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COVID-19 and presenteeism: longitudinal evidence from healthcare workers in greater Accra, Ghana

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Introduction: We investigated the impact of COVID-19 on presenteeism among healthcare workers (HCWs) in the Greater Accra Region of Ghana.
Methods: This longitudinal follow-up study employed a census approach to include 756 HCWs, comprising 252 COVID-19–exposed and 504 unexposed participants. Data were collected at baseline, month 3, and month 6. Statistical analyses were conducted using Stata LP version 15. Pearson's chi-square tests were used to assess differences in presenteeism between exposure groups at each time point. Variables showing significant associations were included in a multivariable generalized linear model with a proportional odds specification to estimate adjusted proportional odds ratios with 95% confidence intervals. Statistical significance was set at $\alpha = 0.05$.
Results: High presenteeism was consistently observed over the six-month period, peaking at 91.7% at month 3. Presenteeism rates were significantly higher among COVID-19–exposed HCWs at all time points ($p < 0.005$). Factors associated with increased presenteeism included having five or more dependents, holding part-time jobs, and working as a nurse or laboratory scientist, whereas HCWs with 5–9 years of experience had lower odds. Moderate to severe depression and anxiety were associated with reduced odds of high presenteeism, although severe anxiety at baseline was linked to increased odds. Overall, presenteeism declined over time.
Conclusion: Presenteeism remains high among HCWs, particularly those experiencing psychological distress. Targeted interventions, including improved working conditions, mental health support, adequate personal protective equipment, and workforce strengthening, are essential to safeguard HCW well-being and health system resilience.

KEYWORDS
COVID-19, Ghana, healthcare workers (HCW), presenteeism, PSYCOLOGICAL HEALTH

Introduction

Healthcare workers (HCWs) constitute approximately 12% of the global workforce, yet only about 3% are in sub-Saharan Africa (SSA), a region that bears 25% of the world's disease burden (1, 2). This stark disparity is worsened by extreme patient-to-doctor ratios, which became critically apparent during the COVID-19 pandemic as overburdened hospitals struggled with overcrowding (2, 3). Sustainable Development Goal 3 (SDG 3), which aims to improve health and well-being, remains unattainable without addressing this workforce crisis (4–6).

During the pandemic, HCWs faced significant challenges related to lung function, blood pressure, psychological health, and presenteeism. Although direct studies on lung function and blood pressure changes among HCWs are limited, COVID-19 infection posed risks of persistent respiratory symptoms and cardiovascular strain, especially in severe cases (7, 8). Psychological health was profoundly affected, with anxiety, depression, stress, burnout, and fear increasing dramatically compared to pre-pandemic levels, particularly among nurses and respiratory therapists (27 Systematic reviews and studies across Asia and Africa consistently identify fear as the most prevalent psychological response, driven by concerns over inadequate personal protective equipment (PPE), infection risk, transmitting the virus to family, and stigmatization (9–12).For example, in a primary healthcare facility in the Greater Accra Region of Ghana, over 70% of HCWs reported symptoms of depression, anxiety, or stress, with factors such as family avoidance, alcohol use, and job category significantly associated with mental health outcomes (12).

Cardiovascular risks were also exacerbated, as a study in India found that 28.8% of healthcare professionals developed new-onset hypertension, particularly among those directly involved with COVID-19 patients, underscoring infection exposure and pandemic-related stress as significant contributors (8). Even mild COVID-19 infections were associated with persistent elevations in systolic blood pressure, averaging an increase of 8.6 mmHg at 12 weeks post-infection, suggesting potential long-term vascular effects mediated by mechanisms such as renin-angiotensin system dysregulation, endothelial injury, and chronic inflammation (8, 13).

Regarding lung function, although specific studies on HCWs are scarce, COVID-19 infection is linked to ongoing respiratory symptoms and reduced pulmonary capacity, which may impair functional capacity and work performance (14). These health burdens were compounded by high workloads, insufficient infection control training, and social isolation, leading many HCWs to engage in presenteeism—attending work while ill—motivated by professional duty, fear of staffing shortages, or economic pressures (15). Presenteeism rates reached as high as 70.6% among nurses during the pandemic, driven by institutional pressure, fear of job loss, concern for patients and colleagues, and inadequate sick leave policies (6, 15). This behavior increased risks of nosocomial transmission, worsened mental health outcomes, reduced quality of care, and decreased workforce productivity(8). Factors such as smoking status and working in intensive care units influenced absenteeism and presenteeism levels (16). Mental health issues including burnout, stress, depression, fear of COVID-19, younger age, female gender, chronic diseases, interrupted medical care, high workloads, staff shortages, inadequate managerial support, poor safety climate, and fear of burdening colleagues further increased the likelihood of presenteeism (17).

Most existing studies predominantly focus on general working populations, while targeted research on HCWs—who face unique exposure risks and occupational stressors—remains relatively limited (18, 19). There is a significant scarcity of comprehensive investigations specifically examining changes in lung function and blood pressure among HCWs, alongside a lack of longitudinal data on the sustained psychological effects and patterns of presenteeism within this critical workforce (18–21). Furthermore, research from the African continent is notably sparse, despite the region's substantial healthcare challenges and workforce shortages (19).

We have stated that the primary objective was to identify determinants of presenteeism, and the secondary objective was to assess whether psychological health, hypertension, and reduced lung function mediate the relationship between COVID-19 infection and presenteeism. We hypothesize that COVID-19 infection directly impairs lung function, elevates blood pressure, and exacerbates psychological distress, thereby increasing presenteeism. Moreover, COVID-19 infection is theorized to have a direct impact on presenteeism (Figure 1). These relationships are expected to be amplified by a history of comorbidities, physical inactivity, and inadequate occupational or family support—factors also independently associated with worsened presenteeism and adverse health outcomes.

This research aligns with global health policy priorities such as the World Health Organization's Global Strategy on Human Resources for Health: Workforce 2030, which emphasizes the need for evidence-based interventions to support healthcare workers' well-being and capacity, particularly in regions with critical workforce shortages like sub-Saharan Africa (4). By filling these knowledge gaps, our study seeks to inform targeted policies and workplace strategies that promote HCWs' health, reduce presenteeism, and strengthen health system resilience during ongoing and future public health emergencies.

Materials and methods

Study design, settings, and participants

A longitudinal follow-up study was conducted including all 756 healthcare workers (HCWs) in the setting who met the inclusion criteria: 252 previously infected with COVID-19 (exposed) and 504 never infected (unexposed). A census was employed to purposively include the entire population, minimizing selection bias and ensuring comprehensive data collection. An exposed-to-unexposed ratio of 1:2 was used to maintain 80% statistical power, even if some unexposed participants became infected during follow-up.

The four healthcare facilities in the Greater Accra Region with the highest COVID-19 caseloads among HCWs as of September 2021 were Greater Accra Regional Hospital, Tema General Hospital, Shai Osudoku District Hospital, and Achimota Hospital (Figure 2), all designated COVID-19 treatment centers according to the Ghana Health Service (J.A. Oliver-Commey, personal communication, August 10, 2021).

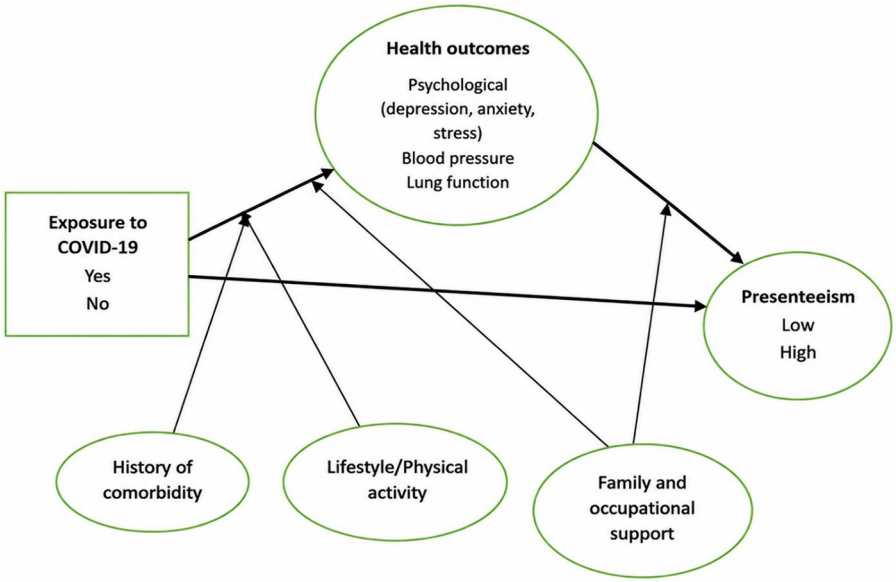


FIGURE 1
A hypothesized model of COVID-19's impact on work productivity. The thick line shows a direct effect, while the lighter line shows an interactive effect.

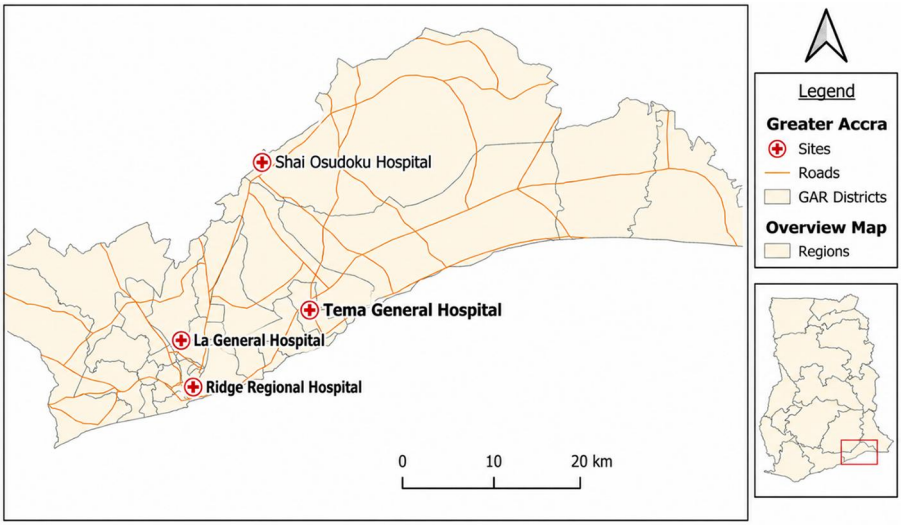


FIGURE 2
Map showing the selected health facilities in Greater Accra, Ghana.

In October 2021, HCWs who had undergone the RT-PCR test were identified from hospital testing registers at the selected facilities, and to be eligible for the study, the HCW should have done a Reverse Transcriptase Chain Reaction Test (RT-PCR) and either a confirmed positive or negative to COVID-19 infection, be permanently employed, and agree to stay in the study area for the six-month monitoring period (October 2021–April 2022). Healthcare workers (HCWs) whose COVID-19 infection status was confirmed using a Rapid Diagnostic Test (RDT), which is subject to limitations in sensitivity and specificity; those on clinical rotations; and those with physician-diagnosed health conditions (e.g., psychosis) that made participation or interviewing impossible were excluded from the study.

Data collection

Trained field workers administered a questionnaire using REDCap (Research Electronic Data Capture), a secure web-based platform hosted by the University of Ghana for electronic data collection (22). Interviews were conducted at all four facilities using Samsung and Nokia Android devices programmed with a customized REDCap interface. Participants completed an online questionnaire structured as follows: (i) socio-demographic/professional characteristics: date of birth, sex, BMI (weight/height^2), health facility, profession, part-time job count, annual salary; (ii) clinical characteristics: personal/family medical history, COVID-19 testing frequency, and rationale; (iii) COVID-19 management: clinical investigations, medications

(sources/types), laboratory results and treatment protocols; (iv) presenteeism assessment (SPS-6): six items evaluating, cognitive, affective, and behavioral capacity to work while managing health issues. The Composite scores ≤15 (low presenteeism) vs. 16–30 (high presenteeism) on the 6–30 scale. The questionnaire was completed at each health facility. On average, each participant spent about 20 min to complete the questionnaire. Participants were enrolled and assessed at baseline (Month 0), midline (Month 3), and endline (Month 6). REDCap's audit trail ensured data integrity across all facilities (22).

Exposure variable

HCWs with RT-PCR-confirmed COVID-19 who recovered within one month (1–30 September 2021) prior to study initiation were classified as the exposed group, while those who tested RT-PCR-negative at recruitment and remained negative throughout the study period (October 2021–April 2022) constituted the unexposed group.

Outcome of interest

The primary outcome was presenteeism, defined as reduced work productivity despite physical attendance, measured using the Stanford Presenteeism Scale (SPS-6). Scores range from 6 to 30, with higher scores (16–30) indicating severe presenteeism (significant functional impairment) and lower scores (6–15) reflecting mild presenteeism (moderate functional limitations). demonstrated good internal consistency in this study, with a Cronbach's alpha of 0.82, indicating reliable measurement of presenteeism among healthcare workers (23, 24).

Statistical analysis

Descriptive statistics for categorical variables were summarized as frequencies and percentages, while continuous variables were reported as means ± standard deviations. Variables exhibiting high multicollinearity [Variance Inflation Factor (VIF) > 10] were excluded from modeling, with VIF <5 considered acceptable. The average VIF across variables was 2.87, indicating reasonable multicollinearity; however, specific variables (e.g., high workplace support from colleagues and supervisors) exceeded VIF thresholds and were excluded (Supplementary Appendix 2).

The interaction between COVID-19 exposure status at baseline*time, as well as the interaction between COVID-19 status at baseline* variables significantly associated with presenteeism, were included in the final multivariable generalized linear model, estimating the adjusted proportional odds ratios (APOR) and the corresponding 95% CI and *p*-values. The Pearson chi-square assessed baseline, month 3, and month 6 associations between presenteeism and exposure status. The pattern of the outcomes from baseline, month 3 and then month 6 were also described on a clustered bar chart between the exposed and the unexposed. Further, we examined presenteeism against categorical variables at each time point using Pearson's chi-square. For the multivariable analysis, all variables (socio-demographic, work and professional-related, history of comorbidity, lifestyle, family and workplace support, and COVID-19-related characteristics) were considered for the final generalized binary logistic regression model. Stata LP v15 (StataCorp, Texas, USA) was used, with statistical significance set at $\alpha = 0.05$.

Results

Participants characteristics

A total of 756 HCWs participated, including 252 exposed (COVID-19-positive) and 504 unexposed individuals. 48.3% ($n = 365$) were aged 30–39 years, with a higher COVID-19 prevalence in this group among the exposed (49.6% vs. 47.6%). 77.6% ($n = 587$) were female. 48.8% ($n = 369$) held a bachelor's degree or higher, with significantly higher COVID-19 rates among the exposed (59.1% vs. 43.7%). 87.3% ($n = 660$) identified as Christian. 54.4% ($n = 411$) were married. 52.0% ($n = 393$) reported having no dependents. 34.1% ($n = 258$) were recruited from Shai-Osudoku District Hospital. 62.4% ($n = 472$) were nurses. 37.7% ($n = 285$) worked in medical/surgical units. 21.6% ($n = 163$) held ≥2 part-time jobs, with higher COVID-19 rates among the exposed (81.2% vs. 58.9%). 50.7% ($n = 383$) had <5 years of experience, yet the exposed group showed lower infection rates (42.5% vs. 54.9%). 56.7% ($n = 429$) earned GHS 2,001–3,000/month. 97.6% reported none; hypertension was the most common (2.4%) among those with pre-existing conditions (Table 1).

Prevalence of presenteeism among HCW

Our study revealed persistently high presenteeism among HCWs over the six-month observation period (Figure 3). The exposed group exhibited markedly elevated rates. 79.4% reported high presenteeism at baseline, 91.7% at month 3 (coinciding with the infection peak), 76.2% by month 6. Presenteeism prevalence in the exposed group differed significantly from the unexposed group at all time points (baseline: $\chi^2 = 33.94$, $p < 0.001$, midline: $\chi^2 = 59.9$, $p = 0.004$, and endline: $\chi^2 = 8.11$, $p = 0.004$). Prevalence peaked at month 3 (91.7%), aligning with the infection surge, before declining at month 6.

Association of socio-demographic and workplace characteristics with presenteeism

Our findings indicate that HCWs with five or more dependents are 1.31 times more likely to experience high presenteeism compared to those with no dependents (AOR = 1.31; 95% CI: 1.00–1.74; Table 2). The odds of high presenteeism were also significantly higher among laboratory scientists (AOR = 1.61; 95% CI: 1.01–2.59) and nurses (AOR = 1.51; 95% CI: 1.05–2.17). In contrast, HCWs with 5–9 years of work experience had reduced odds of high presenteeism (AOR = 0.78; 95% CI: 0.61–1.00). Additionally, those with part-time jobs were nearly twice as likely to experience high presenteeism compared to those without part-time jobs (AOR = 1.74; 95% CI: 1.31–2.32).

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TABLE 1 Socio-demographic, occupational characteristics, and history of comorbidity among participants by exposure status.

Characteristics	Total N = 756 (%)	Unexposed N = 504 n/N (%)	Exposed N = 252 n/N (%)
Age group (in years)			
20–29	259 (34.3)	197 (39.1)	62 (24.6)
30–39	365 (48.3)	240 (47.6)	125 (49.6)
40–49	90 (11.9)	51 (10.1)	39 (15.5)
50–60	42 (5.6)	16 (3.2)	26 (10.3)
Sex			
Female	587 (77.6)	382 (75.8)	205 (81.3)
Male	169 (22.4)	122 (24.2)	47 (18.7)
Highest education			
Certificate	146 (19.3)	141 (28.0)	5 (2.0)
Diploma degree	241 (31.9)	143 (28.4)	98 (38.9)
Bachelor's degree or higher	369 (48.8)	220 (43.7)	149 (59.1)
Religion			
Christian	660 (87.3)	446 (88.5)	214 (84.9)
Muslim	71 (9.4)	35 (6.9)	36 (14.3)
Others	25 (3.3)	23 (4.6)	2 (0.8)
Marital status			
Never married	317 (41.9)	246 (48.8)	71 (28.2)
Married	411 (54.4)	244 (48.4)	167 (66.3)
Previously married	28 (3.7)	14 (2.8)	14 (5.6)
Number of dependents			
None	393 (52.0)	305 (60.5)	88 (34.9)
1–2 dependents	158 (20.9)	104 (20.6)	54 (21.4)
3–4 dependents	134 (17.7)	56 (11.1)	78 (31.0)
Health facility			
Greater Accra Regional Hospital	165 (21.8)	110 (21.8)	55 (21.8)
Shai-Osudoku district hospital	258 (34.1)	172 (34.1)	86 (34.1)
Achimota hospital	213 (28.2)	142 (28.2)	71 (28.2)
Tema General hospital	120 (15.9)	80 (15.9)	40 (15.9)
Profession			
Doctor	110 (14.6)	74 (14.7)	36 (14.3)
Nurse	472 (62.4)	317 (62.9)	155 (61.5)
Laboratory scientist	26 (3.4)	20 (4.0)	6 (2.4)
Pharmacist	36 (4.8)	24 (4.8)	12 (4.8)
Midwives	112 (14.8)	69 (13.7)	43 (17.1)
Department			
Medical/Surgical	285 (37.7)	187 (37.1)	98 (38.9)
	131 (17.3)	93 (18.5)	38 (15.1)
Emergency/Intensive care unit			
Obstetrics & Gynaecology	118 (15.6)	79 (15.7)	39 (15.5)
Child health	88 (11.6)	51 (10.1)	37 (14.7)
Out Patient Department	73 (9.7)	49 (9.7)	24 (9.5)
Pharmacy	35 (4.6)	24 (4.8)	11 (4.4)
Laboratory	26 (3.4)	21/(4.2)	5 (2.0)
Number of part-time jobs			
None	502 (66.4)	297 (58.9)	205 (81.3)
One	91 (12.0)	50/504 (9.9)	41 (16.3)
Two+	163 (21.6)	157 (31.2)	6 (2.4)
Years Worked			
<5 years	383 (50.7)	276/503 (54.9)	107 (42.5)
5–9 years	201 (26.6)	121/503 (24.1)	80 (31.7)
10–14 years	125 (16.6)	79/503 (15.7)	46 (18.3)
15+ years	46 (6.1)	27/503 (5.4)	19 (7.5)
Net monthly salary			
<Ghc 1,000	15 (2.0)	6 (1.2)	9 (3.6)
Ghc 1,001–2,000	131 (17.3)	84 (16.7)	47 (18.7)
Ghc 2,001–3,000	429 (56.7)	311 (61.7)	118 (46.8)
History of comorbidity			
No	475/756 (62.8)	354/504 (70.2)	121/252 (48.0)
Yes	281/756 (37.2)	150/504 (29.8)	131/252 (52.0)
Comorbidity among participants	51/756 (6.7)	30/504 (6.0)	21/252 (8.3)
Hypertension	18/756 (2.4)	14/504 (2.8)	4/252 (1.6)
Asthma	12/756 (1.6)	8/504 (1.6)	4/252 (1.6)
Diabetes	16/756 (2.1)	8/504 (1.6)	8/252 (3.2)
Mental illness	4/756 (0.5)	1/504 (0.2)	3/252 (1.2)
Sickle cell disease	3/756 (0.4)	1/504 (0.2)	2/252 (0.8)
Renal disease	1/756 (0.1)	0/504 (0.0)	1/252 (0.4)

Effect of COVID-19 health outcomes on presenteeism

HCWs with moderate depression showed 34% lower odds of high presenteeism compared to those with normal depression levels (AOR = 0.66; 95% CI: 0.46–0.95; Table 3). Similarly, those with moderate anxiety exhibited 31% reduced odds (AOR = 0.69; 95% CI: 0.52–0.91), while severe anxiety was associated with 50% lower odds (AOR = 0.50; 95% CI: 0.36–0.69).

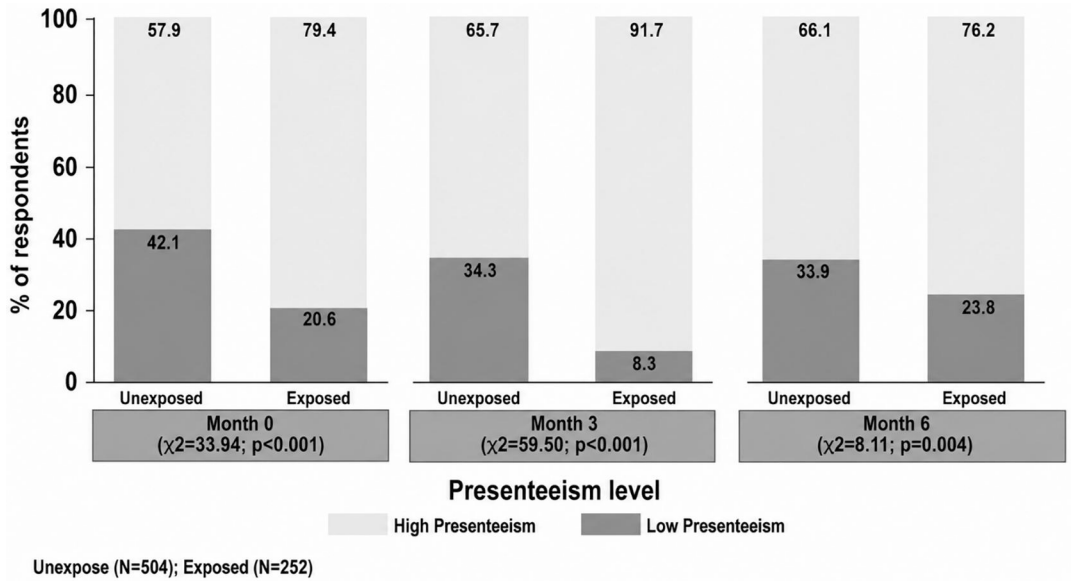


FIGURE 3
Prevalence of presenteeism among the exposed and unexposed at months 0, 3 and 6.

Effect of COVID-19 exposure and time on presenteeism among HCWs

Overall, the likelihood of high presenteeism among HCWs declined progressively over time (Table 4). Compared to baseline (month 0), the adjusted odds of high presenteeism decreased significantly by month 3 (AOR = 0.66; 95% CI: 0.47–0.92) and further by month 6 (AOR = 0.59; 95% CI: 0.46–0.75). When interaction terms were included, the reduction at month 3 became even more pronounced (AOR = 0.46; 95% CI: 0.22–0.93). Notably, HCWs with severe depression had 56% lower odds of high presenteeism compared to those with normal depression levels (AOR = 0.44; 95% CI: 0.25–0.76). In contrast, those with severe anxiety exhibited a 3.24-fold increase in the odds of high presenteeism relative to workers with normal anxiety (AOR = 3.24; 95% CI: 1.22–8.64). Additionally, HCWs engaging in moderate-to-intense exercise had 1.94 times higher odds of low presenteeism (inverse AOR = 0.52) compared to non-exercisers. These findings highlight distinct mental health and lifestyle factors influencing presenteeism patterns in healthcare settings.

Effect of family and workplace support on presenteeism among HCWs

An interaction effect between COVID-19 exposure and levels of family/occupational support was observed (Table 5). While the interaction terms were not statistically significant, the observed differences suggest a non-random pattern in the variations.

Discussion

Main findings

This study examined the impact of COVID-19 on presenteeism among healthcare workers (HCWs) in hospitals within the Greater Accra Region of Ghana. The results showed a strong link between being exposed to COVID-19 and presenteeism, with the prevalence of 79.4%, 91.7%, and 76.2% at the start, three months later, and six months after recovery, respectively. Laboratory scientists, nurses, and HCWs holding other part-time jobs were more likely to exhibit presenteeism. Interestingly, HCWs with moderate and severe levels of depression had reduced odds of experiencing high presenteeism. Contrary to expectations, workplace and family support did not have a significant effect on presenteeism. These findings offer assistance to healthcare facilities in developing countries, where research on the relationship between COVID-19 and work productivity among HCWs remains limited. The result underscores the need for targeted interventions aimed at improving mental health support within healthcare settings. By addressing the factors contributing to presenteeism, facilities can enhance overall productivity and well-being among their workforces.

Methodological validity

This study represents the first investigation to assess COVID-19's impact on presenteeism among HCWs in Ghana and, more broadly, Africa, establishing a critical baseline for understanding post-recovery complications. The findings provide a foundation for structured monitoring systems and multidisciplinary rehabilitation pathways to support HCWs post-infection, addressing a gap in occupational health research amid pandemic-related stressors documented across sub-Saharan Africa (6).The study's large sample size and sampling strategy minimizes random variation and selection bias respectively. The use of the Stanford Presenteeism Scale (SPS-6) reduces information bias and addresses limitations seen in prior regional studies that lacked standardized tools (24). These methodological choices position the study as a pivotal contribution to occupational health literature, particularly in low-resource settings where HCW

TABLE 2 Multilevel generalized logistic regression models of the effect of socio-demographic and workplace characteristics on presenteeism among HCWs.

Variables	Unadjusted model		Adjusted model	
	COR [95% CI]	*P*-value	AOR [95% CI]	*P*-value
Age group				
20–29	1.00 [reference]		1.00 [reference]	
30–39	0.91 [0.78, 1.05]	0.190	1.04 [0.87, 1.25]	0.653
40–49	0.89 [0.56, 1.43]	0.637	1.30 [0.87, 1.95]	0.202
50–60	0.69 [0.41, 1.18]	0.176	1.20 [0.74, 1.95]	0.459
Sex				
Female	1.00 [reference]		1.00 [reference]	
Male	1.05 [0.83, 1.34]	0.681	0.81 [0.62, 1.06]	0.125
Highest educational level				
Diploma degree	1.00 [reference]		1.00 [reference]	
Tertiary	0.66 [0.52, 0.84]	0.001	0.97 [0.80, 1.17]	0.742
Religion				
Christian	1.00 [reference]		1.00 [reference]	
Muslim	0.82 [0.55, 1.21]	0.315	0.91 [0.69, 1.20]	0.503
Others	1.41 [0.78, 2.55]	0.251	1.09 [0.77, 1.55]	0.629
Marital status				
Never married	1.00 [reference]		1.00 [reference]	
Married	0.81 [0.68, 0.97]	0.022	1.01 [0.87, 1.17]	0.873
Previously married	0.77 [0.51, 1.19]	0.241	1.01 [0.68, 1.50]	0.961
Number of dependent				
None	1.00 [reference]		1.00 [reference]	
1–2 dependents	0.96 [0.78, 1.19]	0.725	1.03 [0.83, 1.26]	0.804
3–4 dependents	0.88 [0.68, 1.14]	0.337	1.08 [0.86, 1.35]	0.512
5+ dependents	1.12 [0.86, 1.47]	0.399	1.31 [1.00, 1.74]	0.054
Have another part-time job.				
No	1.00 [reference]		1.00 [reference]	
Yes	2.31 [1.67, 3.18]	<0.001	1.74 [1.31, 2.32]	**<0.001**
Profession				
Doctor	1.00 [reference]		1.00 [reference]	
Nurse	1.45 [1.06, 2.00]	0.021	1.51 [1.05, 2.17]	**0.025**
Laboratory scientist	1.95 [0.92, 4.12]	0.080	1.61 [1.01, 2.59]	**0.047**
Pharmacist	1.30 [0.64, 2.67]	0.468	1.54 [0.89, 2.66]	0.124
Midwives	1.07 [0.61, 1.87]	0.824	1.25 [0.84, 1.87]	0.272
Years Worked				
<5 years	1.00 [reference]		1.00 [reference]	
5–9 years	0.87 [0.69, 1.10]	0.241	0.78 [0.61, 1.00]	**0.051**
10–14 years	0.81 [0.55, 1.20]	0.298	0.80 [0.61, 1.06]	0.128
15+ years	0.79 [0.52, 1.19]	0.255	0.55 [0.28, 1.07]	0.079

The bold values indicate $p < 0.05$.

stressors—including inadequate PPE, testing gaps, and systemic under preparedness—exacerbate presenteeism risks during global health crises.

The major limitation of this study was our inability to take qualitative data. This would have allowed us to explore the experiences of the HCWs in relation to presenteeism. As a way

TABLE 3 Multilevel generalized logistic regression models of the effect of COVID-19 health outcomes on presenteeism among HCWs.

Variables	Unadjusted model		Adjusted model	
	COR [95% CI]	*P*-value	AOR [95% CI]	*P*-value
Depression				
Normal	1.00 [reference]		1.00 [reference]	
Moderate	0.44 [0.30, 0.65]	<0.001	0.66 [0.46, 0.95]	**0.025**
Severe	0.33 [0.21, 0.52]	<0.001	0.77 [0.49, 1.19]	0.240
Anxiety				
Normal	1.00 [reference]		1.00 [reference]	
Moderate	0.52 [0.40, 0.69]	<0.001	0.69 [0.52, 0.91]	**0.008**
Severe	0.32 [0.22, 0.46]	<0.001	0.50 [0.36, 0.69]	**<0.001**
Stress				
Normal	1.00 [reference]		1.00 [reference]	
Moderate	0.46 [0.32, 0.66]	<0.001	0.87 [0.60, 1.26]	0.463
Severe	0.38 [0.26, 0.57]	<0.001	0.88 [0.57, 1.36]	0.558
Blood pressure (BP)				
Normal BP	1.00 [reference]		1.00 [reference]	
High BP	0.71 [0.52, 0.98]	0.037	1.02 [0.78, 1.33]	0.892
Lung function				
Normal	1.00 [reference]		1.00 [reference]	
Reduced	0.93 [0.77, 1.13]	0.488	1.20 [0.91, 1.59]	0.194

The bold values indicate $p < 0.05$.

of adhering to standard precautions on social distances, we were cautious to reducing conversations that could predispose the HCWs and researchers to droplets.

Compared with previous studies

We found that the prevalence of presenteeism among healthcare workers (HCWs) following recovery from COVID-19 was notably high, aligning with global trends observed during the pandemic. Our findings are consistent with a study in the United States, which reported a 51% prevalence of presenteeism among 150 medical residents (26). Similarly, a study conducted in Egypt using an online survey found a 97% prevalence among 97 nurses and therapists during the COVID-19 pandemic (25). Another large-scale survey of 5,035 HCWs revealed that 82% continued to work while ill, further supporting the high rates observed in our study (26).

The elevated prevalence of presenteeism among HCWs carries significant negative implications for healthcare delivery, including diminished care quality, reduced productivity, and an increased risk of medical errors and nosocomial infections (27). Our findings echo global research indicating that presenteeism during infectious disease outbreaks is driven not only by personal dedication but also by systemic inadequacies. Many HCWs in our study reported working while unwell due to fear of job loss, a deep sense of professional obligation, and the desire not to burden their colleagues. These motivations are consistent with previous studies that highlight fear, moral responsibility, and institutional pressure as key drivers of presenteeism (4, 28).

Several determinants of the impact of COVID-19 on presenteeism have been identified across the literature. These include individual-level factors such as psychological health, chronic illness, and socioeconomic stressors; organizational factors such as staff shortages, leadership support, and workplace culture; and structural issues including national health system capacity and pandemic preparedness (19, 29, 30). For instance, inadequate access to personal protective equipment (PPE), broken promises regarding financial incentives, and lack of institutional support have been reported in multiple studies as contributors to presenteeism, particularly in resource-constrained settings (4, 31).

Our study also identified that HCWs with multiple dependents were more likely to report high levels of presenteeism. This finding aligns with research from Brazil showing increased risk of presenteeism among nurses with several children (32). The dual burden of professional duties and domestic responsibilities, particularly during lockdowns and school closures, may have heightened the pressure on HCWs to attend work despite being unwell. Furthermore, the fear of infecting loved ones—especially in households with vulnerable members—compounded this burden.

HCWs with part-time jobs or multiple sources of employment were approximately twice as likely to engage in presenteeism. This

TABLE 4 Multilevel generalized logistic regression models of the effect of COVID-19 exposure and time on presenteeism among HCWs.

Variables	Unadjusted model		Adjusted model	
	COR [95% CI]	*P*-value	AOR [95% CI]	*P*-value
COVID-19 Exposure status				
Unexposed	1.00 [reference]		1.00 [reference]	
Exposed	0.42 [0.26, 0.67]	<0.001	0.52 [0.19, 1.42]	0.205
Month				
Month 0	1.00 [reference]		1.00 [reference]	
Month 3	0.77 [0.54, 1.10]	0.146	0.66 [0.47, 0.92]	**0.013**
Month 6	0.76 [0.58, 0.99]	0.040	0.59 [0.46, 0.75]	**<0.001**
Interaction terms				
COVID-19 exposure *Month				
Exposed*Month 3	–		0.46 [0.22, 0.93]	**0.031**
Exposed*Month 6	–		1.26 [0.78, 2.04]	0.342
COVID-19* Depression level	–			
Exposed*Moderate/mild	–		0.81 [0.45, 1.45]	0.477
Exposed*Severe	–		0.44 [0.25, 0.76]	**0.003**
COVID-19* Anxiety level	–			
Exposed*Moderate/mild	–		1.15 [0.40, 3.32]	0.790
Exposed*Severe	–		3.24 [1.22, 8.64]	**0.019**
COVID-19*Have other work	–			
Exposed* Have other work.	–		0.82 [0.51, 1.32]	0.417
COVID-19 exposure*Exposure to second-hand smoking	–			
Exposed*exposed to second-hand smoking	–		1.34 [0.79, 2.25]	0.276
COVID-19*Does moderate-intense exercise	–			
Exposed*Yes	–		1.94 [1.24, 3.03]	**0.004**
COVID-19 exposure* Work-related stress	–			
Exposed*Moderate	–		0.80 [0.55, 1.17]	0.251
Exposed*High	–		0.79 [0.49, 1.30]	0.358
COVID-19 symptoms exhibited before COVID-19 test* Difficulty in breathing	–			
Exposed*Yes	–		0.61 [0.26, 1.42]	0.255
COVID-19 Symptom exhibited before COVID-19 test* fatigue	–			
Exposed*Yes	–		0.81 [0.39, 1.71]	0.588

The bold values indicate $p < 0.05$.

may be attributed to financial necessity, fatigue from multiple roles, and inflexible job structures. Prior studies also found that multiple employment is associated with increased work-related stress, burnout, and presenteeism, particularly among nurses and support staff (21, 33)).

Mental health factors played a substantial role in presenteeism. High levels of anxiety, stress, and post-traumatic symptoms were significantly associated with increased presenteeism. This is corroborated by evidence from China, the Philippines, and Croatia, where psychological distress was found to impair judgment, energy, and capacity for self-care, pushing HCWs to work despite illness (34–36). The psychological environment of the pandemic—including uncertainty about the virus, fear of reinfection, and constant media exposure to death tolls—intensified these issues.

Interestingly, our study found that severe depression was inversely associated with presenteeism, possibly due to its debilitating effect on physical and mental function. This is supported by meta-analyses indicating that while anxiety may motivate individuals to remain active at work, depression is more likely to result in absenteeism or reduced work functioning (35, 37, 38).Beyond individual and family-level factors, systemic challenges such as repeated COVID-19 surges, inadequate staffing, and increased patient loads placed enormous strain on healthcare workers. The prolonged nature of the pandemic led to chronic stress and fatigue, with little opportunity for rest or recovery (39–41). These conditions not only normalized presenteeism but also institutionalized it as a coping mechanism for understaffed health systems.

TABLE 5 Multilevel generalized logistic regression models of the effect of family and workplace support on presenteeism among healthcare providers.

Presenteeism	Unadjusted model		Adjusted model	
Variables & categories	COR [95% CI]	*P*-value	AOR [95% CI]	*P*-value
Sought the services of a psychologist				
No	1.00 [reference]		1.00 [reference]	
Yes	0.90 [0.57, 1.42]	0.648	0.96 [0.70, 1.32]	0.806
Have family members to take care of you when you are sick				
Yes	1.00 [reference]		1.00 [reference]	
No/No response	1.30 [1.04, 1.62]	0.019	1.12 [0.80, 1.56]	0.522
Support from colleagues at work				
Low support	1.00 [reference]		1.00 [reference]	
Moderate	1.52 [1.30, 1.78]	<0.001	0.94 [0.76, 1.16]	0.580
High support	1.42 [1.12, 1.82]	0.004	1.00 [0.72, 1.40]	0.991
Support from the immediate supervisor				
Low support	1.00 [reference]		1.00 [reference]	
Moderate	1.50 [1.10, 2.04]	0.011	1.14 [0.76, 1.71]	0.524
High support	1.43 [1.10, 1.85]	0.007	1.06 [0.70, 1.62]	0.769
Work-related stress				
Low	1.00 [reference]		1.00 [reference]	
Moderate	0.82 [0.64, 1.05]	0.120	0.77 [0.60, 1.01]	0.055
High	0.87 [0.70, 1.09]	0.222	0.97 [0.74, 1.26]	0.811

Despite these stressors, HCWs were continually expected to fulfill their duties, often at the expense of their own health. The normalization of presenteeism as a form of professional sacrifice carries dangerous long-term consequences. It perpetuates unhealthy work cultures, undermines care quality, and places both staff and patients at risk. Our findings strongly suggest the need for a paradigm shift that recognizes and addresses the roots of presenteeism within healthcare systems (25, 42, 43).

Our study underscores the widespread and multifactorial nature of presenteeism among HCWs post-COVID-19 recovery, reflecting global patterns and highlighting the urgent need for targeted interventions. These include both preventive and responsive measures to protect HCW well-being and ensure continuity and quality in healthcare delivery. Specifically, addressing the mental and physical health challenges associated with COVID-19 is imperative, as the capacity of HCWs to perform effectively is intimately linked to their overall well-being (14, 15, 33).

This study was limited to four hospitals in the Greater Accra Region, which may affect generalizability. Self-reported data on COVID-19 history, mental health, and presenteeism may be subject to recall or social desirability bias. The absence of qualitative data restricted exploration of HCWs' lived experiences, and changes in exposure status or workplace policies during follow-up could have influenced outcomes. Future policies must prioritize the implementation of sustainable and context-specific interventions, including psychological support services, flexible working conditions, and improved employment protections. Moreover, fostering a workplace culture that acknowledges vulnerability, encourages rest and recovery, and actively supports HCW health will be essential to building a resilient healthcare workforce. In doing so, healthcare systems can reduce presenteeism, retain skilled personnel, and safeguard both staff and patients in the face of ongoing and future public health crises (4, 25, 27, 31).

Conclusions

This longitudinal study provides robust evidence of the persistent and multifactorial nature of presenteeism among HCWs following recovery from COVID-19. High rates of presenteeism were observed across multiple time points, with key contributing factors including mental health distress, multiple employment, number of dependents, and occupational roles such as nursing and laboratory work. COVID-19 infection not only impaired the physical and psychological well-being of HCWs but also intensified systemic pressures within already overstretched health systems. The intersection of personal, professional, and institutional challenges left many HCWs with little choice but to continue working while unwell, further jeopardizing their health and the quality of patient care. The findings emphasize the urgent need for health systems, particularly in low- and middle-income countries, to invest in sustainable workforce support structures. These should include adequate PPE, fair compensation, improved staffing ratios, mental health services, and workplace policies that recognize and address presenteeism. Failure to act may result in increased attrition, emigration of skilled professionals, and further

destabilization of fragile health systems. Finally, fostering a supportive work culture that values HCWs' health and well-being is essential. By promoting rest, psychological safety, and responsive management, healthcare institutions can build a resilient workforce capable of withstanding future health crises. Prioritizing the needs of HCWs is not only a moral imperative but a strategic necessity for strengthening health system resilience in the face of ongoing and emerging challenges.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ghana Health Service Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

BO: Conceptualization, Data curation, Investigation, Visualization, Writing – original draft. MO-M: Formal analysis, Validation, Visualization, Writing – review & editing. EA: Methodology, Validation, Writing – review & editing. EU: Methodology, Validation, Visualization, Writing – review & editing. PB: Methodology, Validation, Visualization, Writing – review & editing. PT: Methodology, Validation, Visualization, Writing – review & editing. RQ: Methodology, Supervision, Writing – review & editing.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fenvh.2026.1700906/abstract#supplementary-material.

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