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Prevalence and predictors of stress, anxiety, and depression among healthcare workers during the COVID–19 pandemic at a mental referral hospital in Kampala, Uganda

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Abstract

Background Healthcare workers faced immense psychological strain during the Corona Virus Disease 2019 (COVID – 19) pandemic due to increased workloads, infection risk, and limited protective equipment. This study assessed the prevalence of stress, anxiety, and depression among them and identified factors contributing to these mental health challenges during the outbreak.

Methods A cross-sectional study was done at Butabika National Mental Referral Hospital between February and March of 2023. We gave self-administered, paper-based surveys to all willing Healthcare workers (HCWs) working day shifts during this period. Sections on socio-demographics characteristics, perceived stress (PSS–10), anxiety (GAD–7), and depression (PHQ–9) were all included in the questionnaire. The SPSS version 26.0 program was used to analyse the data. To determine the variables that predict psychological distress, we employed Modified Poisson regression. When the p-value was less than 0.05, statistical significance was declared.

Results Among the 209 enrolled participants, 198 (94.7%) eligible subjects were included in the analysis. Majority of the participants (58.6%) were female, (73.7%) were married, (49.5%) were nurses and 58.6% had more working hours. The prevalence of symptoms of stress, anxiety and depression in healthcare workers during the COVID-19 pandemic was 91.9%, 27.3% and 57.6%, respectively. In relation to perceived stress, being female (aRR = 1.219; 95% CI: 1.010–2.922), being younger in age (aRR = 1.672; 95% CI: 1.050–5.733) and having worked for 11–15 years (aRR = 1.274; 95% CI: 1.020–2.503) were significantly associated with higher risk of perceived stress. Participants with a bachelor's degree had higher risk of generalized anxiety disorder symptoms (aRR = 2.577; 95% CI: 1.123–4.980), whereas being a nurse (aRR = 0.082; 95% CI: 0.040–0.900) showed lower risk of anxiety. Being married (aRR = 1.322; 95% CI: 1.042–2.260) and being younger in age (aRR = 1.037; 95% CI: 1.005–2.834) were significantly associated with higher risk of depressive symptoms, whereas being a technician (aRR = 0.683; 95% CI: 0.480–0.972) and having no change in work volume (aRR = 0.711; 95% CI: 0.532–0.987) were associated to lower risk of depression symptoms.

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Conclusion Psychological distress was high among mental health workers during COVID-19. Supportive measures such as adequate PPE, manageable workloads, mental health check-ins, and challenging societal stigma are needed to improve well-being, within study limitations.

Keywords COVID – 19, Healthcare workers, Anxiety, Depression, Stress, Pandemic, Uganda

Introduction

The globe has seen numerous epidemics throughout history. Pandemics refer to global outbreaks of infectious diseases that affect a large number of people across multiple countries or continents [1]. The present pandemic is the eighth worldwide public health emergency [2]. The COVID-19 pandemic was first documented in Wuhan, China's Hubei province, in December 2019. The novel coronavirus generated COVID-19 disease [3, 4], which spread quickly throughout the world and led to an increase in cases and fatalities [5]. It is transmitted by respiratory droplets, body fluids, fecal-oral contact, direct touch, and environmental surfaces [6, 7].

Around 636 million COVID-19 cases and 6.6 million fatalities had been reported globally as of November 1, 2022 [8]. In Uganda, there were more than 169,473 confirmed COVID-19 cases throughout that time, and more than 3630 people died from the virus [9]. Governments therefore took a number of actions to slow the virus's spread. In Uganda, the government imposed mandatory quarantine for COVID-19 patients and those returning from overseas; people were compelled to work from home, non-essential services were shut down, schools were closed, travel restrictions were in place, and some areas were under lockdown [10]. These policies affected earnings and altered day-to-day living. These causes consequently have an impact on the population's mental health [11].

Healthcare workers on the front lines of care are still at significant risk from COVID-19, making them more vulnerable to infection [12, 13]. A Chinese study found that after working in COVID-19 centers, a large number of healthcare personnel had confirmed COVID-19 infections [14]. Over a decade ago, it was discovered that healthcare workers were more likely to experience mental health issues after a severe SARS outbreak [15]. Increased demand for health services due to the COVID-19 pandemic has had an effect on the mental health of those who work in those services; recent studies worldwide have shown that stress, depression, anxiety, and burnout are prevalent among healthcare providers during the pandemic [16, 17].

A Chinese research conducted during the COVID-19 pandemic in 2020 found that a significant percentage of medical staff showed symptoms of stress (71.5%), anxiety (44.6%), and depression (50.4%) [18]. The prevalence of stress, anxiety, and depression was 35.0%, 60.0%, and 40.0%, respectively, in another study conducted in Jordan [19]. Furthermore, frontline healthcare workers who had close contact with patients infected with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) were twice as likely to experience anxiety and depression [20]. Effective mental health support systems should be established because the study's findings indicate that healthcare workers' mental health is under a lot of stress [21, 22].

Naturally, psychological issues are prevalent in the general population, but because of the nature of their jobs, they can occasionally be more severe for healthcare workers [23]. Due to the high risk of infection, loss of control, insufficient protection, inexperience in managing the disease, overwork, negative patient feedback, perceived stigma, drastic lifestyle changes, quarantine, isolation, exhaustion, burnout, and lack of contact with family, the situation may worsen during epidemics and pandemics [24–27]. This situation can lead to anxiety, depression, stress disorder, and mental health problems [28], where by a number of short- and long-term negative occupational outcomes [29] can develop, including decreased quality of patient care, irritability with coworkers [30], cognitive impairments that negatively impact patient care, and intentions to leave one's job [31]. Consequently, a key component of overall well-being is the psychological well-being of healthcare workers, which is associated with improved physical health, longer lifespans, and higher levels of happiness for each individual provider. These factors improve population health, enhance patient satisfaction, and lower healthcare costs.

At the time of the study, there was little information available and little clarity in the Ugandan context about the psychological reactions of healthcare workers who were working during the pandemic. This limited the potential to inform policy and practice to carry out focused psychological interventions for healthcare workers during this crisis [32]. Understanding the psychological responses of healthcare providers during the COVID-19 pandemic is essential for informing future preparedness efforts. The study findings highlight the need for early and preventive strategies to support the mental, emotional, and physical well-being of healthcare workers. Such evidence could help guide organizational policies aimed at promoting staff resilience and mitigating psychological distress in future public health crises. The study specifically aimed to assess the prevalence and associated factors of stress, anxiety, and depression among healthcare professionals.

Methods

Study design

This was a descriptive cross – sectional study. This approach aligns with similar studies conducted in Turkey [33], Ethiopia [34], and Pakistan [35].

Study setting and period

The study was carried out at Butabika National Mental Referral Hospital during February and March of 2023. The hospital is situated in Kampala's Butabika area. Butabika is located in the Nakawa Division in the southeast of the city, close to the northern beaches of Lake Victoria, the biggest freshwater lake in Africa. Mulago National Referral Hospital is located roughly 12.5 km (8 miles) southeast of Butabika Hospital. Butabika Hospital's coordinates are 0°18'57.0"N, 32°39'33.0"E (longitude: 32.659160, latitude: 0.315845). Butabika National Mental Referral Hospital was chosen as the study setting due to its status as Uganda's leading mental health institution, providing specialized care and serving as a national referral center for complex psychiatric cases [36]. Butabika National Referral Mental Hospital has approximately 396 healthcare staff, including social workers, clinical psychologists, psychiatric nurses, and psychiatrists forming the accessible population for this study. Butabika delivers comprehensive services, such as inpatient and outpatient care, emergency mental health interventions, community-based programs, and rehabilitation for chronic mental illnesses, while also serving as a training and research center for mental health workers [36]. Despite its critical role, the hospital faces systemic challenges, including limited resources, high patient-to-staff ratios, and inadequate infrastructure, which can strain healthcare workers and negatively impact their mental well-being [37].

Study population

The participants included a diverse group of healthcare workers, such as doctors, nurses, clinicians, technicians, and other medical staff (pharmacists, physiotherapists, and social workers).

Inclusion and exclusion criteria

The study included all bona fide healthcare workers at Butabika National Referral Mental Hospital who were employed both before and during the COVID-19 pandemic in Uganda. Participants of all professional cadres were eligible, including doctors, nurses, clinical psychologists, and social workers. Individuals with chronic illnesses such as hypertension, diabetes, or pre-existing mental health conditions were also included, as these comorbidities may influence psychological outcomes [38]. Healthcare workers who were on long-term leave during the study period or had not been employed at Butabika National Referral Mental Hospital prior to the onset of the COVID-19 pandemic were excluded. Additionally, those who declined to provide informed consent or were unavailable during data collection were not included in the study.

Sample size determination

Slovin's formula was used to calculate the sample size needed [39], whereby $N = 396$ and 5% margin of error.

$$n = \frac{N}{1 + N\,(e^2)} = \frac{396}{1 + 396\,\left(0.05^2\right)} = 199$$

A 5% non-response adjustment was applied, resulting in a final sample size of 209 participants. These included doctors ($n = 20$), nurses ($n = 100$), technicians ($n = 17$), clinicians ($n = 21$), and other healthcare workers ($n = 50$).

Sampling technique and procedure

A simple random sampling method, as employed in previous studies [34, 40–42], was used to select the research participants. A sampling frame was developed using the hospital's healthcare worker roster and entered into an Excel spreadsheet. Random numbers were then generated and assigned to each individual in the frame. These numbers were sorted in ascending order to establish the selection sequence. To ensure representativeness across occupational categories (e.g., doctors, nurses, clinicians, technicians), proportional stratified sampling was applied. The total sample size was first determined using standard sample size calculation formulas. Then, the proportion of healthcare workers in each occupational category relative to the total workforce was calculated. These proportions were applied to the total sample size to determine how many participants should be randomly selected from each category. This ensured that all groups were fairly represented according to their actual distribution in the population.

Study variables

The dependent variables included: Stress, which we defined as the emotional, physical, and psychological response to perceived demands or pressures in the workplace; Anxiety, defined as an emotional state characterized by feelings of tension, nervousness, and worry; and Depression, referring to a mood disorder marked by persistent feelings of sadness, hopelessness, and loss of interest in activities. The independent variables included demographic factors such as age, gender, education level, marital status, years of work experience, and workplace role, as well as occupational factors including workload and working hours.

Data collection tools

After examining pertinent literature, a self-administered structured questionnaire was created. The questionnaire asked about the socio-demographic characteristics of the participants, such as their gender, age, marital status, education level, housing status, employment history, work experience, workload, and working hours. Self-report measures such as the Perceived Stress Scale (PSS-10; for moderate-to-high stress, PSS ≥ 14) [43–48], the Generalized Anxiety Disorder 7-item (GAD-7) scale (for likely GAD, GAD-7 ≥ 10) [49–56] and the Patient Health Questionnaire-9 (PHQ-9; for likely MDD, PHQ-9 ≥ 10) [4, 18, 41, 50, 57–60] were also used to evaluate the levels of stress, anxiety and depression respectively. The PSS-10 is a validated 10-item survey that measures thoughts and feelings to determine the self-reported degree of stress. Every item on the scale has a score between 0 (never) and 5 (often) [61]. Stress levels were indicated by higher scores on the scale [43, 62]. A validated seven-item questionnaire called the Generalized Anxiety Disorder 7-item scale (GAD-7) is used to gauge respondents' self-reported anxiety levels. It is based on the symptoms of anxiety included in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR). Its items are typically rated on a 4-point Likert-type scale with scores from 0 (not at all) to 3 (nearly every day) [63]. The comprehensive Patient Health Questionnaire (PHQ) has a nine-item depression module called the PHQ-9 [58]. In general medical and mental health settings, the PHQ-9 is a structure-validated self-report questionnaire that is frequently used to identify prospective individuals with depression based on the DSM-IV symptom criteria for a severe depressive episode [57]. Each item has a response option Ranging from 0 (not at all) to 3 (almost every day), with the overall score as a severity measure Ranging from 0 to 27. An appropriate cut-off point for diagnosing major depression is a PHQ-9 score of 10 or higher [4].The PHQ-9 has demonstrated consistently satisfactory validity, reliability, and practicality in Ugandan populations [64].

Quality control

A preliminary investigation was conducted with 10% of the study participants at the hospital to enhance the validity of the survey tools. This pilot study aimed to assess whether the scales performed as expected and were suitable for the study population, as well as to test the feasibility of the data collection process [65]. Specifically, it involved evaluating the time required for participants to complete the scales, identifying challenges in administering the surveys, and detecting potential issues with response rates or data entry. The pilot also helped assess the effectiveness of participant recruitment, particularly for healthcare workers, who may present unique challenges. Additionally, it provided an opportunity to identify any issues with the study design or protocol, such as difficulties participants might encounter in understanding the scales or confusion caused by specific items, allowing for adjustments before the main study. The internal consistency of the survey instruments was evaluated using Cronbach's alpha. The stress scale demonstrated a Cronbach's alpha of 0.90, the GAD scale 0.89, and the depression scale 0.92, indicating good to excellent reliability of the tools for use in this context. The pilot data were excluded from the final analysis. To ensure clarity, the questionnaires were written in plain English, and supervisors and data collectors were trained on the study's purpose and data collection methodology.

Data analysis

Data were entered into Microsoft Excel 2016 and subsequently analyzed using IBM SPSS version 26.0. Demographic and occupational characteristics were presented in tables using frequencies and percentages. The Kolmogorov-Smirnov test assessed the normality of continuous variables [66]. Bivariate analysis was conducted using cross-tabulations and the Chi-square test to explore associations between variables and identify factors independently related to the dependent variables. Potential confounders such as age, gender, and years of work experience were accounted for during data analysis. To account for potential confounders and better understand the independent relationships between exposure variables and psychological outcomes, Modified Poisson regression models were used [67]. This approach allowed for more accurate estimation of associations by adjusting for multiple covariates simultaneously. Variables found to be significant in bivariate analysis were included in the Modified Poisson regression model to identify potential predictors of clinically significant self-reported symptoms. Risk Ratios (RRs) were calculated to measure the likelihood of occurrence between variables, with statistical significance set at $P < 0.05$.

Ethical considerations

This study received approval from The AIDS Support Organization Research Ethical Committee in 2022 (approval number: TASO – 2022–193). Participants' eligibility was assessed based on the study's inclusion and exclusion criteria. Both oral and written explanations were provided regarding the study's objectives, the voluntary nature of participation, and the assurance of participant anonymity. Furthermore, participants were informed of their right to refuse participation, the opportunity to ask questions about the study, and the estimated time commitment for participation, as outlined in the research participation request letter. Efforts were made to minimize any potential physical or psychological burdens

Table 1 Distribution of the demographic characteristics in relation to the psychological symptoms of the healthcare workers

Variable	Categories	Total	Perceived stress[a]				Likely GAD[b]				Likely MDD[c]			
			No	Yes	χ^2	*P* – value	No	Yes	χ^2	*P* – value	No	Yes	χ^2	*P* – value
		n (%)	n (%)	n (%)			n (%)	n (%)			n (%)	n (%)		
Gender	Female	116 (58.6)	8 (50.0)	108 (59.3)	0.529	0.045*	81 (56.3)	35 (64.3)	0.437	0.509	50 (59.5)	66 (57.9)	0.053	0.818
	Male	82 (41.4)	8 (50.0)	74 (40.7)			63 (43.7)	19 (35.7)			34 (40.5)	48 (42.1)		
Age	18 - 29 years	53 (26.8)	2 (12.5)	51 (28.0)	2.179	0.036*	43 (29.9)	10 (17.9)	1.378	0.502	19 (22.6)	34 (29.8)	2.869	0.028*
	30 - 44 years	116 (58.6)	12 (75.0)	104 (57.1)			82 (56.9)	34 (64.3)			55 (65.5)	61 (53.5)		
	45 - 60 years	29 (14.6)	2 (12.5)	27 (14.8)			19 (13.2)	10 (17.9)			10 (11.9)	19 (16.7)		
Education level	Certificate	79 (39.9)	6 (37.5)	73 (40.1)	1.721	0.357	65 (45.1)	14 (25.0)	5.715	0.021*	31 (36.9)	48 (42.1)	1.454	0.335
	Diploma	52 (26.3)	6 (37.5)	46 (25.3)			38 (26.4)	14 (25.0)			24 (28.6)	28 (24.6)		
	Bachelor's	44 (22.2)	2 (12.5)	42 (23.1)			29 (20.1)	15 (28.6)			19 (22.6)	25 (21.9)		
	Master's	22 (11.1)	2 (12.5)	20 (11.0)			11 (7.6)	11 (21.4)			10 (11.9)	12 (10.5)		
	PhD	1 (0.5)	0 (0.0)	1 (0.5)			1 (0.8)	0 (0.0)			0 (0.0)	1 (0.9)		
Marital status	Married	146 (73.7)	13 (81.3)	133 (73.1)	0.870	0.833	109 (75.7)	37 (67.9)	2.578	0.461	59 (70.2)	87 (76.3)	2.709	0.049*
	Divorced	5 (2.5)	0 (0.0)	5 (2.7)			5 (3.5)	0 (0.0)			1 (1.2)	4 (3.5)		
	Widowed	2 (1.0)	0 (0.0)	2 (1.1)			2 (1.4)	0 (0.0)			1 (1.2)	1 (0.9)		
	Single	45 (22.7)	3 (18.8)	42 (23.1)			28 (19.4)	17 (32.1)			23 (27.4)	22 (19.3)		
Occupation	Doctor	17 (8.6)	1 (6.3)	16 (8.8)	3.483	0.480	13 (9.0)	4 (7.1)	6.824	0.014*	9 (10.7)	8 (7.0)	3.929	0.016*
	Nurse	98 (49.5)	11 (68.8)	87 (47.8)			77 (53.5)	21 (39.3)			39 (46.4)	59 (51.8)		
	Technician	15 (7.6)	1 (6.3)	14 (7.7)			15 (10.4)	0 (0.0)			9 (10.7)	6 (5.3)		
	Clinician	21 (10.6)	0 (0.0)	21 (11.5)			11 (7.6)	10 (17.9)			10 (11.9)	11 (9.6)		
	Other	47 (23.7)	3 (18.8)	44 (24.2)			28 (19.4)	19 (35.7)			17 (20.2)	30 (26.3)		
Religion	Catholic	70 (35.4)	5 (31.3)	65 (35.7)	12.813	0.525	41 (28.5)	29 (53.6)	6.713	0.243	30 (35.7)	40 (35.1)	6.331	0.275
	Anglican	71 (35.9)	6 (37.5)	65 (35.7)			56 (38.9)	15 (28.6)			27 (32.1)	44 (38.6)		
	Muslim	16 (8.1)	1 (6.3)	15 (8.2)			16 (11.1)	0 (0.0)			10 (11.9)	6 (5.3)		
	SDA	7 (3.5)	3 (18.8)	4 (2.2)			5 (3.5)	2 (3.6)			5 (6.0)	2 (1.8)		
	Born again	31 (15.7)	1 (6.3)	30 (16.5)			23 (16.0)	8 (14.3)			11 (13.1)	20 (17.5)		
	Other	3 (1.5)	0 (0.0)	3 (1.6)			3 (2.0)	0 (0.0)			1 (1.2)	2 (1.8)		
Housing status	Own home	53 (26.8)	4 (25.0)	49 (26.9)	8.312	0.328	38 (26.4)	15 (28.6)	4.367	0.439	24 (28.6)	29 (25.4)	3.171	0.530
	Stay with family	53 (26.8)	0 (0.0)	53 (29.1)			43 (29.9)	10 (17.9)			19 (22.6)	34 (29.8)		
	Renting	71 (35.9)	10 (62.5)	61 (33.5)			44 (30.6)	27 (50.0)			34 (40.5)	37 (32.5)		
	Staff quarters	20 (10.1)	2 (12.5)	18 (9.9)			18 (12.5)	2 (3.6)			7 (8.3)	13 (11.4)		
	Hostel	1 (0.5)	0 (0.0)	1 (0.5)			1 (0.6)	0 (0.0)			0 (0.0)	1 (0.9)		
Work experience	1 - 5 years	64 (32.3)	6 (37.5)	58 (31.9)	5.660	0.026*	39 (27.1)	25 (46.4)	5.556	0.235	27 (32.1)	37 (32.5)	1.611	0.807
	6 - 10 years	43 (21.7)	3 (18.8)	40 (22.0)			35 (24.3)	8 (14.3)			16 (19.0)	27 (23.7)		
	11 - 15 years	42 (21.2)	3 (18.8)	39 (21.4)			31 (21.5)	11 (21.4)			17 (20.2)	25 (21.9)		
	16 - 20 years	27 (13.6)	0 (0.0)	27 (14.8)			25 (17.4)	2 (3.6)			14 (16.7)	13 (11.4)		
	> 20 years	22 (11.1)	4 (25.0)	18 (9.9)			14 (9.7)	8 (14.3)			10 (11.9)	12 (10.5)		
Work time	Part time	27 (13.6)	1 (6.3)	26 (14.3)	0.806	0.369	19 (13.5)	8 (14.3)	0.012	0.914	11 (13.1)	16(14.0)	0.036	0.849
	Full time	171 (86.4)	15 (93.8)	156 (85.7)			125 (86.5)	46 (85.7)			73 (86.9)	98 (86.0)		

Table 1 (continued)

Variable	Categories	Total	Perceived stress[a]				Likely GAD[b]				Likely MDD[c]			
			No	Yes	χ^2	*P* – value	No	Yes	χ^2	*P* – value	No	Yes	χ^2	*P* – value
		n (%)	n (%)	n (%)			n (%)	n (%)			n (%)	n (%)		
Work volume	Worked less	15 (7.6)	1 (6.3)	14 (7.7)	0.749	0.688	13 (9.0)	2 (3.6)	1.614	0.446	7 (8.3)	8 (7.0)	1.813	0.004*
	No change	67 (33.8)	4 (25.0)	63 (34.6)			44 (30.6)	23 (42.9)			24 (28.6)	43 (37.7)		
	Worked more	116 (58.6)	11 (68.8)	105 (57.7)			87 (60.4)	29 (53.6)			53 (63.1)	63 (55.3)		

*aRR*adjusted Risk Ratio, *95%CI* 95% Confidence Interval

[a] Perceived stress was defined as PSS-10 score of ≥14

[b] Likely GAD was defined as a GAD-7 score of ≥10

[c] Likely MDD was defined as a PHQ-9 score of ≥10

*Significant if P – value < 0.05

on participants. The study was conducted with strict anonymity; ensuring participants' privacy was safeguarded. Written informed consent was obtained from each participant before participation in the study.

Results

Participants' characteristics

A total of 198 HCWs from the hospital participated in the study giving a response rate of 94.7%. Majority of the participants (58.6%) were female. More than half of the participants had an age of 30–44 years. Majority of the participants (73.7%) were married. Of the participants, (49.5%) were nurses, (8.6%) were doctors and (23.7%) were other. More than a third of the participants 35.4% and 35.9% were Catholics and Anglicans respectively. Over 35.9% of the participants were renting. The participants that had 1–5 years of experience were the majority 32.3%. More than half of the participants 58.6% had more working hours (Table 1).

Prevalence of stress, depression, and anxiety among the healthcare workers

A substantial majority (91.9%) of the participants reported experiencing moderate to high levels of perceived stress. In terms of anxiety, 42.6% of participants exhibited minimal symptoms of Generalized Anxiety Disorder (GAD), whereas 30.1% had mild symptoms and 27.3% were classified as likely to have GAD. Regarding Major Depressive Disorder (MDD), 30.3% had minimal symptoms, 12.1% had mild symptoms, and a majority of 57.6% was identified as likely experiencing MDD **(**Fig. 1**).**

Bivariate association between demographic characteristics and psychological symptoms of healthcare workers

Gender was significantly associated with perceived stress (χ^2 = 0.529, $p=0.045$), although no significant association was found with GAD or MDD. Age showed a significant association with perceived stress (χ^2 = 2.179, $p=0.036$) and with MDD (χ^2 = 2.869, $p=0.028$), with a higher prevalence of MDD observed among participants aged 30–44 years. However, no significant association was noted between age and GAD. Education level was not significantly associated with perceived stress or MDD, but it was significantly associated with GAD (χ^2 = 5.715, $p=0.021$). Marital status was significantly associated with MDD (χ^2 = 2.709, $p=0.049$), but no significant associations were found with perceived stress or GAD. Occupation was significantly associated with both GAD (χ^2 = 6.824, $p=0.014$) and MDD (χ^2 = 3.929, $p=0.016$). Housing status and religion also showed no significant associations with any of the psychological symptoms. Work experience was significantly associated with perceived stress (χ^2 = 5.660, $p=0.026$), though no associations were observed with GAD or MDD. Lastly, work volume was

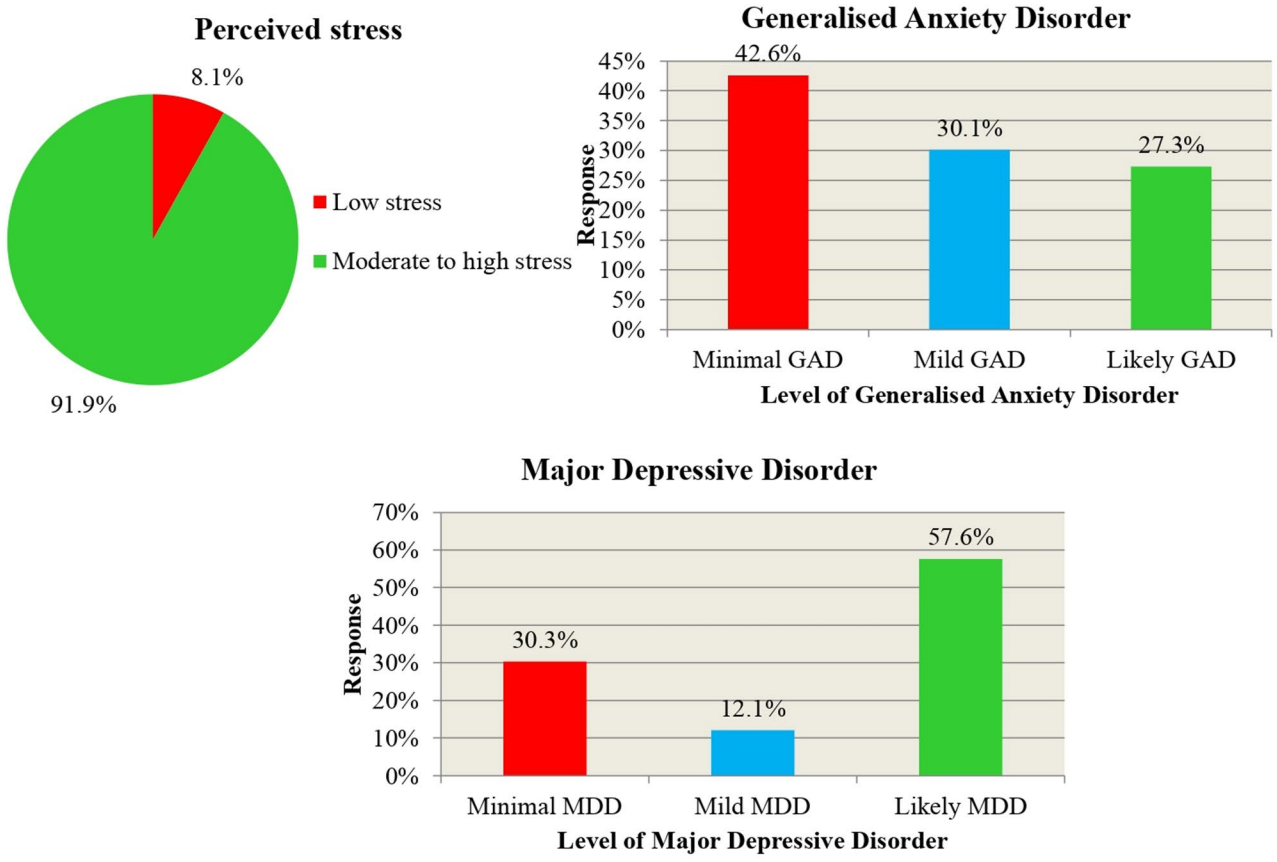

Fig. 1 Level of psychological distress among health care workers in Butabika National Mental Referral Hospital in Uganda

significantly associated with MDD (χ^2 = 1.813, p = 0.004) but not with perceived stress or GAD (Table 1).

Predictors of stress, depression, and anxiety among the healthcare workers

The study found that female healthcare workers had a significantly higher risk of perceived stress compared to males (aRR = 1.219; 95% CI: 1.010–2.922). Younger workers aged 18–29 years were more likely to experience perceived stress (aRR = 1.672; 95% CI: 1.050–5.733) and symptoms of depression (aRR = 1.037; 95% CI: 1.005–2.834) than those aged 45–60 years. Healthcare workers with 11–15 years of experience also showed increased perceived stress (aRR = 1.274; 95% CI: 1.020–2.503). Regarding anxiety, participants with a bachelor's degree had higher risk of generalized anxiety disorder symptoms (aRR = 2.577; 95% CI: 1.123–4.980), whereas nurses (aRR = 0.082; 95% CI: 0.040–0.900) had lower anxiety risk compared to other occupational groups. Married healthcare workers were more likely to exhibit depressive symptoms than singles (aRR = 1.322; 95% CI: 1.042–2.260), whereas technicians (aRR = 0.683; 95% CI: 0.480–0.972) and those with no change in work volume (aRR = 0.711; 95% CI: 0.532–0.987) had lower risk of depression (Table 2).

Discussion

Healthcare workers often face significant stress, anxiety, and depression due to the demanding nature of their work, long hours, and the emotional toll of patient care. These mental health challenges were further intensified by the COVID-19 pandemic, underscoring the urgent need for effective support systems [68, 69]. This study aimed to assess the prevalence and associated factors of stress, anxiety, and depression among healthcare professionals, with particular attention to demographic and occupational characteristics. By identifying key contributors to psychological distress, the study offers valuable insights to guide the development of targeted mental health interventions and workplace policies. These findings are crucial for enhancing the wellbeing, job performance, and retention of healthcare workers, especially in resource-limited settings.

Majority of participants 91.9% experienced stress symptoms. Similarly, Cheng et al. reported that over 90% of frontline healthcare workers (HCWs) in China experienced stress primarily caused by resource shortages and heavy workloads [70]. Heavy workloads, extended workdays, and anxiety about getting infected during the COVID-19 pandemic are probably the causes of this high incidence. Prior research has also demonstrated

Table 2 Modified Poisson regression analysis for predictors of stress, depression, and anxiety among the healthcare workers

Variable	Category	Perceived Stress[a]		Likely GAD[b]		Likely MDD[c]	
		(aRR, 95% CI)	*P*–value	(aRR, 95% CI)	*P*–value	(aRR, 95% CI)	*P*–value
Gender	Female	1.219 (1.010 – 2.922)	< 0.05*				
	Male	Reference	Reference				
Age	18 - 29 years	1.672 (1.050 – 5.733)	< 0.05*			1.037 (1.005 – 2.834)	< 0.05*
	30 - 44 years	1.823 (0.366 – 9.830)	> 0.05			1.952 (0.723 – 4.851)	> 0.05
	45 - 60 years	Reference	Reference			Reference	Reference
Education level	Certificate			1.167 (0.339 – 4.018)	> 0.05		
	Diploma			1.885 (0.256 – 3.098)	> 0.05		
	Bachelor's			2.577 (1.123 – 4.980)	< 0.05*		
	Master's			2.085 (0.808 – 5.423)	> 0.05		
	PhD			Reference	Reference		
Marital status	Married					1.322 (1.042 – 2.260)	< 0.05*
	Divorced					0.212 (0.020 – 2.289)	> 0.05
	Widowed					1.073 (0.051 – 22.656)	> 0.05
	Single					Reference	Reference
Occupation	Doctor			1.900 (0.363 – 9.952)	> 0.05	2.180 (0.680 – 6.990)	> 0.05
	Nurse			0.082 (0.040 – 0.900)	< 0.05*	1.028 (0.485 – 2.178)	> 0.05
	Technician			5.073 (0.865 – 7.859)	> 0.05	0.683 (0.480 – 0.972)	< 0.05*
	Clinician			0.847 (0.244 – 2.938)	> 0.05	1.422 (0.480 – 4.208)	> 0.05
	Other			Reference	Reference	Reference	Reference
Work experience	1 - 5 years	0.617 (0.142 – 2.680)	> 0.05				
	6 - 10 years	0.426 (0.071 – 2.413)	> 0.05				
	11 - 15 years	1.274 (1.020 – 2.503)	< 0.05*				
	16 - 20 years	2.786 (0.493 – 3.758)	> 0.05				
	> 20 years	Reference	Reference				
Work Volume	Worked less					1.095 (0.360 – 3.328)	> 0.05
	No change					0.711 (0.532 – 0.987)	< 0.05*
	Worked more					Reference	Reference

aRR adjusted Risk Ratio, *95%CI* 95% Confidence Interval

[a]Perceived stress was defined as PSS-10 score of ≥14

[b]Likely GAD was defined as a GAD-7 score of ≥10

[c]Likely MDD was defined as a PHQ-9 score of ≥10

*Significant if P – value < 0.05

that medical personnel may have significant psychological stress and mental problems, including elevated stress, as a result of the COVID-19 pandemic's overwhelming workload pressure and fear of infection [71, 72]. While some studies found rates comparable to this one, another study found lower rates. For instance, Teo et al. found that 33% of Singapore healthcare workers reported higher levels of perceived stress in the early phases of the pandemic, which they attributed to improved readiness, sufficient resources, and robust mental health support networks [54]. These variations underscore the critical role of healthcare system resilience and preparedness in mitigating stress among HCWs.

Approximately 27.3% of the healthcare workers exhibited symptoms of Generalized Anxiety Disorder (GAD). Concerns about the repercussions of infection, such as social isolation, financial concerns, illness and death, and worry for family members and loved ones in the event of mortality and/or morbidity, may be the cause of this predominance. These factors can all lead to heightened anxiety. Menzies et al., discovered a strong correlation between fear of death and COVID-19-related anxiety [73]. A study in Nigeria observed a fairly similar GAD prevalence of 25.4% among HCWs [55], which they linked to inadequate protective measures and extended working hours. In contrast, a higher anxiety prevalence of 63.0% was reported by Kibret et al., in Ethiopia [74]. Even though they employed the same instrument (GAD-7) as this study, their sample size was larger, and their research took place during Ethiopia's initial COVID-19 pandemic wave, which included a lockdown and unique restrictions on social and mobility activities. The higher prevalence seen in their study could be explained by these variables.

More than half of the healthcare professionals in this study reported having high levels of depression symptoms. This might be because during the COVID-19 pandemic, healthcare workers (HCWs) in Uganda, a low-income nation, felt more anxiety. This fear was

exacerbated by a lack of Personal Protective Equipment (PPE) and insufficient human resources to manage the rapidly increasing number of cases [75, 76]. This could lead to worries and anxieties about oneself, family members, issues with spouses and children, and the challenges of working from home during the COVID-19 epidemic [77]. The adrenal glands produce and release the hormone cortisol into the bloodstream when some bodies are under stress [78]. Depression and weakened immunity are the results of persistently high cortisol levels [79, 80]. Health care personnel are more likely to suffer from serious illnesses, some of which can be lethal. As a result, if we don't address mental health services, we run the risk of losing the workforce to take care of us. The finding was consistent with those reported in a study conducted in Brazil that reported that 66.4% of healthcare workers (HCWs) experienced depressive symptoms attributing it to inadequate recovery periods [41]. In studies from Iran and Brazil they found lower MDD prevalence of 35.1% and 32.4% respectively as compared to our study [50, 53]. Similarly, a study conducted in Vietnam revealed a 19.2% prevalence of MDD [81]. They ascribed this low prevalence of depression to the country's adoption of multiple successful COVID-19 control measures in the latter stages [82], which decreased the number of cases and eased the strain on medical personnel, thereby reducing psychological distress.

Female healthcare workers (HCWs) were much more likely to report feeling stressed compared to their male counterparts. This is probably because of increased emotional demands, caregiving duties during the COVID-19 pandemic, workplace difficulties, and social expectations for women [83]. According to an Indian study, the case fatality rate for COVID-19 was 2.9% for men and 3.3% for women [84]. Women experience stressful situations more frequently than males, and they have a more emotion-focused coping style than men, according to a study in Ethiopia they found a gender difference in stress and coping strategies [41].The findings of our study align with several studies in Turkey [85] and Africa [86]. However, Chirico et al. argued that male and female HCWs experience similar stress levels [87]. These conflicting findings may be attributed to differences in cultural norms, societal roles, and healthcare system structures across study settings.

Additionally, HCWs with 11–15 years of experience were more likely to have stress than those with over 20 years of experience. This trend may result from mid-career HCWs facing competing professional and personal demands, role overload, and pressure to perform during crises. Several studies found no significant link between work experience and stress, highlighting factors such as shift work and direct patient contact [81], long working hours and lack of social support [40], impact of job characteristics and personal resources [54]. These discrepancies likely reflect differences in healthcare settings, cultural contexts, and study methodologies.

Having a bachelor's degree showed more a likelihood to acquire Generalized Anxiety Disorder (GAD) compared to having a PhD. This may be attributed to fewer coping resources and less confidence in managing pandemic-related challenges [18]. Similarly, a study by Shaukat et al. found that healthcare workers (HCWs) with advanced degrees experienced lower anxiety levels, likely due to enhanced problem-solving skills and greater professional authority [88]. However, one study found that HCWs with higher education experienced higher levels of anxiety, possibly due to a better understanding of the disease [45]. These discrepancies may stem from differences in workplace roles and responsibilities associated with varying educational levels.

A study from Nigeria found that occupation type was significantly associated with anxiety disorder similar to this study [55]. In our study nurses were significantly less likely to have GAD compared to other occupational categories, possibly due to their frequent exposure to stress, well-developed coping strategies, and the collaborative and supportive nature of nursing work environments during the pandemic [89, 90]. In disagreement, Lai et al. found that nurses were more likely to experience GAD, citing long working hours, emotional fatigue from patient care, and fear of infecting their families as key contributors [18].These variations could be attributed to differences in work settings, access to mental health resources, and the availability of support systems for nurses across different study populations. Another study did not find occupational type influencing anxiety; however it highlighted that factors like direct patient care and workplace conditions influence anxiety levels among healthcare providers [23]. Though there was no discernible correlation between gender and anxiety in our study. According to earlier research, female healthcare workers experienced higher levels of anxiety than their male counterparts [91, 92]. These studies suggest that women's vulnerability to a variety of stressors, including difficulties juggling work and personal commitments and a lack of support, may account for this association; as a result, it was expected that psychological distress would rise during the COVID-19 pandemic [93].

Younger participants were more likely to exhibit symptoms of Major Depressive Disorder (MDD) compared to older individuals. The finding was consistent with similar studies in Kenya [94]; Japan [95]; Guatemala [59]. This may be due to younger healthcare workers' (HCWs) lack of experience in managing work-related stress, heightened sensitivity to uncertainty, and increased workload demands [42, 90, 96]. Voth et al. in their study also noted that younger HCWs faced greater psychological distress

stemming from career-related pressures and feelings of inadequacy in handling the complexities of pandemic-related healthcare delivery [97]. However, a study in Turkey found no significant association between age and MDD [98], suggesting that the psychological impact of the pandemic was evenly distributed across age groups. These differences may reflect variations in the availability of support systems and coping resources for younger HCWs across different study populations.

Participants whose workload remained stable were less likely to report MDD compared to those who experienced increased workloads. This could be because higher workloads often lead to physical and emotional exhaustion, culminating in burnout a well-known risk factor for depression [99, 100]. Stable workloads may help prevent burnout, reducing the likelihood of MDD by mitigating chronic stress and work-related burnout [101, 102]. According to a number of qualitative studies, healthcare workers wanted enough sleep during COVID-19. They wanted leaders to give them more assistance and focus on their mental health [103, 104]. We also suggest special implement intervention for healthcare workers in Uganda.

Limitations and strengths

The study had several limitations. Reliance on self-reported data may have introduced reporting bias, with participants potentially over- or underestimating symptoms of stress, anxiety, and depression due to stigma or social desirability. The cross-sectional design limited causal inferences between predictors and mental health outcomes. Additionally, cultural and regional differences in healthcare systems, societal norms, and access to mental health resources may have influenced prevalence rates, affecting generalizability. Unmeasured confounders, such as individual resilience or social support, may also have impacted outcomes. To address these issues, validated assessment tools were used to improve data reliability, and participants were assured confidentiality to reduce bias. While causal relationships couldn't be confirmed, Modified Poisson regression helped control for confounders and identify independent associations. The study's clearly defined context improves its relevance to similar low-resource settings. Inclusion of a diverse sample of healthcare workers helped reduce selection bias. Strengths included the broad analysis of demographic and occupational factors and appropriate estimation of relative risks. Findings offer valuable evidence for mental health policy and intervention planning.

Conclusion

The results show that during the COVID-19 pandemic, healthcare workers (HCWs) experienced a considerable mental health burden, with high prevalence rates of stress (91.9%), major depressive disorder (57.6%), and generalized anxiety disorder (27.3%). This psychological distress is attributed to factors such as being a younger HCW and mid-career workers, female HCWs, and those with lower educational attainment. There is need for healthcare system resilience, resource availability, workplace support, and societal norms on mental well-being. Also addressing these challenges through systemic interventions, resource allocation, and continuous monitoring is essential to safeguard HCWs' mental health and ensure the effectiveness of healthcare delivery systems.

Abbreviations

aOR	adjusted Odds Ratio
CI	Confidence Interval
COVID– 19	Coronavirus Disease 19
GAD– 7	Generalized Anxiety Disorder 7 Item
HCWs	Healthcare workers
MDD	Major Depressive Disorder;
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SPSS	Statistical Package for Social Sciences
PHQ– 9	Patient Healthcare Questionnaire 9 item
PPE	Personal Protective Equipment
PSS– 10	Perceived Stress Scale 10 item

Supplementary Information

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Supplementary Material 1; The surveys used to collect responses are available in the supplementary material.

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Authors' contributions

JO and NE designed the study. JO and NE prepared and processed for ethical review. JO, NE, HM and RM participated in data collection. NE analyzed the data. JO and NE wrote the manuscript. All authors reviewed, read and accepted the final manuscript.

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Data availability

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

Declarations

Ethics approval and consent to participate

This study received approval from The AIDS Support Organization Research Ethical Committee in 2022 (approval number: TASO – 2022–193). Participating in the study was entirely voluntary. Written informed consent was obtained from each participant prior to their involvement in the study. All responses were collected anonymously to ensure confidentiality. Furthermore, all procedures were conducted in strict adherence to the relevant guidelines and regulations outlined in the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Conflict of interest
The authors declare no conflicts of interest.

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