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Hezekiah Kehinde Adesokan, Charity Ashe´osla Agada, Joseph Akwoba Ogugua, Oluwawemimo Oluseun Adebowale, Oluwaseun Adeolu Ogundijo, Peter Ibukunoluwa Alabi, Ibikunle Mark Akanbi

Corresponding author: Hezekiah Kehinde Adesokan, Department of Veterinary Public Health and Preventive Medicine, University of Ibadan, Ibadan, Nigeria. greaterglory2008@gmail.com

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Predictors of COVID-19 pandemic-associated mental health outcomes of slaughterhouse managers in selected states of Nigeria, 2020

Hezekiah Kehinde Adesokan[1,&], Charity Ashe´osla Agada[2], Joseph Akwoba Ogugua[3], Oluwawemimo Oluseun Adebowale[4], Oluwaseun Adeolu Ogundijo[1], Peter Ibukunoluwa Alabi[1], Ibikunle Mark Akanbi[1]

[1]Department of Veterinary Public Health and Preventive Medicine, University of Ibadan, Ibadan, Nigeria, [2]Department of Veterinary Public Health and Preventive Medicine, Joseph Sarwuan Tarka University, Makurdi, Benue State, Nigeria, [3]Department of Veterinary Public Health and Preventive Medicine, University of Nigeria, Nsukka, Nigeria, [4]Department of Veterinary Public Health and Preventive Medicine, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria

[&]Corresponding author

Hezekiah Kehinde Adesokan, Department of Veterinary Public Health and Preventive Medicine, University of Ibadan, Ibadan, Nigeria

Abstract

Introduction: *the COVID-19 pandemic is a global public health and economic crisis, with major outbreaks occurring amongst meat workers globally. The multiple tasks of ensuring safe operations, adherence to COVID-19 non-pharmacological preventive measures and safeguarding the health of the workers are attendant challenges faced by slaughterhouse managers amidst the pandemic. Yet, little or no attention is paid to COVID-19 pandemic related mental health outcome of these managers in developing countries, especially Nigeria.* ***Methods:*** *a cross sectional study was conducted among randomly selected 91 slaughterhouse managers from four of the six geopolitical zones in Nigeria to determine the predictors of COVID-19 pandemic-associated mental health outcome. Data were collected using a validated semi-structured questionnaire which measured COVID-19 related mental health outcome, as well as the explanatory variables including the kind of manager (veterinarian/government worker, butcher), COVID-19 sensitization since the start of pandemic (yes, no), and rate of animal processing since pandemic started (unchanged/increased, reduced). The data were analysed by binary logistic regression using STATA version 14.2.* ***Results:*** *only 13.2% of the respondents had good mental health outcome, 67.0% were on borderline, while 19.8% were poor. More than one-third (34.1%) of the respondents reported a feeling of anxiety that COVID-19 would reduce patronage for their services. Again, 31.9% were always worried about the overall financial demands of COVID-19 mitigation measures and 37.4% were concerned that the slaughterhouse facility lacked requisite infrastructure for risk reduction against COVID-19. Being slaughterhouse managers belonging to the butchers´ association (aOR = 3.03, 95%CI = 0.87 - 10.59), not having prior COVID-19 sensitization (aOR = 2.27, 95%CI = 0.14 - 1.39) and feeling that the pandemic had reduced rate of animal processing (2.23, 95%CI = 0.44 - 11.32) were associated with higher odds of developing poor COVID-19 pandemic related mental health outcome.* ***Conclusion:*** *a high prevalence of poor mental health outcome among the slaughterhouse managers with certain important gaps identified as possible COVID-19 related issues contributing to their mental health distress is reported. Interventional efforts in the slaughterhouses to reduce job-related mental health stressors and consequently improve the health of this workforce are advocated.*

Introduction

The COVID-19 pandemic is a global public health and economic crisis. The pandemic has confronted policymakers with tradeoffs between maintaining essential economic activities and mitigating disease spread [1]. Slaughterhouse´s processing livestock pose a particular public health risk extending far beyond meatpacking companies and their employees. As reported, major COVID-19 outbreaks have occurred amongst meat workers globally [2]. This occurrence might be connected with the precarious working conditions in slaughterhouses, which are ordinarily hazardous to mental health even without a pandemic [3]; a situation which is even worse in most developing countries. Hence, COVID-19 intensifies these existing health risks. More importantly, the physical configuration of most slaughterhouses and communal housing makes social distancing near impossible [2]. Besides, the long work shifts in close proximity to coworkers, difficulty in maintaining proper face covering due to physical demands, and shared transportation among workers are additional potential risk factors [4]. Considering therefore congestion of the workers in the slaughterhouses, any possible zoonotic outbreak will be worsened, and the application of

the existing bio-risk mitigation measures could be a challenge [5].

Available reports show that livestock-processing plants worldwide experienced spikes in infections during the early period of the COVID-19 pandemic, resulting in shutdowns that disrupted meat and dairy supplies [6-8]. For instance, in the United States, reports of COVID-19 spreading within the livestock-processing industry led to increased attention and updated safety guidance by the Centers for Disease Control and Prevention (CDC) [4]. Several plants were forced to shut down until, among other factors, a federal executive order invoked the status of livestock processing as "critical infrastructure" for national security and mandated that these plants remain open [9,10]. However, in most developing countries particularly Nigeria where adequate measures at slaughterhouses are not in place; yet, meat supply chains are expected to be maintained in order to ensure unhindered availability of meat to the public. Meanwhile, because of the continuous contact of the workers with biological materials, they can be exposed to zoonotic pathogens [11] and COVID-19 infections, a fact that makes the slaughterhouses to be considered major sources of occupational exposure.

Central to maintaining the required meat supply chain is the role of slaughterhouse managers who are faced with the multiple tasks of ensuring safe operations at making meat available, adherence to COVID-19 non-pharmacological preventive measures among workers as well as safeguarding the health of their workers. Besides, the possible economic downturns with associated dwindling workforce at the slaughterhouse due to the fear of contracting the virus are additional burdens to these managers. Meanwhile, Leibler *et al.* [12] reported that slaughterhouse workers might experience elevated prevalence of psychological distress compared to general population estimates. According to their report, this at-risk population should be targeted for mental health services, while intervention efforts are required to reduce job-related mental health stressors in order to improve the health of this workforce. Although mental health problems remain one of the recognized non-communicable diseases with high burden in both developed and developing countries, only little attention is paid to it, especially in a rural context [13]. According to World Health Organization (WHO), over 450 million people across the general population suffer annually from mental illness globally; unfortunately, however, up to 75% of people with mental disorders in developing countries, receive no treatment [14]. Additionally, mental disorder-related deaths occur mainly through suicides, accounting for about 1 million deaths a year globally [15].

While studies in Nigeria [16,17] and elsewhere [18,19] have focused on health workers and mental health effects, information on this importantly vulnerable group of the meat-processing sector is grossly lacking. This study therefore, was aimed at assessing COVID-19 pandemic-associated mental health outcomes for slaughterhouse managers in Nigeria, with the ultimate aim to inform the need for mental health services for slaughterhouse managers.

Methods

Study design and setting: this cross-sectional study was conducted between September and December 2020 among slaughterhouse managers of selected geopolitical zones in Nigeria, a West African country categorized into six geopolitical zones-South West, South East, South South, North East, North West, North Central and the Federal Capital Territory (FCT). The country has a number of slaughterhouses across the different states where food animals such as cattle, sheep, goats and pigs are slaughtered and dressed for human consumption. These slaughterhouses are managed by either the government and/or chairmen of butchers´ association of the respective slaughterhouses. Considering the nature of activities demanding close physical contacts in

such a setting, outbreak of diseases such as COVID-19 pandemic constitutes a serious concern.

Study population, sample size and sampling: the study population included the slaughterhouse managers from four of the six geopolitical zones in Nigeria; the selected zones being regions with the highest number of confirmed cases of COVID-19 as at September 29, 2020 when the study was conducted [20]: South-West (46.50%), South-East (16.58%), South-South (12.95%) and North-Central (9.77%) regions (Figure 1). Further, states which were accessible and with defined slaughterhouse managers' system were purposively selected for the study. These states included Oyo and Ogun (southwestern), Kogi, Benue, Nasarawa (north-central), Enugu (south-east) and Cross River (south-south). The slaughterhouses in the state capital of each selected state were used, including state central slaughterhouse (in Ibadan, Oyo State) and up to 25% of slaughterhouses across states that do not practice central state slaughtering system. A detailed information on the project focus, aims, and associated benefits were discussed with all the concerned stakeholders involved in the management of the slaughterhouses, including veterinary officers as well as chairmen of butchers´ associations. Eligibility criteria were being designated by the slaughterhouse as slaughterhouse managers and having being in the position for at least three years. Those who had no official bearing with the management of the slaughterhouses or were below three years in the management were excluded from the study. Following their due consent to participate in the study, 65% of the management team of each selected slaughterhouse were purposively selected. To avoid bias; at least, a minimum of two managers including a veterinarian and a butchers´ association representative where present were included in the study from each selected slaughterhouse (Figure 2). The inclusion was based on willingness to participate, while those who declined participation were excluded. The potential participants were told that participation was voluntary without any attached penalty for refusal to participate. In addition, they were informed they could withdraw their participation in the event that they feel uncomfortable with the process according to the World Medical Association Declaration [21]. They were, however, encouraged to participate considering the overall benefits of the study to them and the general populations.

Questionnaire design and pretest: a validated semi-structured questionnaire written in English was used to collect data. In order to ensure the standardization of the questionnaire, the contents of the questionnaire were reviewed by a panel of experts. Thereafter, it was pilot-tested on a set of 12 slaughterhouse managers who were excluded in the main study for face validity, including language appropriateness and format. Some of the questions were thereafter revised in order to improve clarity and completeness, but ensuring that the content was still maintained. The questionnaire was interviewer-administered and translated into the local languages of respondents by the researchers in cases where the respondents did not understand English language properly. The interviewers paid strict adherence to the laid down non-pharmacological preventive measures against COVID-19, including the use of face masks, maintenance of adequate distance during the interview as well as proper hand washing and sanitizing before and after the interview. The questionnaire contained both closed and open-ended questions and was divided into two sections. The first section contained eight questions on respondents´ socio-demographic characteristics as well as activities related to slaughterhouse and COVID-19 pandemic including sensitization on the pandemic among workers and effects of the pandemic on the slaughter rate in the slaughterhouse. The second section was designed to elicit information on the COVID-19 pandemic related mental health outcomes of the slaughterhouse managers and contained 15 items on a 5-point Likert scale. Some of the questions asked included whether meeting the requirements

for preventive measures against COVID-19 pandemic was causing the slaughterhouse managers anxiety, whether ensuring social distancing in the slaughterhouses setting gives them a mental torture, whether they were worried that the overall financial demands of COVID-19 mitigation measures in the slaughterhouses were unbearable for them, and whether they were apprehensive people might transmit the COVID-19 infection to the slaughterhouse environment. The agreement scale ranged from "1" for "never" to "'5" for "always". Overall, the questionnaire took 10 - 15 minutes per respondent to fill.

The conduct of the research was in line with the ethical principles for medical research involving human subject according to the World Medical Association [21]. The purpose and associated benefits of the study were explained to the potential participants, who were told that participation was voluntary and that there was no penalty attached to their refusal to participate. Verbal consent was obtained from each participant and personal identifiers were not collected. The confidentiality of the respondents was ensured by using number codes on the questionnaire without any use of individual names. The verbal consents obtained were documented in the project notebook by matching the respondents´ consents with their respective codes on the questionnaire administered to each respondent.

Outcome variable: this variable was measured by a 15-item statement which assessed issues pertaining to their mental health status during periods of the COVID-19 pandemic and responses recorded on a 5-option Likert response scale as "never", "rarely", "sometimes", "often" and "always".

Explanatory variables: in this study, the main explanatory variables of interest with predictive value on the outcome variable of COVID-19 related mental health outcome we sought to determine included the kind of manager (veterinarian/government worker, butcher), COVID-19 sensitization since the start of pandemic (yes, no), rate of animal processing since pandemic started (unchanged/increased, reduced).

Data analysis: statistical analysis was done using STATA version 14.2 while the charts were drawn with MS Excel. Socio-demographic and slaughterhouse-related characteristics were presented as frequencies and proportions. COVID-19 related mental health items were also presented as frequency tables. Thereafter, the responses were pooled to get a score for each of the respondents. The score for each question ranged from 0 - 4 (never = 0, rarely = 1, sometimes = 2, often = 3 and always = 4), while the minimum and maximum scores attainable were 0 and 60 (with 15 questions), respectively. Negatively worded questions were reverse coded. The mental health scores were converted to percentage and categorized. Scores less than or equal to 33.3% were categorized as good, those between 33.4% and 66.7% were borderline, while those greater than 66.7% were poor. To determine the relationship between the explanatory variables and COVID-19 related mental health outcome, the outcome variable was further categorized into two groups; both good and borderline were categorized into a group and named good. Binary logistic regression was used to determine the relationship between the explanatory variables and COVID-19 related mental health outcome after controlling for age, sex and religion.

Results

Out of the total 140 eligible slaughterhouse managers (veterinarians = 59, butchers = 81), 91 (65.0%) slaughterhouse managers (veterinarians = 39, butchers = 52) participated in this survey (Oyo = 4; Ogun = 12; Kogi = 19; Benue = 24; Nasarawa =12; Enugu = 4; Cross River =16) across the various slaughterhouses of the four selected geopolitical zones (Table 1). Majority were males (82.4%) and between 35 - 44 years old (44.4%). About 70% of the respondents were Christians. Fifty-two (57.8%)

of the managers were butchers, while 38 (42.2%) were veterinarian or government workers. Fifty-six percent of the respondents have had COVID-19 sensitization at their slaughterhouses, 64.4% ensured adequate spacing between workers, while 81% claimed there was reduction in the rate of animal processing at the slaughterhouses since the pandemic started. About half (49.5%) of the managers stated that the cleaning and disinfection of slaughterhouses was regular (Table 2).

Overall, only 13.2% of the respondents had good mental health outcome, 67.0% were in borderline and 19.8% were poor (Figure 3). Furthermore, more than half of the participants did not agree that preventive measures against COVID-19 pandemic made them fail other primary responsibilities at the slaughterhouses, while only about one-third were undisturbed and comfortable performing their duties in the slaughterhouses during this prevailing pandemic. However, more than one third (34.1%) of the respondents were never relaxed, feeling that COVID-19 would reduce the patronage of prospective customers for their services. Again, 30-40% of the slaughterhouse managers were always worried about the overall financial demands of COVID-19 mitigation measures, as well as attitudes of other workers towards maintaining physical/social distancing. Similarly, 37.4% were concerned that the slaughterhouse facility lacked requisite infrastructure for risk reduction against COVID-19, and 30.7% were apprehensive that people might transmit the infection to the slaughterhouses environment (Table 3).

Table 4 examined the relationship between the explanatory variables and COVID-19 related mental health outcome of the respondents after adjusting for sex, age and religion. Compared to managers who were veterinarians or government workers, butchers were more likely to have poor COVID-19 related mental health outcome (aOR = 3.03, 95%CI = 0.87 - 10.59, p = 0.082) although this association was not significant. Managers who worked in slaughterhouses where COVID-19 sensitization had not been done were about two times more likely to have poor mental health outcome compared to those working in slaughterhouses with prior sensitization (aOR = 2.27, 95%CI = 0.14 - 1.39, p = 0.160). However, this association was not insignificant. The association between the effects of COVID-19 pandemic and mental health outcome was also not statistically significant. Slaughterhouse managers who felt that the rate of animal processing had reduced since the pandemic started were about two times more likely to have poor COVID-19 related mental health outcome compared to those who felt animal processing had increased or remained unchanged (aOR = 2.07, 95%CI = 0.44 - 11.32, p = 0.335).

Discussion

Mental health outcomes have been associated with pandemics in the past [22,23] and COVID-19 pandemic, in particular could lead to significant mental health stresses [24]. Notably, meat processing facility workers remain one of the occupational groups that is worst hit by mental health stress [25-28]. Though a previous report [12] indicated that slaughterhouse workers might experience elevated prevalence of psychological distress compared to general population estimates, information on the mental health outcome related to COVID-19 pandemic on meat processing workers, particularly slaughterhouse managers in Nigeria is grossly lacking. To the best of our knowledge, this is the first report on the predictors of COVID-19 related mental health outcome of slaughterhouse managers in meat processing facilities in the country.

This study revealed that only 13.2% of the slaughterhouse managers had good COVID-19 related mental health outcome, the majority being either on borderline (67.0%) or poor (19.8%) level. These findings reiterate previous reports that workers in meat-processing industries are prone to mental health distress [12,29,30]. This

observation also corroborates the assertion that strenuous work as slaughterhouse routines can have serious psychological effects on the slaughterhouse workers [31]. The lower proportion with good mental health outcome level compared with the rest of the respondents is consistent with other reports which indicate that slaughterhouse workers have higher vulnerabilities to mental health stress [12,32]. Our findings portend that the slaughterhouse managers and plausibly, workers in meat processing industries in general are an occupational population that should be targeted for mental health services, and that intervention efforts to reduce job-related mental health stressors would improve the health of this workforce.

Further, it is evident from the present study that the COVID-19 pandemic might have additional mental health stress on the slaughterhouse managers, worsening the existing vulnerability of this occupational group to mental distress. As observed, more than one-third always felt concerned with the additional cost that providing water, soap and sanitizer for regular washing of hands as a preventive measure against COVID-19 was causing them on a daily basis. A similar proportion suffered mental distress due to requirements to mitigate the pandemic in the slaughterhouse settings. The present observations might be predicated upon the fact that global economic slowdown prompted by the pandemic, as well as the spread of the disease itself, has exacerbated existing societal inequities in most countries, resulting in unequal access to basic needs such as food, water, and health care [33]. According to the WHO, one in three people lacks access to safe drinking water and basic hand washing facilities [34]. Specifically, studies show that most slaughterhouses in Nigeria lack access to potable water supply [35,36]. As such, current demands for use of water aside the cost of regular use of soap and sanitizers connote additional burden on the slaughterhouse managers who must see to the running of the facilities. Therefore, slaughterhouse settings without access to these amenities, which are vital for health and safe food preparation, are more likely to contract the disease, compounding existing inequities [37]. This, therefore, is suggestive of additional mental distress to the managers of such settings, most especially during the present COVID-19 pandemic.

Again, well above half of the slaughterhouse managers were either sometimes, often or always worried about the overall financial demands of COVID-19 mitigation measures and were similarly apprehensive of what might happen to their work and income if the facility was shut down in case of COVID-19 outbreak among the workers. Generally, in sub-Saharan African countries, the slaughterhouse setting is characterized with workers, including slaughterhouse managers who are butchers that often depend on the daily proceeds from the slaughter process. As a result, anything that halts daily activities would negatively impact on their daily income. Unfortunately, these workers are often paid low wages, while some work under informal arrangements [38,39]. They might also be hesitant to quarantine when infected because they could not afford to lose income. Available report showed that major COVID-19 outbreaks have occurred among meat workers globally [2], leading to shutdowns of food processing facilities such as slaughterhouses [40,41]. Such shutdowns therefore might mean loss of sources of livelihood among the managers as well as their dependents.

Moreover, a higher proportion of the slaughterhouse managers had the mental torture of feeling disturbed and highly uncomfortable with performing routine duties in the slaughterhouses due to the prevailing pandemic. This might be related to the level of apprehension that people might transmit the COVID-19 infection to them observed in this study. These findings could be explained by the fact that working conditions in most slaughterhouses are hazardous to health even without a pandemic [3], with COVID-19 intensifying existing health risks. Besides, the physical pattern of slaughterhouses as well as the

likely physical contact which slaughterhouse work demands make social distancing near impossible. This situation is compounded by the observed poor attitudes of the slaughterhouse workers towards maintaining physical/social distancing. Such poor attitudinal disposition has been reported as a major driver of pandemic [42].

Furthermore, the study revealed that slaughterhouse managers who were of the butchers´ association were more likely to have poor COVID-19 pandemic related mental health outcome than those who were of veterinarian counterparts, although this association was not significant. The present finding might be connected to the negative economic impacts of COVID-19 pandemic on the slaughterhouse business considering the fact that slaughterhouse managers who were butchers were more likely to have their interest tilted towards profit making rather than providing wholesome meat for the public. More so, the majority of the butchers including their slaughterhouse managers depend on the daily returns from meat processing for their sustenance unlike the veterinarians whose emoluments were from the government. Hence, the slaughterhouse managers who were of butchers´ association were likely to be more apprehensive and mentally distressed due to the economic downturns occasioned by the pandemic. In addition, the current observation might be as a result of the often relatively poor knowledge of butchers in general regarding public health issues; particularly in relation to preventive measures. This assertion is buttressed by the report of Adesokan *et al.* [43] which indicated poor knowledge of zoonotic disease among such an occupationally exposed group. Consequently, the visibly evident environmental and social factors such as overcrowding and unguarded human-to-human contacts characteristic of the slaughterhouses in Nigeria which could facilitate the spread of the SARS-CoV-2 virus among their members. Such potential prevailing potential factors for disease transmission coupled with poor attitudes of butchers to preventive measures might have heightened the concern and mental health distress of the counterpart slaughterhouse managers. This is evident by the proportions of those who indicated they were either sometimes, often or always scared their members might contract the COVID-19 virus, noting that the butchers constituted the majority of the slaughterhouse managers in this study.

Moreover, our findings showed that the slaughterhouse managers who worked in slaughterhouses where COVID-19 sensitization had not been done were about two times more likely to have poor COVID-19 pandemic related mental health outcome compared to those working in slaughterhouses with prior sensitization; this association was, however not significant. Although, sensitization could contribute to psychological disorders such as panic anxiety and mood disorders [44,45], the present findings suggest that the negative economic effects of COVID-19 pandemic have an overriding mental health distress on slaughterhouse workers in general irrespective of whether or not there was sensitization. More so, the deplorable conditions of meat processing facilities as well as other environmental exposure factors, including overcrowding in most slaughterhouses are similar. These general poor workplace conditions, therefore possibly made the slaughterhouse managers to be similarly vulnerable to poor COVID-19 related mental health outcome. This is probably evident in the majority of the slaughterhouse managers who were concerned that the slaughterhouses did not have the requisite infrastructure for risk reduction against COVID-19. As earlier reported, the slaughterhouses are characterized with precarious working conditions which are hazardous to health [3]; a situation which is even worse in most developing countries.

Importantly, the slaughterhouses managers who experienced decline in the volume of animal processing since the pandemic were about two times more likely to have poor mental health outcome compared to those who experienced

increased or unchanged volume. This observation is evident by the almost two-thirds of the slaughterhouse managers indicating that they were bothered about what would happen to their work and income if the activities in the slaughterhouses were put on hold due to COVID-19 pandemic. The downturn economic effects of COVID-19 pandemic cannot be over-emphasized. In the United States, Marchant-Forde and Boyle [46] reported that there was a 45% reduction in pig processing capacity resulting in about 250,000 pigs per day not being slaughtered. In Nigeria, it was estimated that the agricultural sector lost up to US$ 0.7 billion during the lockdown [47] plausibly due to reduction in demands for such foods as meat and other products since restaurants and other eateries were shutdown.

Our findings notwithstanding, this study had some limitations. One, only slaughterhouse managers were studied; extending the study to all slaughterhouse workers could have given a better insight into the COVID-19 pandemic related mental health outcome of slaughterhouse workers in the study area. Two, only few slaughterhouses from selected states were used; studying more states might also give more credence to our findings. However, our study has provided important informative insights into the predictors of COVID-19 pandemic related mental health outcome of slaughterhouse managers and the need to reduce any stress-causing experience which could worsen the situation.

Conclusion

This study reports the COVID-19 pandemic-associated mental health outcome of slaughterhouse managers from selected states in Nigeria, showing a high prevalence of poor mental health outcome with certain important gaps identified as possible COVID-19-related issues contributing to their mental health distress. Understanding that mental health is a public health issue especially in the developing countries is the first step in formulating interventions that could improve people´s livelihoods. We advocate the need for stakeholders´ engagement and educational intervention on the subject matter among slaughterhouse workers in general, adequate funding and improved accessibility to mental health services, which are needed especially in the new era of the COVID-19 pandemic. It also becomes urgently imperative the need for increasing the capacity of trained mental health professionals who could administer disparate array of psychological and social health interventions efficiently and promptly to the risk groups, including slaughterhouse managers, butchers as well as the general public. Likewise, intervention efforts, including structural improvement and provision of infrastructure, among others in the slaughterhouses are required to reduce job-related mental health stressors and consequently improve the health of this workforce. Further, wide scale-based surveys to understand the mental health status and the most effective intervention approaches among the slaughterhouse workers in Nigeria as well as other developing African countries are advocated.

What is known about this topic

- *COVID-19 pandemic is a global public health issue;*
- *The pandemic is associated with economic downturn;*
- *Mental health is an unrecognized non-communicable disease.*

What this study adds

- *COVID-19 related mental health outcome on slaughterhouse managers;*
- *High prevalence of poor mental health outcome among slaughterhouse managers;*
- *Important gaps identified for informed poor mental health control measures.*

Competing interests

The authors declare no competing interests.

Authors' contributions

HKA conceptualized and designed the study; CAA, JAO, OOA, OAO and IMA collected the data; HKA, OAO and PIA analyzed the data; HKA and PIA wrote the first draft of the manuscript. All the authors revised the first draft, read and agreed to the final version of the manuscript.

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Tables and figures

Table 1: number of slaughterhouse managers from the various slaughterhouses studied across the four selected geopolitical zones of Nigeria

Table 2: socio-demographics of slaughterhouse managers and slaughterhouses-related characteristics

Table 3: responses of slaughterhouse managers towards COVID-19 related issues

Table 4: association between COVID-19 related mental health outcome of slaughterhouse managers and manager type, COVID-19 prior sensitization and pandemic effect on volume of animal processing in selected geopolitical zones of Nigeria

Figure 1: number of confirmed cases of COVID-19 as at September 29, 2020 across the six geopolitical zones of Nigeria

Figure 2: recruitment flowchart of slaughterhouse managers in the selected geopolitical zones of Nigeria

Figure 3: COVID-19 pandemic related mental health outcome of the slaughterhouse managers across the four selected geopolitical zones of Nigeria

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Table 1: number of slaughterhouse managers from the various slaughterhouses studied across the four selected geopolitical zones of Nigeria

State	**No. of slaughterhouses**	**No. of slaughterhouse managers available**		**No. of respondents**
		Veterinarians	**Butchers**	
Oyo	1	2	2	4
Ogun	5	10	10	12
Kogi	15	14	18	19
Benue	14	18	20	24
Nasarawa	3	5	9	12
Enugu	1	2	6	4
Cross River	4	8	16	16
Total	43	59	81	91

Table 2: socio-demographics of slaughterhouse managers and slaughterhouses-related characteristics			
Variables	**Category**	**Frequency**	**Percentage**
Age (years)	≤ 34	17	18.7
	35 - 44	40	44.0
	> 44	34	37.3
Sex	Male	75	82.4
	Female	16	17.6
Religion	Christianity	64	70.3
	Islam	27	29.7
Type of managers	Veterinarian	39	42.9
	Butcher	52	57.1
Any sensitization on COVID-19 since pandemic started?	Yes	51	56.0
	No	40	44.0
Do you ensure adequate spacing between workers?	Yes	58	63.7
	No	33	36.3
Rate of animal processing at the slaughterhouses since pandemic started	Reduced	74	81.3
	Increased	17	18.7
Frequency of facility cleaning and disinfection	Regularly	45	49.5
	Irregularly	46	50.5

Table 3: responses of slaughterhouse managers towards COVID-19 related issues					
Statement	**Never n (%)**	**Rarely n (%)**	**Sometimes n (%)**	**Often n (%)**	**Always n (%)**
Ensuring preventive measures against COVID-19 pandemic is making me fail in my other primary responsibilities at the slaughterhouses	48 (52.8)	8 (8.8)	27 (29.7)	3 (3.3)	5(5.5)
Meeting the requirements for preventive measures against COVID-19 causes me anxiety	36 (39.6)	13(14.3)	27 (29.7)	6 (6.6)	9 (9.9)
Providing water, soap and sanitizer for regular washing of hands on a daily basis is an additional cost that causes me worry	14(15.4)	15(16.5)	20(22.0)	10(11.0)	32(35.2)
Ensuring social distancing in the slaughterhouses setting gives me a mental distress	21(23.1)	10(11.0)	22(24.2)	17(18.7)	21(23.1)
Attitudes of other workers at work gives me concern especially towards maintaining physical/social distancing	12(13.2)	4(4.4)	29(31.9)	10(11.0)	36(39.6)
I am scared that any of my workers might contract the disease	16(17.8)	21(23.3)	26(28.9)	15(16.7)	12(13.3)
I am bothered about what would happen to my work and income if any of my workers is infected and the activities in the slaughterhouses are put on hold?	20(22.0)	12(13.2)	19(20.9)	13(14.3)	27(29.7)
I am concerned that the slaughterhouses does not have the requisite infrastructure for risk reduction against COVID-19	14(15.4)	4(4.4)	16(17.6)	23(25.3)	34(37.4)
I am worried that existing service delivery system does not allow for risk reduction and preparedness against COVID-19	19(20.9)	6(6.6)	24(26.4)	18(19.8)	24(26.4)
It is concerning that the often-dense populations in the slaughterhouses makes it a difficult task to maintain social distancing	8(8.8)	15(16.5)	15(16.5)	18(19.8)	35 (38.5)
I am not hopeful that the nature of service delivery in the slaughterhouses would allow for social distancing	18(19.8)	10(11.0)	19(20.9)	20(22.0)	24(26.4)
I am worried that the overall financial demands of COVID-19 mitigation measures in the slaughterhouses are unbearable for me	19(20.9)	15(16.5)	18(19.8)	10(11.0)	29(31.9)
I am feeling disturbed and highly uncomfortable performing my duties in these slaughterhouses during this prevailing pandemic	28(30.8)	7(7.7)	29(31.9)	9(9.9)	18(19.8)
I am apprehensive people might transmit the infection to the slaughterhouses environment	9(9.9)	12(13.2)	32(35.2)	10(11.0)	28(30.7)
I am not feeling anxious that COVID-19 will reduce the patronage of prospective customers for my services	31(34.1)	12(13.2)	22(24.2)	11(12.1)	15(16.5)

Table 4: association between COVID-19 related mental health outcome of slaughterhouse managers and manager type, COVID-19 prior sensitization and pandemic effect on volume of animal processing in selected geopolitical zones of Nigeria

Characteristics	Number (% of total)	Number (% with poor MHO)	Crude OR (95% CI)	P-value	Adjusted OR* (95% CI)	P-value
Kind of manager						
Vet/government	39 (42.9)	5 (12.8)	Reference		Reference	
Butcher	52 (57.1)	13 (25.0)	3.13 (0.94 - 10.44)	0.060	3.03 (0.87 - 10.59)	0.082
COVID sensitization						
Yes	51 (56.0)	5 (12.5)	Reference		Reference	
No	40(44.0)	13 (25.5)	2.38 (0.14 - 1.29)	0.130	2.27 (0.14 - 1.39)	0.160
Pandemic effects						
Increased/unchanged	17 (18.7)	2 (11.8)	Ref		Ref	
Reduced	74 (81.3)	16 (21.6)	2.07 (0.43 - 10.00)	0.366	2.23 (0.44 - 11.32)	0.335
Total	91 (100.0)	18(19.8)				

MH: mental health outcome; OR: odds ratio; CI: confidence interval; * adjusted for age, sex and religion

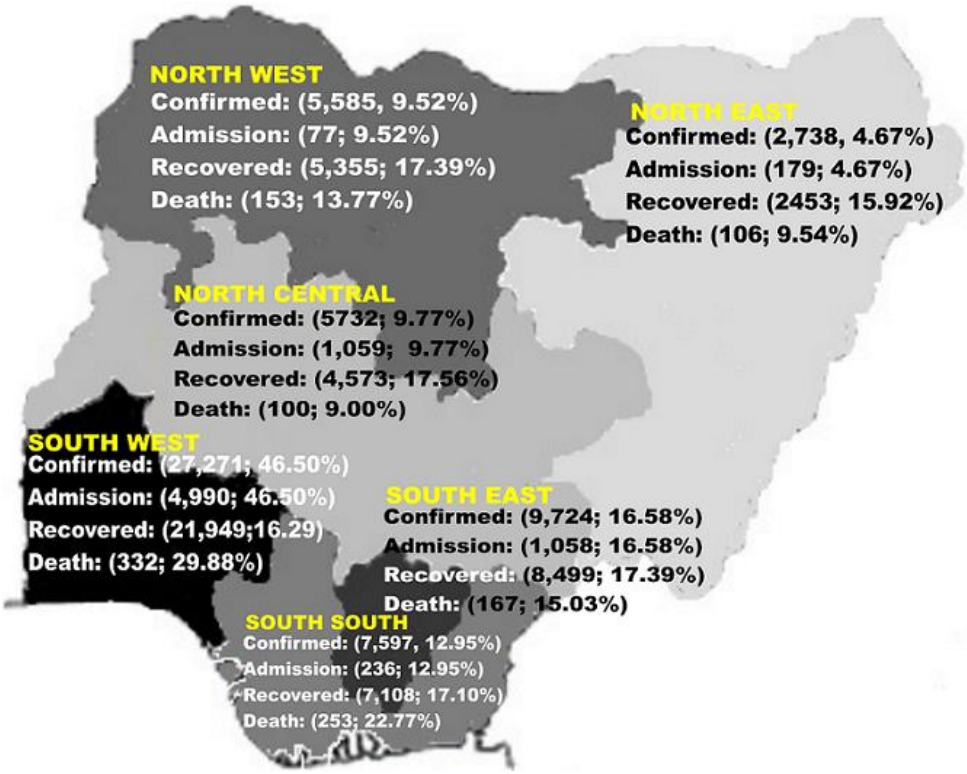

Figure 1: number of confirmed cases of COVID-19 as at September 29, 2020 across the six geopolitical zones of Nigeria

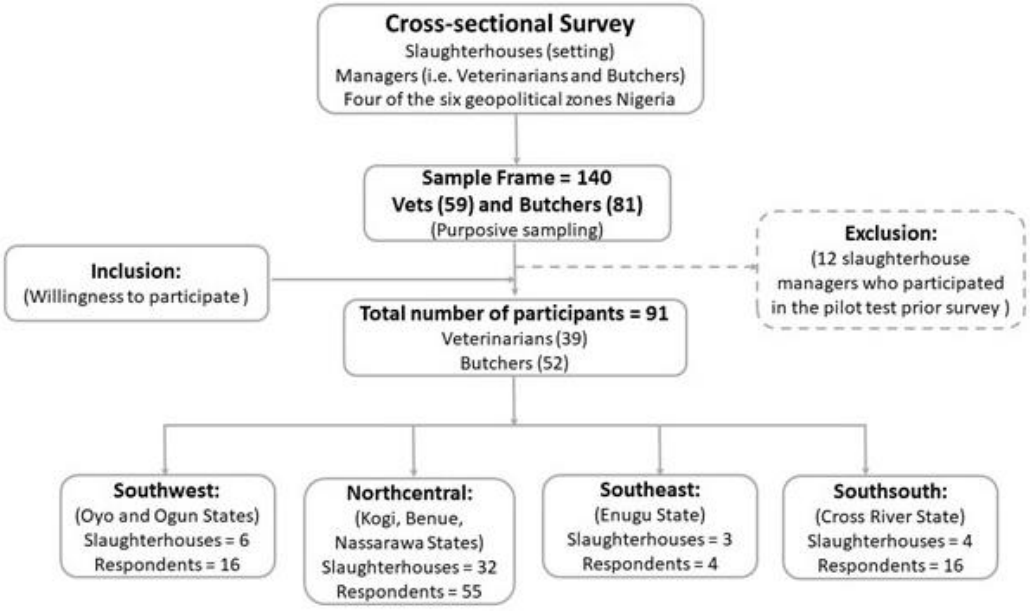

Figure 2: recruitment flowchart of slaughterhouse managers in the selected geopolitical zones of Nigeria

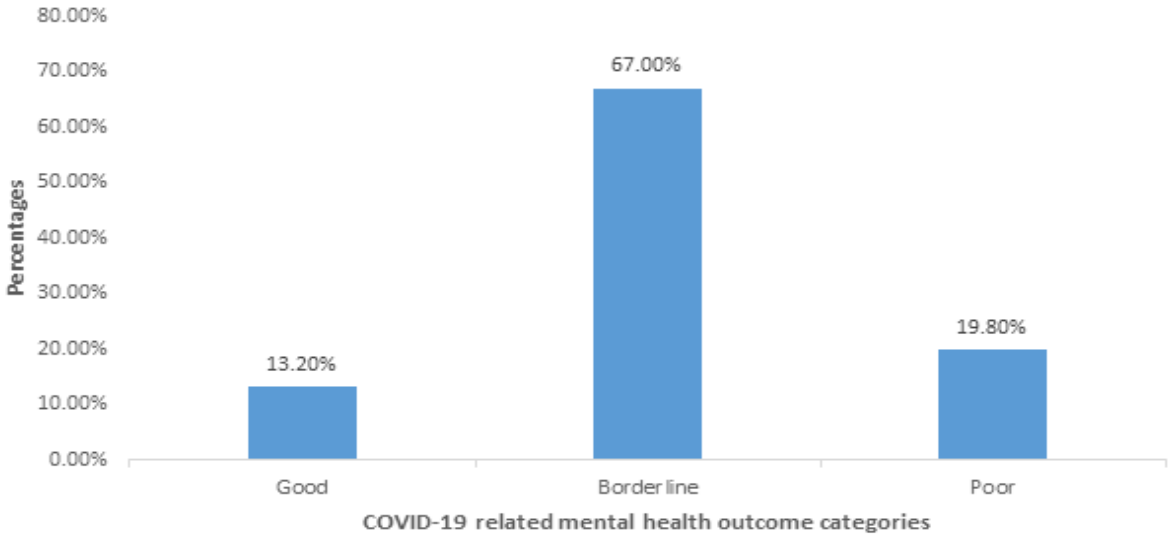

Figure 3: COVID-19 pandemic related mental health outcome of the slaughterhouse managers across the four selected geopolitical zones of Nigeria