Psycho-behavioral responses of Nigerian health workers to an initial human-to-human transmission of the coronavirus disease

Justus Onu,[1,2] Tonia Onyeka,[2,3]
Ngozichukwu Nneka Unaogu,[4]
Alhassan Datti Mohammed,[5]
Kehinde Okunade,[6] Sunday Oriji,[7]
David Agom,[3,8] Dorothy Ekewuba,[2,9]
Cajetan Okwudili Alumona,[2,10]
Chidiebere Peter Echieh,[11] Adaeze Ozoagu[12]

[1]Department of Mental Health, College of Health Sciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria; [2]EPAC Research Team, College of Medicine, University of Nigeria, Ituku-Ozalla Campus, Enugu, Enugu State, Nigeria; [3]Department of Anaesthesia/Pain & Palliative Care Unit, College of Medicine, University of Nigeria Ituku-Ozalla Campus, Enugu, Enugu State, Nigeria; [4]Department of Clinical Services, Federal Neuropsychiatric Hospital, Enugu, Nigeria; [5]Department of Anaesthesia, College of Health Sciences, Bayero University/Aminu Kano Teaching Hospital, Kano, Kano State Nigeria; [6]Oncology and Pathological Studies (OPS) Unit, Department of Obstetrics & Gynaecology, College of Medicine, University of Lagos/ Lagos University Teaching Hospital, Lagos, Lagos State, Nigeria; [7]Federal Neuro-Psychiatric Hospital, Benin City, Edo State, Nigeria; [8]School of Nursing and Health Education, University of Bedfordshire, Luton, UK; [9]Nursing Services Division, University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu, Enugu State, Nigeria; [10]Oncology Pharmacy, Multidisciplinary Oncology Centre, University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu, Enugu State, Nigeria; [11]Division of Cardiothoracic Surgery, Department of Surgery, University of Calabar Teaching Hospital, Calabar, Cross River State, Nigeria; [12]College of Medicine, Enugu State University of Science and Technology, Enugu, Enugu State, Nigeria

Abstract

Previous pandemics have had signifi-cant impact on psychological well-being of front-line health care workers. Issues such as fear of contracting the disease, high workload as a result of high numbers of infected cases, increased job stress and unavailability of personal protective equip-ment have been implicated in development of psychological distress in this subset of individuals. The aim of the present paper is to describe psychobehavioral responses of health care workers and potential predictors of emotional response at onset of COVID-19 outbreak in Nigeria.

Cross-sectional web-based survey and 7-item Generalized Anxiety Disorder Questionnaire (GAD-7) were administered anonymously to 444 respondents compris-ing various categories of frontline health-care workers. Stepwise multiple linear regression was used to determine predictors of anxiety scores. Participants were mostly young adults (mean age 38 years), females (57%), living with a partner (78.2%) and medical doctors (56.8%). Restrictions in clinical activities and use of hand sanitizers were commonest precautionary behaviors. Commonest emotional responses were anger and despair (27.0% and 25.7%), respectively. About 42.8% had clinically significant anxiety symptoms with highest burden among nurses. Perception of likeli-hood of 2nd wave (p=0.03), self-prepared-ness (p=0.04), gender (p=0.01) and cadre (p=0.02) were significant predictors of emotional response of anxiety.

Study findings highlighted diverse psy-chological reactions of health care workers with a large proportion screening positive for significant anxiety symptoms. This has implications for planning a comprehensive psychosocial response to COVID-19 pan-demic and for future pandemics among frontline health care workers in low-resource settings.

Introduction

On the 31st of December 2019, Wuhan Municipal Health Commission, China, reported a cluster of cases of pneumonia in Wuhan, Hubei Province (Wuhan City Health Committee, 2020).[1] A novel coron-avirus was eventually identified in January, 2020.[2] The disease gained international recognition on 30th January, 2020 when the World Health Organization declared it a dis-ease of public health emergency of interna-tional concern and later was declared a pan-demic on 11th March, 2020. As of 22nd April 2020, there were 2475723 confirmed cases worldwide, 169151 deaths across 213 coun-tries, areas or territories.[2] In Nigeria, the first case was announced by the Nigeria Centre for Disease Control (NCDC) on 27th February, 2020.[3] With evidence of commu-nity transmission, the Nigerian government changed from the containment policy to mitigation strategies. Coronavirus disease (COVID-19) is recognized as a huge public health challenge because of the on-going spread within and across countries.[4] Despite its devastating effect on the physical, emo-tional and social well-being, knowledge about its pathophysiology and treatment modalities are still evolving.[4] Therefore, preventive measures have been the main-stay of curtailing the pandemic.[4] The effec-tiveness of the public health measures to control the transmission of the disease depends largely on the perception and behaviour of the population.[5] The preva-lence of psychological distress, insomnia, depression and post-traumatic stress symp-toms among non-medical individuals living

in Nigeria during the COVID-19 pandemic has been described previously.[6,7] The need to improve the psychosocial well-being of the Nigerian populace through psychosocial support for the duration of the COVID 19 pandemic has been emphasized.[8] One important group within this population is the healthcare professionals, who are at forefront of treatment and public health education. At the onset of the pandemic in Nigeria, the discourse on COVID-19 in Nigeria mostly revolved around preventive measures and active case management. However, one crucial aspect of the disease that seems to be missing from the public debate is how to improve the psychosocial well-being of the Nigerian front-line health worker.

Research on the impact of previous outbreaks on the psychological well-being of health care workers (HCWs) have shown some levels of mental distress.[9-11] Some of the concerns expressed by these have bordered on their personal health, fears of family members contracting the disease, stigmatization, isolation and marginalization. Issues such as high workload as a result of high numbers of infected cases, increased job stress and unavailability of personal protective equipment have also been implicated in the development of psychological distress in this subset of individuals.[12,13] During COVID-19 pandemic, medical workers are being forced to make clinical decisions based on scarce resources that are inconsistent with therapeutic values. Knowing that one patient will receive a life-sustaining treatment, and another will be denied that same treatment takes a significant emotional toll on the care providers. These circumstances may cause moral injuries (*i.e.*, injury to an individual's moral conscience and values resulting from an act of perceived moral transgression, which produces profound guilt and shame, and in some cases also sense of betrayal, anger and profound moral disorientation) among health care workers.[14] In addition, there is an additional challenge of loss of colleagues or family members or other loved ones to death consequent upon the disease and other on-going life stressors not related to the pandemic. The situations may lead to diverse psycho-behavioural responses among HCWs.

Another important consideration is the relationship between the perception of risk and psycho-behavioural responses. Studies have shown that there is a relationship between perception of risk, precautionary behaviour and emotional responses during an epidemic.[15,16] Previous reports from severe acute respiratory syndrome (SARS) have shown that people with higher perceived risk of infection were more likely to over-use precautionary behaviour (*e.g.*,

hand washing, use of face mask etc.) and are also prone to psychological reactions (*e.g.*, fear, anxiety).[16] Despite the comprehensive preventive measures, there remains the challenge of possible current and future psychosocial consequences of the disease. Responses to stressful events like a pandemic are generally of two kinds:[17] anxiety responses with autonomic arousal leading to apprehension and irritability and depressive responses with pessimistic thinking. Anxiety responses are generally associated with events of threat whereas depressive responses are associated with events that involve separation or loss.[17] Coronavirus disease presents both events. Threat to life, separation from loved ones due to isolation and loss from death due to the complications of the disease are common. In the light of the above issues, the following research questions became pertinent to COVID-19 with regards to the frontline health care workers in Nigeria:

Research Question 1: How does the frontline health care worker in Nigeria perceive the coronavirus disease?

Research Question 2: What are the precautionary behavioral responses taken by frontline health care workers in Nigeria?

Research Question 3: What are the psychological responses among frontline health care workers in Nigeria?

Research Question 4: Is there a relationship between the the socio-demographic, work-related factors, perception of the disease and the anxiety symptoms among frontline health care workers in Nigeria?

Materials and methods

Ethical considerations

Ethical approval for the study was obtained from the Ethics and Research Committee of the Federal Neuropsychiatric Hospital, Enugu. (FNHE/HTR/REA/VOL.11/430).

Study settings and design

This was a cross-sectional descriptive survey using a structured questionnaire and administered in April 2020 to front-line HCWs. For the purposes of this study, frontline HCWs were defined as medical and allied healthcare workers who had direct contact with patients. Study subjects comprised of both male and female HCWs (doctors, nurses, pharmacist, and laboratory scientists etc..) aged between 18 years and 60 years, who were still actively in service in both public and private hospitals and medical centres across the 6 geopolitical zones of Nigeria (South-South, South-East, South-West, North Central, Northwest, and Northeast). The sample size was not prede-

termined as all available health care workers were recruited using a convenience sampling technique and each participant was required to give informed consent before proceeding to complete the survey. The decision to conduct an anonymous self-administered web-based survey hosted on Google Forms was made partly due to restrictions on physical contact in the country during the study period and because of the rising use of smartphones among the study population, which makes online survey very feasible.[18]

Several professional online platforms for doctors, nurses and allied health workers such as those on WhatsApp® were identified through which the survey instrument was administered. The survey instrument was adapted from an earlier survey used for studies on a previous influenza pandemic[19] and consisted of four main areas: demographic data, perceptions, precautionary measures, emotional responses. Socio-demographic characteristics such as age, gender, religion, ethnicity, number of years of working experience, type of facility, cadre of health care professional, location of practice were included. Respondents were asked if they had made direct contact with confirmed COVID-19 patient/or specimen, their perception of the disease, their perception of the effectiveness of various public health preventive measures (use of face mask, frequent hand washing, social distancing, use of personal protective equipment). Respondents were also asked about the chance of occurrence of another pandemic in the future and the chances of mental distress occurring among survivors and witnesses to COVID-19 disease. They were also asked to rate themselves on an 11-point Likert-type scale (0-very unlikely, 10-very likely) on the likelihood that they would get vaccinated against the disease, on the likelihood that they or their communities may be infected and to rate themselves and their communities on their level of preparedness to respond to the pandemic. They were also asked to rate their perceived preparedness of their medical institutions and their country of practice. Regarding precautionary measures, respondents were asked the precautionary measures they practiced (regular face mask use, frequent hand washing/hand-sanitizing, social/physical distancing, avoidance of crowded places, restrictions in going out, avoidance of social situations/canceled or changed social plan, canceled or changed travel plans, children/ward/family stay home from work/school in response to the pandemic, home disinfection, quarantine of infected persons, obeying the lock down/sit-at-home orders).

With respect to emotional responsiveness, respondents were asked to describe how they felt since the news of community

transmission broke. In addition, the 7-item Generalized Anxiety Disorder Questionnaire (GAD-7) was administered to quantify the level of anxiety. The GAD-7 questionnaire is a 7-item, self-report anxiety questionnaire designed to assess patient's health status during the previous 2 weeks. Designed by Spitzer et al.,[20] the questionnaire is quick to administer and is used in research and clinical settings. Each item is scored against a Likert scale of 0 to 3. The scores are then totaled and presented from 0 to 21. Scores of 5, 10, and 15 represents cut-off points for mild, moderate, and severe anxiety, respectively. When using the instrument for screening of anxiety disorder, a recommended cut-off for referral for further evaluation is 10 or greater.[20] The questionnaire has been validated for use as a screening tool and severity measure,[21] in the primary care,[22] and in the general population.[23] It has been used in Nigeria in a community sample and pregnant women.[24,25]

Data analysis

Data was collected in Google spreadsheet which was transferred to Microsoft Excel spreadsheet and then exported into SPSS 21 (IBM SPSS® Statistics, New York, United States) statistical software where data was analyzed. Descriptive statistics were utilized for the socio-demographic characteristics while the perception of healthcare workers about the disease, the various precautionary behaviors and the psychological responses were described as frequencies and percentages. The relationship between risk perception, nature of the disease, socio-demographic factors and the scores on the anxiety scale was done using Kruskal-Wallis test with post-hoc pairwise comparison. Multiple stepwise linear regression was used to determine the predictors of emotional responses. Statistical significance was considered as $p < 0.05$.

Results

Of the 444 respondents, most were young (mean age of 38 years) with a median 10 years working experience, female (57.0%), living with a partner (78.2%), and were majorly medical doctors (56.8%) as shown in Table 1. Majority of the health care workers attributed the cause of the pandemic to a virus, with a few attributing causative factor to bacteria, tick infestation, trade war between world powers and punishment from God for man's sins. Majority also expressed knowledge of the non-existence of vaccines to prevent the infection and perceived the public measures to combat the pandemic as effective and professed to practicing it (Table 2). Figures 1 and 2 show the emotional responses of the health care workers at onset of the pandemic in Nigeria which was mixed. At one extreme, majority of the respondents responded with anger and despair (27.0% and 25.7%), respectively while at another extreme, others expressed the emotion of hope (26.1%). The prevalence of probable anxiety disorders among the health care workers was 42.8% (95%CI = 41.4-44.3%). The prevalence of probable anxiety disorders across the professionals and the cadres of profession were compared in Table 3. The table shows that nurses were about 3 times more

Table 1. Socio-demographic characteristics.

Variables	No. (%)	Mean±SD / Median (IQR)
Age (years)		38.63 ± 7.94
Duration of service (years)		10.00 (7.00)
Gender		
Male	191 (43.0)	
Female	253 (57.0)	
Marital status		
Living with a partner	347 (78.2)	
Not living with a partner	97 (21.8)	
Religion		
Christianity	372 (83.8)	
Islam	67 (15.1)	
Others	5 (1.1)	
Profession		
Medical Doctor	252 (56.8)	
Nurses	72 (16.2)	
Pharmacist	71 (16.0)	
Laboratory scientist	38 (8.6)	
Others	11 (2.4)	
Geopolitical zones		
South-East	163 (36.7)	
South-South	79 (17.8)	
South-West	96 (21.6)	
North-East	13 (2.9)	
North-Central	36 (8.1)	
North-West	70 (12.7)	

Table 2. Perception and preparedness.

Variables	No. (%)	Median (IQR)
Likelihood of 2nd wave		
High likelihood	253 (57.0)	
Low likelihood	54 (12.2)	
No likelihood	3 (0.7)	
Unsure	134 (30.2)	
Vulnerability to mental health problems among survivors of COVID		
High vulnerability	279 (62.8)	
Low vulnerability	115 (25.9)	
No vulnerability	15 (3.4)	
Unsure	35 (7.9)	
The likelihood the COVID-19 pandemic will reach your community?		7.0 (4.75)*
The likelihood of receiving the vaccine if found?		5.0 (6.0)*
The health care workers preparedness for the COVID-19 pandemic?		5.0 (4.0)**
The institutional preparedness to tackle the pandemic?		4.0 (4.0)**
The country's preparedness to tackle the pandemic?		3.0 (3.0)**

*0=unlikely, 10=very likely, ** 0=unprepared, 10=very prepared.

likely than doctors to have significant symptoms [OR (95% CI) 2.9 (1.7–5.0)]. Whereas allied health care workers were about twice more likely than doctors to have anxiety disorders [OR (95% CI) 1.7 (1.1–2.7)]. Nurses in lower cadre (*i.e.*, nursing officers 1 and 2 and senior nursing officers) were about 3 times more likely than nurses in administrative cadre to have significant anxiety symptoms [OR (95% CI) 2.9 (1.7–5.0)] (Table 3). Table 4 describes the relationship between socio-demographic factors, perception of nature of the disease, risk perception and emotional responses. Females had significantly higher scores in the anxiety scale than males (p = 0.01). The relationship was also significant for health care workers (p = 0.001), perception of the disease (p = 0.04), individual's preparedness (p = 0.04), and the perception of the possibility of the second wave (p = 0.03). Post-hoc analyses revealed that nurses had significantly higher anxiety than doctors (p = 0.001) and other non-doctor, non-nurses health care workers (p = 0.02); those who perceived the disease as severe enough to cause morbidity and fatality had higher scores in the anxiety scale when compared to those who perceived the disease as mild (p = 0.03); individuals who were unprepared had significantly higher anxiety score than those who perceived themselves as prepared (p = 0.04); and those who acknowledged very high likelihood of a 2nd wave had higher anxiety symptoms when compared with those who thought it unlikely (p = 0.03). Significant predictors of the emotional responses elicited by the presence of the pandemic were: the perception of the possibility of 2nd wave of the pandemic (2.0% of the variance), perception of self-preparedness (3.2% of the variance) and the profession of the health care worker (2.3% of the variance) (Table 5).

Discussion

The main highlights of this cross-sectional survey are: 1) The majority of medical health care workers perceived as useful, the various public health measures instituted to prevent the spread of the disease; 2) Several precautionary measures were adopted especially those involving avoidance of contact with patients; 3) The probable prevalence of anxiety disorders among health care workers at the onset of the pandemic in Nigeria was 42.8%; 4) Scores in the anxiety scale were significantly higher in nurses than doctors (p = 0.001) and in the allied health care workers than in doctors (p = 0.02), females than males (p = 0.01), if the disease was perceived as fatal than mild (p = 0.03), and if the HCWs perceived
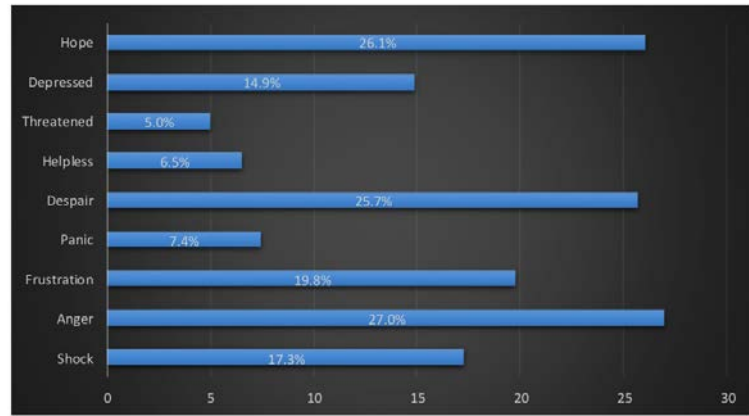

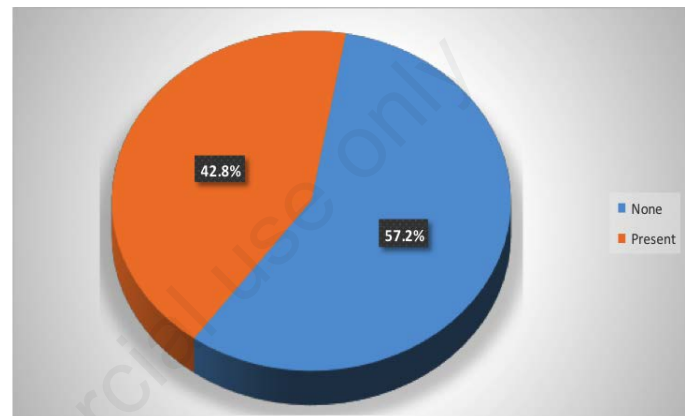**Figure 1. Immediate Reaction of Health Care Workers when the news broke for the Index Case in Nigeria.**

Figure 2. Prevalence of probable anxiety disorder.

Table 3. Precautionary behavior.

Variables - Perception of the public health measures	No. (%)
Use of face mask	
Not effective at all	9 (2.0)
Not very effective	102 (23.0)
Quite effective	246 (55.4)
Very effective	87 (19.6)
Hand washing	
Not effective at all	4 (0.9)
Not very effective	30 (6.8)
Quite effective	184 (41.4)
Very effective	226 (50.9)
Social distancing	
Not effective at all	1 (0.2)
Not very effective	32 (7.2)
Quite effective	120 (27.0)
Very effective	291 (65.5)
Precautionary behaviors utilized by HCWs	
Wear face mask	410 (92.3)
Use hand sanitizer	441 (99.3)
Avoid crowd	432 (97.3)
Restrict movement	375 (84.5)
Practice social distancing	428 (96.4)
Restricted clinics/other events	431 (97.1)
Kept children at home	439 (98.9)
Disinfected the home	344 (77.5)
Complied with quarantine order	412 (92.8)
Obey stay at home	411 (92.6)

themselves to be unprepared than well prepared (p = 0.04); 5) Preventive behavior especially those related to reduction of contact were largely acceptable and adopted by the health care workers in this study. This is consistent with previous studies,[26] where it was reported that preventive behavior was widely adopted in the study population during the Influenza epidemic. The common thing about the latter study and this present study was the timing. Both studies were done at the early phase of the pandemic when precautionary measures were more likely to be adhered to. Whether this trend has continued throughout the period of the pandemic will need to be further investigated. Majority of the health care professionals who were respondents in this study recognized the Covid-19 pandemic as a viral disease. In addition to this, some held the politico-spiritual theories of causation of the disease (*e.g.,* trade war between USA and China and punishment from the supernatural). The latter finding is not entirely surprising as supernatural influences on disease still holds sway in most African societies.[27,28] Health care workers are members of this sub-culture; hence, the perception of the disease may be influenced by their cultural milieu. Secondly, this present study was done at the beginning of the pandemic in Nigeria. At that time, information about the disease was obtained from a wide variety of social media sources which could potentially bias health care professionals.

With regards to the emotional responses, there were diverse reactions of health care workers in Nigeria at the beginning of the pandemic. While some responded with anger and despair, others expressed hope and optimism. This finding reflects the variability of human responses to perceived stress mediated by factors related to Covid-19 pandemic (*e.g.*, risk of infection) or remote factors such as personality characteristics.[13] Furthermore, the prevalence of significant anxiety symptoms in this study which was found to be 42.8%, is within the range of 0.6% to 57% reported among health care workers at the front line of the COVID-19 pandemic.[29,30] One Ethiopian study that utilized similar methodology (*i.e.*, utilizing the GAD-7) found the prevalence of COVID-19 anxiety among health care workers to be 63%.[31] However, a recent systematic review of 29 studies on the prevalence of anxiety disorders among frontline health care workers attending to COVID-19 cases found a pooled prevalence of 25.5%.[32] It is worthy of note that this systematic review included mostly studies that utilized diagnostic instruments (*e.g.*, Mini-International Neuropsychiatric Interview) and few studies using screening tools (*e.g.,* GAD-7). It is known that screening tools such as GAD-7 tends to overestimate diagnosis of anxiety disorder. Despite the methodological differences of these studies, there appear to be a consensus that the burden of anxiety disorders is high among frontline health care workers in this COVID-19 era when compared with the 10.7% anxiety disorders reported in the general population prior to the pandemic.[33] This finding underscores the importance of a comprehensive psychosocial policy for health care workers during and after the pandemic.

In considering the sub-group analysis for the prevalence of significant anxiety symptoms in nurses, allied HCWs, and doctors, the non-overlapping confidence intervals demonstrate that the differences were significant. Allied HCWs reporting higher anxiety symptoms in this study than their medical counterparts tallies with finding from a subset of HCWs in a center in Southwest Nigeria[34] and in Singapore.[35] Also, the finding of higher prevalence of significant anxiety symptoms among nurses is consistent with previous reports.[32,36] For example, Cheung *et al.*[36] reported a higher prevalence (50.1%) among nurses when compared to a much lower figure in the physicians. A previous survey by the National Institute of Health[37] showed that of 130 jobs, nurses ranked 27th of those likely to develop mental health problems, a situation where physicians ranked much lower. There are plausible reasons for the higher prevalence of anxiety symptoms among nurses when compared with physicians. Firstly, the nursing profession is largely made up of females. It is known that female gender is a risk factor for anxiety disorders.[38] This is also the case in this present study where females had significantly higher scores on the anxiety scale than males, a finding that correlates with findings of Wang *et al.*[39] Therefore, the higher proportion of anxiety symptoms in nurses may be a secondary effect of gender. Secondly, The authors posit that the significantly high anxiety levels found among the nursing cadre in this cohort may most likely arise from their regular close and prolonged contact with hospital in-patients in the course of discharging their nursing duties while the low anxiety scores recorded among doctors could be because they are better acquainted with the pathophysiology of the disease than the non-physician cadre and have less contact with the patients than nurses during the admission period. With regards to the potential predictors of significant anxiety symptoms among the frontline health care workers, we found that being a nurse, female, perception of self as unprepared to face the pandemic and a strong sense of the likelihood of the second wave of covid-19 were the significant predictors of anxiety symptoms. Previous studies have identified being a woman,[38] perceived insufficiency of information,[13] having no access to personal protective equipment,[31] and having a chronic medical condition,[31] as significant predictors too. In addition, frontline HCWs from resource-poor settings in Africa and other regions of the world consider themselves to be circum-

Table 4. Emotional responses.

Variables	No (%)
Emotional responses of the Nigerian HCWs to the news of the COVID-19 in Nigeria	
Shock	77 (17.3)
Anger	120 (27.0)
Frustration	88 (19.8)
Panic	33 (7.4)
Despair	114 (25.7)
Helpless	29 (6.5)
Threatened	22 (5.0)
Depressed	66 (14.9)
Hope	116 (26.1)
Anxiety symptoms	
None	254 (57.2)
Mild	126 (28.4)
Moderate	37 (8.3)
Severe	27 (6.1)

None = GAD-score < 5, mild anxiety = GAD-score ≥ 5 < 10, moderate anxiety = GAD-score ≥ 10 < 15, severe anxiety = GAD-score ≥ 15.

Table 5. COVID-19 pandemic perception versus emotional responses.

Perception	GAD-7 total score, median (IQR)	χ^{2*}	p-value
The nature of the disease			
Mild disease	1.0 (5.5)	5.71	0.05
High infectivity	4.0 (6.0)		
High morbidity and fatality	5.0 (5.0)		

*=Kruskal-Wallis test, GAD=Generalized Anxiety Disorder, IQR=Interquartile range.

stantially disadvantaged with regards to poorly developed healthcare infrastructure, a situation that puts them at much greater risks of contracting COVID 19 and other infectious diseases[40] as well as creates anxiety among HCWs.

Limitations

The low response rates from HCWs in the North East and North Central regions of the country contributed to the small sample size of the study. The authors attribute this to the current conflicts and instability in both regions. Conduct of the study in the early phase of the outbreak in Nigeria and the use of convenience sampling method may affect generalizability of findings. Thus, follow-up studies assessing psychobehavioral responses during and after the pandemic are recommended. In addition, the cross-sectional nature of this study may limit the possibility of making inference as to whether the anxiety symptoms reported existed before the onset of pandemic.

Conclusions

This study shows that there was a high prevalence of precautionary behaviors, perceived disease risks as well as a high prevalence of negative emotional responses such as anxiety, despair, and anger at pandemic onset in Nigeria. This reinforces the need for the development of psychosocial interventions for the well-being of HCWs. Emotional health should be always made priority area for HCWs but especially during any pandemic. The World Health Organization (WHO) has selected this year, 2021, to be the *Year of the Health and Care Worker* (YHCW) in order to recognize the devotion and dedication of HCWs around the globe and to remind the world of the many sacrifices made and challenges faced by HCWs especially in the face of the COVID 19 pandemic.[41] This declaration should spur health institutions in similar low-resource settings as the study environment to help preserve the mental and emotional well-being of their staff by providing counselling sessions at intervals and on-demand, using the Psychological Medicine and the Social Work departments and encouraging peer support via phone, video or support groups.[42] Finally, planning a comprehensive psychosocial response for Nigerian HCWs in relation to the COVID-19 pandemic and future pandemics is of utmost necessity.

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