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Community perception and acceptability of COVID-19 vaccine in south-west Nigeria: an online cross-sectional study

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Abstract

Background: The development of COVID-19 vaccines holds great potential for controlling the spread of SARS COV 2. Vaccines, irrespective of the disease are generally fraught with hesitancy, and Nigeria has a history of vaccine hesitancy.

Objective: This study aimed at determining the perception of community members about the COVID-19 vaccine and their readiness to accept the vaccine in South West, Nigeria.

Methods: A descriptive cross-sectional study design was employed to collect data from consenting adults using a structured online questionnaire for a period of three weeks. Data were subjected to a Chi-square test and logistic regression for bivariate and multivariate analysis, respectively.

Results: A total of 807 respondents participated in the survey with 57.7% males and 42.3% females. Forty-five respondents (5.6%) had previously been diagnosed with COVID-19 while 11.5% of the respondents had co-morbidity. The overall perception of COVID-19 vaccines was good. Fifty-nine (59%) percent of the respondents were willing to accept the vaccine and will also encourage their family members to take the vaccine. Vaccine origin and cost were determinants of vaccine acceptability. Non-acceptability of the vaccine (61.6%) was based on possible adverse effects of the vaccine and mistrust of the government. Educational level, skill status, type of employment and sector of employment were associated ($p < 0.001$) with the acceptability of the COVID-19 vaccine.

Conclusions: Citizens were willing to take COVID-19 vaccines, however, lack of trust in government programs might undermine the vaccine campaign. Hence, the government needs to rebuild trust with the citizens towards achieving a high vaccination rate for COVID-19.

Introduction

COVID-19 is a novel disease caused by a new strain of coronavirus known as Severe Acute Respiratory Virus 2 (SAR CoV 2) that has not been previously identified in humans. It was first reported in Wuhan city, China on the 31st of December, 2019 where cases of severe pneumonia of unknown origin was seen and was linked to a seafood market.^{1,2}

The disease was declared by World Health Organization (WHO) on 30th January 2020 as a Public Health Emergency of International Concern.³ Since the inception of this disease, it has affected over 200 countries and territories all over the world and was declared a global pandemic by WHO since 11th of March, 2020.⁴

The first case of COVID -19 in Nigeria was reported on the 27th of February, 2020.⁵ Since its outbreak, it has impacted every area of human life; social, economic, and religious. It has disrupted societal norms and forced a new way of communal interaction and family engagements. As a result of the increasing number of cases as well as the high fatality rate worldwide, an active search for therapeutics and vaccines to prevent the further spread of the disease, and bring an end to the pandemic has been ongoing. This is one of the global strategies in the fight against COVID-19.⁶ The development of a safe and effective vaccine has been considered essential in the prevention of COVID-19 mortality and morbidity in the population.^{7, 8} This is an important strategy in the control of the pandemic because a COVID-19 vaccination program will ensure the establishment of long-lasting vaccine-induced herd immunity as against transient infection-induced herd immunity.⁹ The global race for a COVID-19 vaccine has resulted in emergency authorization use for several vaccines of different origin.¹⁰ This has raised concerns on the safety and efficacy of some of these vaccines thereby challenges the integrity of the vaccine discovery process, and prejudices based on its origin.

The spread of SARS COV 2 has imposed enormous burden on the health systems of both the developed and the developing nations. Nigeria has been classified as one of the vulnerable, high-risk African countries due to her frail health system.¹¹ Nigeria has recorded a total of 168,256 cases with 2,122 deaths (Case fatality rate is 1.3%). The South-Western states (Ekiti, Lagos, Ogun, Ondo, Osun, and Oyo) account for about 47% (78,617) of the confirmed cases and 35.9% (761) of total CFR in Nigeria.⁵

The development of a vaccine against the disease is considered an utmost priority in saving humanity, protecting public health, and ensuring food security and livelihoods. The global Target Product Profile (TPP) for vaccines against COVID-19 is majorly concerned with the development of vaccines that confers a long-time protection for persons that are more susceptible to the disease.¹² Human intentions, behaviors and attitudes are critical factors towards achieving universal vaccine coverage in any vaccine-preventable disease program.^{13,}

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Vaccines, irrespective of the disease and vaccine program are generally fraught with hesitancy. Vaccine hesitancy is the term used for a delay in acceptance or an outright refusal of a vaccine, despite its availability and has been classified as one of the top ten threats to global health.^{15, 16} Globally, vaccine hesitancy is determined by elements which include self-satisfaction, expediency and self-assurance.¹⁵ In Nigeria, vaccine hesitancy is further plagued by the diverse socio-cultural and demographic factors, and geopolitical structures.

In view of this, and the public health emergency occasioned by the COVID-19 pandemic in the country, there is the need for a strategic advocacy and conscientious planning towards ensuring the uptake of any safe and effective COVID-19 vaccine whenever it is made available. Three vaccine candidates; AstraZeneca/Oxford, Pfizer-BioNTech and Janssen (Johnson and Johnson) have been approved for use in Nigeria.¹⁷

Globally, socio-demographic and psychosocial variables are context-specific human characteristics underlying vaccine hesitancy.¹⁵ Thus, this study aimed to assess the awareness and perceived risk, community perception and acceptability of COVID-19 vaccine in south-west, Nigeria. This will guide the policy makers in the implementation of COVID-19 immunization program in order to enhance success of vaccination when the vaccine is eventually available for use.

Materials and Methods

Ethical consideration

Ethical clearance was obtained from the Research Ethics Committee, LAUTECH Teaching Hospital, Osogbo, Osun State with number LTH/EC/2021/04/516. Participants provided written online consent. By not requesting names and making sure that all entries were made into a single Excel file that was only accessible to the data analyst, confidentiality and data protection were put in place.

Study area, design and population

The study was conducted in one of the six geopolitical zones of Nigeria, the South-western which comprises of 6 states (Oyo, Ogun, Osun, Lagos, Ekiti, and Ondo) with an adult population of 21,538,83.¹⁸ A descriptive cross-sectional study design was used involving adults (≥ 18 years of age) resident in the six south western states. The inclusion criteria were people who can read English, own a smart-phone and have internet connectivity. Those that did not give consent were excluded from the study. The study was conducted within three weeks from December 2020 to January 2021.

Sample size and sampling technique

A prevalence of 74.6% for COVID 19 vaccine acceptance¹⁹ and a margin of error of 4% (95% CI: 70.4 – 78.4) was used to calculate the sample size of 455. A simplified-snowball sampling technique where participants were requested to pass the research instrument (Google form) to their WhatsApp, Facebook contacts was used.

Study instrument and data collection

A pretested semi- structured questionnaire was used to collect data for the study using open and close ended questions. The questionnaire included sections on socio-demographic data, awareness of COVID-19 infection, perceived risk of being infected with COVID-19, perception about COVID 19 vaccine and acceptance of COVID 19 vaccine. The research instrument was pre-tested, reviewed based on feedback from pre-testers. Data was collected using an electronic questionnaire (Google Form) and administered through social media networks (WhatsApp, Telegram and Facebook).

Statistical analysis

Data was analysed using SPSS version 25 (IBM SPSS Inc., Chicago USA). Shapiro-Wilk test was used to test for normality of data. Categorical variables such as socio-demographic characteristics of respondents were presented using frequency tables, charts and proportions. The perception of COVID-19 was based on 3-point Likert scaled structured questions. Respondents who scored a median value of the maximum attainable score and above were regarded as having good perceptions. Bivariate analysis using Chi square test was used to assess association between respondents' socio-demographic characteristics and their acceptance to take COVID-19 vaccine as well as perception about COVID-19 vaccine and their acceptance to take COVID-19 vaccine. Logistic regression was used to estimate the Odds ratios at 95% confidence intervals for variables that were statistically significant at bivariate analysis to estimate magnitude and direction of relationships. All analyses were done at the 5% significance level with a p-value of ≤ 0.05 considered as significant.

Results

A total of 814 respondents accessed the on-line questionnaire, however 7 respondents did not give consent. Hence, they were removed from the study.

Socio-demographic characteristics of the respondents

Table 1 shows the socio-demographics of respondents. A total of 807 respondents participated in the survey. Majority of the respondents were between 31 and 50 years (70.3%), with 57.7% males and 42.3% females with a mean age of 41.29 ± 9.52 . A greater percentage of the respondents had tertiary education and above (96.2 %) were married (79.3%). Most respondents were employed (87.2%) with 65.2% working in the health- care related sector. About two - thirds (61.2%) of respondents earn above N30, 000 which is the minimum wage for Nigeria presently.

Respondents' awareness about COVID-19 disease

All respondents were aware of COVID-19 with only 45(5.6%) ever been diagnosed of the disease. 29.9% of the respondents were acquainted with at least someone who had been diagnosed of the disease. Among the respondents, only 11.5% of them had co-morbidity. The recovery within this group of persons diagnosed with COVID-19 was 88.8%. Most of the respondents (96.3%) were aware of the on-going research for vaccine development for COVID – 19; however, 22.4% of the respondents believed there is a cure already for the disease. A greater percentage of respondents prefer to get information about COVID-19 from social media. The elderly (85.3%) were the group perceived most vulnerable for the disease.

Respondents perceived risk of COVID-19 Infection

Over three-fifth (62.8%) of respondents were of the opinion that their work place predisposes them to COVID-19 infection. Majority (87.9%) of respondents believe that the current public health safety measures on the use of face mask, social distancing and washing of hands protect them from the disease. Most of the respondents (80.2%) worry about the low compliance of the safety measures, and that the pandemic might become unmanageable (55.4%) in their states. The respondents expressed a greater worry that their family members may die (86.4%) from the disease than for themselves if they contract the disease (49.6%). Over two-thirds of the respondents were of the opinion that having COVID-19 vaccines will help combat the disease

Community perception of COVID-19 vaccine

A greater proportion of respondents were aware of the use of vaccines to protect against diseases (91.1%) and have been vaccinated before (82.8%). Most respondents disagree that COVID-19 vaccine will kill more than the infection itself (65.2%), that it will only be available for the rich and elites (59.0%), and that it is related to 5G technology (55.0%). However, half of the respondents (51.2%) were of the opinion that the COVID-19 vaccines will not be administered to people with equity and fairness. Overall, the perception towards COVID-19 vaccines was good (77.7%).

COVID-19 vaccine acceptability among respondents

Table 2 shows that 59% of the respondents were willing to accept the vaccine and 59.6% will encourage their family members to take the vaccine. The cost of the vaccine will not hinder 50.4% of the respondents willing to take the vaccine from receiving it, however, almost all of them (98.3%) were of the opinion that the vaccine should be provided free of charge. Also, the

origin of the vaccine will not be a determinant to taking the vaccine for about two-fifth (37%) of those willing to accept the vaccine and 95% of them will encourage their family members to be vaccinated. Majority of them preferred the vaccine manufactured from USA. (Figure1). This was closely followed by the vaccine from UK, and then Europe while vaccine from China was the least preferred. Almost three-fourth (71%) of the respondents indicated the willingness to receive the vaccine for as many times as may be required.

Over 60% of the respondents, who were not willing to accept the vaccine, based their decision on possible adverse effects of the vaccine and mistrust of government. The other reasons were cost implication, vaccine failure, prior unpleasant experiences with vaccines, and uncertainty in the effectiveness of the vaccine. Majority (88.8%) of those that will not accept the vaccine will still not take it if even given free of charge by the government and 78.2% of them will not encourage their family members to take it.

Majority of our respondents (84.6%) are parents and 57.2% of them will allow their children to be vaccinated against COVID-19 infection. Most of the parents that refused vaccination for their wards were on the basis of the unknown long-term effect (82.5%) of the vaccine.

Association between respondents' socio-demographic, co-morbidity, perception about COVID-19 vaccine and their acceptance to take vaccine against COVID 19

Bivariate analysis of the association between respondents' socio-demographics, co-morbidity, perception about COVID-19 infection, and their acceptance to take vaccine against COVID-19 revealed that there was statistical significance between educational level, skill status, type of employment and sector of employment at $p < 0.001$.

Predictors of acceptance of COVID-19 vaccine among respondents

The logistic regression analysis (Table 3) shows that respondents that were unemployed and unskilled were 4 times more likely to accept COVID - 19 vaccine compared to those who were employed and skilled workers respectively. Also, respondents working in non- medical sector were twice more likely to accept COVID-19 vaccine when compared to those in the medical sector.

DISCUSSION

Due to the global spread of COVID-19, and its resultant impact on global health, the demand for COVID- 19 vaccine has been on the increase. However, vaccine hesitancy presents a major

challenge in the efforts at curtailing the spread of the disease. This study shows that all the respondents were aware of COVID-19 infection. This discovery is not unanticipated as the infection is presently a pandemic. Only 5.6% of the respondents as ever been diagnosed of the disease and about a third of them know someone or have a family member who has been diagnosed with COVID-19 with 88.8% recovery rate. This result is however higher than that of a web-based study where 23.4% of respondents knew someone who tested positive for COVID-19.²⁰ Compared with the national data on COVID-19, the result of this study is similar, in that the burden of the disease is minimal in Nigeria relative to that observed in developed nations. This study obtained a higher proportion of recovery compared to a study in Afghanistan where the maximum recovery rate was 55%.²¹ More than three-fourth of the respondents in this study were aware that there is no cure for COVID-19 and this is quite different from a study done in Pakistan where half of the respondents strongly believe that there is a cure for COVID-19 infection.²² This tells us that our respondents are at par with the current burden of the disease.

Almost all of the respondents were aware of the on-going research about vaccine development for COVID-19 with a little above half getting their information from social media platforms. This implies a shift in the quest for information from the convectional audiovisuals. This finding is however lower when compared to a study where most of the respondents (80.2%) had the social media as their major source of COVID-19 information.²³ Compared with the other group of persons, the elderly were considered to be most vulnerable to the disease. This is consistent with all known etiology of the disease. About a tenth of the respondents had co-morbidity.

About 2/3rd of respondents were of the opinion that their place of work predisposes them to the disease. This finding could be due to the fact that a greater proportion of our respondents were from the health sector. This needs to be further explored in subsequent studies. This is similar to a web-based cross-sectional study in which 60% reported their jobs put them at risk of the disease though the result was higher than that reported by Enitan et al (46.7%).^{20, 23}

Community perception of the vaccine is that the vaccine will reduce mortality arising from the disease as majority of respondents were of the view that more people will die from the disease if the vaccine is not introduced and that the vaccine is not related to 5G technology. However, they were of the opinion that there won't be fairness in the administration of the vaccine and that information from health care workers and providers will influence their acceptance of the

COVID-19 vaccine more than that by the government. Overall, there was a good perception of COVID-19 vaccine in community. This reveals the readiness of the populace to the reception of the vaccine though their trust in the government is a major concern as it buttresses the reality on ground that the trust in government programmes and policies have swindled and it needs urgent intervention. This result is in tandem with studies where only 7.3% of respondents associated the vaccine with 5G technology and 79.5% of respondents reported good perception about the vaccine.^{24, 25}

This study revealed that 59% of respondents were willing to accept COVID-19 vaccine when it becomes available in Nigeria despite their concern about the safety and effectiveness of the vaccine. This is a high proportion and this might be closely related to the location of the survey as it is a known fact that vaccine refusal and hesitancy is more in the northern part of the country. Our result is similar to a studies conducted by Olomofe et al and Akinyemi et al that obtained 58% and 59% respectively as well as a global survey where 54-64% acceptance rate was observed.²⁶⁻²⁸ However, it is lower when compared to studies conducted on social media users (74%) but higher than a web-based survey with acceptance level of 40%.^{19, 20} Almost all respondents willing to take the vaccine will encourage their family members to take the vaccine.

Respondents' predisposition to vaccine cost, vaccine origin as well as number of doses required vary in our study. The cost of the vaccine was a major factor among those willing to accept it as greater than half were no more willing to accept the vaccine if payment will be required. This is an important information to note for the government and agencies involved in the vaccine process as the rate of acceptance will increase if the vaccine is provided free of charge. This is similar to findings from a study conducted in Osun state in which a decline was noticed if payment will be required for the vaccine.²⁷ Our study also revealed that a greater percentage of the respondents who were willing to accept the vaccine expressed readiness to take as many doses as may be required. This is in contrast to a study where people were not willing to take multiple doses.²⁶ About three-fourth of respondents were concerned about the origin of the vaccine, with majority of them having preference for the vaccine which emanates from USA. This may suggest an exposure of respondents to COVID-19 related information from the USA accessed through social media and traditional media platform as well as a trust in the country's vaccine discovery process.

About a quarter of the respondents were not willing to accept the vaccine. This may be as a result of increased information on the different vaccine candidates available at the time of

conducting this survey. Of these respondents, only a minute number were willing to take the vaccine if it will be given free of charge. This finding is similar to a study conducted among social media users in Nigeria but higher than that obtained by Olomofe et al.^{19, 26} The major reasons for not willing to take up the vaccine were the fear of side effects which is closely followed by lack of trust in the government and cost of the vaccine. This is similar to findings where the unwillingness to receive the COVID-19 vaccine was due to the perceived hastiness of the clinical trials, untrustworthiness of the process, and possible side effects of the vaccine.^{19, 28} Most of this group of respondent will not encourage their family members to take the vaccine. Parental acceptance to vaccinating their children was also looked into in this study and this is the first study to record such. 57.2% consented to their children having the vaccine while 29.6% declined and 13.2% were indifferent. The two main reasons for declining were that COVID 19 was not harmful to children and the vaccine was not yet evaluated for its long-term side. This study showed that about two-thirds of the participants will encourage their family members to be vaccinated against COVID-19. This is similar to findings in a study in Bangladesh.²⁹ Although a greater percentage of the respondents had a good perception about COVID-19 infection, it did not translate to being willing to take the vaccine as there was no statistically significant association between perception and willingness to accept the vaccine.

There is statistically significant association between vaccine acceptability and education, skill status, type of employment and sector of employment. Although there was no statistically significant difference in sex and vaccine acceptability, the finding in this study was similar to that obtained by Adebisi in which a slightly higher proportion of males were willing to take the vaccine compared to the females.¹⁹ Predictors of acceptance of COVID-19 vaccine were skill status, type of employment and sector of employment. This is not unexpected because the risk of exposure to this infection is dependent on the type of job and the sector of the economy where one works. This is in contrast to findings by Olomofe et al in which being male and good perceptions of vaccine were found to be predictors of uptake of a potential COVID 19 vaccine.²⁶

Limitations

The respondents are limited to only the southwestern states of Nigeria, hence the result cannot be generalized to the whole country. Also, those without internet connectivity on their mobile phones were exempted from the study.

Conclusions

Despite the high level of willingness to take the COVID-19 vaccine when it becomes available among our respondents in the south western part of Nigeria, lack of trust in government programme and unknown side effects were the major reasons cited for non- acceptability of the vaccine. Hence, the government needs to improve on restoring the trust of the citizens towards achieving a high vaccination rate for COVID-19 vaccine within the south-west when the exercise commences.

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Table 1. Socio-demographic characteristics of respondents recruited from an online survey from South Western States of Nigeria from Dec 2020-Jan 2021 (N=807)

Variables	Frequency	Percentage
Gender		
Female	466	57.7
Male	341	42.3
Age (years)		
<20	7	0.9
21-30	108	13.4

31-40	263	32.6
41-50>50	304	37.7
Mean age	125	15.5
	41.29 ± 9.52	
Education		
None	6	0.7
Primary	1	0.1
Secondary	24	3.0
Tertiary	387	48.0
Postgraduate	389	48.2
Marital status		
Single	144	17.8
Married	640	79.3
Divorced	10	1.2
Widow	11	1.4
widower	2	0.2
Religion		
Christianity	686	85.0
Islam	120	14.9
Traditional	1	0.1
Employment status		
Employed	704	87.2
Unemployed	103	12.8
Skill status (n=704)		
Skilled	678	96.3
Unskilled	26	3.7
Type of employment (n=704)		
Artisan	12	1.7
Civil servant	427	60.7
Corporate organization/company	137	19.5
Public servant (elected or appointed government official)	54	7.7
Trade/micro small medium enterprises	74	10.5

Sector of employment working(n=704)		
Medical sector (Health-care related)	459	65.2
Non-medical sector (Non-health care related)	245	34.8
Monthly income (n=704)		
<30000	273	38.8
>30000	431	61.2

Table 2. COVID-19 vaccine acceptability among respondents recruited from an online survey from South Western States of Nigeria from Dec 2020-Jan 2021(N=807)

Statements	Yes (%)	No (%)	Indifferent (%)
Will you accept to be vaccinated against COVID-19	476(59.0)	197(24.4)	134(16.6)
Will you encourage your family members to be vaccinated for COVID-19	481 (59.6)	172 (21.3)	154 (19.1)
Vaccine Acceptance (476)			
Will cost be an issue in taking the vaccine	240 (50.4)	181 (38.0)	55 (11.6)
Should the government make it available free of charge	468 (98.3)	1 (0.2)	7 (1.5)
Will the origin of the vaccine be a determinant to you accepting the vaccine?	255 (53.6)	176 (37.0)	45 (9.4)
Will you encourage your family members to be vaccinated for COVID-19	452 (95.0)	7 (1.5)	17 (3.5)
Vaccine Refusal (197)			
If given free of charge by the government will you consider taking the vaccine	4 (2.1)	175 (88.8)	18 (9.1)

If enforced by your employer will you agree to take the vaccine	18 (9.1)	142 (72.1)	37 (18.8)
Will you encourage your family members to be vaccinated for COVID-19	11 (5.6)	154 (78.2)	32 (16.2)

Table 3. Predictors of acceptance of COVID 19 vaccine among respondents recruited from an online survey from South Western States of Nigeria from Dec 2020-Jan 2021(N=476)

Variable	B	aOR (95% CI)	p value
Education			
None(Ref)			
Primary	-0.330	0.719(0.000)	1.000
Secondary	21.090	0.000	0.999
Tertiary	20.915	0.000	0.999
Employment status			
Employed(Ref)			
Unemployed	17.391	4.056(2.475 – 6.645)	*<0.001
Skill status (n=704)			
Skilled (Ref)			
Unskilled	1.486	4.417(1.416 – 13.782)	*<0.011
Sector of employment working(n=704)			

Medical sector (Ref)			
Non-medical sector (Non-health care related)	0.749	2.115(1.518 – 2.947)	*<0.001

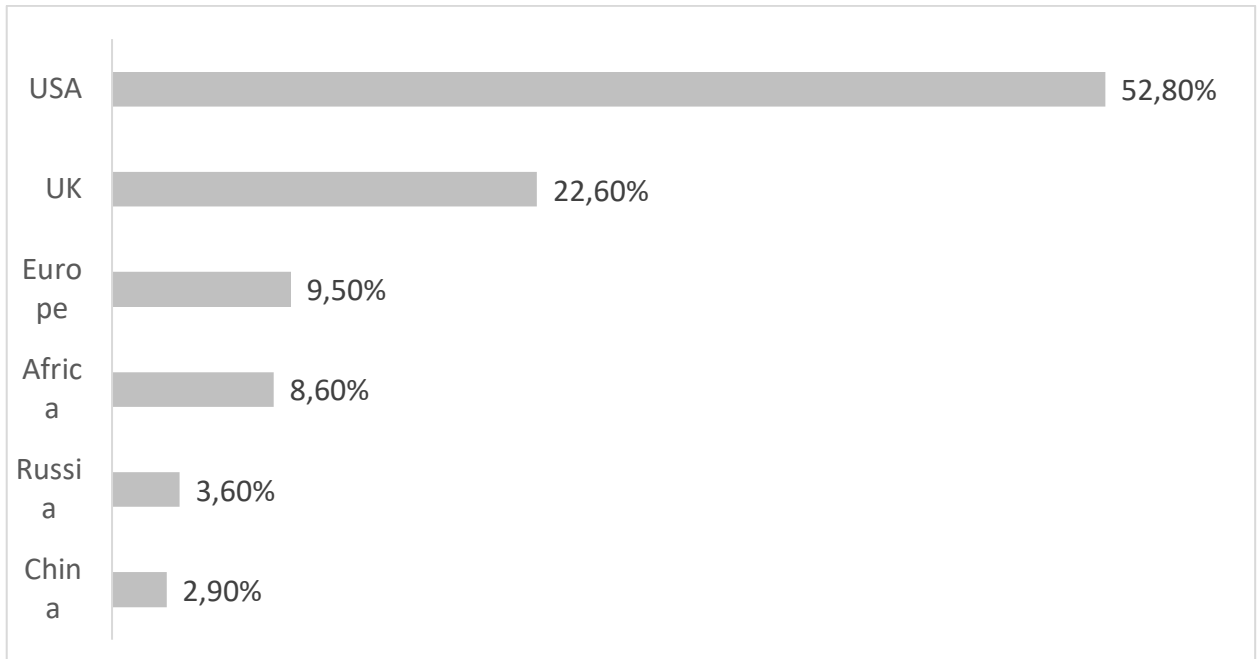


Figure 1. Preference for COVID-19 vaccine origin among respondents recruited from an online survey from South Western States of Nigeria from Dec 2020-Jan 2021 (N=476)