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A multi-country study of the associations between HIV vulnerability status, perception of COVID-19 related stigma and post-traumatic stress symptoms during the first wave of the pandemic

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Abstract

Background This study investigated the associations between COVID-19 related stigma and post-traumatic stress symptoms (PTSS); and the associations between PTSS and COVID-19 related stigma, HIV status, COVID-19 status and key HIV population status.

Methods This was a secondary analysis of data of 12,355 study participants generated through an online survey that recruited adults from 152 countries between July and December 2020. The dependent variables were COVID-19-related stigma and PTSS. The independent variables were HIV status (positive/negative), transaction sex (yes/no), use of psychoactive drugs (yes/no), and vulnerability status (transaction sex workers, people who use psychoactive drugs, living with HIV, and COVID-19 status). The confounding variables were age, sex at birth (male/female), level of education, sexual minority individuals (yes/no) and country income level. Multivariable logistic regression analyses were conducted to determine associations between the dependent and independent variables after adjusting for confounders.

Results There were 835 (6.8%) participants who experienced COVID-19 related stigma during the pandemic and 3,824 (31.0%) participants reported PTSS. Respondents who were living with HIV (AOR: 1.979; 95%CI: 1.522–2.573), tested positive for COVID-19 (AOR: 3.369; 95%CI: 2.692–4.217), engaged in transactional sex (AOR: 1.428; 95%CI: 1.060–1.922) and used psychoactive drugs (AOR: 1.364; 95%CI: 1.053–1.767) had significantly higher odds of experiencing COVID-19 related stigma. Individuals with vulnerability status (AOR: 4.610; 95%CI: 1.590–13.368) and who experienced COVID-19 related stigma (AOR: 2.218; 95%CI: 1.920–2.561) had significantly higher odds of PTSS.

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Conclusion Individuals with vulnerability status may be at increased risk for COVID-19 related stigma. Key and vulnerable populations who were living with HIV and who experienced stigma may be at a higher risk of experiencing PTSS. Populations at risk for PTSS should be routinely screened and provided adequate support when they contract COVID-19 to reduce the risk for poor mental health during COVID-19 outbreaks and during future health crisis with similar magnitude as the COVID-19 pandemic.

Keywords COVID-19, HIV, Stress disorders, Post-traumatic, Social stigma

Introduction

Many individuals and their families who recovered from COVID-19 have faced double challenges- the physical health fallout from experiencing COVID-19 symptoms and related complications, and the COVID-19 related stigma that is driven by fear and misconception about the disease [1, 2]. Stigma is the disapproval of or negative attitudes toward persons with certain characteristics or diseases that distinguish them from other members of society [3]. It is either enacted or self, and results from stereotypes, labelling, prejudice, and discrimination learned by most members of a social group [4–6].

One of the potential consequences to experiencing stigma is depression [7, 8]. Depression and stigma share common symptoms such as guilt feeling, low self-esteem, and self-blame [7, 8]. Social exclusion, rejection, eviction from homes of residence, insult, and the burden of responsibility to reduce family and friends' risk of contracting the COVID-19, create mental health challenges for COVID-19 affected persons [9–12]. People who experience stigma may also experience discrimination, psychological stress, and suicide ideation [13]. Moreover, stigma constitutes a major barrier to the containing COVID-19 pandemic because it perpetuates fears of contracting the virus, poor knowledge about the transmission of the disease, and concerns about dying from the disease [14]. As a result, stigma makes the people less willing to test for the virus, to be diagnosed, or even feel reluctant to seek treatment when they are infected [9, 15–17].

There are many individuals who may feel more vulnerable to the consequences of COVID-19 associated stigma. People living with HIV, sexual minority individuals and key populations in the HIV response (people who inject drugs, people who transact sex, men who have sex with men, transgender people, and people in prisons and closed settings [18]) face stigma and discrimination more often than members of the general population [19–25]. HIV-positive individuals are vulnerable to stigma just like COVID-19 [26]. Like COVID-19, HIV is infectious with no definite therapy. They are both associated with avoidance, blame, and discrimination [27] as identified by people living with HIV who also had COVID-19 [28]. Both forms of stigma are associated with mental health challenges [29, 30]. For individuals who consistently experience social and disease-related stigma, the risk of

experiencing COVID-19 related stigma may be a déjà vu experience.

In the present study, we utilized the Framework Integrating Normative Influences on Stigma (FINIS) as the conceptual model to facilitate understanding stigma experiences [31]. The framework articulates that the stigmatization process can be broken down into a series of constituent domains, including drivers, facilitators, stigma 'marking', and stigma manifestations, which influence a range of outcomes among affected populations that ultimately impact health and society [32]. We conceptualise that the fear of SARS-CoV-2 infection may be a driver of COVID-19 related stigma [1, 2]. However, there are norms, legal environments and policies that facilitate the enactment of health-condition (in this study we looked at HIV and COVID-19) and sexual orientation related stigma; and the perception or experiencing of COVID-19 related stigma. This may cause post traumatic stress symptoms (PTSS).

The Framework recognises that both social and illness characteristics shape the experience of stigma. Additionally, social and illness characteristics combined to shape the experience of stigma, and different levels of social life influence the experience of stigma [33]. We postulate that people who had past experiences of stigma due to social and illness characteristics may be more likely to experience COVID-19 related stigma especially people whose way of life may not conform with normative expectations [32]. These include people living with HIV, who may be extremely cautious during the pandemic because of the fear of severe infection [34, 35]; people injecting drugs due to increased risk of relapse [36]; sex workers who may experience increased dependency due to loss of income [37]; and sexual minority individuals due to stigmatization of decisions to engage in sexual behaviours during a time of mandated quarantines [38]. We also postulate that the experience of stigma may be confounded by the level of economic development of the society.

In addition, though people living with HIV, sexual minority individuals and key populations have a comparable biological risk profile for COVID-19 to that of the general population [39–43], their experience of COVID-19 related stigma may differ. A prior experience of negative labelling and social exclusion may amplify the risk of COVID-19 related stigma. For those who experience multiple forms of stigma, the intersectional of those

stigmas – health (COVID-19, HIV), sexual orientation (sexual minority individuals), occupation (sex work) and lifestyle (drug use) – could increase the risk for post-traumatic stress disorder (a disorder that develops in some people who experience a shocking, scary, or dangerous event) [44–46].

The aims of this study, therefore, were to assess associations between reported experience of COVID-19 pandemic related stigma and living with HIV and key HIV population status; and assess the association between post-traumatic stress symptoms and the self-reported experience of COVID-19 pandemic stigma. We hypothesised that (1) people living with HIV and being a member of a key population will be positively associated with the experience of COVID-19 stigma and (2) the experience of COVID-19 stigma will be positively associated with post-traumatic stress disorder.

Methods

Ethical considerations Ethical approval was obtained from the Human Research Ethics Committee at the Institute of Public Health of the Obafemi Awolowo University Ile-Ife, Nigeria (HREC No: IPHOAU/12/1557). Ethical approval was also obtained from Brazil (CAAE N° 38423820.2.0000.0010), India (D-1791-uz and D-1790-uz), Saudi Arabia (CODJU-2006 F) and the United Kingdom (13,283/10,570) for the conduct of the primary study. Study participants checked a box to indicate consent before participating in the online survey.

Study design and study population This was a secondary analysis of data generated through a cross-sectional international study that recruited adults from 152 countries through an online survey between July and December 2020 during the first wave of the COVID-19 pandemic. Study participation was open to anyone 18 years and older. There were no exclusion criteria.

Sample size The sample size for the primary study was calculated based on the highest global prevalence of a mental health disorder in 2019. The pre-survey minimum sample size for this study was set at 59 valid respondents from each of the 193 member States of the United Nations based on the estimated prevalence of the most common global mental health disorder in 2019, (3.94% for anxiety disorder) [47]; a desired precision of estimate was 0.05 and a confidence level was 95% for an infinite population size [48]; and increased by 10% to accommodate non response and incomplete responses [49]. From the statistical modelling perspective, a minimum of 10 participants with complete responses per each of the independent variables enabled the performance of regression analyses with a minimum probability level (p-value) of 0.05 [50]. For this study, the data of 12,355 (58.5%) respondents

with complete responses were extracted from the 21,106 respondents.

Participant recruitment Study participants were recruited through respondent-driven sampling. Initially, 45 members of the mental health and wellness (MEHEWE) study group (www.mehewe.org) were asked to share the survey link with their contacts around the world to facilitate recruitment. The survey link was also posted on social media groups (Facebook, Twitter, and Instagram), network email lists and WhatsApp groups. The details of how the survey was conducted and the data collection tools are published elsewhere [51–55].

Data collection tool Quantitative and qualitative assessments were conducted to validate the study questionnaire. The overall content validity index for the study questionnaire was 0.83. The dimensionality and reliability of the tool were also assessed. Qualitative analysis showed that participants agreed that the multidimensional assessment captured the effect of the pandemic though it was better suited for those with a high level of education. The details on the validation of the tool for the data collection had also been published [51]. The instrument was developed in English and the validated instrument translated into French, Spanish, Arabic and Portuguese.

Dependent variables There were two dependent variables: reported experience of COVID-19 related stigma or discrimination and post-traumatic stress symptoms (a proxy measure for post-traumatic stress disorder [56]). For COVID-19 related stigma, participants were asked to check a box if they had experienced stigma or discrimination from other people (people treating you differently because of your identity, having symptoms, or other factors related to COVID-19) during this COVID-19 period. Those who checked the box were categorised as having experienced COVID-19 related stigma or discrimination.

Post-traumatic stress symptoms (PTSS) were measured using the 17-item self-report PTSD checklist for civilians [57]. This is a 5-point scale with responses ranging from 1- “not at all” to 5- “extremely”. The possible total score ranged from 17 to 85 with a cut-off of 28 used to dichotomise the responses to “no PTSS” (17–27) and “PTSS present” (28–85) [58]. The details of the measure had been reported in two prior studies published from the same data set [54, 55]. The Cronbach alpha for the PTSD items was 0.93, the test-retest validation score was 0.83, the content validation index was 0.81 and the intra-class correlation coefficient was 0.89 indicating excellent reliability [55]. For this study, the Cronbach alpha was 0.96.

Independent variables The independent variables were the subpopulations previously identified. These are: HIV

key populations (people who engaged in transactional sex, people who use psychoactive drugs) vulnerable to social stigma [59, 60], people living with HIV [61], and people who had COVID-19 [62]. Respondents identified their status by ticking a box. All respondents who ticked the checkbox were designated as having a vulnerability status.

Confounding variables The confounding variables were age at last birthday, sex at birth (male, female), sexual identity (heterosexual, sexual minority individuals, undisclosed), level of education (no formal education, primary, secondary and college/university) and country of resident's income level (low-income countries (LICs), lower middle-income countries (LMICs), upper middle-income countries (UMICs) and high-income countries (HICs). Respondents had to pick a country of residence from a list. The country was then categorised into the country income level using the 2019 World Bank Data on country classification by Gross National Income [63].

Data analysis Raw data were downloaded, cleaned, and imported to SPSS version 23.0 (IBM Corp., Armonk, N.Y., USA) for analysis. A multivariable logistic regression analysis was conducted to determine the associations between reported experience of COVID-19 related stigma and the independent variables (living with HIV, had COVID-19, use of psychoactive drugs and engaging in transactional sex) after adjusting for confounders. A second multivariable logistic regression analysis was conducted to determine the associations between PTSS and the independent variables (experience of COVID-19 related stigma, vulnerability status) after adjusting for confounders. Adjusted odds ratios (AOR), 95% confidence intervals (CI), and *p* values were calculated. Statistical significance was set at 0.05.

Results

Of the 12,355 respondents whose data were extracted for this study, 835 (6.8%) experienced COVID-19 related stigma. Table 1 shows that respondents living with HIV (AOR: 1.979; 95%CI: 1.522–2.573) and those who had COVID-19 (AOR: 3.369; 95%CI: 2.692–4.217) had significantly higher odds of experiencing stigma than people not living with HIV and those did not have COVID-19 respectively. Also, respondents who engaged in transactional sex (AOR: 1.428, 95%CI: 1.060–1.922) and those who used psychoactive drugs (AOR: 1.364; 95%CI: 1.053–1.767) had significantly higher odds of experiencing COVID-19 related stigma than respondents who did not engage in transactional sex or used psychoactive drugs respectively.

Table 2 shows that there were 3,824 (31.0%) respondents who experienced PTSS during the COVID-19 pandemic. Respondents with vulnerability status had

significantly higher odds of PTSS than the respondents who were not vulnerable (AOR: 4.610; 95%CI: 1.590–13.368). In addition, those who experienced COVID-19 related stigma had significantly higher odds of experiencing PTSS than those who did not (AOR: 2.218; 95%CI: 1.920–2.561).

Discussion

The study findings suggest that populations from groups that have traditionally experienced stigma and discrimination (people who use psychoactive drugs, transactional sex workers and people living with HIV) were more likely to experience COVID-19 related stigma. Also, people who experienced COVID-19 related stigma were more likely to report PTSS than those who did not. Individuals who were vulnerable to social stigma had higher risks of PTSS. Thus, the findings suggest that groups of people who were already at risk of experiencing stigma may be more vulnerable to experiencing COVID-19 related stigma and the challenges that come with this addition stigma such as PTSS. The results of this study support the study hypotheses.

This is one of few studies to provide empirical evidence on the possible risks for experiencing COVID-19 related stigma, and the effects of this on the mental health of affected individuals. Stigma can affect individual's mental health negatively; and marginalized groups, including sexual minority individuals, individuals with physical diseases and socially excluded individuals, have a higher risk of experiencing stigma [64, 65].

The study has some limitations. This was a cross-sectional study which makes it difficult to establish a cause-effect relationship between the variables. Also, a non-probability sampling technique was used to recruit the study population. While this is the most appropriate way to recruit hidden populations like those identified for this study [66–68], and also an appropriate method for data collection during the COVID-19 pandemic [69, 70], the use of online platforms for data collection may have inadvertently excluded populations who are not able to access the internet and smartphones or similar devices. The study also excluded those without access to the survey in their languages. These limitations the generalisability of study findings to those who are potentially more vulnerable such as individuals with lower educational attainment and socioeconomic status. The results reported here may therefore, underrepresent the true magnitude of the problem. Also, because PTSS is self-reported, prevalence of post-traumatic stress disorder may be overestimated [71]. In addition, the experience of stigma was measured by a single question. While many consider single-item measures are an unsound approach to measuring cognitive and affective outcomes, single-item measures can provide valid and reliable assessments

Table 1 Multivariable logistic regression analysis for the associations between reported experience of COVID-19 related stigma or discrimination, HIV status, COVID-19 status, use of psychoactive drugs and engaging in transactional sex during the first wave of the pandemic (N = 12,355)

Variables	Total N = 12,355 n (%)	Experienced COVID-19 related stigma		AOR; 95% CI; p value
		No N = 11,520 (93.2%) n (%)	Yes N = 835 (6.8%) n (%)	
Living with HIV*	905 (7.3)	817 (90.3)	88 (9.7)	1.979; 1.522–
Yes	11,450 (92.7)	10,703 (93.5)	747 (6.5)	2.573; p < 0.001
No				1.000
Had COVID-19*	625 (5.1)	505 (80.8)	120 (19.2)	3.369; 2.692–
Yes	11,730 (94.9)	11,015 (93.9)	715 (6.1)	4.217; p < 0.001
No				1.000
Engage in transactional sex *	452 (3.7)	384 (85.0)	68 (15.0)	1.428; 1.060–
Yes	11,903 (96.3)	11,136 (93.6)	767 (6.4)	1.922; p = 0.019
No				1.000
Use psychoactive drugs*	722 (5.8)	640 (88.6)	82 (11.4)	1.364; 1.053–
Yes	11,633 (94.2)	10,880 (93.5)	753 (6.5)	1.767; p = 0.019
No				1.000
Mean age (Standard deviation)	35.8 (13.1)	36.0 (13.2)	33.4 (11.4)	0.979; 0.973–
				0.985; p < 0.001
Sex at birth	4487 (36.3)	4135 (92.2)	352 (7.8)	1.000
Male	7868 (63.7)	7385 (93.9)	483 (6.1)	0.804; 0.693–
Female				0.932; p = 0.004
Sexual identity	9655 (78.1)	8999 (93.2)	656 (6.8)	1.000
Heterosexual	1146 (9.3)	1033 (90.1)	113 (9.9)	1.145; 0.913–
Sexual minority individuals	1554 (12.6)	1488 (95.8)	66 (4.2)	1.437; p = 0.242
Undisclosed				0.660; 0.505–
				0.863; p = 0.002
Educational status	291 (2.4)	283 (97.3)	8 (2.7)	0.397; 0.194–
No formal education	352 (2.8)	338 (96.0)	14 (4.0)	0.815; p = 0.012
Primary	2282 (18.5)	2120 (92.9)	162 (7.1)	0.512; 0.295–
Secondary	9430 (76.3)	8779 (93.1)	651 (6.9)	0.888; p = 0.017
College/University				0.932; 0.773–
				1.123; p = 0.459
				1.000
Country income level	189 (1.5)	175 (92.6)	14 (7.4)	0.899; 0.529–
LICs	6983 (56.5)	6556 (93.9)	427 (6.1)	1.585; p = 0.712
LMICs	2484 (20.1)	2317 (93.3)	167 (6.7)	0.675; 0.562–
UMICs	2699 (21.8)	2472 (92.6)	227 (8.4)	0.810; p < 0.001
HICs				0.854; 0.690–
				1.057; p = 0.147
				1.000

Nagelkerke R2 0.052

Omnibus test of model coefficients Chi-square = 257.641; p < 0.001

*Adjusted for: age, sex at birth, sexual identity, educational status and country income level

of important psychological phenomena just like their multi-item counterparts [72]. Finally, stigma related to HIV, sex work, and drug use were not measured so we are unable to characterize whether participants experienced stigmas in these domains. For these reasons, the study findings need to be interpreted with caution. Despite these limitations, the findings provide valuable evidence for policy and programmatic considerations. The findings can also assist in developing further hypotheses.

First, the study findings showed that populations that more likely to experience stigma and discrimination were also more likely to experience COVID-19 related stigma.

Membership in stigmatised groups is known to amplify the risk of the stigma associated with health problems [33]. This is part of a social process that excludes those who are perceived to deviate from the acceptable standards in a sociocultural framework [73, 74]. The social identity theory further explains this phenomenon by noting that individuals think of themselves as individuals or as group members through a process of social categorization and social identification. As group members, individuals then want to maintain a positive social identity by maintaining their group's favourable social standing over that of out-groups through social comparison.

Table 2 Multivariable logistic regression analysis for the associations between the COVID-19 pandemic induced post-traumatic stress symptoms, reported COVID-19 related stigma vulnerability status during the first wave of the pandemic (N = 12,355)

Variables	Total N = 12,355 (100%) n (%)	Post-traumatic stress symptoms		AOR; 95% CI; p value
		Yes N = 3824 (31.0%) n (%)	No N = 8531 (69.0%) n (%)	
Experienced stigma and discrimination*	835 (6.8)	397 (47.5)	438 (52.5)	2.218; 1.920–
Yes	11,520 (93.2)	3427 (29.7)	8093 (70.3)	2.561; p < 0.001
No				1.000
Vulnerable*	18 (0.1)	13 (72.2)	5 (27.8)	4.610; 1.590–
Yes	12,337 (99.9)	3811 (30.9)	8526 (69.1)	13.368; p = 0.005
No				1.000
Mean age (Standard deviation)	35.8 (13.1)	31.9 (11.3)	37.6 (13.5)	0.967; 0.963–
				0.970; p < 0.001
Sex at birth	4487 (36.3)	1152 (25.7)	3335 (74.3)	1.000
Male	7868 (63.7)	2672 (34.0)	5196 (66.0)	1.403; 1.287–
Female				1.530; p < 0.001
Educational status	291 (2.4)	231 (79.4)	60 (20.6)	10.984; 8.156–
No formal education	352 (2.8)	205 (58.2)	147 (41.8)	14.791; p < 0.001
Primary	2282 (18.5)	905 (39.7)	1377 (60.3)	4.150; 3.311–
Secondary	9430 (76.3)	2483 (26.3)	6947 (73.7)	5.202; p < 0.001
College/University				1.550; 1.402–
				1.713; p < 0.001
				1.000
Country income level	189 (1.5)	51 (27.0)	138 (73.0)	1.051; 0.747–
LICs	6983 (56.5)	2334 (33.4)	4649 (66.6)	1.477; p = 0.776
LMICs	2484 (20.1)	643 (25.9)	1841 (74.1)	0.898; 0.810–
UMICs	2699 (21.8)	796 (29.5)	1903 (70.5)	0.997; p = 0.043
HICs				0.824; 0.726–
				0.936; p = 0.003
				1.000

Nagelkerke R2: 0.132

Omnibus test of model coefficients Chi-square = 1213.907; p < 0.001

*Adjusted for: age, sex at birth, educational status and country income level

Thus, people stigmatise others who do not belong to their group because it gives stigmatisers an elated sense of self-esteem [75]. The findings also show that living with HIV and who had COVID-19 were significantly and independently associated with experiencing stigma. This implies that populations at risk of being stigmatised may not need to have tested positive for COVID-19 to experience COVID-19 related stigma. This has been demonstrated in research that showed some people who were not infected with COVID-19 were labelled as being infected with COVID-19 [76]. There is also the possibility of COVID-19 related self-stigma among people who had previous experience of stigma. These individuals may have increased activation of the amygdala and insula related to aversive emotions, and the anterior cingulate and lateral prefrontal cortex associated with cognitive control [77] leading to greater chances of self-stigmatisation. These possibilities need to be studied further.

The study findings also suggest that experiencing COVID-19 related stigma and discrimination may increase the risk of PTSS. This risk is about five times greater for people living with HIV and those who tested positive for COVID-19. Thus, being infected with

COVID-19 exposes key populations living with HIV to the risk of a third stigma. Our finding agrees with previous research showing that stigma is a risk factor for post-traumatic stress disorder [78, 79]. In addition, we provide new evidence that experiencing COVID-19 related stigma and discrimination, and the experience of COVID-19 related stigma and discrimination by persons who have risk of past experiences of stigma because their lifestyle or from living with HIV, may significantly increase the risk for post-traumatic stress disorder. Therefore, populations vulnerable to stigma who contract COVID-19 would benefit from mental health support to reduce their risk of post-traumatic stress disorder.

It is recognised that COVID-19 stigma results from a complex web of expectations caused by individual and contextual interactions between the stigmatised and the stigmatisers. The theoretical framework that drives this study (FINIS) attempts to explain the community and individual factors that drives stigma. It recognises that the risk of stigma is higher when persons who hold devalued statuses are aware of this devalued social identity as this influences the perception and response to the social slights of stigma and acts of discrimination [80].

Key populations, sexual minority individuals and people living with HIV face devalued social status and thus, are more likely to respond to social cues of stigma associated with COVID-19. The negative social cues associated with COVID-19 were reinforced by public messages of COVID-19 infection danger appraisal [81]. This increases the possibility of COVID-19 related stigma being a global phenomenon. However, this phenomenon can be addressed by societal contexts emphasizing the acceptability of acting on cultural biases [33]. Though FINIS was developed to appraise the experience of stigma and discrimination by people with mental illness, we find the framework applicable to the experience of COVID-19 related stigma.

Furthermore, we observed that individuals who do not disclose their sexual identity seem to be protected from COVID-19 related stigma. Though we handled sexual identity as a confounding variable, the study finding suggests that this variable may moderate the reporting of stigma. Prior studies identified that sexual minority individuals avoid disclosing their sexual identity in real life to reduce being stigmatized [82–85]. The concealment of sexual identity doing research may however, not imply concealment in real life. Further research is needed to understand the reasons for concealment of sexual identity for research purposes, to enable appropriate interpretation of study findings.

Our study confounding variables - age, educational status, sex at birth and the country of residence - may also moderate the experience of stigma and PTSS. We observed that the likelihood of experience COVID-19 related stigma and PTSS decreased with age, as reported in previous studies [86–89]. The association between educational status and PTSS reported in this study had also been reported elsewhere [90, 91]. Also, we observed that females were less likely to experience COVID-19 related stigma and discrimination as reported in previous studies [92]. We also observed that although females were less likely to experience COVID-19 related stigma, which may be related to the fact that more males than females test positive to COVID-19 [92], more females experience PTSS as reported in past studies [93–96]. This paradox may suggest that females are better able to cope with stigma but are less able to deal with other factors that predispose to PTSS during the COVID-19 pandemic. This observed paradox needs to be studied further.

In conclusion, populations at risk of experiencing stigma prior to the pandemic such as people who inject drugs, transactional sex workers, sexual minority individuals and people living with HIV, were at higher risk of experiencing COVID-19 related stigma. The risk of PTSS may be higher for people who face COVID-19 related stigmatization and those with combined HIV and COVID-19 infection. People living with HIV, key

populations and sexual minority individuals may need to be screened for PTSD when accessing health care services to facilitate prompt management. The study suggests a complex relationship with clustering of various stigmas that may have been deepened by the COVID-19 pandemic.

Abbreviations

AOR	Adjusted Odds Ratio
CI	Confidence Interval
COVID-19	Coronavirus infectious disease 2019
HIV	Human Immunodeficiency Virus
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SD	Standard Deviation

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Authors' contribution

M.O.F conceived the study. The Project was managed by M.O.F, O.C.E., M.E.T and A.L.N. Data curation was managed by N.M.A. Data analysis was conducted by R.A.A.Z. M.O.F developed the first draft of the document. R.A.A.Z, J.I.V, P.E., A.B.A-T, M.F.A.Q, M.J., E.A., M.A.A., B.G., I.I., N.M.A., J.L., M.E.T., and A.L.N. all read the draft manuscript and made inputs prior to the final draft. All authors approved the final manuscript for submission.

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Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval of the current study was obtained from the Human Research Ethics Committee at Institute of Public Health of the Obafemi Awolowo University Ile-Ife, Nigeria (HREC No: IPHOAU/12/1557) as the lead partner for this study. The protocol was in accordance with international and national research guidelines. All participants provided written informed consent before taking the survey.

Consent for publication

Not applicable.

Competing interests

Martin Ayanore and Jorma Virtanen are Associate Editors with the BMC. Morenike Oluwatoyin Folayan and Maha El Tantawi are Senior Editor Board members at BMC Oral Health. All other authors declare no conflict of interest.

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