Ethnicity and Education as Predicting Factors for the Acceptance of the COVID-19 Vaccine in Nigeria

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Abstract

Aim. The aim of this study was to examine ethnicity and educational level as predicting factors for the acceptance of COVID-19 vaccines in Nigeria. Two (2) hypotheses were posed for this study.

Methods. This study employed the concurrent explanatory design method. The sample was comprised of 32,224 respondents, all Nigerian citizens. A multi-stage sampling technique was employed for the survey involving quantitative data. A questionnaire was used as the instrument for data collection.

Results. The findings of this study revealed that there is a significant difference in COVID-19 vaccine acceptance based on tribe/ethnicity. The Tiv tribe and respondents who had tertiary education had the highest acceptance rate of COVID-19 vaccine.

Conclusion. The findings of this study show that there is a significant relationship between ethnicity, educational level and acceptance of COVID-19 vaccines in Nigeria. To improve the community-based COVID-19 immunization drive, it is crucial to develop creative, theory-based interventions to involve important stakeholders like village chiefs, religious leaders, and others. Additionally, a successful health message campaign must be implemented to fight the widespread falsehoods and misinformation that have contributed to the non-acceptance of COVID-19 vaccination.

Introduction

The SARS-CoV-2 event, also known as COVID-19, spread quickly across the globe and was subsequently classified as a worldwide epidemic by the WHO. More than 628 million confirmed cases of COVID-19 have been documented globally as of November 2022, and there have been more than 6 million related deaths. This has caused enormous psychological, social, and economic unrest all over the world (1). On February 27, 2020, Lagos, Nigeria received the first report of it (2). In Nigeria, more than 266,000 cases and more than 3,000 fatalities have been documented (3). The coronavirus pandemic is currently humanity's biggest challenge. Normalcy as it was prior to the pandemic is unlikely to return unless a safe and effective vaccination is put into place.

Vaccines strengthen the immune system by enhancing the body's inherent defense systems to raise resistance to specific disease pathogens (4). Memory cells are produced by vaccinations, which instruct the immune system to rapidly manufacture antibodies when an infection naturally occurs (5). Numerous COVID-19 vaccinations that are both reliable and safe were widely distributed not long after the pandemic's inception. To promote the production of antibodies and give protection against pathogens like bacteria and viruses, a live or attenuated antigen is used in a vaccine. Vaccination is one of the best preventative methods against infectious diseases (6), but for a vaccine program to be successful, acceptance and coverage are key factors (6). There has been a widespread outbreak of misinformation regarding the approved COVID-19 vaccines as a result of the licensing and distribution of some effective and safe vaccinations against severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2). This false information does not only apply to Nigeria. According to a number of media reports, mistrust of the US and EU has grown to be a significant barrier to broader vaccination coverage (7). Only 67% of Americans surveyed by Malik et al. at Yale University indicated a willingness to get the COVID-19 vaccination prior to the approval of any vaccine. However, since that time, this proportion has increased (6). Worldwide, over 12 billion vaccine doses have been administered (1). According to GeoPoll surveys undertaken in a few African nations, vaccine hesitancy declines when more vaccines are made available (8). As of October 30, 2022, over 87 million vaccine doses have been administered in Nigeria (1). As of November 4, 2022, 40 out of 100 people in Nigeria have received their first dose of the COVID-19 vaccination (16), while just 3,369,628 persons have received the second dose, and more than 200 million people, or 97.15 percent of the population, were still unvaccinated (9). Despite the acute reluctance to receive the COVID-19 vaccination and the urgent necessity for it, there is still ample COVID-19 vaccine indifference. As a result, vaccination rates are still low everywhere, particularly in Africa and Nigeria.

Nigeria will probably fall short of its COVD-19 vaccine goals if things continue as they are. Nigeria's chances of reaching its goal of immunizing more than 15% of the population are slim. There are conflicting opinions regarding the safety and effectiveness of the vaccine as well as the facts regarding the pandemic's evolution (6-10). Despite such responses, a Nigerian online survey performed before the first vaccination was approved found that 58.2% of respondents would get the vaccine once it was available, while 19.2% and 22.6 percent, respectively, were unwilling or unsure (10). Over the years, it has been discovered that ethnic minorities have lower vaccination rates. This is frequently tied to concerns regarding trust in the government or the healthcare system, but sometimes it is also connected to convenience and a lack of health insurance. People from ethnic minorities were more likely to get the H1N1 vaccine in the UK, US, and Australia, according to a systematic analysis of vaccination intentions and behavior (11). This was explained by the higher likelihood of hospitalization in the UK for people from the Asian ethnic minority in particular (12).

In addition, Bangladeshi and Pakistani children's H1N1 mortality rates were higher than those of British children, raising awareness in those populations (13). The findings of several studies (7-14) showed a significant association between vaccine acceptance and race/ethnicity, with being Black/African American and American Indian as independent predictors. Another significant element that could have an impact on vaccination rates is the level of education; studies conducted in the past have demonstrated a relationship between level of education and vaccination rates. Two studies (14,15) have demonstrated a substantial relationship between the level of education and vaccination uptake among the general population, which is also consistent with studies on

vaccine reluctance for polio. Nigeria is not an exception to the refusal of some West African populations to embrace COVID-19 immunization, despite the benefits of vaccines and their usefulness in preventing specific diseases being widely known around the world. This study is intended to determine the factors that influence how well the COVID-19 vaccine is received in Nigeria.

Research question

Is there a significant relationship between the level of education, ethnicity of Nigerians and the acceptance of a COVID-19 vaccine?

Hypothesis

H1: There is no significant difference between the acceptance of the COVID-19 vaccine and ethnicity.

H2: There is no significant difference between the acceptance of the COVID-19 vaccine and the level of education.

Methods

In addition to using concurrent explanatory ways of quantitative approaches, this study used a descriptive method design. Nigerian nationals who live in the country made up the study's population. The sample size for this study was determined using a list of states from various geopolitical zones that were chosen based on their ethnic composition. 32,224 people participated in the sample. A multi-stage sampling procedure was used for the survey containing quantitative data. The states were categorized in the first stage according to the main ethnic groups in Nigeria. The second stage involved selecting respondents from each ethnic group according to their population percentage in the nation using simple random sampling. They are Hausa (29%), Fulani (26%), Yoruba (21%), Igbo (18%), Ijaw (10%), Kanuri (4%), Ibibio (3.5%) and Tiv (2.5%). Of the total population, from which 0.2 percent of the population was chosen, 10,851 respondents were Hausa, 8,062 were Fulani, 7,281 were Yoruba, 3,087 were Igbo, 1,045 were Ijaw, 928 were Kanuri, 592

were Ibibio, and 378 were Tiv. The instrument was given to the chosen study participants in the third stage using the purposive sampling method. The instrument was a closed-ended questionnaire adapted from Adeleke et al (16). The instrument consisted of two parts: the first part covered the respondents' background data while the second part consisted of a 10-question item to answer why they would accept COVID-19 vaccination. The instrument was validated by experts and transcribed into 8 different languages to suit the needs of the respondents. Both descriptive and inferential statistics were used to analyze the data that were gathered for this investigation. Inferential statistics for the t-test and ANOVA were used to analyze quantitative data obtained from the questionnaire.

Results

Table 1. **Demographic characteristics of the respondents**		
Variables	**Frequency**	**Percentage**
Ethnicity		
Hausa	10851	33.7
Yoruba	7281	22.6
Fulani	8062	25
Igbo	3087	9.6
Ijaw	592	1.8
Kanuri	928	2.9
Ibibio	378	1.2
Tiv	1045	3.2
Level of education		
No formal education	14946	46.4
Primary school	3399	10.5
Secondary school	4154	12.9
Tertiary institution	9725	30.2
Total	**32224**	**100**

Table 2. **ANOVA summary showing the difference between COVID-19 vaccine acceptance and ethnicity**

				COVID-19 vaccine acceptance					
Tribe	N	Mean	Std. deviation		Sum of squares	df	Mean square	F	Sig.
Hausa		2.9530	0.83541						
Yoruba	7281	3.7803	0.92698						
Fulani	8062	3.3772	0.86345	Between groups	10267.189	7	1466.741	1798.303	0.00
Igbo	3087	4.2513	1.01029	Within groups	26276.185	32216	0.816		
Ijaw	592	4.3589	1.04507	Total	36543.374	32223			
Kanuri	928	4.6039	1.05758		-				
Ibibio	378	4.8870	1.04559						
Tiv	1045	4.9913	1.06946						
Total	32224	3.5326	1.06493						

Table 2 revealed that there is a significant difference in COVID-19 vaccine acceptance based on tribe/ethnicity; $F (7.32216)=1798.303$, $p<0.05$, $\eta^2=0.281$. Thus, the null hypothesis is rejected. The Tiv tribe had a higher acceptance rate of the COVID-19 vaccine while the Hausa people showed low acceptance of the COVID-19 vaccine.

Table 3. **Post hoc test showing the difference between COVID-19 vaccine acceptance and ethnicity**

		Multiple comparisons				
		Dependent variable: Covid-19 vaccine acceptance				
		Bonferroni				
(I) TRIBE	(J) TRIBE	Mean difference (I-J)	Std. Error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
hausa	Yoruba	-0.82722*	0.01368	0.000	-0.8700	-0.7845
	fulani	-0.42412*	0.01328	0.000	-0.4656	-0.3826
	Igbo	-1.29830*	0.01842	0.000	-1.3559	-1.2408
	Ijaw	-1.40588*	0.03812	0.000	-1.5250	-1.2868
	Kanuri	-1.65090*	0.03089	0.000	-1.7474	-1.5544
	Ibibio	-1.93391*	0.04725	0.000	-2.0815	-1.7863
	Tiv	-2.03829*	0.02925	0.000	-2.1297	-1.9469
yoruba	Hausa	0.82722*	0.01368	0.000	0.7845	0.8700
	Fulani	0.40311*	0.01460	0.000	0.3575	0.4487
	igbo	-0.47108*	0.01940	0.000	-0.5317	-0.4105
	ijaw	-0.57865*	0.03860	0.000	-0.6992	-0.4581
	kanuri	-0.82368*	0.03148	0.000	-0.9220	-0.7253
	ibibio	-1.10669*	0.04764	0.000	-1.2555	-0.9579
	tiv	-1.21106*	0.02988	0.000	-1.3044	-1.1177

fulani	hausa	0.42412*	0.01328	0.000	0.3826	0.4656
	yoruba	-0.40311*	0.01460	0.000	-0.4487	-0.3575
	igbo	-0.87418*	0.01911	0.000	-0.9339	-0.8145
	ijaw	-0.098176*	0.03846	0.000	-1.1019	-0.8616
	kanuri	-1.22678*	0.03131	0.000	-1.3246	-1.1290
	ibibio	-1.50980*	0.04753	0.000	-1.6583	-1.3613
	tiv	-1.61417*	0.02969	0.000	-1.7069	-1.5214
igbo	hausa	1.29830*	0.01842	0.000	1.2408	1.3559
	yoruba	0.47108*	0.01940	0.000	0.4105	0.5317
	fulani	0.87418*	0.01911	0.000	0.8145	0.9339
	ijaw	-0.10757	0.04052	0.222	-0.2342	0.0190
	kanuri	-0.35260*	0.03381	0.000	-0.4582	-0.2470
	ibibio	-0.63561*	0.04921	0.000	-0.7894	-0.4819
	tiv	-0.73999*	0.03232	0.000	-0.8410	-0.6390
ijaw	hausa	1.40588*	0.03812	0.000	1.2868	1.5250
	yoruba	0.57865*	0.03860	0.000	0.4581	0.6992
	fulani	0.98176*	0.03846	0.000	0.8616	1.1019
	igbo	0.10757	0.04052	0.222	-0.0190	0.2342
	kanuri	-.24503*	0.04750	0.000	-0.3934	-0.0966
	ibibio	-0.52804*	0.05946	0.000	-0.7138	-0.3423
	tiv	-0.63241*	0.04646	0.000	-0.7775	-0.4873
kanuri	hausa	1.65090*	0.03089	0.000	1.5544	1.7474
	yoruba	0.82368*	0.03148	0.000	0.7253	0.9220
	fulani	1.22678*	0.03131	0.000	1.1290	1.3246
	igbo	0.35260*	0.03381	0.000	0.2470	0.4582
	ijaw	0.24503*	0.04750	0.000	0.0966	0.3934
	ibibio	-.028301*	0.05511	0.000	-0.4552	-0.1109
	tiv	-0.38739*	0.04074	0.000	-0.5146	-0.2601
ibibio	hausa	1.93391*	0.04725	0.000	1.7863	2.0815
	yoruba	1.10669*	0.04764	0.000	0.9579	1.2555
	fulani	1.50980*	0.04753	0.000	1.3613	1.6583
	igbo	0.63561*	0.04921	0.000	0.4819	0.7894
	ijaw	0.52804*	0.05946	0.000	0.3423	0.7138
	kanuri	0.28301*	0.05511	0.000	0.1109	0.4552
	tiv	-0.10437	0.05421	1.000	-0.2737	0.0650
Tiv	hausa	2.03829*	0.02925	0.000	1.9469	2.1297
	yoruba	1.21106*	0.02988	0.000	1.1177	1.3044
	fulani	1.61417*	0.02969	0.000	1.5214	1.7069
	igbo	0.73999*	0.03232	0.000	0.6390	0.8410
	ijaw	0.63241*	0.04646	0.000	0.4873	0.7775
	kanuri	0.38739*	0.04074	0.000	0.2601	0.5146
	ibibio	0.10437	0.05421	1.000	-0.0650	0.2737

* The mean difference is significant at the 0.05 level.

Table 3 further corroborates the results of table 2. The Bonferroni post hoc analysis for multiple comparisons conducted showed that the mean value of COVID-19 vaccine acceptance was significantly different between Hausa, Fulani, Yoruba, Igbo, Ijaw, Kanuri, Ibibio and Tiv. The acceptability of COVID-19 vaccines tends to be significantly higher among the Tiv tribe (2.03829, $p<0.00$) followed by the Fulanis (1.21106, $p<0.00$) and the Yorubas (1.21106, $p<0.01$). These results show that the Tiv tribe has the highest level of COVID-19 vaccine acceptability.

Table 4 revealed that there is a significant difference in COVID-19 vaccine acceptance based on the level of education of the respondents; F $(3.32220)=1833.981$, $p<0.05$, $\eta^2=0.146$. Thus, the null hypothesis is rejected. Respondents who had no formal education showed a low acceptance rate for COVID-19 vaccines while respondents who graduated from tertiary institutions had a high acceptance rate for COVID-19 vaccines.

Table 4. ANOVA summary showing the difference between COVID-19 vaccine acceptance and level of education

COVID-19 vaccine acceptance

Education	N	Mean	Std. deviation		Sum of squares	df	Mean square	F	Sig.
No formal education	14946	3.111	0.9163						
Primary school	3399	3.619	1.082						
Secondary school	4154	3.868	1.098	Between groups	5330.04	3	1776.68	1833.98	0.00
Tertiary institution	9725	4.006	0.997	Within groups	31213.33	32220	0.969		
Total	32224	3.532	1.064	Total	36543.37	32223			

Table 5. Post hoc test showing the difference between COVID-19 vaccine acceptance and level of education

Multiple comparisons

Dependent variable: Covid-19 vaccine acceptance

Bonferroni

(I) EDUCATIONAL_LEVEL	(J) EDUCATIONAL_LEVEL	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval Lower bound	Upper bound
no formal education	primary school	-0.50835*	0.01870	0.000	-.05577	-0.4590
	secondary school	-0.75690*	0.01726	0.000	-0.8025	-0.7114
	tertiary institution	-0.89515*	0.01282	0.000	-0.9290	-0.8613
primary school	no formal education	0.50835*	0.01870	0.000	0.4590	0.5577
	secondary school	-0.24856*	0.02276	0.000	-0.3086	-0.1885
	tertiary institution	-0.38681*	0.01961	0.000	-0.4385	-0.3351
secondary school	no formal education	0.75690*	0.01726	0.000	0.7114	0.8025
	primary school	0.24856*	0.02276	0.000	0.1885	0.3086
	tertiary institution	-0.13825*	0.01824	0.000	-0.1864	-0.0901
tertiary institution	no formal education	0.89515*	0.01282	0.000	0.8613	0.9290
	primary school	0.38681*	0.01961	0.000	0.3351	0.4385
	secondary school	0.13825*	0.01824	0.000	0.0901	0.1864

*. The mean difference is significant at the 0.05 level.

Table 5 further corroborates the result of table 4. The Bonferroni post hoc analysis for multiple comparisons conducted showed that the mean value of COVID-19 vaccine acceptance was significantly different between the respondents according to their educational background. The acceptability of COVID-19 vaccines tends to be significantly higher among those who had tertiary education and those with no formal education (0.89515, $p<0.00$), followed by those who are secondary school leavers (0.75690, $p<0.00$) and those with no formal education, followed by primary school leavers (0.50835, $p<0.00$).

Discussion

The results of Table 2 showed that the Tiv ethnic group had the highest likelihood to take the COVID-19 vaccination (mean=4.9913), followed by the Ibibios (mean=4.887), and that the Hausas had the lowest probability of doing so, followed by the Fulanis (mean=3.3772). Over time, it has been discovered that ethnic minorities have lower vaccination rates. This is frequently tied to concerns with trust in the government or the healthcare system, but sometimes it is also a result of convenience and a lack of health insurance. People from ethnic minorities were more likely to get the H1N1 vaccine in the UK, US and Australia, according to a systematic analysis of vaccination intentions and behavior (11). This further corroborated the findings (7-14), which showed a substantial relationship between race/ethnicity and vaccine acceptability, with American Indian and Black/African American status serving as independent predictors. Vaccination hesitancy remains a potential obstacle against the prompt distribution and administration among citizens. In addition, one study (22) showed that being a member of the Hausa and living in the northern part of the country are factors that have a significant positive association with COVID-19 vaccine uptake. Table 4 shows that people who are graduates of tertiary institutions displayed the highest tendency of accepting COVID-19 vaccines (mean=4.0064), followed by the senior secondary school leavers (mean=3.8682), while those who had no formal education (mean=3.1113) had the lowest tendency of accepting the COVID-19 vaccine followed by the primary school leavers (mean = 3.6169). The study was in accordance with existing studies (14-15) that have shown that there is a substantial link between level of education and vaccination uptake. These findings also support research on vaccine hesitancy for polio. Moreover, existing studies (20,21) support the present study by showing that individuals with higher levels of education were more likely to accept the COVID-19 vaccine. The reasons for these differences could be religious and cultural backgrounds. Moreover, the investigation carried out by CDC on COVID-19 vaccine hesitancy in Nigeria between July 2021 and April 2022 showed that the majority of the study respondents lacked confidence in the vaccine, was afraid of possible side effects from the vaccine, had mistrust of the government and did not believe that COVID-19 existed (18). A monitoring study conducted during this period engaged Nigeria's mass vaccination campaigns at the sub-national level, which increased the coverage of use (18). A review (19) has demonstrated significant variations in the COVID-19 vaccine acceptance rates across different population subgroups. However, certain time-trend patterns were observed based on when the population groups were compared. Among healthcare workers, the acceptance rate was 55.5% in October 2020, 32.5% in January 2021, and 45.6% in March 2021. Among adults, the acceptance rate was 20.0% in May 2020, 58.2% in July 2020, 50.2% in August 2020, 51.1% in February 2021, and 45.6% in March 2021. It seems that the COVID-19 vaccine acceptance rates first declined, and then began to increase over time. It is, however, clear that population differences exist in addition to time trends. This picture may be regulated by the study participants' levels of awareness and knowledge of the COVID-19 vaccine at the time of the study. Based on the findings, we recommend that in order to improve a community-based COVID-19 immunization drive, it is crucial to develop creative, theory-based interventions to involve important stakeholders like village chiefs, religious leaders, and others. Additionally, a successful health message campaign must be implemented to fight the widespread falsehoods and misinformation that have contributed to the non-acceptance of COVID-19 vaccination. Moreover, policymakers, healthcare professionals, and other stakeholders in the areas of information dissemination and health promotion should help to dispel myths about COVID-19 vaccination.

Conclusion

The findings of this study show that there was a significant relationship between ethnicity, level of education and the determinant of acceptance of the COVID-19 vaccine in Nigeria. This study shows that COVID-19 vaccination acceptance in areas with low population will also affect the acceptance rate. It also showed that population differences exist based on religion and level of awareness and knowledge of the COVID-19 vaccine at the time of the study.

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ETNIČKA PRIPADNOST I OBRAZOVANJE KAO ČIMBENICI PREDVIĐANJA ZA PRIHVAĆANJE CJEPIVA PROTIV BOLESTI COVID-19 U NIGERIJI

Sažetak

Cilj ove studije bio je ispitati etničku pripadnost i razinu obrazovanja kao faktore predviđanja prihvaćanja cjepiva protiv bolesti COVID-19 u Nigeriji. Za ovu studiju postavljene su dvije hipoteze.

Metode. U ovoj studiji primijenjena je metoda paralelnog objašnjenja. Uzorak se sastojao od 32 224 ispitanika, od kojih su svi građani Nigerije. Za istraživanje koje uključuje kvantitativne podatke primijenjena je metoda višefaznog uzorkovanja. Kao instrument prikupljanja podataka primijenjen je upitnik.

Rezultati. Nalazi ove studije otkrili su da postoji značajna razlika u prihvaćanju cjepiva protiv bolesti COVID-19 na temelju plemena / etničke pripadnosti. Pleme Tiv i ispitanici koji su imali tercijarno obrazovanje imali su najveću stopu prihvaćanja cjepiva protiv bolesti COVID-19.

Zaključak. Nalazi ove studije pokazuju da postoji značajan odnos između etničke pripadnosti, razine obrazovanja i prihvaćanja cjepiva protiv bolesti COVID-19 u Nigeriji. Kako bi se poboljšala akcija cijepljenja protiv bolesti COVID-19 u zajednici, ključno je razviti kreativne, teorijski utemeljene intervencije za uključivanje važnih dionika poput seoskih poglavara, vjerskih vođa i drugih. Osim toga, mora se provesti uspješna kampanja zdravstvenih poruka u borbi protiv raširenih laži i dezinformacija koje su pridonijele neprihvaćanju cijepljenja protiv bolesti COVID-19.