID-19 cases in rural healthcare centers continue to contribute to the mistrust and confidence on COVID-19 clinical trials. In the healthcare centers, a majority of participants were males (171/260, 65.8%, 95% CI: 59.8-71.4), demonstrating disproportionate gender inequalities since most women work in inferior positions which would have made it hard for them to participate in this study. KCTCOVacTrials were higher amongst the least educated (certificate holders) than bachelor degree holders. Skepticism against DNA recombinant vaccines (DRV) implies genetically modified vaccines such as the Oxford-AstraZeneca vaccine, Pfizer/BioNTech are bound to face a level of resistance once adapted in Uganda. This was important since there was a high preference for herbal vaccines, currently being promoted by the government, despite a lack of infrastructure to successful develop a vaccine by any resource poor country in Africa. Furthermore, high fear and distrust against COVID-19 vaccine clinical trials was common in the rich and most affluent regions of Uganda. **CONCLUSION:** Knowledge, confidence, and trust in COVID-19 vaccines are all low among healthcare workers in Uganda. These findings signal a need to increase these factors before new trials of COVID-19 vaccines are initiated.

KEYWORDS: COVID-19 clinical trials in resource poor countries; COVID-19 vaccines; Clinical trials in Africa; COVID-19 and medical workers; vaccines, Oxford-AstraZeneca.

INTRODUCTION

Africa offers many potential advantages for clinical trial conduct including genetic diversity as well as large pools of potential participants who are naïve to drug or vaccine products [1]. However, from 1991 to 2018, Africa contributed only 2.5% to the global total of clinical trials [1]. Fear and suspicion are important barriers to trial participation as is drug and vaccine

acceptance [2]. In order to build trust and acceptance, African countries should be included in trials of vaccines that are intended to be used in their communities [3].

Several factors contribute to skepticism regarding clinical trials and the products they test. Regulations and ethical guidelines to protect patients, while present in Egypt, South Africa, Uganda, and Ghana, are inadequate in many other countries, which contribute to insufficient research and development culture compared to Europe or North America [1]. Additional factors causing fear and mistrust include a history of inadequate commitment and/or skill on the part of researchers and their staff, shortages of medical personnel, failure of researchers to understand the local culture, poor infrastructure, an absence of national regulatory requirements, and ineffective ethical counseling and informed consent processes [1, 2]. Inadequate human and/or financial resources contribute to the inability to build awareness regarding individual trials [1]. None of these problems are ameliorated by the reluctance to travel to unfamiliar institutions and providers for trials [4].

Misunderstanding also contributes to widespread myths and fears associated with infectious disease clinical trials. Fear of contracting infectious agents such as the Ebola virus from vaccines can be compounded by psychological trauma following receipt of vaccines [2, 3, 5]. The media, advocacy groups, medical journals, and public information services can each shape how the population receives, analyses, and uses medical and health information. These groups, and social media, have contributed, sometimes inadvertently, to the dissemination of myths and misunderstanding of local communities without addressing emotional, psychosocial and ethical aspects of trials [2].

African research teams need both financial and human resources, as well as data collection tools to establish a more constructive research culture and infrastructure [1]. High-quality clinical trials require collaboration with various stakeholders and awareness of the physical, emotional, psychosocial, and ethical needs of potential trial participants and their communities [2]. Many African countries would benefit from improving their capacity to host clinical trials and investing in research collaborations. A set of common ethical guidelines for the continent as a whole would improve both trust and research quality [1]. For example, the Ugandan government has funded the Ministry of Health and Busitema University to pursue bee venom proteins and herbal organics to manage COVID-19 [6, 7], demonstrating interest by African countries to identify a magic bullet by using natural products. The objective of the current study was to identify major challenges associated with prospective COVID-19 clinical trials amongst healthcare workers in Uganda, a group identified as crucial for COVID-19 community

management [8]. It was important to assess their knowledge, confidence and trust level on COVID-19 vaccine trials in preparation for the Oxford University-AstraZeneca COVID-19 vaccine programs for March 2021 in Uganda.

2.0 METHODS

2.1 Study Design

A descriptive cross-sectional study was conducted amongst workers in health facilities in Uganda from September 5th to October 7th 2020. During this period, COVID-19 national lockdown restrictions were just being lifted, and media reports emphasized the potential of a COVID-19 vaccine. Data were collected using an online questionnaire to minimize printing and contact, consistent with COVID-19 cautions [9, 10].

2.2 Study Population

Individuals working in a health facility (clinicians, nurses, pharmacists, laboratory personnel, supports staff, and other workers) were targeted by using local telephone communication to connect to the healthcare workers. Those who consented to participate in the study were included. "Other" or "non-health" workers were defined as persons working at the health facility involved in non-administrative activities at the time of the survey. Persons who declined to consent and those not working in a medical facility were excluded.

2.3 Data collection and measures

A semi-structured questionnaire was developed after a thorough literature search to identify key areas of concern for community confidence in COVID-19 prevention measures. The questionnaire had three sections addressing: sociodemographic characteristics (age, gender, marital status, educational level, occupation, and location of health facility); knowledge about investigational COVID-19 vaccines and vaccine trials; degree of fear and suspicion about COVID-19 vaccine clinical trials; confidence on potential COVID-19 vaccine clinical trials, the local medical community, and government measures. The questionnaire was reviewed and validated by 5 different experts in local and international universities with expertise on the topic, then uploaded using a google form (via docs.google.com/forms) for pretesting before data collection was conducted.

2.4 Establishment of knowledge, confidence and trust scores

The knowledge score was acquired by calculating scoring questions 7-10, 17 and 22 in which right scores scored 1 and wrong responses scored 0. These were then expressed as an average count and converted to percentage and used for analysis. Knowledge questions were on SARS-

CoV-2 virology, vaccine development, role of vaccines and research in clinical trials on COVID-19, fear on COVID-19 clinical trials, history of participation in COVID-19 clinical trials (since the government of Uganda is conducting preliminary studies currently), and having received communication on COVID-19 clinical vaccine clinical trials (Supplement file). Our hypothesis was that healthcare works have a good knowledge on these basic clinical notes since they have been identified as essential staff and will be vaccinated first ahead of the general population.

The confidence score was acquired by summing the Likert scores on questions 16, 18-21 and 23, 25, 26 for which 0=very low, 1 = low, 2=not sure, 3=moderate, 4 = high, 5 = very high. The average score was then expressed as a proportion and used for analysis. Questions asked ranged from ranking government commitment to develop a COVID-19 vaccine, ability of Ugandans to handle COVID-19 vaccine clinical trials, commitment of workmates to observe COVID-19 vaccine clinical trials and assess capacity of human resource at the health center to handle COVID-19 vaccine clinical trials.

The trust score was acquired by calculating the average score on questions 11-13, 15, and 24 in which these scored i.e., 0 = very low, 1 = low, 2 = not sure, 3=moderate, 4 = high, 5 = very high. These ranged on level of fear on COVID-19 vaccine clinical trials, level of suspicion, willingness to participate in COVID-19 clinical trials, willingness to participate on a rushed COVID-19 vaccine clinical trial.

2.5 Statistical analysis

Data was exported into STATGRAPHICS centurion CVI version 16.1.11 (StatPoint Tech., Inc.) and descriptive statistics were conducted. Relationship models for knowledge, confidence, and trust using factorial analysis [FA] (standardized principal component [PC]) were conducted followed by multivariable correlation analysis to access the strength of the relationships. The observed trends in the FA were investigated using General linear Model (GLM) to determine the significant influential variables. All analyses were performed at 95% confidence level and p-values less than 0.05 were taken to be significant after correcting for multiplicity.

3.0 RESULTS

3.1 Population study variables.

A majority of study participants fell into the middle age category, were men, and had received a college education as shown in Table 1.

Table 1. Statistic on sociodemographic variables in the study population.

Parameter	Variable	Frequency (n =260)	Percent	95% CI
Age (years)	>45	23	8.8	5.8-12.8
	25-45	166	63.8	57.9-69.5
	<25	71	27.3	22.2-33.0
Gender	Female	89	34.2	28.7-40.2
	Male	171	65.8	59.8-71.4
Marital status	Married	118	45.4	39.4-51.5
	Single	142	54.6	48.5-60.6
Education level	Bachelors	107	41.2	35.3-47.2
	Certificate	26	10.0	6.8-14.1
	Diploma	47	18.1	19.8-23.1
	None	8	3.1	1.3-6.0
	Postgraduate	72	27.7	22.5-33.4
Occupation	Clinician	34	13.1	9.4-17.8
	Laboratory personnel	80	30.8	25.4-36.6
	Nurse	29	11.2	7.7-15.4
	Pharmacist	23	8.8	5.8-12.8
	Support staff	94	36.2	30.5-42.1
Location	Central	101	38.8	33.1-44.9
	Eastern	72	27.7	22.5-33.4
	Northern	25	9.6	6.5-13.7
	Western	62	23.8	19.0-29.3
Age (years)	Minimum	18		
	Maximum	65		
	Mean ± SEM	31.8±0.5		

3.2 Relationship between knowledge, confidence, and trust

Eigen analysis of the factor matrix for Factorial Analysis (FA) produced considerable variations at F2 explaining 84.4% of the cumulative variance in the component, but, with an eigenvalue ≥ 1.0. Thus, leaving F1 (Eigen value = 1.68) with a cumulative variance of 56.06% as the model component that met the criteria (Table 2).

Table 2: Descriptive characteristics and factor loading matrix of variables in FA

Variables	Average ±SD	Factor1$^{\alpha,\beta}$	Factor 2$^{\alpha,\beta}$	Estimated Communality	Specific Variance
Knowledge	42.18±16.14	0.557437	-0.82786	0.636	0.364
Confidence	2.52±0.81	0.814915	0.341258	0.674	0.326
Trust	2.29±0.97	0.840756	0.218117	0.547	0.453

Note: *F1 [Eigen value, 1.68169; cumulative %, 56.056], F2[Eigen value, 0.849384; cumulative %, 84.369]*

All three variables; knowledge (55.7%), confidence (81.5%), and trust (84.1%) were responsible for the variability in factor (component) 1 on a positive multidirectional scale (Table 1), with a closer relationship between confidence and trust (r=0.527; p<0.001) than knowledge and confidence (r=0.201; p=0.001) or trust (r=0.257; p<0.001) (Fig. 1).

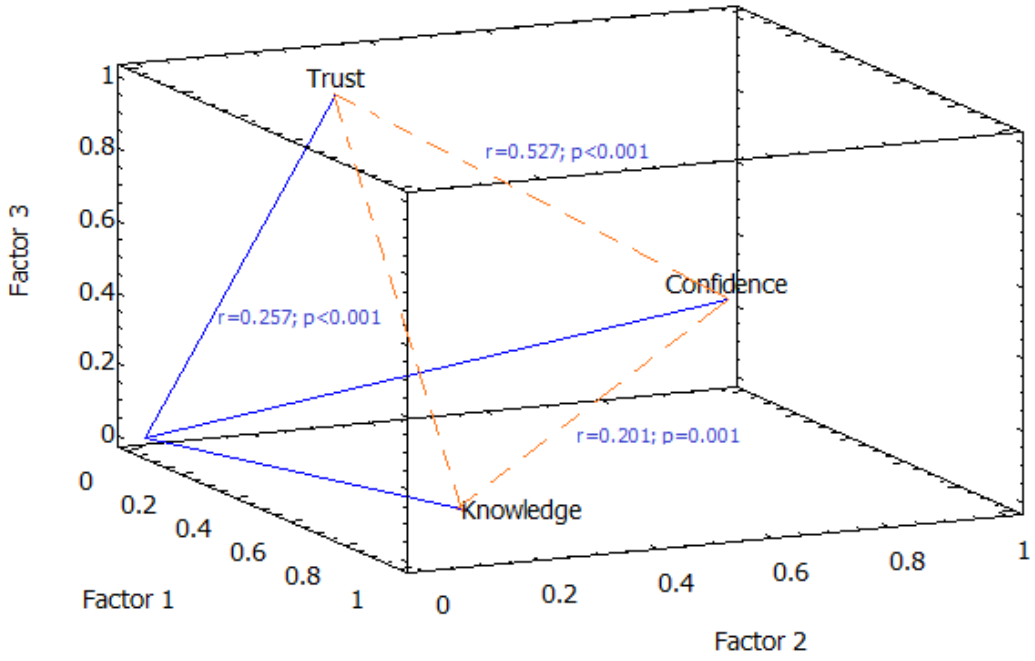

Figure 1. Factor loading components and correlation of variables

3.3 Influence of sociodemographic characteristics on the knowledge score, confidence, and trust for COVID-19 vaccine clinical trials amongst the healthcare workers

Knowledge, confidence, and trust scores (KCTs) were generally low for all groups. In some groups, for some scores, significant differences in knowledge, trust, and confidence were identified. Of interest, trust scores decreased with increasing education (P = 0.000), and confidence and trust were higher in professions that required less education (Table 3). Confidence and trust levels varied by region, with the highest scores in the east. Participants who preferred the herbal vaccine expressed a relatively higher knowledge on COVID-19 vaccine clinical trials as compared to those who are in favor of a live attenuated vaccine. Trust was also found to be highest in herbal vaccines than all the other vaccine types presented in this study (P = 0.018).

Table 3. Sociodemographic variables associations with knowledge, confidence and trust on COVID-19 vaccine clinical trials in Uganda

Parameter	Variable	N	Percentage knowledge score			Confidence score			Trust score		
			Mean ±SEM	ANOVA F (P) value	Median (Min-Max)	Mean ±SEM	ANOVA F(P) value	Median (Min-Max)	Mean ±SEM	ANOVA F(P) value	Median (Min-Max)
Age	>45	23	44.2±3.4	0.603	50(16.7-66.7)	2.5±0.2	0.2	2.4(0.9-4.3)	2.4±0.2	1.4	2.6(0.4-3.8)
	25-45	166	41.4±1.2	(0.548)	33.3(0.0-83.3)	2.5±0.1	(0.814)	2.5(0.3-4.6)	2.2±0.1	(0.246)	2.0(0.0-5.0)
	<25	71	43.4±2.1		33.3(0.0-83.3)	2.6±0.1		2.7(0.8-4.4)	2.4±0.1		2.2(0.4-4.8)
Gender	Female	89	39.3±1.5	4.3	33.3(0.0-66.7)	2.6±0.1	2.1(0.147)	2.5(0.9-4.6)	2.3±0.1	0.1(0.747)	2.2(0.4-5.0)
	Male	171	43.7±1.3	(**0.039**)	50.0(0.0-83.3)	2.5±0.1		2.5(0.3-4.4)	2.3±0.1		2.0(0.0-4.8)
Marital status	Married	118	42.7±1.5	0.2(0.666)	33.3(16.7-83.3)	2.6±0.1	0.7(0.413)	2.5(0.3-4.4)	2.4±0.1	4.1(**0.045**)	2.4(0.4-5.0)
	Single	142	41.8±1.4		33.3(0.0-83.3)	2.5±0.1		2.5(0.8-4.6)	2.2±0.1		2.0(0.0-4.8)
Education level	Bachelors	107	41.0±1.4	2.3(0.63)	33.3(0.0-83.3)	2.5±0.1	1.4	2.5(0.6-4.1)	2.2±0.1	6.6	2.0(0.4-4.2)
	Certificate	26	46.2±3.2		50.0(16.7-66.7)	2.8±0.2		2.8(1.0-4.6)	2.9±0.3		3.0(0.4-5.0)
	Diploma	47	46.1±2.6		50.0(16.7-83.3)	2.5±0.1	(0.239)	2.5(1.0-4.4)	2.4±0.1	(**0.000**)	2.0(0.6-4.8)
	None	8	31.3±6.6		33.3(0.0-50)	3.1±0.4		3.1(1.6-3.9)	3.1±0.4		3.0(2.0-4.8)
	Postgraduate	72	41.2±1.9		33.3(16.7-83.3)	2.5±0.1		2.5(0.3-4.6)	2.0±0.1		2.0(0.0-3.4)
Occupation	Clinician	34	39.7±2.4	0.4	33.3(16.7-83.3)	2.1±0.1	3.5	2.2(0.3-3.6)	2.1±0.1	6.6	2.0(0.6-3.6)
	Laboratory personnel	80	42.5±1.8	(0.825)	50.0(0.0-83.3)	2.5±0.1	(**0.009**)	2.5(0.8-4.3)	1.9±0.1	(**0.000**)	2.0(0.0-4.4)
	Nurse	29	42.5±3.3		50.0(16.7-83.3)	2.5±0.1		2.5(1.0-4.1)	2.5±0.1		2.5(1.2-5.0)
	Pharmacist	23	44.9±3.2		50.0(16.7-83.3)	2.4±0.2		2.3(0.9-4.6)	2.2±0.2		2.0(1.0-4.0)
	Support staff	94	42.0±1.8		33.3(0.0-83.3	2.7±0.1		2.7(0.6-4.6)	2.6±0.1		2.4(0.4-4.8)
	Central	101	42.4±1.5	1.8	50(16.7-83.3)	2.5±0.1	6.4	2.5(0.9-4.6)	2.1±0.1	10.8	2.0(0.4-4.4)

Location	Eastern	72	44.9±1.9	(0.144)	50(0.0-83.3)	2.8±0.1	(**0.000**)	2.9(0.8-4.4)	2.8±0.1	(**0.000**)	2.8(0.6-5.0)
	Northern	25	36.7±3.2		33.3(16.7-83.3)	2.2±0.2		2.1(0.9-3.4)	2.4±0.2		2.2(1.2-3.8)
	Western	62	40.9±2.3		33.3(0.0-83.3)	2.3±0.1		2.4(0.3-4.1)	2.0±0.1		2.0(0.0-3.8)
Preferred	DRV	41	42.3±2.9	1.2	33.3(16.7-83.3)	2.5±0.1	1.0	2.5(0.6-4.1)	2.2±0.1	3.1	2.0(0.8-4.0)
COVID-19	HV	38	46.9±2.8		50(16.6-83.3)	2.7±0.1		2.6(1.3-4.3)	2.5±0.2		2.6(0.8-4.6)
vaccine	IV	89	41.0±1.5	(0.319)	33.3(0.0-83.3)	2.5±0.1	(0.412)	2.5(0.8-4.6)	2.1±0.1	(**0.018**)	2.0(0.0-4.2)
	LAV	35	39.5±2.5		33.3(16.7-83.3)	2.5±0.1		2.6(0.9-4.3)	2.3±0.2		2.2(0.4-4.4)
	None	57	42.2±1.0		33.3(0.0-83.3)	2.4±0.1		2.4(0.3-4.6)	2.6±0.2		2.4(0.6-5.0)

223 KEY: DRV= DNA Recombinant vaccines, HV = Herbal vaccines, IV = Inactivated vaccines, LAV = Live attenuated vaccines. N = number of
224 participants, SEM = Standard error mean, Min-Max = Minimum-Maximum values.

3.4 Multivariate analysis on COVID-19 clinical trials amongst Ugandans (Eric)

From the GLM analysis in Table 4, the sociodemographic factors significantly explained the changes in the confidence (F=2.74, p=0.001) and trust (F=5.30, p<0.001), but not knowledge (F=1.47, p=0.117), with a variability accuracy of 2.65% for knowledge, 9.17% for confidence and 19.92% for trust.

Table 4. Variable influence of the knowledge score, confidence, and trust

Source	SS	Df	MS	F-Ratio	P-Value	R-sq	R-sq (adj)
Knowledge							
Model	5589.81	15	372.654	1.47		8.29	2.65
Residual	61845.2	244	253.464		0.117		
Total (Corr.)	67435	259					
Confidence							
Model	24.8141	15	1.654	2.74		14.43	9.17
Residual	147.151	244	0.603		**0.001**		
Total (Corr.)	171.965	259					
Trust							
Model	59.5571	15	3.970	5.30		24.56	19.92
Residual	182.937	244	0.750		**<0.001**		
Total (Corr.)	242.494	259					

Note: *Corr., Corrected; SS, Sum of Squares; MS, Mean Square; DF, Degree of freedom; R-sq., Correlation squared (accuracy); adj., adjusted.*

Regression analysis (Table 5) showed that only sex was the significant influence variable (F=8.49, p=0.0039) for knowledge, while occupation (F=3.02, p=0.019) and region (F=6.05, p=0.001) were the significant influence variables for confidence. All sociodemographic variables except age group and sex (p>0.05) were significant contributors to the variation in trust (marital status: F=5.49, p=0.02; education; F=3.42; p=0.01; occupation: F=3.79; p=0.005; region: F=6.58; p<0.001).

Table 5. Regression model outcome summary and significance of predictor variables

Source	SS	Df	MS	**F-Ratio**	**P-Value**	**Variance**
Knowledge						
Age group	313.274	2	156.637	0.62	0.5399	-2.105
Sex	2152.75	1	2152.750	8.49	**0.0039**	21.888
Marital Status	68.2873	1	68.287	0.27	0.6042	-2.205
Education	1336.58	4	334.144	1.32	0.2637	1.948
Occupation	626.993	4	156.748	0.62	0.6498	-2.392
Region	1054.89	3	351.630	1.39	0.2472	1.857
Residual	61845.2	244	253.464			253.464
Total (corrected)	67435	259				
Confidence						
Age group	0.43659	2	0.218	0.36	0.697	-0.008
Sex	0.39342	1	0.393	0.65	0.420	-0.002
Marital Status	1.67448	1	1.674	2.78	0.097	0.013
Education	2.91125	4	0.728	1.21	0.309	0.003
Occupation	7.28699	4	1.822	3.02	**0.019**	0.030
Region	10.944	3	3.648	6.05	**0.001**	0.058

Residual	147.151	244	0.603			0.058
Total (corrected)	171.965	259				
Trust						
Age group	2.44901	2	1.225	1.63	0.197	0.010
Sex	2.64235	1	2.642	3.52	0.062	0.022
Marital Status	4.11783	1	4.118	5.49	**0.020**	0.040
Education	10.252	4	2.563	3.42	**0.010**	0.044
Occupation	11.3622	4	2.841	3.79	**0.005**	0.052
Region	14.7894	3	4.930	6.58	**0.000**	0.079
Residual	182.937	244	0.750			0.750
Total (corrected)	242.494	259				

Note: *Corr., Corrected; SS, Sum of Squares; MS, Mean Square; DF, Degree of freedom; R-sq., Correlation squared (accuracy); adj., adjusted*

4. DISCUSSION

We identified a low level of knowledge, confidence and trust on COVID-19 vaccine clinical trials (KCTCOVacTrials) amongst healthcare workers in Uganda. In particular, there were no differences in the KCTs with age. These observations, though basic, highlight mistrust in the community with regard to COVID-19 vaccine clinical trials in Uganda. These findings are in agreement with previous studies in Africa [1, 2]. These circumstances signal possible problems for upcoming clinical trials.

The majority of health workers in Uganda, believe that the human resources designated to handle COVID-19 cases are inadequate; the health worker evaluation may contribute to antivaccine sentiments, in agreement with previous reports [1]. A previous national wide study in Uganda showed that healthcare workers are six times more knowledgeable about COVID-19 than teachers (non-medical staff) [13], however a failure to replicate this self-reported knowledge on COVID-19 vaccine clinical trials raises major policy challenges. Our study also identified males as having a significantly higher knowledge score than females, thus identifying gender inequalities that parallel the disproportionate distribution of males and females in the healthcare professional. Addressing these discrepancies in a developing country like Uganda would help promote knowledge equity amongst healthcare workers since the job a person has usually has a great impact on their knowledge level [14]. The low productivity, common in most healthcare centers in Uganda [15], only continues to precipitate the low confidence and trust on the planned COVID-19 vaccine clinical trials in Uganda. This situation would be harmful and unproductive for the Ugandan government since it would undermine the herd immunity offered through vaccination strategies.

The study re-emphasized the general age distribution amongst Ugandans in which a majority are middle aged (25-45 years) in agreement with our previous studies [9, 10]. Gender disparities were consistent with general conditions in the area, including access to education. Women in developing countries are more likely to be employed in nursing and other lower paying positions leading to under representation of females in managerial positions [11]. This online questionnaire required a smartphone and internet connectivity, which presented an economic barrier to participation. Globally, there are more females in the healthcare profession than men [12], which suggests an alternate modality should be investigated for future surveys.

We found that the least educated i.e., illiterate and certificate holders had a higher confidence and trust level in the COVID-19 clinical trials than those who had a higher level of education. These findings demonstrate challenges for the planned COVID-19 vaccinations in Uganda since medical staff are frontline workers in the global fight against the pandemic [8]. Support staff and nurses were more confident on the COVID-19 vaccine clinical trials than their senior counterparts. The skepticism identified amongst the educated and most professional healthcare workers re-emphasizes the need to increase transparency to encourage scientific and community scrutinize on the vaccines [16].

Vaccine confidence was lowest in the central and western regions of Uganda and this was important since these are the highly developed regions of Uganda. The lack of confidence by the relatively rich and most educated against internationally produced COVID-19 vaccines for clinical trials in Uganda in preference for the herbal vaccines (HV) being produced by the Ugandan government [6], is a threat to the World Health organization (WHO) efforts to contain the pandemic. In the search for a magic bullet against COVID-19, most African countries have already experimented with the 'Madagascar COVID-Organics cocktail,' although no evidence on efficacy has been found by the WHO [17, 18].

To support efforts to identify novel therapeutical options, the Ugandan government has invested heavily in COVID-19 HV [6, 7], despite failures from the Madagascar study [18]. In this study, the largest proportion of Ugandans expressed skepticism against the Live Attenuated Vaccines (LAV), DNA Recombinants vaccines (DRV), and inactivated vaccines (IV). The Oxford-AstraZeneca vaccine is a viral vector i.e., developed from an adenovirus to mimic the SARS-CoV-2 thus making it a genetically modified organism (GMO) and an example of DRV [19]. Low confidence and trust levels against DRVs identified in this study would raise challenges once Uganda begins to use the Oxford-AstraZeneca vaccines as planned [20]. In

addition, the Pfizer/BioNTech vaccines are messenger RNA vaccines-a new class of vaccines [21], demonstrating a need for more studies in Uganda to help guide policy. Since developing countries lack the capacity to develop vaccines, money spent on the HV would be invested into improved training and funding for basic institutional research which would increase transparency and public confidence in scientific reports [1].

This study identifies major challenges to vaccine uptake in Uganda as well as regional differences in opinions. The high fear and distrust against COVID-19 vaccines identified in this pilot survey were in agreement with previous reports from Africa [2, 3]. The skepticism towards COVID-19 vaccines would be associated with its origin from the north and refusal of neocolonialism through medical research, once again showing a need for well-structured trials and drug development in resource poor countries and a balance has to be established stronger patents and economic powers.

CONCLUSION

Strategic policies to revise demographics in the healthcare system would promote productivity. An increase in transparency by the Ugandan government would help encourage the educated and rich in central and western Uganda to increase on their trust and confidence towards COVID-19 vaccines. Since a majority of COVID-19 cases are in central Uganda, the need to revise and shift policy to increase consumer confidence are urgent. Future studies would need to be conducted placing emphasis on the mRNA vaccines, since these are the leading vaccine candidates against the pandemic.

ABBREVIATIONS AND ACRONYMS

COVID-19	Coronavirus disease 2019
DNA	Deoxyribonucleic acid
DRV	DNA recombinant vaccines
HV	Herbal vaccine
IV	Inactivated vaccines
KCTCOVacTrials	Knowledge, confidence and trust COVID-19 vaccine trials
KCTs	Knowledge, confidence and trust scores
LAV	Live attenuated vaccines

mRNA	messenger Ribonucleic acid
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
WHO	World Health Organization

DECLARATIONS

Ethical approval

This was acquired from Kampala International University Ethics Review Board and registered under with number Nr.UG-REC-023/201914. Consent to participate was acquired through online acceptance to participate in the study.

Author contributions

All authors contributed equally.

Funding

This work was supported by Zhejiang University Education Foundation Emergency Research Fund (SCW and KB); Global Challenges Research Fund and the University of Edinburgh.

Conflicts of interest

The authors declare no conflict of interest.

Supplementary file

Geographical distribution of study participants and questionnaire

Data availability statement

Raw data files can be accessed on figshare at this link……..

Acknowledgements

The authors extend their appreciation to the researchers supporting project number (RSP-2020/201), King Saud University, Riyadh, Saudi Arabia.

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