



Assessment of Awareness, Knowledge and Willingness to Care for COVID-19 Patients by Primary Care Providers in a Southern Nigerian City: A Cross-sectional Study

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Abstract

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BACKGROUND: Due to the novel nature of COVID-19, management strategies are poorly understood by most primary care providers (PCPs), especially in the low- and middle-income countries (LMICs) of the world. If the knowledge of PCPs concerning COVID-19 is enhanced, awareness, perception, and attitude toward patient care will improve. Consequently, maximum prevention and control will be achieved.

AIM: This study aims at assessing the awareness, knowledge, and willingness of the PCPs to care for COVID-19 patients in Calabar, Nigeria.

METHODS: A cross-sectional descriptive study was used to evaluate 1126 PCPs (doctors, nurses, and community health officers) actively working in government primary, secondary, and tertiary health-care facilities in Calabar, Nigeria. A total population sampling method was employed and a validated, semi-structured, 33-item questionnaire was used to explore the objectives of the study.

RESULTS: Majority (99.4%) of the study participants were aware of COVID-19. Most (68.4%) information regarding COVID-19 came from the social media. Bonferroni *post hoc* test of multiple comparisons revealed that the knowledge score for PCPs in tertiary (11.2 ± 8) was significantly higher compared to those in secondary (10.6 ± 1.6) and primary levels of care (10.7 ± 1.7). Approximately 55.3% of the participants did not want to be involved in the management of COVID-19 patients.

CONCLUSION: There is the need to focus and intensify training of the PCPs working at the primary and secondary levels of care to increase their awareness, knowledge base, willingness to care for patients and eventually reduce morbidity and mortality associated with COVID-19 in the study setting.

Introduction

A variant of coronavirus infection, also known as COVID-19, is caused by the novel coronavirus that was discovered in December 2019 [1], [2], [3], [4]. This virus which was first discovered in Wuhan, China, has led to a pandemic that has spread across 215 countries affecting over 52,000,000 individuals [5]. It has also amounted to over 3,900,000 deaths worldwide [5]. In Nigeria, over 223,483 cases have been identified with about 2984 deaths, as at December 2021 [6]. These statistics continue to rise daily all across the globe.

Although it is suspected that COVID-19 is originally a zoonotic disease, the primary reservoir and intermediate host still remain unknown [1], [7], [8]. COVID-19 outbreak is said to have originated from a

seafood market in Wuhan where exotic animals such as mammoths, rabbits, bats, snakes, and birds were also frequently sold [1], [9], [10]. Investigation has showed that people who had at no point visited this market became sick signifying a human-to-human transmission which is very rapid [1], [7].

Human-to-human transmission is propagated by close personal contact with infected persons through respiratory droplets from sneezing and coughing. Infection may also spread from contact with surfaces contaminated by the virus [11], [12], [13]. A potential feco-oral route of spread has also been identified in some individuals [14], [15], [16], [17]. It remains unclear if the infection can be spread from the corpse of an infected person [18], [19], [20], [21].

COVID-19 is a highly virulent and contagious disease. Symptoms range from

high fever, soreness of the throat, unproductive cough, and dyspnea to acute respiratory disease (pneumonia) [2], [18], [20], [22], [23]. The etiologic agent, SARS-CoV2 strain of the coronavirus, is phylogenetically similar to previous human coronavirus, SARS-CoV which causes severe acute respiratory syndrome (SARS) [1], [3], [24].

The spread of COVID-19 is at an exponential rate and has put a major strain on world economies as well as on health-care services with a vast number of countries becoming overwhelmed with the increasing incidence of the disease [25], [26], [27], [28]. It has also taken a gigantic toll on health-care system leading to high rates of infection and deaths among health care workers. The impact of COVID-19 has also led to economic burden, hardship, and psychological distress among the people, including panic among healthcare providers. In Nigeria, a complex relationship has been found between financial insecurity, poor quality of life, food insecurity, mental health, and socioeconomic status during COVID-19 pandemic [29].

Furthermore, due to the fact that this infection is novel, specific management, prevention, and control are poorly understood by PCPs working in the primary, secondary, and tertiary health-care facilities, especially in the low-middle-income countries. Furthermore, communication gap, lack of in-depth knowledge, as well as poor motivation of health care workers, all hinder local research [30]. At the helm of affairs, inadequate support by the government, showing off in lack of provision of facilities for supportive care, insufficient personal protective equipment (PPEs) for health care workers, lack of properly equipped isolation/quarantine centers, and poor funding for training of medical personnel, have not helped at all [31], [32]. There have been several reports of health-care providers fleeing their places of primary assignment on sighting probable, suspected or confirmed cases of COVID-19. When awareness, knowledge, attitude, and perception of PCPs are poor with regard to COVID-19, prevention, control, and proper management will not be successful.

The primary care providers are the first contact care providers who come in contact with individuals with a vast array of diseases including the COVID-19 thus, with the rising incidence, morbidity and mortality from COVID-19, it is important that health care workers fully understand the disease, its transmission, and prevention. It is also important that misconception and wrong attitudes toward the disease are dispelled especially, in the light of various conspiracy theories that abound in social media.

This study was set out to assess awareness, knowledge, and willingness of the PCPs to care for COVID-19 patients and it is hoped that information gathered from this study will aid in creating of proper awareness among health care workers and the general population as a whole, improve knowledge base of the

frontline doctors, and change their orientation positively for effective and efficient patient care.

Methods

This is a cross-sectional descriptive study that evaluated primary care providers (doctors, nurses, and community health officers) actively working in public health facilities within Calabar, Nigeria. This was carried out in the various health institutions of the city including Primary Health Centres, Federal Secretariat Staff Clinic, the General Hospital, University of Science and Technology Medical Centre, Lawrence Henshaw Memorial Infectious Disease Hospital, Federal Neuropsychiatric Hospital, University of Calabar Medical Centre, Navy Reference Hospital, and University of Calabar Teaching Hospital (UCTH), the largest public health facility in the state.

It is informative to note that this study was conducted in the first phase of COVID-19 infection, however, it can provide baseline information for other studies of its kind.

Ethical approval for this study was obtained from the Health Research and Ethics Committee of the University of Calabar Teaching Hospital (UCTH/HREC/33/705) and Cross River State Ministry of Health (CRSMOH/RR/REC/2020/118). The approval from CRS MH covered the primary and secondary health facilities, while that of the UCTH covered the tertiary facility (the University of Calabar Teaching Hospital).

A total population sampling method was used. Out of the total number of 1160 PCPs working in public health facilities in Calabar, 1126 consented to participate in the study, making a response rate of 97%. Non-consenting health care workers, acutely ill staff and those with cognitive dysfunction, were excluded from the study. A 33-item self-administered, semi-structured, and pre-tested questionnaire was used to explore the objectives of this study. The questionnaire was adapted, designed, and modified from an online questionnaire on knowledge, attitude, and practices toward COVID-19 among Chinese residents [33]. This questionnaire was originally created by Zhong *et al.* with the use of guidelines for clinical and community management of COVID-19 by the National Health Commission of the People's Republic of China [33]. The questionnaire (Appendix I) consisted of two parts: (a) Demographics and (b) awareness, knowledge, and willingness. Test-retest (intraobserver) reliability test was carried out to ensure that the questionnaire consistently measured what it intended to measure. Reliability coefficient of 0.86 at an alpha level of 0.05 was realized. The data generated from the questionnaire was entered and analyzed using the licensed Statistical Package for the Social Sciences

(SPSS) Version 23 for Windows (License key: 446a418671b0b6e41359).

Descriptive statistics (frequency, proportions, means, and standard deviation) were used to summarize variables. Inferential statistics like Chi-square was used to establish association between two categorical variables and t-test to test association between two continuous variables. Level of statistical significance was set at $p \leq 0.05$.

Results

A total of 1126 PCPs were recruited for this study. There was a male-to-female ratio of 1:2.7. The results also showed that more than half of the

Table 1: Sociodemographic and practice-related characteristics of the study participants (n = 1126)

Variable	Frequency (%)
Sex	
Male	304 (27.0)
Female	822 (73.0)
Age group (years)	
20–28	111 (9.9)
29–37	389 (34.5)
38–46	386 (34.3)
47–55	186 (16.8)
56–64	51 (4.5)
Marital status	
Single	303 (26.9)
Married	766 (68.0)
Divorced	13 (1.2)
Widowed	34 (3.0)
No response	10 (0.9)
Ethnic group	
Efik	424 (37.7)
Ibibio	127 (11.3)
Ejagham	132 (11.7)
Yoruba	22 (2.0)
Ibo	103 (9.1)
Hausa	9 (0.8)
Others	263 (23.4)
No response	46 (4.1)
Religion	
Christianity	1095 (97.2)
Islam	3 (0.3)
African traditional religion	4 (0.4)
Others	9 (0.8)
No response	15 (1.3)
Place of practice	
Primary	337 (29.9)
Secondary	125 (11.1)
Tertiary	664 (59.0)
Cadre	
Doctor	304 (27.0)
Nurse/midwife	444 (39.4)
Community health worker	340 (30.2)
No response	38 (3.4)
Duration of practice	
1–5	293 (26.0)
6–10	311 (27.6)
11–15	145 (12.9)
6–20	89 (7.9)
>20	276 (24.5)
No response	12 (1.1)

Table 2: Source of information about COVID-19 among primary care providers across levels of health care (n = 1126)

Source of information about COVID-19	Level of care				Chi-square test	p
	Primary (n = 337; 31%), n (%)	Secondary (n = 125; 11%), n (%)	Tertiary (n = 664; 58%), n (%)	Total (n = 1126), n (%)		
Health care professional	38 (11)	19 (15.2)	161 (24)	218 (19.4)	FET: 65.321	< 0.001*
Friends/relatives	2 (1)	3 (2.4)	7 (1)	12 (1)		
Workshop/seminar	69 (21)	8 (6.4)	47 (7)	124 (11)		
Media (radio/internet/articles)	227 (67)	95 (76)	448 (68)	770 (68.4)		
Never heard of COVID-19	1 (0)	0 (0)	1 (0)	2 (0.2)		

*Statistical significance level. FET: Fisher's exact test.

PCPs [664 (59.0%)] were in the tertiary level of health care (Table 1). Almost all the PCPs (99.4%) were aware of COVID-19 and majority (68.4%) of these PCPs derived their information from social media (Table 2). This level of awareness was slightly higher in secondary PCPs (100%) than in tertiary (99.2%) and primary PCPs (99.1%). More than half of the PCPs in the different levels of care knew the cause of COVID-19, its origin from China, its transmission through contact with infected droplets and incubation period of between 2 and 14 days. Majority of the PCPs also could identify common COVID-19 symptoms, the primary target organ of the disease, the ability of the organism to survive on surfaces for hours, some general preventive measures, the sites for diagnostic sample collection, and that there is no definitive treatment (Table 4). However, variable proportions in the three different levels of care did not have this correct knowledge. The difference in mean composite score for correct knowledge of etiopathogenesis, diagnostic sample collection sites, and treatment for COVID-19 was statistically significant ($p < 0.001$). The score was highest among PCPs in the tertiary level (11.2 ± 8) followed by those in the primary (10.7 ± 1.7) and the least was for PCPs in the secondary level of care (10.6 ± 1.6). A Bonferroni *post hoc* test revealed that the knowledge score for PCPs in tertiary was significantly higher compared to those in the secondary and in the primary level of care.

Concerning the correct knowledge of preventive measures for COVID-19 among the study participants across levels of care, not all PCPs in the study knew N95 face mask as the best mask for health care workers. The proportion of those that knew was higher among those in the tertiary level followed by the primary and secondary and the difference was statistically significant ($p < 0.001$). Similarly, not all PCPs in the primary, secondary, and tertiary knew that PPEs were to be donned before attending to COVID-19 patients; that quarantine applies to suspected cases while isolation applies to confirmed cases. The overall mean of composite score for knowledge of preventive measures was 8.31 ± 1.40 . The mean composite score among PCPs in tertiary was above the overall mean, but that for the secondary and primary was each below the overall mean. The difference in mean composite scores was statistically significant ($p < 0.001$). A Bonferroni *post hoc* test of multiple comparisons again revealed that the mean knowledge score of COVID-19 preventive measures was significantly higher among PCPs in

Table 3: Willingness to be involved in managing COVID-19 patients across levels of healthcare

As HCW, would you like to be involved in management of COVID-19 infected patient?	Level of practice				Chi-square test	p
	Primary facility (n = 337)	Secondary facility (n = 125)	Tertiary facility (n = 664)	Total (n = 1126)		
Yes	114 (42.7)	49 (39.2)	296 (44.6)	489 (43.4)	7.156	0.128
No	185 (54.9)	76 (60.8)	362 (54.5)	623 (55.3)		
No response	8 (2.4)	0 (0.0)	0 (0.0)	14 (1.2)		

HCW: Health care worker.

tertiary compared with that of those in the secondary and primary levels of care. Interestingly, respondents in the tertiary level of care also have a more positive perception regarding patients' recovery from COVID-19 infection compared to respondents from other levels of care. As shown in Table 5, More than two-third (88%) of ALL respondents perceived that infected people will recover. This perception was significantly higher among PCPs in the Tertiary (91.1%) level of care compared with those in the Secondary (84.0%) and the Primary (83.4%).

Approximately 55.3% of the PCPs did not show willingness to be involved in the management of COVID-19 patients (Table 3). One of the main reasons for this was inadequate PPEs (Figure 1).

Discussion

COVID-19 is a disease of serious global public health concern. Apart from its health implications, it has caused a vast array of other effects including economical, domestic, and social effects [34], [35]. Health care workers, especially the frontline workers, have been particularly affected by this outbreak worsened by inadequate information about the disease.

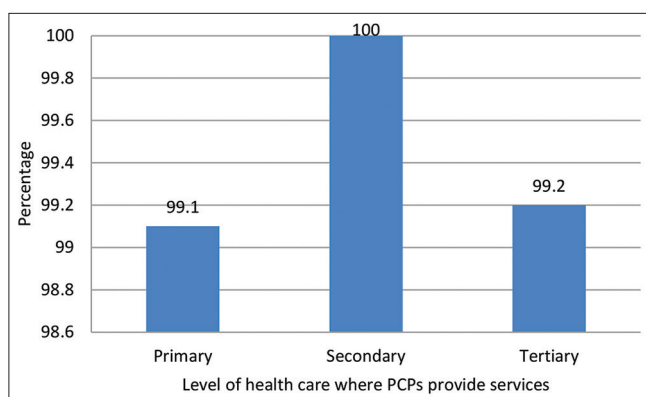


Figure 1: Awareness of primary care providers about COVID-19

It was discovered from this study that almost all the participants (99.4%) were aware of the disease and this information was attained mainly from social media. This finding was consistent with a study carried out by Ogolodom *et al.* in Southern Nigeria [36]. A study conducted by Bhagavathula *et al.* which involved a global online participation by health care workers, had contrary finding as depicted by a poor awareness of COVID-19 by health-care providers. It, however, also

showed that those who were knowledgeable about the disease got the information from social media [37]. This goes to show the importance of social media in information dispersion and dissemination in this present generation.

In terms of awareness of the disease, it was also discovered that PCPs in the secondary health-care levels had more awareness (100%) of COVID-19 than those in the other levels of care (Figure 1). This could possibly be attributed to a special training carried out for participants at the secondary level by the state government at the beginning of the COVID-19 outbreak in the country. However, the depth and scope of the training are important in determining accurate knowledge about COVID-19.

More than half of the PCPs at different levels of care recruited for the study had accurate knowledge about COVID-19. Just like this study, a Ugandan study also had a large number of PCPs with accurate knowledge (mean knowledge score of 82.4%) [38]. In addition to a relatively high level of knowledgeable PCPs, our study also revealed a statistically significant difference in correct knowledge of COVID-19 among primary care providers in various levels of the health-care system. For instance, the composite mean score for correct knowledge of etiopathogenesis, diagnostic sample collection, and COVID-19 treatment was highest in health-care providers in tertiary centers (11.2 ± 1.8), with the lowest in primary health-care centers (10.7 ± 1.7). This may be because of a better coordination of training and continuous professional development courses for health care worker in the tertiary health-care centers.

From the forgone, the awareness of primary care providers about COVID-19 was generally favorable. However, more than half (55.3%) of them were not willing to be involved in the management of

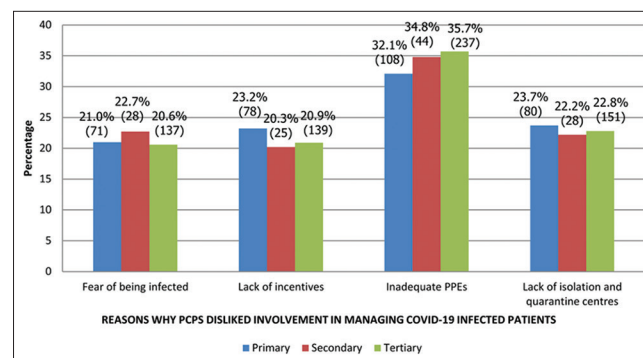


Figure 2: Reasons why PCPs disliked involvement in the management of COVID-19-infected patients. Primary (n = 337), secondary (n = 125), and tertiary (n = 664)

Table 4: Correct knowledge of etiopathogenesis, diagnostic sample collection sites, and treatment for COVID-19 among primary care providers across levels of care

Knowledge items (14 items)	Place of primary care practice				χ^2	p
	Primary (n = 337)	Secondary (n = 125)	Tertiary (n = 664)	Total (n = 1126)		
A disease to control population	53 (15.7)	15 (12.0)	133 (20.0)	201 (17.9)	6.389	0.172
Caused by a type of coronavirus	217 (64.4)	106 (84.8)	595 (89.6)	595 (81.5)	106.342	<0.001*
Not a punishment from god	122 (36.2)	40 (32.0)	306 (46.1)	468 (41.6)	16.741	0.002*
Spread from animal to man	160 (47.5)	35 (28.0)	262 (39.5)	457 (40.6)	17.298	0.002*
From China	237 (70.3)	82 (65.6)	470 (70.9)	789 (70.1)	4.023	0.403
Transmitted through contact with infected droplets	312 (92.6)	122 (97.6)	640 (96.4)	1074 (95.4)	10.853	0.093
Incubation period is 2–14 days	328 (97.3)	123 (98.4)	646 (97.3)	1097 (97.4)	1.869	0.931
Common symptom: Cough, fever, and sore throat	327 (97.0)	123 (98.4)	659 (99.2)	1109 (98.5)	10.634	0.031*
Primary target organ: Respiratory system	327 (97.0)	124 (99.2)	658 (99.1)	1109 (98.5)	7.881	0.096
Asymptomatic carrier can transmit	216 (93.8)	117 (93.6)	623 (93.8)	1058 (93.8)	2.685	0.612
The organism can survive on surface for hours	291 (86.4)	112 (89.6)	603 (90.8)	1006 (89.3)	4.999	0.287
Prevented using face mask and social distancing	333 (98.8)	121 (96.8)	652 (98.2)	1106 (98.2)	3.442	0.487
Throat/nose swab is used for diagnosis	274 (81.3)	107 (85.6)	614 (92.5)	995 (88.4)	29.724	< 0.001*
No definitive treatment	293 (86.9)	103 (82.4)	600 (90.4)	996 (88.5)	12.013	0.062
Mean composite score \pm SD	10.7 \pm 1.7	10.6 \pm 1.6	11.2 \pm 1.8	10.9 \pm 1.8	ANOVA: 15.32	< 0.001*

SD: Standard deviation.

patients infected with the disease. The major reason for this unwillingness was lack of PEPs followed by lack of incentives and subsequently the fear of getting infected by the disease (Figure 2). This was contrary to the observation in a study by Shi *et al.*, where it was observed that 71.17% of the participants were willing to care for patients with COVID-19 [39]. The predictors for this willingness to manage patients were advanced training (which half of the participants had undergone), ability to identify risk and protect themselves, as well as their patients from acquiring the disease [39]. Regarding fear of getting infected (Figure 2), respondents (22.7%) in the secondary facility expressed more fear compared to those in the primary (21%) and tertiary (21.06%). This may explain why respondents from the secondary facility (60.8%) were more unwilling to care for COVID-19 patients compared to those in the primary (54.9%) and tertiary (54.5%) (Table 3). In a study conducted in Ethiopia by Woyessa *et al.*, 49% of the health care workers involved in the study were afraid that they would become infected with COVID-19 infection and as such were unwilling to participate in the treatment of infected patients [40]. In a Medical University at Lucknow, India, a study on COVID-19 revealed that 9% of doctors were willing to quit medical profession and 23% of doctors preferred not to serve patients during pandemic of contagious disease [41]. This was as a result of the fear of becoming infected and subsequent spread of the disease to their families, as well as poor government infrastructure required to fight the disease [40]. Another study, a systematic review and qualitative meta-synthesis by Jollings *et al.* involving 46 studies

of pandemics of which five were COVID-19 pandemic, revealed that fear of becoming infected was of utmost concern in most of the frontline health care workers that participated in the study [42].

Our study, therefore, shows the need for adequate training, provision of necessary resources, and equipment required for the management of COVID-19 and appropriate funding and remuneration of workers.

Limitations

1. Causal relationship cannot be established because of the cross-sectional nature of the design. However, the findings can form basis for other superior researches.
2. This study was conducted in one out of 18 cities in Cross River State, Nigeria. Generalization of its findings should be done with caution. However, being a total population study with a robust sample size greater than 1000, this will perhaps add credence to the power of the study.
3. Social desirability bias may occur due to the tendency of some respondents to give responses which are socially desirable or use defense mechanism such as denial. Assurance of strict confidentiality must have helped to minimize this.

Table 5: Perceptions of primary care providers toward COVID-19 and unwillingness to be involved in managing COVID-19 patients across levels of care

Perception	Place of primary care practice				Chi-square test	p
	Primary facility (n = 337)	Secondary facility (n = 125)	Tertiary facility (n = 664)	Total (n = 1126)		
Infected people may recover						
Yes	281 (83.4)	105 (84.0)	605 (91.1)	991 (88.0)	19.172**	0.004*
No	5 (1.5)	1 (0.8)	10 (1.5)	16 (1.4)		
Do not know	51 (15.1)	19 (15.2)	49 (7.4)	119 (10.6)		
Most HCW caring for infected persons may not be infected						
Yes	181 (53.7)	63 (50.4)	358 (53.9)	602 (53.5)	8.209	0.084
No	76 (22.6)	34 (27.2)	190 (28.6)	300 (26.6)		
Do not know	80 (23.7)	28 (22.4)	116 (17.5)	224 (19.9)		
Some infected persons recover fully?						
Yes	273 (81.0)	110 (88.0)	583 (87.8)	966 (85.8)	9.357**	0.052
No	6 (1.8)	2 (1.6)	11 (1.7)	19 (1.7)		
Do not know	58 (17.2)	13 (10.4)	70 (10.5)	141 (12.5)		

*Statistically significant, ** Fisher's exact test. HCW: Health care worker.

Conclusion

There is need for training, retraining, and continuing professional development (CPD) for all primary care providers working in the primary, secondary, and tertiary health-care facilities in the study area. This should improve their level of awareness, knowledge base, as well as enhance their willingness to attend to COVID-19 cases. Provision of PPE is not negotiable considering the virulent nature of COVID-19 infection. There must be mandatory policy to ensure availability of PPEs at all levels of care in the study setting and a plea is herewith forwarded to the government of the Cross River State in this regard.

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