



Exploring the myths surrounding the COVID-19 vaccines in Africa: the study to investigate their impacts on acceptance using online survey and social media

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Purpose: The coronavirus disease 2019 (COVID-19) vaccine is the key to getting out of the pandemic. However, acceptance of the vaccine has been affected by false information and rumors, which have kept people from getting the shot since it was rolled out.

Materials and Methods: This study aimed to investigate the various misconceptions surfaced about the COVID-19 vaccines in Africa. We performed an online survey using an anonymous questionnaire to reach out to African respondents by social media and all possible online platforms such as Facebook, WhatsApp, Instagram, Twitter, YouTube, and so forth. The web-based questionnaires about the myths surrounding the vaccines were extracted from nonscientific information, unproven statements, social media posts, news reports, and people's concerns about the safety of the COVID-19 vaccines. Participants indicated their level of agreement with each statement.

Results: A total of 2,500 people responded to the online survey in Africa. The two common myths that respondents agreed with were that "since vaccines for COVID-19 have been developed, we can make vaccines for the common cold, human immunodeficiency viruses, and other diseases" (n=892, 35.7%) and that "researchers rushed the development of the COVID-19 vaccines; therefore, it is not very effective, safe and cannot be trusted" (n=595, 23.8%). The range of respondents who neither agreed nor disagreed with these myths was 12.4%–33.0%. The majority (1,931, 77.2%) indicated disagreement with the statement "after getting the COVID-19 vaccine, one can stop wearing a mask as well as taking safety precautions."

Conclusion: Myths surrounding the COVID-19 vaccines have impact on acceptance. Exploring them helps public health authorities in Africa dispel them and provide accurate information to promote vaccination campaigns, education, and acceptance.

Keywords: Therapeutic misconception, Patient acceptance of health care, COVID-19 vaccines, Africa

Introduction

Since its emergence in December 2019, the coronavirus disease 2019 (COVID-19) pandemic has threatened the world with high transmission, hospitalizations, and mortality rates [1]. Before the end of December 2020, the pandemic has led to the deaths of more than 1.6 million people across 223 countries around the globe. The whole world was waiting to arrive at an effective and safe vaccine and its strategies to combat the COVID-19 pandemic [2].

Progress in vaccine development was seen in December 2020 when a partnership between the Department of Health and Human Services and Department of Defense

which has organized a public-private partnership called “Operation Warp Speed” reported 300+ COVID-19 vaccine candidates, of which 52 were in the phase of clinical evaluation and the remaining been in preclinical development [3]. Eventually, six vaccine candidates showed promising potential in their efficacy proceeded to the phase 3 large-stage clinical trials. Only three gained the Centers for Disease Control and Prevention (CDC) and Food and Drug Administration (FDA) Emergency Use Approval in the United States, Moderna, Johnson & Johnson’s Janssen, and Pfizer-BioNTech [4]. Novavax and AstraZeneca are in large-scale (phase 3) clinical trials in the United States [4]. AstraZeneca was approved by the World Health Organization (WHO) and used across the world. Sputnik V-Russia is approved in Central and South America, the Middle East, Central Europe, Africa, Asia, Russia, and Africa.

Vaccination of the global population aimed to promote individual immunity against the deadly virus and protect those unable to get vaccinated through “herd immunity” [5]. It is estimated that 55%–82% vaccine uptake is required to build herd immunity against the SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) [6]. The COVAX Global Initiative was established to provide equitable access to COVID-19 vaccines across the world to higher-income and lower-income countries. The WHO, United Nations Children’s Fund, Coalition for Epidemic Preparedness Innovations, Access to COVID-19 Tools ACT-Accelerator, Gavi, the Vaccine Alliance, PAHO Revolving Fund, and the World Bank have delivered over 70 million doses to 126 countries, working with both governments and vaccine manufacturers [7]. The goal is to work with vaccine manufacturers to offer low-cost COVID-19 vaccines to countries. Inovio, Moderna, CureVac, Institute Pasteur/Merck/Themis, AstraZeneca/University of Oxford, Novavax, University of Hong Kong, Clover Biopharmaceuticals, and University of Queensland/CSL are part of the COVAX Initiative. The COVAX Initiative aims to supply 600 million doses to Africa to vaccinate at least 20% of the population. Contributing countries include France, Norway, Germany, Italy, New Zealand, Spain, Sweden, the United Arab Emirates (UAE), Canada, and the United States [7]. Some African countries are also getting vaccine donations from China, Russia, India, and the UAE. The African countries of Tanzania, Burundi, Burkina Faso, Central African Republic, Chad, and Eritrea are yet to receive COVID-19 vaccines [7].

Dr. Seth Berkley, CEO of Gavi, the Vaccine Alliance, stated that “the momentum we are witnessing behind this unprece-

dent global effort means there could be light at the end of the tunnel: a vaccine is our best route to ending the acute phase of the pandemic, and the COVAX effort is the best way to get there [8]. For higher-income countries, it represents a win-win: not only will you be guaranteed access to the world’s largest portfolio of vaccines, but you will also be negotiating as part of a global consortium, bringing down prices and ensuring truly global access. Signing up to the COVAX Facility gives each country its best chance at protecting the most vulnerable members of their populations—which in turn gives the world its best chance at mitigating the toll this pandemic has taken on individuals, communities, and the global economy. To make this end-to-end vision a reality, we need countries to make end-to-end commitments: funding research and development, signing up to the Facility, and supporting the COVAX Advance Market Commitment.”

Therefore, equal access to a COVID-19 vaccine is the key to beating the virus and paving the way for recovery from the pandemic. COVID-19 vaccination, in combination with prevention and control guidelines such as handwashing and masking-up, remains an important tool to stop the pandemic [9]. As recommended by experts, getting vaccinated will protect people and particularly people at increased risk of severe illness from COVID-19 [9].

Distribution complications and lack of health infrastructure and staff contribute to slow vaccination rates. Nine countries have administered less than a quarter of the doses they obtained, and 15 countries have given less than half of the doses [3]. However, despite public health importance, high mortality, vaccine hesitancy is rising globally due to myths surrounding the COVID-19 vaccines leading to lower than anticipated acceptance. They spread with ease due to social media and online platforms. This widespread misinformation, skepticism, and popularity of anti-vaccine movements toward the COVID-19 vaccination make global vaccination and herd immunity an even more difficult task [10]. “While we call for vaccine equity, Africa must also knuckle down and make the best of what we have,” said Matshidiso Moeti, regional director for WHO in Africa [3].

Previous studies indicate that people have various misconceptions and are likely to reject a newly developed vaccine for a detected disease [11]. The polio vaccine boycott in Nigeria prompted by distrust and fallacies which lead to a five-fold increase in the polio incidence in Nigeria between 2002 and 2006 is an example [12,13]. Subsequently, a mass deworming program was rejected in Ghana due to misconception among

community members [14]. Okunlola et al. [15] in 2020 highlighted some myths and misconceptions associated with the COVID-19 pandemic. Although a global survey done by the World Economic Forum in 15 countries showed high vaccination intentions in China (80%), the United Kingdom (77%), and the United States (nearly 70%), there remains robust and widespread movements and resistance to COVID-19 vaccination globally [16]. According to this same study, the number of people who agreed to take the vaccines dropped significantly in some countries, including South Africa and France [2]. Concerns ranged from possible side effects to the speed at which the vaccines were developed and more mysterious allegations that the vaccines contain a microchip for tracking purposes [2]. People also have a mixed feeling of whether the vaccines are safe, protect against the virus, and stop wearing masks after vaccination. Whereas others would accept the vaccines, others will not [17], which may be due to fears, worries, and surrounding misconceptions.

Deliveries of the COVID-19 vaccines in Africa started in February 2021, intending to supply 600 million doses to vaccinate at least 20% of the population under the COVAX Program [18]. It is necessary to identify some of the myths that influence people's intention not to get vaccinated to effectively develop interventions and health education to promote a positive vaccination attitude and overall acceptance of the COVID-19 vaccines. A study commissioned by the African CDC on COVID-19 vaccine perceptions in 15 countries indicated a significant proportion of people had concerns around vaccine safety. On average, about 20% of respondents said they would not have a vaccine, but the proportion varied from below 10% in Ethiopia, Niger, and Tunisia to 41% in Democratic Republic of the Congo [19]. Assessing the knowledge, attitude and perceptions of respondents, and further education of the general public has proved effective in changing the risk perception of the populace and resulted in attitudinal changes that were necessary to reduce the epidemic disease burden [20]. Adequate monitoring of social media platforms to confirm and improve the quality of information delivered to the people is of prime importance. The present study explores the perceived myths about the safety of vaccines and the impacts of these myths on acceptance in Africa.

Materials and Methods

Study design and questionnaire development

This study employed a cross-sectional approach to recruiting

participants through an online survey focusing on Africa. A web-based survey in English was developed using Google Docs for this purpose, and responses were collected in Google Forms database; data collection took place until July 5, 2021. The online survey was disseminated on January 5, 2021, on all online platforms, social media, and targeted groups in Africa's regions. The responsibility to ensure wide distribution and organization of the data collection process was also entrusted to professional groups situated in all the regions of Africa.

The survey questions were divided into two sections: The first section inquired about the sociodemographic characteristics of respondents and the second section was statements related to the myths of the COVID-19 vaccine. These statements were gathered and reviewed by the study organizers from anti-vaccine groups, social media misinformation, "fake news", and questions or concerns about the safety of COVID-19 vaccines. Participants' responses were categorized by agreeing, disagreeing, or expressing no idea about the statements. Respondents were asked whether they would accept the COVID-19 vaccine when made available. The estimated time it took to complete the survey was around 5 minutes. To ensure the appropriateness, preliminary validity, and feasibility of the questionnaires, the survey was reviewed and evaluated by five experts in the field of health education, vaccine development, and health communication related to the statements' cognitive construction and correct interpretation. A pilot test of the survey with 10% of the participants was carried out to rule out irrelevant statements. The experts suggested that we include open-ended questions to find out more myths respondents might have had.

Participants

The survey was widely distributed to ensure that respondents from all five regions (North, Southern, East, West, and Central) of Africa were represented. No sample size determination method was employed because the study aimed to recruit an adequate number of respondents who will give general objective views about the myths surrounding the COVID-19 vaccines with a more remarkable analysis power.

Inclusion criteria were met by participants by having access to the internet, using a tablet or iPad, and consented to participation in the study. Minors under 18 years of age were excluded from the study because of their vulnerability as a population and additional protections for children in research. Participants were also excluded from the study if their sub-

mitted survey responses were incomplete (with 95 responses not included). History of prior vaccination and medical circumstances related to COVID-19 did not affect participation.

Ethical considerations

The study (protocol GHS-ERC 009/02/21) was submitted to the Ghana Health Service Ethics Committee in the host country, where the survey originated and was designed. It was determined that the survey procedures aimed at observing public behavior or involved minimal risk were exempted from ethical review and did not require ethical approval. However, all procedures employed in this study were in line with the medical research ethical principles of the World Medical Association Declaration of Helsinki. The purpose and details of the study were fully explained to the participants through the introductory page and the consent form contained within the online survey. Participation was voluntary, and the surveys were completely anonymous with no names, no confidential details, or identifiable information required.

Statistical analysis

The data collected were coded and entered into Microsoft Excel (Microsoft Corp., Redmond, WA, USA) for data cleaning and labeling. Responses to each statement were grouped as agree, neutral (no idea), and disagree. Data analysis was performed using IBM SPSS Statistics ver. 24.0 (IBM Corp., Armonk, NY, USA). Demographic variables were obtained using frequencies and percentages. Five age groups were defined for this study: 18–29, 21–30, 31–40, 41–50, and 51 years and above. All comparisons were made using the chi-square test of association. Statistical significance was set to be $p < 0.05$.

Results

A total of 2,500 responses were included and analyzed for the study. Incomplete submissions such as respondents skipping specific questions and minor omissions were excluded and not considered part of the data analyzed. Almost two-thirds (61.3%) of the respondents were females, while 38.7% were males. Ages ranged from 18 years to 51 years and above, with the age group of 21–30 years forming most respondents (35.8%). Among the participants, 90.7% reported that they had attained high education, whereas 64.8% were employed. Approximately 40% of the respondents (980/2,500) were from West Africa, 665 Central Africans, 450 East Africans, 235 Southern Africans, and 170 North Africa participants. Table 1 presents the details

Table 1. Demographic characteristics of the respondents

Characteristic	No. (%)
Gender	
Male	967 (38.7)
Female	1,533 (61.3)
Age (yr)	
18–20	104 (4.2)
21–30	895 (35.8)
31–40	631 (25.2)
41–50	385 (15.4)
≥51	485 (19.4)
Marital status	
Single	1,140 (45.6)
Married	1,116 (44.6)
Co-habitation/relationship	206 (18.2)
Separated/divorced	38 (1.5)
Religion	
Christian	1,766 (70.6)
Muslim	337 (13.5)
Traditional and others	397 (15.9)
Occupation status	
Employed	1,621 (64.8)
Unemployed	879 (35.2)
Attained higher education	
Yes	2,267 (90.7)
No	233 (9.3)
African sub-region of respondents	
West Africa	980 (39.2)
East Africa	450 (18.0)
Central Africa	665 (26.6)
North Africa	170 (6.8)
Southern Africa	235 (9.4)
Accept vaccine	
Yes	1,699 (68.0)
No	801 (32.0)

of respondents on age, marital status, religion, education, and occupational status. Table 2 shows a statistically significant association between demographic variables such as gender, age, marital status, religion, high education attainment, occupation status, access to credible information, and the acceptance of COVID-19 vaccines or the vaccine’s acceptance dependent on these demographic variables.

Ten statements were presented to the respondents, and their responses to each of them are shown in Table 3. Agreement with these statements ranged from 8.8%–35.7%. The range in percentage of respondents who expressed “no idea (neutral stands)” with each statement was 12.4%–33.0%. The

Table 2. Association between selected demographic variables with acceptance of the coronavirus disease 2019 vaccines (n=2,500)

Variable	Acceptance of the COVID-19 vaccines		df	χ^2 (Fischer's exact test)	p-value
	No	Yes			
Gender					
Female	448	1,081	1	16.833	0.001*
Male	361	610			
Age (yr)					
18–20	56	56	4	44.310	<0.001
21–30	322	639			
31–40	208	399			
41–50	126	237			
≥51	97	360			
Marital status					
Single	404	819	3	100.231	<0.001
Married	266	775			
Co-habitation/relationship	111	84			
Separated/divorced	28	13			
Religion					
Christian	601	1,136	2	17.130	0.008
Muslim	112	251			
Traditional and others	96	304			
Higher education attainment					
Not attained	168	69	1	177.542	<0.001*
Attained	641	1,622			
Occupational status					
Employed	406	1,150	1	73.952	<0.001*
Unemployed	403	541			
Regular access to credible information					
No access	237	125	1	212.001	<0.001*
Have access	572	1,566			

df, degrees of freedom.

*p<0.05 level of significance.

statements that a few respondents agreed with were that “since vaccines for the COVID-19 have been developed, we can make vaccines for the common cold, human immunodeficiency viruses (HIV) and others” (35.7%) and that “researchers rushed the development of the COVID-19 vaccines; therefore, it is not very effective and safe or cannot be trusted” (23.8%). However, most respondents debunked and disagreed with some of these myths. The majority (77.2%) did not agree that after getting the COVID-19 vaccines, one can stop wearing a mask and taking safety precautions. Consequently, 66.4% do not believe that the COVID-19 vaccine enters your cell and changes the DNA. Respondents who will accept the vaccine were more likely to disagree with statements 1, 2, 3, 4, 5, 6, 7, 9, and 10, whereas those who will not take the vaccine agreed (p=0.001). The present study also identified that certain myths about the

COVID-19 vaccines do not influence acceptance shown in Table 4. The myth did not influence acceptance that since vaccines for COVID-19 have been developed, “we can make vaccines for other viruses such as the common cold and HIV [21].”

Discussion

Hesitancy to new vaccines, population confidence or willingness to vaccinate, and their blunt refusal may be as a result of misinformation about its safety or misconceptions which have gain ground on social media platforms [22,23]. Anti-vaccine lobbyists and religious groups make use of social media and the internet to express and spread their lack of trust in the pharmaceutical industry, advocate against vaccination, and report the alleged risk of vaccination [24,25]. These some-

Table 3. Responses of Africans to the myths surrounding the COVID-19 vaccines

Statements	Response		
	Agree	Neutral (no idea)	Disagree
1. Taking the COVID-19 vaccine can make me sick with COVID-19.	389 (15.6)	492 (19.7)	1,619 (64.8)
2. The COVID-19 vaccines affect fertility or prevent having a baby later in life for a woman.	273 (10.9)	826 (33.0)	1,401 (56.0)
3. If I have had the COVID-19 infection and recovered, I don't need the vaccine.	401 (16.0)	451 (18.0)	1,648 (65.9)
4. Researchers rushed the development of the COVID-19 vaccines; therefore, it is not very effective and safe or cannot be trusted.	595 (23.8)	581 (23.2)	1,324 (53.0)
5. After getting the COVID-19 vaccine, one can stop wearing the mask and taking safety precaution.	221 (8.8)	348 (13.9)	1,931 (77.2)
6. The side effects of the vaccines are dangerous and include allergic reactions so that I won't take the vaccines.	442 (17.7)	670 (26.8)	1,388 (55.5)
7. The COVID-19 vaccines enters your cells and change your DNA.	312 (12.5)	529 (21.2)	1,659 (66.4)
8. Since vaccines for the COVID-19 have been developed, we can make vaccines for the common cold, HIV, and others.	892 (35.7)	668 (26.7)	940 (37.6)
9. The COVID-19 vaccines include a tracking device attached to many mysteries.	325 (13.0)	673 (26.9)	1,502 (60.1)
10. I am not at risk for COVID-19 infection and its complications. Because of that, there is no need for me to take the vaccines.	311 (12.4)	309 (12.4)	1,880 (75.2)

Values are presented as number (%).
 COVID-19, coronavirus disease 2019; HIV, human immunodeficiency viruses.

times justify the myths surrounding the COVID-19 vaccines. Therefore communication, the internet, and social media are paramount to the determinants of vaccine acceptance, hesitancy, and levels of misconceptions.

The present-day study showed that only a tiny percentage of respondents agreed with the myths surrounding the COVID-19 vaccines suggesting only a minority of Africans held significant misconceptions about the vaccines. The study, however, also revealed that one-third of all the respondents (33.0%) neither agreed nor disagreed with the statement that the COVID-19 vaccines affected fertility later in life for women; this implies a lack of knowledge about the COVID-19 vaccines and fertility. It offers an excellent opportunity for stakeholders and health authorities to provide comprehensive information about the possible impact of the vaccine on fertility, pregnancy, and miscarriage. People need to consider the facts about the vaccines and what could happen if they develop COVID-19 symptoms during pregnancy. Couples have to be reassured that it is safe to become pregnant after the COVID-19 vaccination. The vaccine is not causing any change in infertility for women, and unvaccinated expectant mothers have an increased risk of severe illnesses from COVID-19. A study done by Gray et al. [26] in 2021 published in the American Journal of Obstetrics and Gynecology shows that the COVID-19 vaccines are safe and effective for pregnant and breastfeeding women and they also offer protection for their babies. The CDC, the Society for Maternal-Fetal Medicine, and the American College of Obstetricians and Gynecologists agree

that the COVID-19 vaccine can be offered to pregnant women who are eligible [27-29].

For respondents who still have doubts and safety concerns, they should discuss the risks and benefits of the COVID-19 vaccination with their healthcare providers. There is no evidence that antibodies from the vaccines interfere with fertility or cause pregnancy problems.

We also found some skepticism about whether vaccines for the common cold, HIV, and other diseases can equally be produced since vaccines for the COVID-19 have been developed, which was the most common misconception (35.7%) the study revealed, or participants agreed on. However, it does not significantly affect acceptance. Again, public health authorities need to educate the general population on the logic behind developing the COVID-19 vaccine compared to other diseases. Each disease and the illnesses they cause have their unique challenges, which are different from one another.

Furthermore, respondents were also concerned that researchers rushed the development of the COVID-19 vaccines, and it is not very safe, effective, and trusted. Although the COVID-19 vaccines seemed to have had rapid development, 69 days to clinical trial once developed from laboratory and animal models [30]. The clinical trials that examined the vaccines' safety and quality control were not rushed or compromised in any way, they used standard vaccine development stages, and they occurred in the United States, Europe, and China [31].

In the past, vaccine development was lengthier partly be-

Table 4. Potential influence of these statements and their impacts on acceptance of the vaccine

Variable	Will accept the vaccine		χ^2	df	p-value
	No	Yes			
1. Taking the COVID-19 vaccine can make me sick with COVID-19.					
Agree	273	116	454.877	2	0.001
Neutral (no idea)	233	259			
Disagree	295	1,324			
2. The COVID-19 vaccines affect fertility or prevent having a baby later for a woman.					
Agree	234	39	570.631	2	0.001
Neutral (no idea)	347	479			
Disagree	220	1,181			
3. If I have had the COVID-19 infection and recovered, I don't need the vaccine.					
Agree	328	78	595.642	2	0.001
Neutral (no idea)	181	270			
Disagree	297	1,351			
4. Researchers rushed the development of the COVID-19 vaccines; therefore, it is not very effective and safe or cannot be trusted.					
Agree	440	155	732.285	2	0.001
Neutral	205	376			
Disagree	156	1,168			
5. After getting the COVID-19 vaccine, one can stop wearing the mask and taking safety precaution.					
Agree	91	130	247.176	2	0.001
Neutral (no idea)	232	116			
Disagree	478	1,453			
6. The side effects of the vaccines are dangerous and include allergic reactions so that I won't take the vaccines.					
Agree	351	91	910.661	2	0.001
Neutral	334	336			
Disagree	116	1,272			
7. The COVID-19 vaccines enters your cells and change your DNA.					
Agree	221	91	442.192	2	0.001
Neutral (no idea)	271	258			
Disagree	309	1,350			
8. Since vaccines for the COVID-19 have been developed, we can make vaccines for the common cold, HIV, and others.					
Agree	297	595	4.158	2	0.125
Neutral	193	475			
Disagree	311	625			
9. The COVID-19 vaccines include a tracking device attached to many mysteries.					
Agree	221	104	428.275	2	0.001
Neutral	324	349			
Disagree	256	1,246			
10. I am not at risk for COVID-19 infection and its complications. Because of that, there is no need for me to take the vaccines.					
Agree	285	26	833.473	2	0.001
Neutral	194	115			
Disagree	322	1,558			

df, degrees of freedom; COVID-19, coronavirus disease 2019; HIV, human immunodeficiency viruses.

cause of limited technology and resources.

The messenger RNA (mRNA)-based technology is a rela-

tively easy, low-cost manufacturing process, synthetic, and quick to produce [32]. Allows the ability to streamline vaccine

discovery and development and facilitate a rapid response to emerging infectious diseases, such as COVID-19 [33]. The technology employed to manufacture the mRNA COVID-19 vaccines was developed in record time because other researchers have been working on mRNA research for three decades [34]. The lessons from this strategy over time were applied for the development for use as COVID-19 vaccines [33].

Experts continuously monitor the safety and standards of the COVID-19 vaccines, scientists worldwide, and agency partners experts to ensure that the COVID-19 vaccines continue to be safe through the CDC, the National Institutes of Health, and the National Academies of Sciences, Engineering, and Medicine. The FDA regulates and approves vaccines in the United States. Vaccines undergo a rigorous review of laboratory, clinical, and manufacturing data to ensure the safety, effectiveness, and quality of these products. The European Medicines Agency (EMA) are the scientific evaluators, approvers, and monitors of vaccines in the European Union, The Medicines and Healthcare Products Regulatory Agency in the United Kingdom [35]. In Africa, Nigerian National Agency for Food and Drug Administration and Control and the South African Health Products Regulatory Authority utilize the FDA and EMA guidance [36].

The FDA Ghana utilizes an independent committee of experts, the Joint COVID-19 Vaccine Safety Review Committee,

and an FDA Safety Monitoring Department [37]. It is common for new vaccines to be met with misconceptions and initial hesitancy. One of the considerable sources where African health institutions can give information about the benefits of the COVID-19 vaccines to the general population and recommendations is through social media. Although social media represent a rapidly evolving global environment for disseminating misconceptions, it can be used as a tool for designing an effective educational intervention. This will serve the purpose of increasing vaccine acceptance, addressing hesitancy, and tackling the problem of misinformation in Africa. In this study, the willingness to accept the COVID-19 vaccine among Africans was relatively high as 68% of the respondents expressed the intention to take it regardless of these misconceptions. Demographic profiles such as gender ($p=0.001$), age ($p<0.001$), marital status ($p<0.001$), religion ($p=0.008$), high educational attainment ($p<0.001$), occupational status ($p<0.001$), and access to regular information ($p<0.001$) were some factors highly associated with acceptance of the vaccine. These demographic characteristics were more likely to contribute to the acceptance of the vaccines or can be regarded as highly accurate predictors of acceptance (Table 5).

These findings corroborate the studies of Al-Mohaithef and Padhi [38] in 2020, who investigated the community determinants that influence COVID-19 vaccine acceptance in Saudi

Table 5. Analysis of demographic characteristics to the 10 statements

Statements	Response			p-value
	Agree	Neutral (no idea)	Disagree	
1. Taking the COVID-19 vaccine can make me sick with COVID-19.	389 (15.6)	492 (19.7)	1,619 (64.8)	
Gender				
Female	259	949	325	0.001
Male	130	670	167	
Age (yr)				
18–20	39	52	13	
21–30	65	583	247	
31–40	117	410	104	
41–50	103	218	64	
≥51	65	356	64	
Marital status				
Single	143	279	725	
Married	142	181	793	
Co-habitation	78	39	89	
Separated	26	0	12	
Occupation				
Employed	220	259	1,142	0.0001
Unemployed	169	233	477	

(Continued on next page)

Table 5. Continued

Statements	Response			p-value
	Agree	Neutral (no idea)	Disagree	
Attained higher education				
Yes	298	453	1,516	0.0001
No	91	39	103	
Religion				
Christians	194	441	1,131	0.0001
Muslims	104	26	207	
Traditional and others	91	25	281	
2. The COVID-19 vaccines affect fertility or prevent having a baby later in life for a woman.	273 (10.9)	826 (33.0)	1,401 (56.0)	
Gender				
Female	169	517	847	0.594
Male	104	309	554	
Age (yr)				
18–20	39	39	26	0.0001
21–30	65	377	453	
31–40	65	232	334	
41–50	78	76	231	
≥51	26	102	357	
Marital status				
Single	117	467	556	0.0001
Married	91	308	717	
Co-habitation	39	51	116	
Separated	26	0	12	
Occupation				
Employed	130	476	1,015	0.0001
Unemployed	143	350	386	
Attained higher education				
Yes	195	761	1,311	0.0001
No	78	65	90	
Religion				
Christianity	169	594	1,003	0.0001
Muslim	78	104	155	
Traditional and others	26	128	243	
3. If I have had the COVID-19 infection and recovered, I don't need the vaccine.	401 (16.0)	451 (18.0)	1,648 (65.9)	
Gender				
Female	246	231	1,056	0.0001
Male	155	220	592	
Age (yr)				
18–20	0	39	65	
21–30	195	91	609	
31–40	65	181	385	
41–50	77	51	257	
≥51	64	89	332	
Marital status				
Single	181	194		0.0001
Married	116	244		
Co-habitation	78	13		
Separated	26	0		

(Continued on next page)

Table 5. Continued

Statements	Response			p-value
	Agree	Neutral (no idea)	Disagree	
Occupation				
Employed	194	270	1,157	0.0001
Unemployed	207	181	491	
Attained higher education				
Yes	349	412	1,506	0.023
No	52	39	142	
Religion				
Christianity	259	311	1,196	0.0001
Islam	78	104	155	
Traditional and others	64	36	297	
4. Researchers rushed the development of the COVID-19 vaccines; therefore, it is not very effective and safe or cannot be trusted.	595 (23.8)	581 (23.2)	1,324 (53.0)	
Gender				
Female	298	362	873	0.0001
Male	297	219	451	
Age (yr)				
18–20	13	13	78	0.0001
21–30	247	286	362	
31–40	155	129	347	
41–50	129	37	219	
≥51	51	116	318	
Marital status				
Single	272	338	530	0.0001
Married	258	191	667	
Co-habitation	39	56	115	
Separated	26	0	12	
Occupation				
Employed	336	360	925	0.0001
Unemployed	259	221	399	
Attained higher education				
Yes	479	542	1,246	0.0001
No	116	39	78	
Religion				
Christianity	440	439	887	0.0001
Islam	91	78	168	
Tradition and others	64	64	267	
5. After getting the COVID-19 vaccine, one can stop wearing the mask and taking safety precaution.	221 (8.8)	348 (13.9)	1,931 (77.2)	
Gender				
Female	117	143	1,273	0.0001
Male	104	205	658	
Age (yr)				
18–20	0	39	65	
21–30	156	78	661	
31–40	39	65	527	
41–50	13	115	257	
≥51	13	51	421	

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Table 5. Continued

Statements	Response			p-value
	Agree	Neutral (no idea)	Disagree	
Marital status				
Single	156	142	842	0.0001
Married	52	154	910	
Co-habitation	13	26	167	
Separated	0	26	12	
Occupation				
Employed				0.0001
Unemployed				
Attained higher education				
Yes	195	296	1,776	0.0001
No	26	52	155	
Religion				
Christianity	117	297	1,352	0.0001
Islam	78	39	220	
Traditional and others	26	12	359	
6. The side effects of the vaccines are dangerous and include allergic reactions so that won't take the vaccines.	442 (17.7)	670 (26.8)	1,388 (55.5)	
Gender				
Female	221	400	912	0.0001
Male	221	270	476	
Age (yr)				
18–20	13	26	65	0.0001
21–30	169	338	388	
31–40	78	168	385	
41–50	143	49	195	
≥51	39	89	357	
Marital status				
Single	156	428	556	0.0001
Married	221	177	718	
Co-habitation	39	65	102	
Separated	26	0	12	
Occupation				
Employed	234	359	1,028	0.0001
Unemployed	208	311	360	
Attained higher education				
Yes	351	631	1,285	0.0001
No	91	39	103	
Religion				
Christianity	325	503	938	0.0001
Islam	104	91	142	
Tradition and others	13	76	308	
7. The COVID-19 vaccines enters your cells and change your DNA.	312 (12.5)	529 (21.2)	1,659 (66.4)	
Gender				
Female	156	285	1,092	0.0001
Male	156	244	567	

(Continued on next page)

Table 5. Continued

Statements	Response			p-value
	Agree	Neutral (no idea)	Disagree	
Age (yr)				
18–20	26	26	52	0.0001
21–30	65	246	584	
31–40	91	142	398	
41–50	104	38	243	
≥51	26	77	382	
Marital status				
Single	117	336	687	0.0001
Married	130	154	832	
Co-habitation	39	39	128	
Separated	26	0	12	
Occupation				
Employed	156	271	1,194	0.0001
Unemployed	156	258	465	
Attained higher education				
Yes	234	477	1,556	
No	78	52	103	
Religion				
Christianity				
Islam				
Tradition and others				
8. Since vaccines for the COVID-19 have been developed, we can make vaccines for the common cold, HIV, and others.	892 (35.7)	668 (26.7)	940 (37.6)	
Gender				
Female	621	372	540	0.0001
Male	271	296	400	
Age (yr)				
18–20	26	39	39	0.0001
21–30	377	233	285	
31–40	231	169	231	
41–50	103	127	155	
≥51	155	100	230	
Marital status				
Single	364	362	414	0.0001
Married	438	280	398	
Co-habitation	78	28	102	
Separated	12	0	26	
Occupation				
Employed	581	462	578	0.006
Unemployed	311	206	362	
Attained higher education				
Yes	581	462	578	0.0001
No	311	206	362	
Religion				
Christianity	671	488	607	0.0001
Islam	156	78	103	
Traditional and others	65	102	203	

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Table 5. Continued

Statements	Response			p-value
	Agree	Neutral (no idea)	Disagree	
9. The COVID-19 vaccines include a tracking device attached to many mysteries.	325 (13.0)	673 (26.9)	1,502 (60.1)	
Gender				
Female	234	427	872	0.0001
Male	91	246	630	
Age (yr)				
18–20	39	52	13	0.0001
21–30	156	260	479	
31–40	65	169	397	
41–50	52	103	230	
≥51	13	89	383	
Marital status				
Single	169	403	568	0.0001
Married	65	244	807	
Co-habitation	65	26	115	
Separated	26	0	12	
Occupation				
Employed	104	335	1,182	0.0001
Unemployed	221	338	320	
Attained higher education				
Yes	260	569	1,438	
No	65	104	64	
Religion				
Christianity	234	466	1,066	0.0001
Islam	78	143	116	
Traditional and others	13	64	230	
10. I am not at risk for COVID-19 infection and its complications. Because of that, there is no need for me to take the vaccines.	311 (12.4)	309 (12.4)	1,880 (75.2)	
Gender				
Female	182	143	1,208	0.0001
Male	129	166	672	
Age (yr)				
18–20	26	13	65	0.0001
21–30	78	129	688	
31–40	104	52	475	
41–50	65	63	257	
≥51	38	52	395	
Marital status				
Single	116	142	882	0.0001
Married	143	128	842	
Co-habitation	26	39	141	
Separated	26	0	12	
Occupation				
Employed	130	154	1,337	0.0001
Unemployed	181	156	543	
Attained higher education				
Yes	272	270	1,725	0.006
No	39	39	155	

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Table 5. Continued

Statements	Response			p-value
	Agree	Neutral (no idea)	Disagree	
Religion				
Christianity	234	218	1,314	0.001
Islam	52	39	246	
Traditional and others	25	52	320	

Values are presented as number (%) or number.

COVID-19, coronavirus disease 2019; HIV, human immunodeficiency viruses.

Arabia.

Health education interventions should target sociodemographic groups or areas in Africa that are identified as a priority to increase vaccine/health education, understanding, dispel misconceptions around vaccine safety and increase overall vaccine acceptance. Many people will need to accept and receive COVID-19 vaccines to achieve herd immunity, slow the spread and stop the pandemic in Africa. Globally, 150 doses have been administered per 1,000 people, but it’s about eight doses per 1,000 people in Africa. In South Africa, 67% of its population, 40 million people would need to be fully vaccinated to achieve her immunity by the end of 2021 [39]. Therefore, public health authorities across Africa must provide accurate information focusing on correcting the present study’s misconceptions, promoting positive attitudes, increasing safety awareness, and accepting the COVID-19 vaccines in vaccine campaigns.

The study reflects the views of African respondents on social media with internet access. There could be alternative opinions that were not represented.

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