

Cross-sectional Survey of Knowledge, Attitudes and Practices Towards the COVID-19 Pandemic During the Lockdown Period in Nigeria

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Abstract

People's knowledge, attitudes and practices (KAP) have been found to be significant metrics of success against the spread of COVID-19. A few studies have equally evaluated Nigerians' KAP towards COVID-19 but were limited to one geo-political zone or selected cities in Nigeria. This study investigated the KAP of Nigerians towards the COVID-19 pandemic, covering all the 36 states of the federation and the Federal Capital Territory. Survey data were collected through an online questionnaire. The questionnaire comprised 7 demographic variables, 6 knowledge-based questions, 5 attitude-based questions and 5 practice-based questions on COVID-19. The statistical analysis methods used included Kruskal Wallis test, Mann-Whitney U test, multiple linear regression, Chi-square test of independence and logistic regression models, accordingly. A total of 1320 respondents completed the questionnaire during the study period (between March 31 and April 28, 2020 inclusively). Among these respondents, 54.2% were male, 64.2% were between 25 and 54 years and 33.2% were involved in physical labour. There was overall a low percentage (45%) of correct knowledge (CK) about the COVID-19 pandemic in Nigeria when compared with China. This was suspected to be associated with infodemic. In general, there was more incorrect knowledge (IK) than CK of COVID-19 among the

respondents. The overall percentage (67%) of correct practices (CP) against COVID-19 was reported as being moderate. Findings revealed the need for the Nigerian government to control the practice of going to worship places and/or parties during the pandemic. Recommendation on strategic KAP towards COVID-19, infodemic control, suicide or self-harm prevention and non-Nigerian discrimination sensitization programme were provided in the study.

Keywords: COVID-19, Nigeria, knowledge, attitudes, practices

Introduction

On January 30, the World Health Organization (WHO) declared the China-originated severe acute respiratory syndrome coronavirus (SARS-CoV-2) as a Public Health Emergency of International Concern (PHEIC). The World Health Organization also named the disease that causes SARS-CoV-2 as COVID-19 (meaning Coronavirus 2019) (WHO, 2020a). Zhou et al. (2020) reported that SARS is associated with fever, cough, headache, muscle pain, and other symptoms of respiratory infection. They also documented that while the standard incubation period for COVID-19 is between 3 and 7 days, inclusively, there have been records of 24-day incubation.

According to the International Federation of the Red Cross and Red Crescent Societies (IFRC), in December 31, 2019, the government of China reported an unknown pneumonia case in Wuhan of Hebei province (IFRC, 2020). The first COVID-19 death was documented in Wuhan on January 11, 2020, while on January 20, China confirmed COVID-19 as a human-to-human transmission virus. As at April 28, the virus had spread around the world, including the following countries with number of confirmed cases as follows: Spain (209,465), Italy (199,414), United Kingdom (157,153), India (29,435), Iran (91,472), United States of America (960,916), South Africa (4,793), and Nigeria (1,337).

African countries, having learnt from the Ebola virus epidemic, had prepared against the importation of COVID-19 into their communities (Kapata et al., 2020). Nigeria, being one of the classified high-risk African countries, introduced control (non-pharmaceutical) measures against the spread of COVID-19. These measures included interviewing

passengers that arrived from COVID-19 hotspot countries, issuing travel bans, screening international travellers at the international airports (excluding the local airports), and self-quarantine of visitors from hotspot countries. Other internal control measures used by Nigeria include shut down of COVID-19 hotspot states within the country, such as Ogun, Lagos, and Kano states and the Federal Capital Territory (FCT); shut-down of inter-state movement; indefinite suspension of attendance at schools, places of worship, markets, relevant national programmes; closure of airports and land borders; social distancing; promotion of hand washing with soap and running water; and good hygiene among the populace (Adepoju, 2020 and Bassey and Akaninyene, 2020).

The work of WHO (2020b) reported that, as at April 27, Nigeria was the fifth most infected country in Africa after South Africa, Algeria, Cameroon and Ghana, with 1337 infected cases and 40 deaths on record. WHO also reported that Nigeria had a community transmission case of the COVID-19 epidemic. While the Nigerian government continued to promote these non-pharmaceutical control measures to curtail the community spreading of COVID-19 epidemic, the level of adherence of Nigerians was very significant for the government to accomplish this aim. A study by the IFRC (2020) had confirmed the distortion of COVID-19 information with *infodemic* (a term coined by WHO), which creates contradicting knowledge of the disease. The study by Zhong et al. (2020) reported that the level of knowledge and the attitude of the populace towards an infectious/contagious virus is related to the level of emotional response among the same populace. This emotional response level will, consequently, determine the level of spread (community transmission) of such an epidemic disease. Hence, it has become imperative to understand the awareness and level of practice of preventive measures against COVID-19 in Nigeria. This study investigated the knowledge, attitudes and practices (KAP) of Nigerians towards COVID-19 during the epidemic period. The four subsequent sections in this study discuss the statistical methods, the statistical analysis with corresponding results, the results obtained, and the conclusion.

Statistical Methodology

Participants

The Federal Government of Nigeria (FGN) declared the enforcement of an initial two-week lockdown in Abuja, Lagos and Ogun

states on March 30, 2020 in order to reduce the spread of COVID-19 within the country. However, the first-phase gradual lifting of the lockdown order started on May 4, 2020. This national online survey was conducted between March 31 and April 28, 2020, inclusively. An online survey, as against a community-based national survey, was conducted for this study due to the lockdown exercise as at the time of this survey. An e-poster was designed that showed a brief background description, objective, procedures, voluntary nature of participation, declaration of anonymity and confidentiality, and a Google form link that hosted the questionnaire. The questionnaire-poster was broadcast on WhatsApp platforms (both individual and group), Twitter, Instagram and individual Facebook pages. Similarly, the e-poster was advertised on the official Facebook advertisement campaign system in order to gain the national attention of Nigerian Facebook users.

Measures

The COVID-19 preparedness and response questionnaire released by the IFRC, UNICEF and the World Health Organization (IFRC, UNICEF & WHO, 2020) was adopted and moderated by the authors to suit the KAP of COVID-19 in Nigeria. The questionnaire comprised the demographic section and the knowledge, attitudes, and practices (KAP) section. The seven demographic variables used were state of residence (within Nigeria), gender, age, marital status, religion, occupation, and level of education. The KAP section of the questionnaire had six knowledge-based questions (tagged K1-K6), five attitude-based questions (tagged A1 - A5) and five practice-based questions (tagged P1 - P5) with multiple choice options, the Boolean option or the Likert type option. Table 1 summarizes the KAP questionnaire (with option properties). Questions K1, K2 and K3 examined the respondents' knowledge on the type and source of information about COVID-19. Questions K4, K5 and K6 investigated the respondents' knowledge of the transmission mode, symptoms and prevention of COVID-19. In total, there were fifty-two (52) knowledge options with thirty-three (33) correct knowledge options and nineteen (19) incorrect knowledge options.

Table 1: Survey questionnaire for the assessment of Knowledge, Attitude and Practice towards COVID-19

	Questions	Options
K1	Have you ever heard about the new coronavirus disease (COVID-19)?	Boolean option (Yes, No)
K2	What kind of information have you received about the disease?	5 Multiple choice options
K3	Where did you hear about the new coronavirus from? What channels or sources?	17 Multiple choice options
K4	How does the coronavirus spread?	11 Multiple choice options
K5	What are the main symptoms?	8 Multiple choice options
K6	Do you know how to prevent it?	9 Multiple choice options
A1	How can you rate Nigerian government awareness programme on COVID-19?	6 Likert-type scale options
A2	Which channel/who do you trust the most to receive information related to coronavirus?	17 Likert-type scale options
A3	What is your reaction to the news that some Nigerian political leaders have contracted COVID-19?	4 Likert-type scale options
A4	Do you agree to the sit-down at home instruction issued by the Federal Government of Nigeria?	3 Likert-type scale options
A5	Are you afraid that contact with Coronavirus is a DEATH SENTENCE?	3 Likert-type scale options
P1	What have you and your family done to prevent becoming sick with coronavirus in the recent days?	7 Multiple choice options
P2	What to do if you or someone from your family has symptoms of this disease?	7 Multiple choice options
P3	Which group is being discriminated in your community because of coronavirus?	5 Multiple choice options
P4	In recent days, do you go to religious worship in the church/mosque/others	4 Likert-type scale options
P5	In recent days, do you organize or attend social parties?	4 Likert-type scale options

The attitude of people towards COVID-19 was measured by five (5) questions (Questions A1 to A5 in Table 1). These questions investigated the respondents' attitude towards the government COVID-19 awareness programme, lock-down order, and fear that contracting COVID-19 is a death sentence, among others. The respondents' practices were evaluated with five questions, P1 through P5 in Table 1. These included what the respondents did to prevent sickness, respondents' participation in social gatherings and visit to worship places, and discrimination against Nigerians and non-Nigerians in efforts to control the spread of COVID-19. K1 was a Boolean question, while each option in questions K2 to K6 and P1 to P3 were scaled multiple-choice options. Questions A1 through A5 and P4 and P5 were Likert-scale options. The Cronbach's alpha coefficient for reliability test of instrument on these questions revealed 90.1% high acceptable internal consistency.

Statistical Analysis

The data was analysed with SPSS version 23. By frequencies, the total correct knowledge (CK) and incorrect knowledge (IK) responses and total correct practice (CP) and wrong practice (WP) responses were obtained based on the WHO standard procedures for the control of COVID-19 (IFRC et al., 2020). The distributions of CK, IK, CP and WP scores were confirmed to violate normality assumption at 5% significant level. Similarly, these distributions were confirmed to violate the homogeneity assumption in almost all cases at 5% significant level. Hence, nonparametric tests like Kruskal-Wallis test and the Mann-Whitney U test were used for the test of difference among or between means, respectively. Similarly, post-hoc, correlation and chi-square tests were used, accordingly. Multiple linear regression analysis was used to identify the significant demographic (independent) variables associated with CK, IK, CP and WP (dependent) variables. The binary, ordinal and nominal logistic regression models were also used to identify the demographic variables that were statistically and significantly associated with practices and attitudes (non-continuous dependent variables), accordingly. All the tests were conducted at 5% significant level or mentioned where otherwise. The likelihood ratio statistic was also used for decision making in most of the chi-square tests due to the violation of the association assumption.

Results

Descriptive analysis

A total of 1320 respondents completed the online survey questionnaire as at April 28. The highest number of 156 responses (11.8%) was observed on April 16. Similarly, 1, 4 and 2 number of item non-responses were observed on attitude questions A3, A4, and A5 respectively, and were retained as not available (NA) response. The highest number of respondents, 338 (25.6%), were from Lagos State (South West geo-political zone) and the least, 3 (0.2%) respondents, were from Yobe State (North East geo-political zone). Other survey characteristics included 716 (54.2%) male respondents, 847 (64.2%) respondents were between 25 and 54 years, 727 (55.1%) respondents were single, 831 (63%) respondents were Christian, 438 (33.2%) respondents were physical labourers and 521 (39.5%) respondents had HND/Bachelor's degree certificates (see column 3 of Table 2 for details). The bar plots in Figure 1 show the summary of the number of respondents by gender according to the states. There are 36 states and the Federal Capital Territory. States in the South West zone had the highest response rates (Lagos 339, Ogun 190, Oyo 76) followed by the North West zone, and the least response rate came from Yobe State.

Figure 2 gives the distributional plots of the six demography factors. A high number of respondents with HND/Bachelor's degree as well as those with NCE/OND took part in the survey, an indication that the survey captured a large population of people with basic knowledge of COVID-19. More male respondents participated in the survey than female respondents, and the age group, 25-54 years, dominated the survey. Considering marital status, respondents who were single showed more concern about COVID-19 followed by married respondents. Respondents of both the Christian and Islamic faiths participated in the survey. Students and civil servants dominated the occupational status and physical labour had the least number amongst the respondents.

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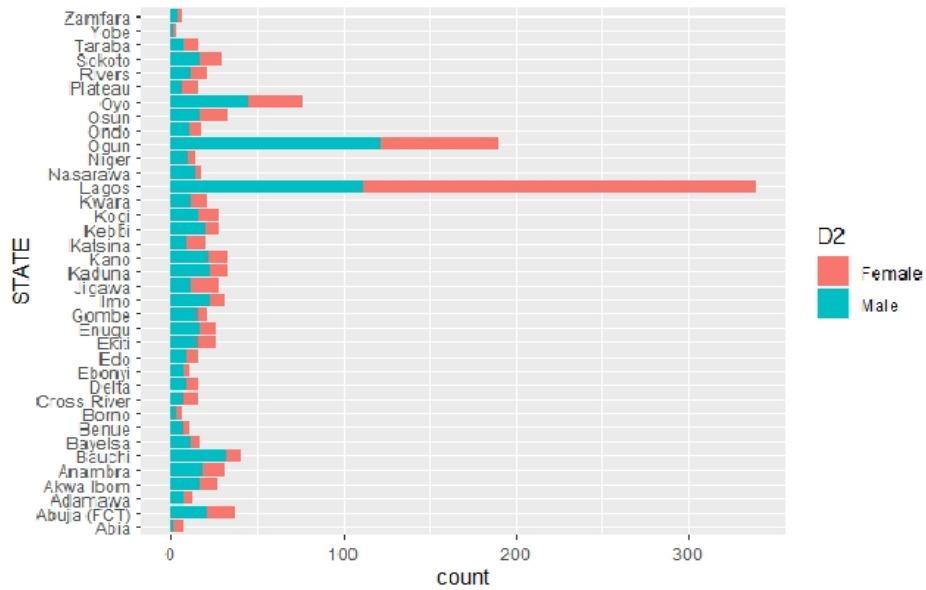


Figure 1: Bar plots showing the distribution of the respondents by state according to gender.

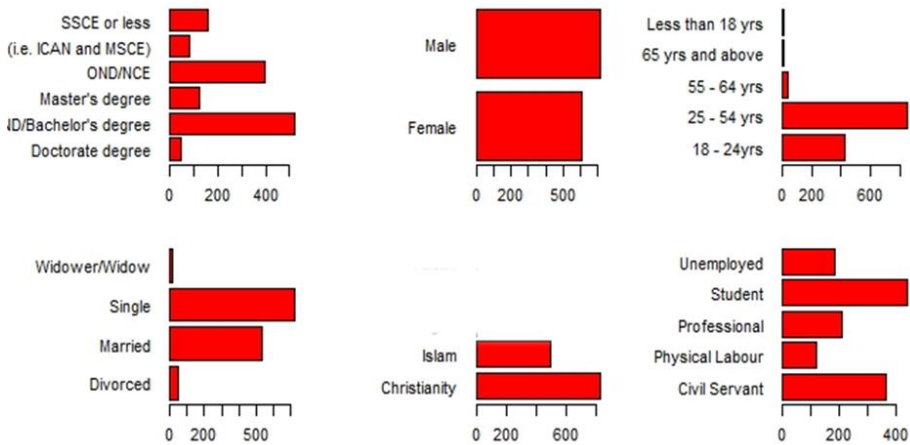


Figure 2: Bar plots showing the distributions of the demographic variables of COVID-19

Table 2: Descriptive Statistics of Participants' Correct Knowledge and Correct Practices of COVID-19

Demographic Variables		No. of Participants (%)	Correct Knowledge		Correct Practices	
			Mean \pm SD	<i>p</i> -value	Mean \pm SD	<i>p</i> -value
Gender ¹	Female	604(45.8)	13.96 \pm 5.696	0.000*	3.32 \pm 1.178	0.027*
	Male	716(54.2)	15.42 \pm 6.119		3.41 \pm 1.297	
Age Group ²	< 18 yrs	9(0.7)	14.00 \pm 7.194	0.322**	3.22 \pm 1.302	0.793**
	18 - 24 yrs	425(32.2)	14.87 \pm 6.061		3.40 \pm 1.161	
	25 - 54 yrs	847(64.2)	14.65 \pm 5.893		3.35 \pm 1.278	
	55 - 64 yrs	34(2.6)	15.29 \pm 6.460		3.50 \pm 1.441	
	\geq 65 yrs	5(0.4)	20.00 \pm 5.477		3.40 \pm 1.140	
Marital Status ²	Married	537(40.7)	15.33 \pm 5.779	0.000*	3.49 \pm 1.202	0.000*
	Single	727(55.1)	14.60 \pm 6.094		3.33 \pm 1.256	
	Divorced	47(3.6)	10.94 \pm 4.580		2.62 \pm 1.226	
	Widow(er)	9(0.7)	12.33 \pm 5.809		3.22 \pm 1.481	
Religion ¹	Christianity	831(63)	15.12 \pm 6.111	0.003*	3.41 \pm 1.226	0.193**
	Islam	489(37)	14.12 \pm 5.679		3.30 \pm 1.273	
Occupation ²	Physical Labour	438(33.2)	15.18 \pm 5.912	0.000*	3.51 \pm 1.113	0.000*
	Unemployed	367(27.8)	14.77 \pm 5.807		3.34 \pm 1.248	
	Student	208(15.8)	16.72 \pm 6.061		3.63 \pm 1.244	
	Civil Servant	186(14.1)	13.73 \pm 5.693		3.25 \pm 1.253	
	Professional	121(9.2)	11.33 \pm 5.259		2.69 \pm 1.403	
Education Level ²	SSCE or less	157(11.9)	14.42 \pm 5.787	0.000*	3.27 \pm 1.119	0.000*
	OND/NCE	394(29.8)	12.11 \pm 4.700		3.01 \pm 1.182	
	HND/B.Sc.	521(39.5)	15.78 \pm 6.148		3.53 \pm 1.269	
	M.Sc.	122(9.2)	18.82 \pm 5.890		3.92 \pm 1.118	
	Ph.D.	82(6.2)	13.15 \pm 4.979		3.05 \pm 1.314	
	Prof. Cert.	44(3.3)	19.11 \pm 4.520		4.11 \pm 0.868	

Demographic Variables		No. of Participants (%)	Correct Knowledge		Correct Practices	
			Mean ± SD	<i>p</i> -value	Mean ± SD	<i>p</i> -value
Geo-Political Zone ²	South West	680(51.5)	16.48±6.046	0.000*	3.69±1.097	0.000*
	North Central	144(10.9)	14.10±5.945		3.26±1.257	
	North East	100(7.6)	13.14±5.514		2.92±1.323	
	North West	178(13.5)	12.99±4.681		3.17±1.206	
	South South	111(8.4)	11.60±4.819		2.72±1.336	
	South East	107(8.1)	12.32±5.381		2.89±1.376	

¹Mann-Whitney U test ²Kruskal-Wallis test *:Reject Null Hypothesis at 5% sig. level **:Do not reject Null Hypothesis

There were 6 questions on knowledge assessment of COVID-19 with 52 total options, 33 CK options and 19 IK options (see Table 1 for characteristics of the questions). The COVID-19 CK score per participant was obtained by adding the participant’s correct responses (not more than 33 points). The total COVID-19 IK score was obtained by adding the CK responses that were not selected from the 33 CK options to the list of the IK responses selected from the 19 IK list per participant. The overall mean of the COVID-19CK responses score was 14.75 with standard deviation (SD) of 5.97. There was 45% (14.75/33 *100%) overall CK about COVID-19 among the respondents. The average IK score was 19.23 (out of a minimum of 30 points) with SD at 5.36. Ordinal logistic regression revealed that gender of female (vs. male), occupation of physical labour (vs. professional), unemployed (vs. professional) and student (vs. professional) and the educational levels OND/NCE (vs. professional certificates) and doctorate degree (vs. professional certificates) were found to be significantly associated with IK among the respondents (see Table 3). Ogun State had the highest overall CK percentage of 56.55% while Yobe State had the least overall CK percentage of 22.21% among the states in Nigeria. Table 5 shows the computed overall CK percentage for all the states in Nigeria, based on this survey. Statistically, the IK score of COVID-19 (19.23) was highly significant compared to the CK score (14.75) at $p < 0.0001$ (see Table 5). CK was significantly different across the demographic characteristics, except for age group.

The results show a highly statistically significant CP score (3.37) compared to the WP score (2.05) at $p < 0.0001$ (see Table 5). On the average, the CP score among the respondents was 3.37 (out of 5 points) with SD of 1.24. This gave a 67.4% ($3.37/5 * 100\%$) overall CP percentage among the respondents. Ordinal logistic regression revealed that gender of female (vs. male), marital status of single (vs. widow(er)) and marital status of divorced (vs. widow(er)), occupations of physical labour (vs. professional) and occupation of civil servant (vs. professional) and IK were significantly associated with WP (see Table 3). Oyo State had the highest overall CP percentage score of 80% while Yobe State had the least overall CP percentage score of 20% among the states in Nigeria. Table 5 shows the computed overall CP percentage score for all the states in Nigeria, based on this survey.

Statistical investigation revealed that Ogun and Oyo states (in the South West zone) had the highest significant average CK scores of 18.66 and 18.38 respectively, and the highest average CP scores of preventive measure (3.94 and 4.00, respectively), though with no statistically significant difference (see Table 5). Residence in Abuja (14.64) and Lagos State (15.59) had significant similar CK of COVID-19 at $p = 0.000$. The Kruskal-Wallis post-hoc test result showed that the South West zone had a significantly high average correct knowledge (16.48) of COVID-19 disease at ($p = 0.000$) compared to the other 5 zones. The North Central zone also had a significantly high average CK (14.10 at ($p = 0.025$)) of COVID-19 over residence in the South South zone (11.60). This similar significant difference was also observed with the CP against COVID-19 among the six geo-political zones in Nigeria. The South West zone, of all the zones, had the highest statistically significant average CK of COVID-19 in Nigeria. However, there was no significant difference in CK of COVID-19 among residents in the North Central, North-East, North-West and South-East zones. The residents of the South-South zone had the least significant average CK of 11.60. The chi-square test showed that CK or IK of COVID-19 and the CP or WP against the disease significantly depends on the geo-political zone and state of residence of respondents at 5% statistical significant level with a likelihood ratio of $p = 0.000$.

Table 3: Results of the ordinal logistic regression on factors that are associated with IK and WP among the respondents*

Variables	Estimate (est.)	Exp(est.)	SE	p-value
WP Incorrect Knowledge	.321	1.3790	.017	.000
WP Gender (female vs. male)	-.315	0.7296	.137	.021
WP Marital Status (single vs. Widow/Widower)	1.585	4.8817	.779	.042
WP Marital status (Divorced vs. Widow/Widower)	2.058	7.8264	.829	.013
WP Occupation (Physical Labour vs. Professional)	-1.101	0.3326	.285	.000
WP Occupation (Civil Servant vs. Professional)	-.567	0.5673	.262	.030
IK State of residence (All States vs. Zamfara)	.093	1.0970	0.000	≤ 0.001
IK Gender (female vs. male)	.472	1.6032	.133	.000
IK Occupation (Physical Labour vs. Professional)	-.663	0.5151	.293	.024
IK Occupation (Unemployed vs. Professional)	-.762	0.4668	.268	.004
IK Occupation (Student vs. Professional)	-1.189	0.3047	.306	.000
IK Education level (OND/NCE vs. Professional Cert.)	1.145	3.1410	.379	.003
IK Education level (Ph.D. degree vs. Professional Cert.)	1.156	3.1769	.430	.007

Notes: WP: Wrong Practices; IK: Incorrect Knowledge; SE: Standard Error; Exp: Exponential
 WP and IK are the dependent variables while the seven demographic variables are the independent variables

The Kruskal-Wallis test results revealed that there was no statistically significant difference for each of the average CK and CP scores against COVID-19 among the five age groups (see Table 2). This means that the respondents, irrespective of the age group, had very similar average knowledge of COVID-19. However, the Kruskal-Wallis test results revealed that there was statistically significant difference among the respondents' marital status as they acquired CK of COVID-19 and carried out correct practice (CP) of the preventive measures against COVID-19.

The post-hoc test confirmed that the single, married and widow(er) respondents significantly had the same CK and CP scores while the divorced had the least CK and CP against COVID-19. The Mann-Whitney U test results revealed that male respondents significantly acquired more CK and exercised more CP than the female respondents at $p = 0.000$ (see Table 2). However, it was confirmed that there was no significant difference in the WP against COVID-19 between the male and female respondents (at $p = 0.795$).

Ordinary regression analysis was conducted to know the significantly preferred sources of COVID-19 information for CK and CP. Results revealed that the respondents significantly prefer radio, TV, WhatsApp, health unit/healthcare workers and community health workers for CK and CP at $p < 0.01$. The test also showed that Christian and Muslim respondents provide a significant average score for CK. The same also applied to the average scores for IK among Christian and Muslim respondents. However, evidence showed that the Christian respondents (3.41) were significantly more involved in WP of COVID-19 when compared to the Muslim respondents (3.30) at $p = 0.667$. The chi-square test revealed that CK and IK by the respondents did not significantly depend on their religion, while CP and WP against COVID-19 significantly depended on the religion of the respondents at $p = 0.000$. The Kruskal-Wallis test revealed that there was a statistically significant difference in the average CK and CP of the respondents based on their educational level at $p = 0.000$ (see Table 2). The professionals and M.Sc. holders among the respondents had significantly higher CK while OND/NCE and Ph.D. holders had the significantly lowest CK of COVID-19. Similarly, professionals and M.Sc. holders had significant CP scores while the SSCE/less and OND/NCE holders among the respondents had the significant least CP score against COVID-19.

The Kruskal-Wallis test revealed that there were statistically significant differences in each of the CK and CP of COVID-19 based on the occupation of the respondents at $p = 0.000$ (see Table 2). Professional occupation had the significant least average CK score (11.33) and CP score (2.69) for COVID-19 prevention, while students had the significant CK score of 16.72 and CP score of 3.63 for the disease. While the majority, 76.6% (1011), of the respondents had the fear that contracting COVID-19 is a death sentence, 4% (53) respondents did not agree to such

attitude, and 19.2% (254) respondents did not know if COVID-19 is or is not a death sentence.

Sixty-three (4.8%) respondents, five (0.4%) respondents, ten (0.8%) respondents and sixteen (1.2%) respondents had observed the practice of discrimination against non-Nigerians, Igbo, Hausa/Fulani and Yoruba, respectively. Binary logistic regression analysis revealed that only the geopolitical zone variable is statistically significant to the discrimination against non-Nigerians at $p = 0.001$. The discrimination against non-Nigerians was significantly observed in Ogun, Lagos and Oyo states (in the South West zone) with 33.3% (21 respondents), 30.2% (19 respondents), and 3.6% (9 respondents) observing the discrimination of non-Nigerians, respectively, out of the total respondents that observed the discrimination.

The attitude of not going to parties or social gatherings as instructed by the FGN was practiced by most, 1224 (92.7%), of the respondents. Similarly, 754 (57.1%) respondents did not go to worship places as instructed by the FGN. However, 42.9% (566) of respondents still went to worship places. Considering Abuja, Lagos, and Ogun states, where the federal government had declared total lockdown as at the time of this survey, these states had 17, 51 and 58 respondents respectively who reported going to worship places. Also 72 (5.45% of 1320) respondents still went to both worship places and attended social gatherings.

Discussion

This study revealed that on the average CK score was 14.75 with a SD of 5.97. This SD is very high compared to the reported SD (1.6) of CK score in China (Zhong et al., 2020). The high SD is due to the fact that most respondents did not have correct information about COVID-19. Similarly, this study reports 45% overall CK about COVID-19 among the respondents. This indicates that at least 55% of the respondents did not have CK about COVID-19. The 45% overall CK in Nigeria's case is relatively small compared to China that had 90% CK of COVID-19 (Zhong et al., 2020). This means that most respondents did not have correct information about COVID-19 in Nigeria. In general, the respondents in Nigeria had more IK score than CK of COVID-19. Considering the 36 states in Nigeria and the Federal Capital Territory (FCT), only Ogun and Oyo State respondents had more CK scores. Hence, this calls for urgent

COVID-19 sensitization programmes across the remaining 34 states and the Federal Capital Territory of Nigeria.

Though 82.3% (equivalent to 1085) of the respondents rated the Nigerian government's awareness programme on COVID-19 as moderate and high, yet approximately 70% of the respondents got to know about COVID-19 information from the television stations and website-based social media, however, they would significantly prefer not to receive CK or build CP of COVID-19 based on the information from the website-based social media. This could indicate that the government awareness programme was being distorted by infodemic from the website-based social media, which consequently reduced the percentage of CK among the respondents. This may also have been responsible for the high SD associated with the CK. The IFRC (2020) reported that WHO had confirmed infodemic to be associated with COVID-19 information.

In general, the respondents had significant higher CP scores than WP scores for COVID-19 in Nigeria. However, Abia, Adamawa, Akwa-Ibom, Anambra, Borno, Cross River, Delta, Ebonyi and Yobe states had higher WP scores than CP scores for COVID-19 while Plateau State had the same WP and CP scores (see Table 5). The governments in these ten states are advised to organize urgent strategic sensitization programmes on COVID-19. This study reports a moderate overall CP (67.4%) against the spread of COVID-19 among the respondents. However, there is need for improvement. It is expected that consistent strategic sensitization programmes will reduce the 16.9% (224) respondents that rated the government's COVID-19 awareness programme low and the 0.8% (11) respondents that were unaware of any of the government COVID-19 awareness programmes. The female population (under gender), the professional (under occupation) and the OND/NCE and Ph.D. population (under education level) showed the least CK score for COVID-19 (see Table 2). Sensitization programmes on the CK of COVID-19 will therefore be necessary, especially among the highlighted population.

There was significant positive correlation (62.4%) between the CK and the CP scores of respondents at 1% significance level. This shows that the amount of CK acquired significantly increases the amount of CP which will reduce the spread of COVID-19 in Nigeria. Hence, Government and NGOs are advised to invest more in COVID-19 sensitization

programmes. The demographic characteristics that are significantly associated with IK and WP are presented in Table 3.

Respondents in the South West zone, especially in Lagos, Ogun and Oyo states had the highest CK and truly applied the correct practices against COVID-19. However, respondents in the North East zone significantly had the least CK of COVID-19 and CP against COVID-19. There is urgent need for state governments in the states located in the North Central, North East, North West, South East and South-South geopolitical zones of Nigeria to immediately increase sensitization programmes on knowledge of and correct practices against COVID-19.

A hundred and ten (49.1%) of the 224 respondents that rated the government's awareness programmes as low, or who were unaware of these programmes, were physical labourers who resided in Lagos State. It is recommended that government and NGOs should specially extend strategic COVID-19 awareness programmes to the physical labourers population in Lagos State. Similarly, government and NGOs in Ogun State should conduct strategic COVID-19 awareness programmes for this particular population in the state.

Radio stations, TV stations, WhatsApp, health unit/healthcare workers and community health workers proved to be statistically significantly preferred as sources of information for CK and to learn CP on COVID-19. Hence, these aforementioned sources are the best media for government and NGOs to host strategic COVID-19 sensitization programmes in Nigeria. Similarly, individuals are advised to use the closed social media platforms like WhatsApp and Telegram (excluding the open social media) to share COVID information. It was observed that 958 (72.6%) of the respondents were not concerned about the news that some Nigerian political leaders have contracted COVID-19. This could indicate that there is no good relationship between the political leaders and the Nigerian citizens. This study recommends the creation of good political relationship between the political leaders and the citizens.

Out of the one thousand and eleven (1011) respondents that had the attitude of fear that contracting COVID-19 is a death sentence, 693 (68.5%) and 749 (74.1%) respondents received the COVID-19 information from television stations and website-based social media (open social media) respectively. Excessive fear of COVID-19 as a death sentence could lead to

suicide or self-harm behaviour among respondents (Sahoo et al., 2020). Hence, this study recommends that counselling of the populace on suicide or self-harm prevention should be part of all COVID-19 sensitization programmes in Nigeria.

There was significant positive correlation between the IK of COVID-19 and the attitude of fear that the contraction of COVID-19 is a death sentence at 5% significance level. This signifies that the more the respondents acquired incorrect knowledge of COVID-19, the more they developed fear that the contraction of COVID-19 is a death sentence. This study, again, suspects that these results are highly associated with COVID-19 infodemic. Hence, this study recommends that the Nigerian government and NGOs should find strategic ways to educate the female population, those less than 18 years, and those between 18 and 24 years (see Table 4), on the correct information about COVID-19. In fact, education on COVID-19 infodemic should be part of all the sensitization programmes in all the states in Nigeria. Out of the 254 (19.3%) respondents that could not decide on this attitude of fear, 49 (19.3% of 254) were domiciled in Lagos State, 43 (16.9% of 254) in Ogun State, 19 (7.5% of 254) in Oyo State, 11 (4.3% of 254) in Osun state and 10 (3.9% of 254) in Ekiti State; with special attention on the respondents between the ages of 25 and 54. This study recommends more COVID-19 sensitization programmes for this age group in the above-mentioned states considering the marital status and educational level of the respondents; this is in order for them to develop an informed positive attitude towards the eradication of the disease in Nigeria.

Table 4: Results of the Multinomial logistic regression on factors that are associated with the attitude of fear that contracting COVID-19 is a death sentence

Attitude		B	Std. Error	p-value	Exp(B)
Yes	Gender (Female vs. Male)	-.795	.341	.020	.452
I don't now	Age (Less than 18 yrs. vs. 65 yrs. and above)	-14.608	1.295	.000	4.527E-07
	Age (between 18 - 24 yrs. vs. 65 yrs. and above)	-14.189	.469	.000	6.881E-07

The discrimination against non-Nigerians was observed by both the single and married respondents between the ages of 18 and 54, with 74.6% of them being Christians and 42.9% employed in physical labour occupations; also by those that had HND/B.Sc. degree certificates. This high number of those discriminating against non-Nigerians, which was observed in Lagos and Ogun states, could be associated with the Nigerian index case that came from Italy to Ogun State on February 27 through the Murtala Muhammad International Airport, Lagos. This study recommends that non-discrimination against non-Nigerians should be one of the topics in COVID-19 sensitization programmes, especially in Lagos and Ogun states.

While there was significant high compliance with the lockdown order of the FGN, statistically significant numbers of people still went to the worship places, especially in Ogun and Lagos states and in the Federal Capital Territory where the FGN declared total lockdown for a certain period. It is suspected that this fact may have increased the spread of COVID-19 in Nigeria. These respondents were majorly between the ages of 25 and 54, and statistically significantly spread across the two religions with special attention on the single and married, the unemployed and civil servants with OND/NCE and HND/B.Sc. qualification. This study recommends that government at all levels in Nigeria should compel the law enforcement agencies to enforce the lockdown order among both the Christian and Muslim populations in all worship places.

Due to the lockdown order in Nigeria, this study was conducted online. People without technological gadgets to access the online questionnaire and people with limited internet access would have been excluded from the survey. Hence, this study might have under-represented the population with low socioeconomic status in Nigeria. It is expected that future investigations will attend to this shortcoming. Similarly, despite the intention to get more questionnaire respondents through Facebook adverts and other broadcast means using the survey's questionnaire link, the study still had a low number (1320) of respondents. It is expected that future research will investigate the attitude of Nigerians to online surveys.

Table 6 specially compared the results in this study with an existing (reviewed) COVID-19 KAP study for Nigeria (Olapegba et al., 2020). This study, however, has a wider coverage (all states and the FCT in

Nigeria) and is a complete national survey on COVID-19, though with limitations. It used both descriptive and inferential statistical methods for robust statistical conclusion and reported both the percentage of CK and CP of COVID-19 by the respondents. In general, the results in this study provide a wide coverage of the national COVID-19 knowledge, attitudes and practices (KAP) evaluation for Nigeria.

Conclusion

The aim of this study was to investigate the knowledge, attitudes and practices (KAP) of Nigerians towards control of the spread of COVID-19 in Nigeria. This study has shown that there was low percentage (45%) of correct knowledge (CK) about COVID-19 in Nigeria with a high standard deviation (SD) of 5.97 compared with China which documented 90% CK with an SD of 1.6. This low CK about COVID-19 in Nigeria was suspected to be associated with the challenge of infodemic. Similarly, there was moderate percentage (67.4%) of correct practices (CP) against the spread of COVID-19 in Nigeria with an SD of 1.24. In general, there was more IK about COVID-19 than CK of COVID-19 among Nigerians, hence, the recommendation of national sensitization on the CK about COVID-19 in Nigeria. Urgent strategic sensitization programmes on CK of COVID-19 should be implemented in 34 states and the Federal Capital Territory where respondents had less CK than IK of COVID-19. Similarly, urgent sensitization programmes on CP against COVID-19 are recommended in Abia, Adamawa, Akwa-Ibom, Anambra, Borno, Cross River, Delta, Ebonyi, Yobe and Plateau states where CP were less than WP against COVID-19. Counselling on the prevention of suicide or self-harm by Nigerians is strongly recommended for incorporation into the national sensitization programmes. The practice of going to worship places and/or social parties, especially in the hotspot states in Nigeria, presented serious challenges to the control of the spread of COVID-19 in Nigeria.

In general, the KAP of Nigerians towards the control of the spread of COVID-19 needs more and urgent strategic sensitization from the government and NGOs in Nigeria. Most of these strategic sensitization programmes should be channelled through radio and TV stations; closed social media such as WhatsApp and Telegram; health unit/healthcare workers and community health workers with the control of infodemic from the open social media-such as Facebook, Twitter, among others. Comparison of this study with other reviewed KAP studies of COVID-19

in Nigeria reveal that this study has a wider coverage. However, there is the need to extend this KAP research to the Nigerians of low socioeconomic status.

Table 5: Statistics of Participants' CK, IK, CP and WPof COVID-19 based on State of Residence

States	No (%)	CK		IK	CP		WP
		Mean ± SD	Over all CK in %		Mean ± SD	Over all CP in %	
Abia	8 (0.6)	10.88±5.194	32.97	22.88±4.518	2.13±0.835	42.60	3.88±0.641
Abuja (FCT)	37 (2.8)	16.46±6.026	49.88	17.81±5.471	3.65±1.060	73.00	1.70±1.288
Adamawa	13 (1)	12.15±5.565	36.82	21.62±4.840	2.69±1.377	53.80	3.08±1.935
Akwaiabom	27 (2)	10.78±5.139	32.67	22.70±4.598	2.56±1.251	51.20	2.78±1.649
Anambra	31 (2.3)	10.81±5.326	32.76	22.68±5.160	2.58±1.587	51.60	2.97±1.991
Bauchi	41 (3.1)	14.17±5.286	42.94	19.27±4.701	3.15±1.315	63.00	2.27±1.747
Bayelsa	17 (1.3)	12.35±4.182	37.42	20.88±3.935	3.12±1.111	62.40	2.12±1.409
Benue	11 (0.8)	11.55±4.591	35.00	21.91±4.230	2.82±1.168	56.40	2.73±1.555
Borno	6 (0.5)	11.67±6.022	35.36	22.17±5.456	2.67±1.862	53.40	3.17±2.041
Cross River	15 (1.1)	10.67±4.894	32.33	23.67±3.498	2.27±1.534	45.40	4.00±1.690
Delta	16 (1.2)	11.81±5.636	35.79	22.25±4.640	2.63±1.310	52.60	3.50±1.414
Ebonyi	11 (0.8)	12.00±5.367	36.36	21.18±5.154	2.64±1.433	52.80	2.82±1.940
Edo	15 (1.1)	12.73±4.758	38.58	20.40±4.778	2.73±1.438	54.60	2.53±1.767
Ekiti	26 (2)	11.85±4.106	35.91	21.96±4.123	3.04±1.311	60.80	2.58±1.579
Enugu	26 (2)	12.19±5.028	36.94	21.58±4.553	3.12±1.275	62.40	2.27±1.687
Gombe	21 (1.6)	13.19±6.202	39.97	20.14±6.231	2.95±1.244	59.00	2.43±1.630
Imo	31 (2.3)	14.42±5.427	43.70	19.58±5.071	3.29±1.216	65.80	2.45±1.767
Jigawa	28 (2.1)	12.57±4.426	38.09	20.61±4.298	3.07±1.120	61.40	2.21±1.449
Kaduna	33 (2.5)	14.30±4.164	43.33	19.24±3.857	3.39±1.116	67.80	1.88±1.474

States	No (%)	CK	Over	IK	CP	Over	WP
		Mean ± SD	all CK in %	Mean ± SD	Mean ± SD	all CP in %	Mean ± SD
Kano	33 (2.5)	11.73±5.008	35.55	21.79±4.709	2.91±1.444	58.20	2.67±1.963
Katsina	20 (1.5)	10.45±3.720	31.67	22.85±3.602	2.65±1.089	53.00	2.60±1.501
Kebbi	28 (2.1)	13.04±4.069	39.52	20.32±3.982	3.50±1.036	70.00	1.71±1.410
Kogi	28 (2.1)	14.75±6.979	44.70	18.79±6.414	3.25±1.430	65.00	2.00±1.846
Kwara	21 (1.6)	15.14±4.618	45.88	18.76±3.632	3.52±1.078	70.40	1.76±1.300
Lagos	338 (25.6)	15.59±5.924	47.24	18.60±5.361	3.57±1.014	71.40	1.67±1.092
Nasarawa	18 (1.4)	12.11±4.626	36.70	21.28±4.281	3.00±1.495	60.00	2.44±1.947
Niger	14 (1.1)	13.07±7.011	39.61	21.29±5.413	3.07±1.072	61.40	2.64±1.447
Ogun	189 (14.3)	18.66±5.878	56.55	15.98±5.323	3.94±1.095	78.80	1.60±1.274
Ondo	18 (1.4)	13.17±4.232	39.91	20.17±4.287	3.50±0.985	70.00	1.78±1.309
Osun	33 (2.5)	14.27±5.724	43.24	19.94±4.968	3.39±1.413	67.80	2.15±1.787
Oyo	76 (5.8)	18.38±5.621	55.70	16.21±4.892	4.00±1.058	80.00	1.45±1.290
Plateau	15 (1.1)	10.80±4.057	32.73	22.73±3.788	2.80±1.373	56.00	2.80±1.740
Rivers	21 (1.6)	11.76±4.460	35.64	21.76±4.122	3.00±1.414	60.00	2.67±1.932
Sokoto	30 (2.3)	15.30±5.214	46.36	18.60±4.576	3.40±1.163	68.00	1.93±1.388
Taraba	16 (1.2)	12.88±5.149	39.03	20.81±4.764	2.94±1.124	58.80	2.44±1.315
Yobe	3 (0.2)	7.33±0.577	22.21	25.67±0.577	1.00±0.000	20.00	5.00±0.000
Zamfara	6 (0.5)	11.33±3.830	34.33	22.00±3.464	3.00±1.549	60.00	2.67±1.966
Total(°)/ Mean	1320(100%)	14.75±5.972	44.70	19.23±5.357	3.37±1.244	67.40	2.05±1.529
	<i>P-value</i>	0.000* ¹		0.000* ¹	0.000* ¹		0.000* ¹

¹Kruskal-Wallis test of participants

*:Reject Null Hypothesis at 5% significant level

No: Number

Table 6: Difference between this study and Olapegba et al. (2020) study on KAP of COVID-19 in Nigeria

SN	Metrics	Olapegba et al. (2020)	This study
1	Coverage (Scope)	It considered only 180 cities and towns within Nigeria. These cities and towns were not mentioned.	It considered all the 36 states in Nigeria and the Federal Capital territory (FCT)
2	Statistical method used for analysis	The study used only descriptive statistics.	The study used both descriptive and inferential statistical methods.
3	Percentage of CK	83%	45%
4	Percentage of CP	Not available	67%
5	Nationwide reports	Report was based on ethnic groups not based on geo-political zones nor the states and the FCT in Nigeria.	Findings were based on the six geo-political zones and the 36 states and the FCT in Nigeria.

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