



Research Article

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Knowledge, Attitude and Practices of Veterinarians During COVID -19 Outbreak in Nigeria: 2020

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Abstract

Background: Coronavirus Disease 2019 (COVID-19), a viral pneumonia-like disease caused by novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) started in Wuhan, Hubei Province of China on December 31, 2019, and assumed a pandemic status; infecting about 30 million people, with a mortality in excess of 957,000 as of 20 September 2020.

Aim: This study aims to assess the level of knowledge, attitude, and practice concerning COVID-19 among veterinarians with a view to detecting variables that may hinder the effective contributions of veterinarians in Nigeria towards the management and control of the current COVID-19 outbreak in Nigeria.

Methods: This study assessed the knowledge, attitude, and practices concerning COVID-19 among veterinarians with a view to detecting variables that may hinder their effective contributions towards the management and control of COVID-19 outbreak in Nigeria.

Results: The study found that male veterinarians had significantly good knowledge ($p=0.012$, $OR=0.157$, $CI=0.03-0.66$) and attitude ($OR=18.415$, $CI=1.45-5.16$, $P=0.011$) towards COVID-19 than female counterparts. Similar results were also recorded regarding practices ($OR=2.941$, $CI=1.03-8.36$, $P=0.043$). Educational qualification was found to be significantly associated with attitude of veterinarians in respect of COVID-19 prevention ($OR=0.473$, $CI=0.073-0.011$, $P=0.006$). Thus, gender (male) was found to be independent predictors of good knowledge, attitude and practices regarding COVID-19. In addition, educational qualification was also found to be an independent predictor of attitude of veterinarians regarding COVID-19 control. Veterinarians generally had good knowledge about the epidemiology, diagnosis, treatment and prevention of COVID-19. However, despite their knowledge, the level of willingness of veterinarians to support national response activities was still poor.

Conclusion: This study advocated for a collaborative effort (one-health) between medics and vets in tackling future pandemics/infectious diseases like COVID-19. In addition, since most vet knows the basics of infectious diseases like COVID-19, they can be deployed for national response activities.

Keywords: Veterinarians; COVID-19; Nigeria; Knowledge; Attitude; Practices; Zoonotic; Gender; Age; Education

Abbreviations: WHO: World Health Organization, COVID: 19: Coronavirus Disease 2019, SARS- CoV: 2: Severe Acute Respiratory Syndrome Coronavirus 2, RNA: Ribonucleic Acid; MERS-CoV: Middle East Respiratory Syndrome Coronavirus, FCT: Federal Capital Territory, KAP: Knowledge, Awareness and Practices, SPSS: Statistical Program for Social Sciences, CI: Confidence Interval, DVM: Doctor of Veterinary Medicine, PCR: Polymerase Chain Reaction, Rt-PCR: Real time Reverse Transcription: Polymerase Chain Reaction, UK: United Kingdom, USA: United State of America

Introduction

Following the outbreak and report of pneumonia-like disease on the 31 December 2019 in Wuhan, Hubei Province of China,

the global health community intensified efforts at all levels as it attempts to unravel the dynamics of this novel disease. A month later, the World Health Organization (WHO) declared the disease



a public health emergency of international concern (January 30, 2020) and termed the diseases "Coronavirus Disease 2019 (COVID-19)" on 11 February 2020 [1]. From that time, the disease had rapidly spread across the world to achieve a pandemic status, infecting more than 30 million people with a mortality in excess of 957,000 as of 20 September 2020 [2].

Caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), COVID-19 virus or SARS-CoV-2 belongs to the family of Coronaviridae of the order Nidovirales. The virus has a large structure, with a single, plus-stranded RNA genome [3,4]. A novel virus, SARS-CoV-2 was first isolated from three people with pneumonia or flu-like symptoms connected to the cluster of acute respiratory illness cases in Wuhan, Hubei Province in China [5]. Coronaviruses are known to affect and have been identified in several mammals; with some causing diseases like common cold symptoms in immunocompetent individuals, some strains such as Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and Middle East Respiratory Syndrome Coronavirus (MERS-CoV) are zoonotic in origin and have been linked to sometimes fatal illness [6,7]. The global impact of COVID-19 pandemic apart from morbidity and mortality is enormous, and estimated loss by the Asian Development Bank is put at \$5.8 trillion on a short-term containment scenario of 3 months, to \$8.8 trillion for a longer-term containment scenario of 6 months [8]. Indeed, comprehensive estimates of the economic burden of this disease will easily exceed earlier predictions as transmission of the SARS-CoV 2 continue around the world.

The general handling and management of the pandemic in an effort to control the disease in Nigeria has raised a number of challenges for the countries health systems. Insufficient and sub-optimal health infrastructures, poor healthcare financing, limited health insurance coverage, cultural beliefs and ignorance of the general public are just a few of the obstacles capable of hampering the control and management of COVID-19 in Nigeria. This means that accessibility, affordability and acceptability of healthcare in Nigeria is generally poor. Thus, in spite of efforts of the Government of the country through its Primary Healthcare Services, the most vulnerable in the society including the very young, aged, pregnant women and the immunocompromised are often disproportionately disadvantaged.

To be able to introduce and install effective control measures in a disease's situation like COVID-19, having knowledge about the disease and its modes of transmission, basic hygiene principles and measures put in place by government is of uttermost importance. In addition, older people and especially those with underlying severe or chronic health conditions who have been identified as being at greatest risk for severe infection and death due to COVID-19 [9] are also associated with reduced mental or cognitive ability to assess

and process health information. Their capacity to understand and make well-informed decisions and take optimal health-promoting actions a skill set commonly called "health literacy" [10,11] is compromised. This is especially true when vital health information is not timely, trusted, consistent, or actionable. Thus, in uncertain and confusing times like this, when the interpretation of critical and ever-changing public health messages is paramount, many vulnerable populations may be further marginalized by inadequate health communication, posing substantial risks to themselves and their communities [10].

The daunting challenges posed by the COVID 19 pandemic also presented an excellent opportunity for all sectors in the public health security apparatus to unite in collective response under the One-Health initiative. Amongst several professionals in national health security systems of nations, Veterinarians provide a highly skilled, competent and ready-to-deploy pool of professionals that can support national COVID 19 response. In fact, this has already been demonstrated in the United Kingdom, USA, Spain, Italy, and Germany. It is therefore most likely that developing nations like Nigeria with relatively weaker health infrastructure may need to do similarly. One of the objectives of this study was therefore to assess how knowledgeable the veterinary profession is, regarding its role in responses to pandemics as currently being experienced.

Nigeria is among the African countries that have been seriously hit by the COVID-19 epidemic. Since the report of the first case in Nigeria on 27 February 2020, the outbreak of COVID-19 has affected all 36 states and the Federal Capital Territory (FCT) with over 57,000 cases and more than 1000 deaths as of 20 September 2020 [12]. In an effort to control the disease, several unprecedented measures have been adopted by the Federal government including the suspension of public transportation, closing of public spaces, schools and universities, observing physical distancing, the prohibition of mass gathering at places of worship and ceremonies, locked down of the country, isolation and care for infected people and suspected cases. In addition, Nigerians were urged to perform hand washing with soap and running water, use of alcohol-based hand sanitizer and to wear face mask outside their homes and in public places [13]. The battle against COVID-19 is still ongoing in Nigeria, but the commitment of people toward the effective implementation and strict adherence to control measures which is largely affected by their knowledge, attitudes, and practices (KAP) towards COVID-19 will guarantee the final success [14]. This is because lessons learnt from the 2003 outbreak of SARS suggest that knowledge and attitudes towards infectious diseases are associated with some level of panic emotion among the population, which can further complicate attempts to prevent the spread of the disease [15-17]. Behaviours like underestimation (where people belittle the disease), stigmatization, panic emotions, undertaking of false measures to avoid infection; all affect the battle against such an

uncommon situation [18], and this stems from the poor knowledge and understanding of the disease.

The unprecedented nature of the global crisis precipitated by COVID-19 has unfortunately been marked by miscommunication regarding the imminent threat of COVID-19, its mode of spread and treatment, leading to confusion and inaction among the public and even Health Professionals [19], including veterinarians. KAP studies are generally meant to reveal misconceptions or misunderstandings that may serve as hindrance to the achievement of a goal or acts as a potential barrier to behavioral change [20]. Thus, the main aim of this study was to assess the level of knowledge, attitude, and practice concerning COVID-19 among veterinarians with a view to detecting variables that may hinder the effective contributions of veterinarians in Nigeria towards the management and control of the current COVID-19 outbreak in Nigeria.

Methodology

A unicentric cross-sectional survey-based study was carried out between April 25 and May 4 2020. A structured questionnaire was designed and ran using the Kobo Toolbox® application. The questionnaire was deployed through a web link and pretested on 10 individuals in and around Plateau State, Nigeria. Corrections on the questions were adjusted as was necessary. However, data from the pretesting was not included in the final analysis. The determination of the knowledge, attitude and practices on COVID 19 outbreak among Veterinarians involved the deployment of the questionnaire to Veterinarians in Nigeria to assess their knowledge, attitude and practices during the COVID-19 outbreak as well as their awareness of being one of the frontline professions in the support and management of COVID-19 outbreaks.

Design of the questionnaire

Overall, the questionnaire featured 35 questions most of which were multichoice. The questionnaire was divided into 4 parts with section one mainly focused on participants' demographics, while section two evaluates the general knowledge of veterinarians about COVID-19. Dichotomized "yes", "no" and "True or false" options were used for the purpose of the evaluation. The third section determines the veterinarian's attitude, while the fourth assesses their practices towards COVID-19 infection. Dichotomized "yes", "no" and multiple-choice questions were included, and respondents were asked to check correct answers.

To make clear demarcation of participants knowledge, attitude and practice level, the responses were scored, every correct answer added one mark to a participant's total score, and zero for wrong or uncertain answers. To discern the knowledge differences among the groups, the score was divided into two categories: a cut-off value of 5-8 was taken as good, while 4 and below was considered poor. The average time taken by reach individual to complete the

survey was ten minutes. In total, one hundred and forty-three (143) respondent sent in their responses but only 92 were found to have satisfactorily filled responses after the data was cleaned.

Data analysis

The records were double-checked and cleaned by two researchers before analysis using IBM SPSS Version 22.0 (IBM SPSS Corp, SPSS Statistics ver. 20, USA). Descriptive data were expressed as percentage and frequency. Data were then analysed using descriptive statistics by Chi-square (for non-parametric data) to determine factors associated with good and poor knowledge, attitude and practices regarding COVID-19. Logistic regression analysis was also carried out to determine significant predictors of participants Good ' knowledge, attitude and practices regarding COVID-19. All the statistical tests were considered to be statistically significant at a P-values of less than 0.05 ($P < 0.05$) with a confidence interval of 95% (95% CI). The results were presented in tabular forms.

Results

Demographic characteristics of veterinarians (Total Number=92)

A total of 143 questionnaires were filled, however only 92 of the forms were properly filled. Hence only the 92 questionnaires were used for the study. Of the 92 respondents, 54 (58.7%) were less than 35 years while 38 (41.3%) were above 35 years of age, 65 (70.7%) of the respondents were males, while 69(75%) were married. In addition, of the 92 respondents, 47 (52.8%) had a household size of <6, while 75 (83.3%) have same resident/state of practice,42 (45.7%) of the respondents had DVM as the minimal qualification with 45 (48.9%) having less than 10 years post-graduation practice experience, and 34 (37%) of them work in the private sector. The baseline characteristics of the participants are presented in Table 1.

Logistic models for predictors of factors associated with knowledge of veterinarians based on control of COVID 19 by socio-demographic characteristics

Of the 92 respondents, 65 (64.1%) males had good knowledge of COVID-19 which was associated significantly with the knowledge level of females ($p=0.012$, $OR=0.157$ CI: 0.03-0.66). This showed that males were significant predictors of good knowledge about COVID-19 than their female counterparts. However, knowledge did not differ significantly with veterinarians that were <35 years of age ($p=0.456$), married veterinarians ($p=0.379$), veterinarians with <6 household size ($p=0.765$), veterinarians with the same state of residence/practice ($p=0.37$), private veterinarians ($p=0.939$), and veterinarians with DVM ($p=0.775$). Although veterinarians with less than 10 years post-graduation experience had higher positive knowledge compared to their counterparts, it was however found not to be significant ($p=0.362$) (Table 2).

Logistic models for predictors of factors associated with attitude of veterinarians based on control of COVID-19 (Total Number=92)

The result showed that gender and educational qualification had significant association with attitude. Of the 42 veterinarians that had DVM, 27 (71.4% 30%) of them had good attitude in respect of COVID-19 prevention (OR=0.473, 0.073-0.011, P=0.006). In respect of gender, males were found to have good attitude compared to their female counterparts; this was also significant (OR=18.415, CI=1.45-5.16, P=0.011). Educational qualification and gender were therefore found to be predictors of attitude of veterinarians in respect to COVID-19 control. However, attitude did not show significant association with veterinarians that are less than 35 (p=0.567), married veterinarians (p=0.406), veterinarians with <6 household size (p=0.607), veterinarians with the same state of practice/residence (p=0.593), veterinarians working with the private sector (P=0.682), and veterinarians with less than 10 years post-graduation experience (p=0.49) despite the fact that they had higher positive attitude compared to their counterparts (Table 3).

Logistic models for independent predictors of factors associated with practice of veterinarians based on control of COVID-19. (Total Number=92)

Practices was found to significantly associated with gender as males had better practices (OR=2.941, CI=1.03-8.36, P=0.043) compared to their female counterparts, and therefore gender was a predictor of practices. However, practices did not associate significantly with veterinarians <35 of age (p=0.732), veterinarians

with DVM (P=0.239), married veterinarians (p=0.296), veterinarians with the same state of residence/practice (p=0.705), veterinarians with less than 10 years post-graduation experience (p=0.665), and private veterinarians (p=0.169) (Table 4).

Responses by veterinarians to questions on knowledge, attitude and practices towards COVID-19

Almost all the vets (97.8%) agreed that advanced age and co-morbidity individuals are among the vulnerable group to COVID-19. In addition, about 62.9% of the respondents also agreed that asymptomatic individuals can transmit the disease, while 68.5% of the respondents mentioned the hallmark symptoms associated with COVID-19. Regarding the diagnosis for COVID-19, 66.3% of the respondents agreed that molecular test was the most recommended diagnostic test for COVID-19, while 23% and 24.1% of them agreed that domestic and wild cats were also susceptible to COVID-19 respectively and can therefore be infected with the disease. For the treatment of COVID-19, 59.6% and 77.5% of the respondent believed that Hydroxychloroquine and Remdesivir respectively can be used. Regarding COVID-19 prevention strategies, all the respondents were in total agreement (100%) that strategies including social distancing, isolation and treatment, and avoidance of large gathering are effective in curtailing the spread of the virus. However, the attitude of the veterinarians in respect of their willingness for contact tracing/sampling, environmental decontamination, and support to national response team was 11.1%, 22.2%, and 23.1% respectively, and thus low, however, majority of the participants (94.4%) were willing to be tested when exhibiting clinical signs as shown in Table 5.

Table 1: Demographic characteristics of veterinarians in study location of some states in Nigeria.

Variables	Number (N)	Percentage (%)
Highest Educational qualification		
DVM	42	45.7
MSc	34	37
PhD	16	17.4
Total	92	
Age		
<35	54	58.7
>35	38	41.3
Total	92	100
Gender		
Male	65	70.7
Female	27	29.3
Total	92	100
Marital status		
Single	23	25
Married	69	75

Total	92	100
Household size		
<6	47	52.8
>6	42	47.2
Total	89	100
Place of residence/practice		
No	15	16.7
Yes	75	83.3
Total	90	100
Type of practice		
Ministries (Federal/State/LG + clinic)	33	35.9
Private (Clinic)	34	37
Academic /Research	25	27.2
Total	92	100
Years of practice post-graduation		
Less than 10 years	45	48.9
11 to 20 years	35	38
Above 20 years	12	13
Total	92	100

Key: DVM = Doctor of Veterinary Medicine; MSc = Master of Science; PhD = Doctor of Philosophy; LG = Local Government.

Table 2: Logistic models for independent predictors of factors associated with knowledge of veterinarians based on control of COVID-19 (Number=92) by socio-demographic characteristics.

Variable	Good N (%)	Poor N (%)	Total N (%)	OR (95% CI)	P-value
Age					
<35	45 (48.9)	9 (9.8)	54 (58.7)	2.327 (0.25-21.42)	0.456
>35	33 (35.9)	5 (5.4)	38 (41.3)		
Gender					
Male	59 (64.1)	6 (6.5)	65 (70.7)	0.157 (0.03-0.66)	0.012
Female	19 (20.7)	8 (8.7)	27 (29.3)		
Marital status					
Single	18 (19.6)	5 (5.4)	23 (25.0)	2.259 (0.36-13.89)	0.379
Married	60 (62.2)	9 (9.8)	69 (75.0)		
Household size					
<6	39 (43.8)	8 (9.0)	47 (52.8)	1.298 (0.23-7.16)	0.765
>6	36 (40.4)	6 (6.7)	42 (47.2)		
State residence/ practice					
No	12 (13.3)	3 (3.30)	15 (16.7)	2.341 (0.36-15.05)	0.37
Yes	65 (72.2)	10 (11.1)	75 (83.3)		
Practice type					
Min. (Fed/State/LG)	27 (29.3)	6 (6.5)	33 (35.9)	1.307 (0.12-13.91)	0.824
Private	28 (30.4)	6 (6.5)	34 (37.0)	1.098 (0.09-12.34)	0.939
Academic /Research	23 (25.0)	2 (2.2)	25 (27.2)		
Educational qualification					
DVM	35 (38.0)	7 (7.6)	42 (45.7)	1.554 (0.07-31.75)	0.775

MSc	28 (30.4)	6 (6.5)	34 (37.0)	3.451 (0.23-50.65)	0.366
PhD	15 (16.3)	1 (1.1)	16 (17.4)		
Experience post-graduation					
< 10 years	38 (41.3)	7 (7.6)	45 (48.9)	0.223 (0.00-5.61)	0.362
11 to 20 years	30 (32.6)	5 (5.4)	35 (38.0)	0.444 (0.04-4.28)	0.482
> 20 years	10 (10.9)	2 (2.2)	12 (13.0)		

Keywords: OR: Odds Ratio; CI: Confidence Interval; Min.: Ministry; Fed.: Federal Government; LG: Local Government; DVM: Doctor of Veterinary Medicine; MSc: Master of Science; PhD: Doctor of Philosophy

Table 3: Logistic models for independent predictors of factors associated with Attitude of veterinarians based on control of COVID 19 (Total Number=92) by socio-demographic characteristics.

Variables	Good N (%)	Poor N (%)	Total N (%)	OR (95% CI)	p-value
Age					
<35	32(35.6)	21(23.3)	53(58.9)	1.633 (0.30-8.76)	0.567
>35	21(23.3)	16(17.8)	37(41.1)		
Educational level					
DVM	27(30.0)	15(16.7)	42(46.7)	1.19 (0.13-0.01)	0.006
MSc	23(25.6)	10(11.1)	33(36.7)	0.47 (0.07-0.01)	
PhD	3(3.3)	12(13.3)	15(16.7)		
Gender					
Male	33(36.7)	31(34.4)	64(71.1)	18.42 (1.45-5.16)	0.011
Female	20(22.2)	6(6.7)	26(28.9)		
Marital status					
Single	13(14.4)	9(10.0)	22(24.4)	1.85 (0.43-7.91)	0.406
Married	40(44.4)	28(31.1)	68(75.6)		
Household size					
<6	26(29.0)	19(21.8)	45(51.7)	0.73 (0.21-2.46)	0.607
>6	24(27.6)	18(20.7)	42(48.3)		
State of residence/practice					
No	8(9.1)	7(8.0)	15(17.0)	1.45 (0.37-5.6)	0.593
Yes	43(48.9)	30(34.1)	73(83.0)		
Practice type					
Min.(Fed/State/LG)	21(23.3)	11(12.2)	32(35.6)	0.71 (0.13-3.75)	0.682
Private	22(24.4)	12(13.3)	34(37.8)	0.61 (0.10-3.42)	0.574
Academic /Research	10(11.1)	14(15.6)	24(26.7)		
Years of service post-graduation					
< 10 years	27(30.0)	17(18.9)	44(48.9)	0.45(0.04-4.62)	0.499
11 to 20 years	20(22.2)	15(16.7)	35(38.9)	0.64(0.11-3.77)	0.625
> 20 years	6(6.7)	5(5.6)	11(12.2)		

Keywords: OR: Odds Ratio; CI: Confidence Interval; Min.: Ministry; Fed.: Federal Government; LG: Local Government; DVM: Doctor of Veterinary Medicine; MSc: Master of Science; PhD: Doctor of Philosophy

Table 4: Logistic models for independent predictors of factors associated with practice of veterinarians based on control of COVID 19. (Number=92).

Variable	Good N (%)	Poor N (%)	Total N (%)	OR (95% CI)	P-values
Age					
<35	32(35.6)	21(23.3)	53(58.9)	0.78 (0.18-3.33)	0.732
>35	21(23.3)	16(17.8)	37(41.1)		

Educational qualification					
DVM	25(27.8)	15(16.7)	40(44.4)	3.31 (0.45-24.18)	0.239
MSc	19(21.1)	15(16.7)	34(37.8)	1.81 (0.35-9.18)	0.472
PhD	9(10.0)	7(7.8)	16(17.8)		
Gender					
Male	42(46.7)	22(24.4)	64(71.1)	2.94 (1.03-8.36)	0.043
Female	11(12.2)	15(16.7)	26(28.9)		
Marital status					
Single	15(16.7)	7(7.8)	22(24.4)	2.14 (0.51-8.84)	0.296
Married	38(42.2)	30(33.3)	68(75.6)		
State of residence/practice					
No	9(10.2)	6(6.8)	15(17.0)	0.76 (0.18-3.14)	0.705
Yes	42(47.7)	31(35.2)	73(83.0)		
Household size					
<6	32(36.4)	14(15.9)	46(52.3)	0.33 (0.10-1.08)	0.069
>6	20(22.7)	22(25.0)	42(47.7)		
Practice type					
Min (Fed/State/LG+clinic)	16(17.8)	15(16.7)	31(34.4)	0.31 (0.05-1.62)	0.166
Private	20(22.2)	14(15.6)	34(37.8)	0.28 (0.04-1.71)	0.169
Academic/Research	17(18.9)	8(8.9)	25(27.8)		
Experience post-graduation					
< 10 years	28(31.1)	16(17.8)	44(48.9)	0.62 (0.07-5.29)	0.665
11 to 20 years	18(20.0)	17(18.9)	35(38.9)	0.54 (0.10-2.79)	0.458
> 20 years	7(7.8)	4(4.4)	11(12.2)		

Keywords: OR: Odds Ratio; CI: Confidence Interval; Min.: Ministry; Fed.: Federal Government; LG: Local Government; DVM: Doctor of Veterinary Medicine; MSc: Master of Science; PhD: Doctor of Philosophy

Table 5: Frequency of responses by veterinarians to questions related to COVID-19.

Questions	Frequency(n)	Percent (%)	Total
Causative agent of COVID -19 is SARS-CoV-2	78	84.8	91
Old and co-morbidity are among vulnerable group	90	97.8	92
Asymptomatic individuals can transmit the disease	90	98.9	91
Mentioned hall mark symptoms	63	68.5	92
Incubation period may reach 14 days	11	12	92
Human to human transmission is occurring	1	1.1	91
Diagnostic test has been molecular (PCR)	61	66.3	92
Currently no cure for COVID-19 only supportive treatment	92	100	92
Currently no vaccine for COVID-19 only trials	88	95.7	92
Hydroxychloroquine is used in treatment of COVID-19	53	59.6	89
Remdesivir is used in treatment of COVID-19	69	77.5	89
Azithromycin is used in treatment of COVID-19	58	65.2	89
Domestic cats are susceptible to COVID-19	20	23	87
Wildcats (lions, tigers, etc.) are susceptible to COVID-19	21	24.1	87
One showing Covid-19 symptoms should restrict contact with animals/pets	56	62.9	89
Social distancing is a good preventive measure	91	100	92

Isolation and treatment are effective measures to curb spread	92	100	92
To prevent coronavirus, avoid large gathering	91	98.9	92
Willingness to serve in surveillance (contact tracing, sampling)	10	11.1	90
Willingness to serve in environmental decontamination	20	22.2	90
Willingness to volunteer to support national response	21	23.1	91
Willingness to be tested when exhibiting C/S	85	94.4	90
Veterinarians can support in applying ventilators to patients	74	80.4	92
Willingness to serve to apply ventilator on patients	81	90	90
Willingness to serve in case ID at ports of entry	41	45.6	90
Veterinarians can support diagnostics/testing	35	38	92

Keywords: PCR: Polymerase Chain Reaction; C/S: Clinical Signs; ID: Identification

Discussion

This study aimed to understand the knowledge, attitude and practices of veterinarians in respect to COVID-19, since knowledge, attitude and practices of veterinary doctors could influence their behavior towards COVID-19 prevention. Overall, vets considered in the present study exhibited good knowledge, positive attitude and good practice toward COVID-19, even though some poor attitude were identified in the present study such as low willingness to support the national response team for the prevention and control of COVID-19. To the best of our understanding, literature search has not found any published work yet on the role of vets on the control of COVID-19 in Nigeria, particularly none that examined the knowledge, attitude and practices in respect to the control of the disease from the country especially during the current outbreak of COVID-19. Therefore, this population-based survey could provide baseline data to the profession and government for preventive measures in case of future outbreaks. However, in view of the limited publications on the role of veterinarians in COVID-19 national response, the comparison of our findings has been made with other related conditions/professions. In general, good knowledge has been continuously reported as a factor correlated with infection prevention behaviour and influencing preventive behaviour [21-23]. Knowledge has been reported as a prerequisite for establishing prevention beliefs, forming positive attitudes, and promoting positive behaviours, and individuals' cognition and attitudes towards disease affect the effectiveness of their coping strategies and behaviours to a certain extent [24]. Thus, understanding the KAP of veterinarians with regards to the COVID-19 pandemic can provide information on how they are reacting/coping with the pandemic and how this can be applied to future pandemic.

In this study, none of the demographic variables showed association with knowledge except gender, where males had more knowledge about COVID-19 compared to their female counterparts. This finding indicates gender to be a significant predictor of knowledge among vets. The significant difference between male and female with regard to the knowledge of COVID-19 might be

due to the higher population of males compared to females in the profession in Nigeria, which was also reflected in this study. In addition, males are known to socialize more compared to females, as they have been reported to be more opportuned to travel to conferences to meet their colleagues and other professional, and health related activities, and are thus more exposed to information compared to their female counterpart [25,26]. Other workers [27] similarly found significant association between gender and knowledge. The present study showed that having DVM, working as a private vet and having <10 years post experience after vet school did not significantly affect knowledge, although these factors had higher frequency. The association of the level of education and knowledge have been debatable. While a study showed no significant difference between level of education and knowledge [28], others demonstrated that educational level was significantly associated with the knowledge of MERS-CoV [29,30]. This study also found that age and being married ($p>0.05$) did not significantly affect knowledge of COVID-19 among vets although they had higher response frequency. However, other workers [27] have observed that knowledge was significantly higher among those with age >30 years.

Except for gender and educational qualification none of the demographic variables examined in this showed significant association with the attitude of vets towards COVID-19 ($p<0.05$). This finding is similar to the reported lack of significant association between attitude and age, specialty or experience [27,31], but contrary to another study [30] which reported the years of experience as the only demographic variable significantly associated with mean attitude score.

Regarding practices of vets towards COVID-19 control, only gender and specifically male, showed a significant association with practice ($p<0.05$) among the demographic variables examined in this study; this is similar to the findings of other workers [30]. These good practices towards COVID-19 which are in line with WHO's guidelines and include regular hands washing, the use of hand sanitizers, wearing of nose mask, practicing social distance,

and stay at home order [32] are critical for the control of COVID-19 transmission and infection. Indeed, other studies [33] have also found men to be more active in taking preventive measures against MERS-CoV. This is however contrary to the finding of other workers [27] who observed a significantly higher mean practice score among females. Other factors found in this study which intensify good practices and encourages preventive behavior, though not significant, include age, marital status, years of experience post qualification, household size, and the type of practice.

Regarding the other variable of this study, majority of participants (97.8%) reported old and co-morbidity groups to be at a higher risk of the disease, which aligns with studies which reported elderly people with comorbidities such as hypertension, diabetes, and coronary heart disease as being at more risk of infection with SARS-CoV-2 [34-39]. In addition, almost all of the respondents agreed that asymptomatic individuals can transmit COVID-19, which is similar to other reports [40-42]. Good knowledge was also apparent in response to questions regarding the laboratory diagnostic test for COVID-19 in humans, most vets mentioned PCR as the diagnostic choice for COVID-19. The real time reverse transcription-polymerase chain reaction (RT-PCR) technique has been mentioned by other workers as the recommended diagnostic test for COVID-19 [34,36,37,40,43,44].

Regarding cure, all the participants were unanimous that currently there are no cure for COVID-19 but only supportive treatment, with no known vaccine available yet. However, participants of the current study had adequate Knowledge regarding several of the drugs used in supportive treatment of COVID 19, of which include: Hydroxychloroquine, Azithromycin and Remdesivir. Such drugs had been mentioned in several studies in the treatment of COVID-19 [45-48].

Participants were also highly knowledgeable in the prevention strategies for COVID-19. However, the high knowledge was not matched by a high willingness to support the national response. This low level of support could be due to the fact that this study was carried out at the early stage of the pandemic when information about the virus and disease prevention were scanty. However as at the time of writing this report, the level of involvement of other health professionals including veterinarians have increased as the disease spread nationally. Nonetheless, most veterinarians were willing to be tested if they should exhibit clinical signs.

In the present study about 62% of veterinarians were of the view that individuals showing symptoms of COVID-19 should restrict contact with animals/pets because domestic and wild cats were susceptible to COVID-19. This could be due several reports of the transmission of SARS-CoV-2 to domestic animals, and moreover transmission of COVID-19 from humans to domestic cats and several wild cats (tigers and cats) have been reported [49-53].

Conclusion

This study's findings provide new insights for infection prevention education in the wake of this new infectious disease. Our study showed that there was good knowledge, positive practices and attitude among vets in Nigeria towards the prevention of COVID-19 infection. The data collected in this survey could be used as baseline data to monitor vet's perception and participation in the event of a future outbreak of infectious diseases in Nigeria and provide insight when designing future interventions strategies for pandemics. During the course of this pandemic, several countries both developed and developing countries including Nigeria have deployed a combination of preventive measures including closure of educational institutions or places of work, isolation of households, towns, or cities and availability of good diagnostic facilities for accurate and timely diagnosis.

However, several of these countries had had to contend with inadequate health facilities and capacity to handle a sudden spike in the number of COVID-19 cases. This limited capacity is a significant driver behind calls to flatten the curve, lower the speed at which new cases occur and thus keep the number of persons sick at any one time lower [54]. We therefore advocate for collaborative efforts (one-health) between the medics and the vets when planning health education about COVID-19 and training of health professionals against future outbreaks of infectious diseases. Most vets are aware of the basics of COVID-19 infection and act as a potential reservoir to fill the gaps in Healthcare services should the need arise as is the case in countries like United Kingdom (UK) and United State of America (USA) where veterinarians have been put on notice for clinical roles should the need arise [55,56]. In Nigeria, Vets are currently involved in the testing of COVID-19 and are carrying out this task effectively. However, there is still scope for improvements on some of the gaps noticed on the attitude among vets especially in respect of willingness to support the national response teams.

Limitations

In spite of good study findings, we admit some limitations, and cautions must be taken while generalizing the results of the study due to limited sample size. In addition, most of the study participants were men which could input some level of gender bias. Furthermore, this study was conducted as a cross-sectional survey and at the earliest stage of the pandemic when most vets were not aware of so much information's about COVID 19. Self-reported information may not be entirely accurate and should be viewed with caution as it may reflect the subjective views of participants themselves. This may limit the reliability of the findings because of the possibility that participants could give a more positive picture than would have been revealed by other data collection methods. The participants might have answered in a manner that they perceived as correct and some participants might have given

answers in a manner that will be viewed favorably by the researcher and thus may not be their true response (social desirability bias).

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Conflict of Interest

Authors wish to declare that they have no conflict of interest.

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