

Perception of risk and compliance with COVID-19 safety guidelines among healthcare workers in Ghana: a cross-sectional study

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Abstract

Background: Healthcare workers are the 'frontline' in the provision of effective and quality healthcare delivery, yet they are beset with several occupational hazards and risks when providing care especially during a global health crisis. With limited health resources availability during patient care delivery coupled with relatively little evidence on compliance to infection prevention practices, this study investigates healthcare workers' compliance with COVID-19 safety protocols and identifies factors associated with their perceived risk of COVID-19.

Methods: This cross-sectional survey utilized non-probability sampling strategies to obtain primary data from both clinical and non-clinical health workers in various health facilities within four regions of Ghana. Structured questionnaires designed using Google forms and paper-based questionnaires were used. Binary logistic regression analysis was performed to identify the factors associated with the perceived risk of COVID-19.

Results: A total of 513 questionnaires were obtained at the end of the study. The results showed that healthcare workers are highly compliant with hand hygiene practices and wearing face masks. Results from the regression analysis showed that the number of working years a healthcare worker had spent, category of health professional, type of health facility, region of work, frequency of COVID-19 test, and compliance with hand hygiene practices were strongly associated with healthcare workers' perception of risk of COVID-19.

Conclusion: Findings suggest that both individual and health system factors are significant in increasing the risk of COVID-19 among healthcare workers. Efforts at enforcing strict compliance with infection prevention should be implemented to protect the health workforce and mitigate against the transmission of the coronavirus.

Background

Since the declaration of COVID-19 as a pandemic in March 2020 by the World Health Organization [1], strict compliance to infection prevention and control (IPC) practices have been accentuated in all countries. In response to combating the transmission of the coronavirus among health workers, several IPC measures targeted at eliminating or minimising the spread of the virus were recommended by the WHO. IPC is an essential component of the healthcare infrastructure that is concerned with preventing healthcare associated infection [2]. The guidelines associated with healthcare for suspected COVID-19 range from ensuring triage; early recognition and source control; application of standard precautions for all patients; contact and droplet precautions; airborne precautions for aerosol-generating procedures; implementing administrative controls and using environment and engineering controls [1]. These safety precautions are protective only if they are strictly complied with.

Healthcare workers (HCW) are at the front line of the COVID-19 pandemic [1] because of their direct contact with both infected and asymptomatic clients in the hospital environment. Compared to non-

healthcare workers, health professionals have the highest occupational hazards, risks, and exposure to contracting the coronavirus [3, 4]. The incidence of HCWs contracting coronavirus has been reported in different settings [5, 6, 7, 8, 9]. Recent estimates provided by the Centers for Disease Control indicate that approximately 9,282 HCWs in the United States have been infected with COVID-19 [6]. Gomez-Ochoa and colleagues in their systematic review and meta-analysis of the prevalence of COVID-19 among HCWs found the estimated prevalence of SARS-COV-2 infection to be 11% from samples of HCWs with nurses being the most populous group of HCWs infected [5].

In Ghana, recent estimates by the Ghana Health Service (GHS) indicate a low infection rate of COVID-19 among HCWs than the population [10]. For instance, as of 15th April 2021, the incidence of COVID-19 cases in the population was 91,709 with 771 deaths. The Ghana Medical Association (GMA) and other health workers' associations projected approximately 779 health workers to have contracted COVID-19 as of 30th June 2020 with 9 deaths [11]. Of this number, 190 were doctors, 410 were nurses and midwives, 156 comprised of different categories of health workers, and 23 pharmacists. As of 28th February 2021, this figure had increased to 900 infections with less than 50 mortalities.

Several factors account for HCWs inability to fully comply with the COVID-19 safety protocols instituted in health facilities. For instance, a Cochrane review conducted by Houghton and colleagues [12] to explore barriers and facilitators to HCWs adherence with IPC guidelines showed that, minimal support from management, insufficient isolation spaces, lack of quality and adequate personal protective equipment (PPE) and fear of patients being stigmatized when PPE were used accounted for difficulties in compliance to IPC guidelines. In Ghana, the GMA reports that inadequate and erratic supply of PPEs to HCWs both in quantity and quality, laxity in adherence to IPC guidelines, delay in COVID-19 tests and results and inadequate contact tracing within facilities accounts for the high infection rate among health workers [11]. Evidently, these conditions increase HCWs exposure and risk of COVID-19.

Recent empirical evidence on compliance with COVID-19 IPC among HCWs have been investigated [12, 13, 14, 15]. Other studies have also identified factors associated with preventive and adherence to IPC measures among HCWs [6, 16]. For example, Agarwal and colleagues [13] evaluated HCWs preventive practices during the coronavirus pandemic in India and found that age, gender, and occupational roles of HCWs were associated with the extent of adherence to IPC practices. Female HCWs above 31 years, nurses and senior doctors were more compliant to COVID-19 preventive behaviours compared to other categories of health workers. Lai and others [117] and Olum et al [18] reported similar findings from Agarwal's study in their work. Ashinyo and colleagues [19] reported high compliance with hand hygiene, PPE use, and performance of aerosol generating procedures among health personnel at COVID-19 treatment centres in Ghana. However, lower compliance was found among non-clinical workers, HCWs who had inadequate PPEs, staff who had ever married, and pharmacists. Additionally, Ranjan and colleagues [15] found that resident doctors were at a lower risk of COVID-19 compared to the other HCWs.

The study builds on recently published studies of compliance to COVID-19 IPC practices among HCWs and fills the gap and dearth of empirical research by investigating healthcare workers' perceptions of their

risk of COVID-19. The study further investigates the association between adherence to COVID-19 safety guidelines and perceived risk of COVID-19. Our study is timely and relevant particularly in highlighting the plausible factors that significantly expose Ghanaian HCWs to occupational risks and infections during the provision of healthcare delivery in light of mitigation strategies to reduce the spread of transmission. We hypothesize that HCWs who are always compliant with hand hygiene practices at the workplace are less likely to perceive themselves at risk of COVID-19 compared to those HCWs who are not compliant with hand hygiene practices.

Methods

Study design

This cross-sectional survey used both web and paper-based questionnaires to obtain data from HCWs in government, private, quasi-government, and Christian Health Association of Ghana (CHAG) health facilities located in four regions of the country. The online survey via Google forms provided a convenient approach to obtain data from a cross-section of health personnel while minimizing face-to-face contacts. This data collection strategy was used in similar situations elsewhere [21]. Paper-type questionnaires supplemented the online survey and were self-administered to study participants who could not access the online survey due to phone and technological barriers. Using the paper questionnaires also facilitated ease of recruiting other categories of HCWs such as laundry staff, cleaners, laboratory technologists, and sonographers whose nature of work prevented them from participating in the study.

Setting

Four regions (Greater Accra, Ashanti, Central and Western) were purposively selected because they were the epicenters with the highest incidence of the coronavirus infections. For instance, as of 8th April 2021, Greater Accra Region (GAR) had recorded 50,241 cases; Ashanti 15,379; Western 5,717 and Central 3,294 [20].

Characteristics Of Participants And Sample Size

Eligible respondents included both clinical and non-clinical HCWs recruited from different health facilities. Clinical staff should be providing direct patient care in any department/unit of the hospital such as physicians, general registered nurses, midwives, pharmacists, laboratory technologists, and nurse aides or health assistants. On the other hand, non-clinical staff were personnel who did not directly provide patient care, example, administrative support staff. At the time of the study, they should not have been infected with COVID-19. The sample size was calculated using Cochran's formula $N = z^2 * p(1-p)/d^2$ assuming a response rate of 50%, 95% confidence interval (CI), z of 1.96, and 5% margin of error. A further 10% was added to counteract any errors in completing the questionnaires, resulting in a final estimated sample size of 414.

Sampling

Non-probability sampling techniques were used to recruit potential participants - purposive, convenience and 'chain referral' techniques. The aim was to complement and facilitate ease of access to data collection. For instance, the 'chain referral' sampling strategy was purposed at reaching several other HCWs indirectly in the specified regions through peer and social networks, and groups. We anticipated that given the double burden of work (including shift system schedules) at this time, they may not be easily accessible to participate in the study, hence, these multiple sampling procedures.

Instrumentation

We designed and pre-validated a questionnaire based on HCWs background characteristics, and compliance with IPC practices which included: hand hygiene, PPE use (face masks), social distancing, and disinfection practices at the workplace. These four main IPC practices are the most basic yet importantly observed IPC measures observed by all categories of health workers in health facilities globally. The questionnaire comprised of 19 items with two sections: section A focused on participants background details such as age, sex, marital status, number of living children, highest educational level (completed), religious affiliation, category/type of HCW, number of years since being employed, type of health facility, and region of workplace. Section B consisted of eight items on compliance with hand hygiene practices, wearing of PPE (face masks), social distancing, and disinfection practices at the workplace (Table 2). The internal consistency with Cronbach's alpha coefficient on the eight-item compliance measures was 0.80.

Measures

The outcome variable was perceived risk of COVID-19. It was measured as a dichotomous variable: 1 = *Yes*, and 0 = *No*. The explanatory or predictor variables were the level of compliance constructs assessed by eight items. These items focused on hand hygiene, wearing of face masks, social distancing, and disinfection practices. These items were assessed on a three-point scale from *Not compliant at all = 0*, *Sometimes compliant = 1* and *Always compliant = 2*. The control variables were age, sex, marital status, highest educational level, religious affiliation, category/type of HCW, number of years since being employed, type of health facility, and region of workplace. Questions on the frequency of COVID-19 tests, and ever tested for COVID-19 were included.

Ethical Consideration

This study is part of a larger study on HCWs knowledge, attitude and perceived vulnerability to COVID-19 and the likelihood of contracting COVID-19. It was approved by the University of Ghana Ethics Committee for the Humanities (ECH016/20–21) and the Ghana Health Service Ethics Review Committee (GHS-ERC

012/08/20). All ethical principles and considerations in the study were in accordance with the Declaration of Helsinki. Informed consent (mostly written) was obtained from all the study participants for the paper-based questionnaires while a statement of informed consent was included in the Google form prior to starting the questionnaire.

Data analysis

Data analysis involved univariate, bivariate, and multivariate analysis. Univariate analysis included simple descriptive statistics using frequencies to describe respondents background characteristics. Bivariate analysis was performed with chi-square tests to determine the association between the independent and dependent variables. Multivariate analysis was performed to identify the factors associated with perceived risk of COVID-19 and to also examine the effect of all the study variables on HCWs perceived risk of COVID-19. The type of multivariate analysis used was binary logistic regression. All analysis were performed in STATA version 12.

Results

Sample characteristics

Table 1 presents respondents characteristics. Of the 513 questionnaires that were distributed, a total of 497 health care workers participated in the survey (response rate of 96%). Fifty-six percent were females, and the mean age was 32.2 years. Nearly half (49%) of the sample were clinical staff - general physicians, nurses, midwives, pharmacists, laboratory technicians and technologists, health assistants, and sonographers. The mean duration of active years spent in employment was 6 years. Of the participants recruited in the study, 60% were currently working in government hospitals compared to other hospitals such as CHAG, private and quasi- government health facilities (14%, 13% and 11%) respectively. At the time of the survey, slightly more than half of the sample had tested for COVID-19.

Table 1
Background characteristics of study participants

Variables	N [%]
Sex	
Female	280 [56.34]
Male	217 [43.66]
*Marital status	
Married	223 [44.87]
Not married (including ever married)	270 [54.33]
Age	
< 30	204 [41.05]
30–39	233 [46.88]
40+	60 [12.07]
Number of living children	
0	211 (45.47)
1	65 (14.01)
2	87 (18.75)
3+	101 (21.77)
*Religious affiliation	
Christianity	452 (90.95)
Other	43 (8.65)
Type of HCW	
Clinical staff	244 [49.09]
Non-clinical support staff	253 [50.91]
Highest level of education (completed)	
Pre-tertiary	75 [15.09]
Tertiary	422 [84.91]

*Includes missing numbers

Compliance with COVID-19 IPC practices

Participants' responses to compliance with infection prevention measures are presented in Table 2. We classified high compliance as 80%, moderate compliance (79 – 50%) and low compliance (less than 49%). Overall, HCWs were highly compliant with hand hygiene practices, and use of PPE (wearing face masks) with moderate compliance on social distancing (60%), disinfection practices of shared items (61.97%), and touched surfaces (63.98%).

Table 2
Compliance to COVID-19 IPC practices

Statements	Always compliant	Sometimes compliant	Not compliant at all
	N (%)	N (%)	N (%)
Frequent handwashing with soap and water after attending to or touching patients/clients at the health facility	412 (82.90)	58 (11.7)	27 (5.43)
Frequent use of alcohol-based hand sanitizer after touching surfaces, shared objects at the health facility	416 (83.70)	57 (11.47)	24 (4.83)
Frequent use of alcohol-based sanitizer after touching or attending to patients/clients at the health facility	399 (80.28)	69 [13.88]	29 [5.84]
Regular use of recommended surgical face mask when interacting with colleagues and patients at the hospital	371 (74.65)	95 [19.11]	31 [6.24]
Regular use of recommended surgical face mask when attending to patients/clients at the health facility	400 (80.48)	73 [14.69]	24 [4.83]
Maintaining safe distance when interacting with others at the hospital	295 (59.36)	169 [34.0]	33 [6.64]
Disinfecting commonly used items (stationery, equipment, etc.) shared with colleagues at the hospital/health facility	308 (61.97)	151 [30.38]	38 [7.65]
Disinfecting shared and commonly used and touched surfaces at the hospital/health facility	318 (63.98)	138 (27.77)	41 (8.25)

Results Of Bivariate Analysis

We performed bivariate analysis with chi-square tests to identify the factors associated with HCWs perceived risk of COVID-19. Two variables were excluded during the analysis- marital status and religious variables because of missing values. The results in Table 3 showed that health workers' age, years in service, category/type of HCW (clinical/non-clinical), region of workplace, ever tested for COVID-19, and

frequency of COVID-19 test were significantly associated with HCWs perceived risk of COVID-19 at $p < 0.05$.

Table 3
Distribution of predictor variables and perceived risk of COVID-19

Background characteristics	Perceived risk of COVID-19			
	Yes	No	p	χ^2
Sex Male [Ref]	125 (57.60)	92 (42.40)	0.460	0.545
Female	152 (54.29)	128 (45.71)		
Age				
<30 [Ref]	99 (48.53)	105 (51.47)	0.016**	8.292
30–39	145 (62.23)	88 (37.77)		
40+	33 (55.0)	27 (45.0)		
Number of children				
0 [Ref]	108 (51.18)	103 (48.82)	0.288	3.764
1	42 (64.62)	23 (35.38)		
2	48 (55.17)	39 (44.83)		
3+	53 (52.48)	48 (47.52)		
Educational level				
Secondary [Ref]	38 (50.67)	37 (49.33)	0.338	0.919
Tertiary	239 (56.64)	183 (43.36)		
Years in service				
Less than one year [Ref]	8 (25.00)	24 (75.00)	0.000**	22.604
1–3 years	98 (51.04)	94 (48.96)		
4–6 years	52 (58.43)	37 (41.57)		
7+	119 (66.48)	60 (33.52)		
Type of health facility				
CHAG [Ref]	32 (43.24)	42 (56.76)	0.016**	10.286
Government	168 (56.0)	132 (44.0)		
Private	37 (55.22)	30 (44.78)		
Quasi-government	40 (71.43)	16 (28.57)		

**p < 0.05 *p < 0.10

Background characteristics	Perceived risk of COVID-19			
	Yes	No	p	χ^2
Region of workplace				
Ashanti [Ref]	47 (40.17)	70 (59.83)	0.000**	31.822
Central	61 (46.21)	71 (53.79)		
Greater Accra	169 (68.15)	79 (31.85)		
Type/category of HCW				
Clinical staff [Ref]	163 (66.80)	81 (33.20)	0.000**	23.804
Non-clinical staff	114(45.06)	139 (54.94)		
Ever tested for COVID-19				
Yes [Ref]	140 (61.95)	86 (38.05)	0.011**	6.484
No	137 (50.55)	134 (49.45)		
Frequency of COVID-19 test				
Twice and more [Ref]	71 (71.72)	28 (28.28)	0.002**	12.923
Never	135 (51.14)	129 (48.86)		
Once	71 (52.99)	63 (47.01)		
IPC practices				
Hand hygiene				
Always compliant [Ref]	206 (58.52)	146 (41.48)	0.144	3.8714
Sometimes compliant	38 (50.0)	38 (50.0)		
Not compliant at all	33 (47.83)	36 (52.17)		
Wearing face masks				
Always compliant [Ref]	198 (56.73)	151 (43.27)	0.789	0.474
Sometimes compliant	40 (53.33)	35 (46.67)		
Not compliant at all	39 (53.42)	34 (46.58)		
Maintenance of social distance				
Always compliant [Ref]	173 (58.64)	122 (41.36)	0.088*	4.8513

**p < 0.05 *p < 0.10

Table 4
Association between explanatory variables and perceived risk of COVID-19

Socio-demographic factors	Model 1		Model 2	
	IPC practices		All variables	
	OR	95% CI%	OR	95% CI%
Sex	--	--		
Male [Ref]	--	--	1.00	
Female	--	--	1.41	0.911–2.195
Age	--	--		
< 30 [Ref]	--	--	1.00	
30–39	--	--	1.17	0.645–2.119
40+	--	--	0.61	0.243–1.534
Years in service	--	--		
Less than one year [Ref]	--	--	1.00	
1–3 years	--	--	2.20*	0.887–5.474
4–6 years	--	--	1.90	0.662–5.445
7+	--	--	4.62**	1.549–13.802
Educational level	--	--		
Secondary [Ref]	--	--	1.00	
Tertiary	--	--	0.91	0.487–1.709
Type of health facility	--	--		
CHAG [Ref]	--	--	1.00	
Government	--	--	1.97**	1.059–3.659
Private	--	--	1.94	0.831–4.538
Quasi-government	--	--	2.08*	0.873–4.979
Region of workplace	--	--		
Ashanti [Ref]	--	--	1.00	

$p < 0.05^{**}$ $p < 0.10^{*}$ $R^2 = 0.1434$ $X^2 = 90.69$ $N = 459$

Outcome variable: No (Ref), Yes (1)

Socio-demographic factors	Model 1		Model 2	
	IPC practices		All variables	
Central	--	--	1.11	0.580–2.145
Greater Accra	--	--	2.05**	1.102–3.839
Type/category of HCW	--	--		
Clinical [Ref]	--	--	1.00	
Non-clinical	--	--	0.46**	0.286–0.734
Ever tested for COVID-19	--	--		
Yes [Ref]	--	--	1.00	
No	--	--	2.53	0.612–10.445
Frequency of COVID-19 test	--	--		
Twice and more [Ref]	--	--	1.00	
Never	--	--	1.16	0.267–5.038
Once	--	--	0.49**	0.262–0.942
IPC practices				
Hand hygiene				
Always compliant [Ref]	1.00		1.00	
Sometimes compliant	0.57*	0.301–1.082	0.39**	0.184–0.830
Not compliant at all	0.61*	0.349–1.076	0.47**	0.245–0.892
Wearing of PPE				
Always compliant [Ref]	1.00		1.00	
Sometimes compliant	1.00	0.535–1.881	0.82	0.399–1.694
Not compliant at all	0.99	0.488–2.030	0.76	0.340–1.713
Maintenance of social distance				
Always compliant [Ref]	1.00		1.00	
Sometimes compliant	0.67*	0.433–1.033	0.62*	0.370–1.024
Not compliant at all	1.38	0.561–3.384	1.15	0.429–3.091
p < 0.05** p < 0.10* R ² = 0.1434 X ² = 90.69 N = 459				
Outcome variable: No (Ref), Yes (1)				

perceived risk of COVID-19. The study also investigated the factors associated with health workers perceived risk of COVID-19. The results showed that HCWs were highly compliant with hand hygiene practices and wearing face masks when providing patient care at the workplace (or health facility). We find that these findings echo similar results in recent studies conducted by Ashinyo et al [19] and Agarwal [13] while Kassie and colleagues [14] found contrary results. This result suggests that health workers probably prioritize these infection preventive measures as more effective in minimizing the transmission of the coronavirus; hence, the high adherence practices. Further, it is likely that health workers find it relatively less difficult to observe hand hygiene practices and wearing face masks than disinfecting frequently shared items and maintaining social distance. Adherence to infection prevention is critical since suboptimal IPC measures have been found to be risk factors of COVID-19 [6, 16] and which could lead to hospital acquired infections. On the other hand, health system factors, behavioural characteristics, and availability of PPE could account for health workers' moderate adherence with social distancing and disinfection practices at the hospital such as difficulty in providing care while socially distanced, limited, or insufficient space within the ward.

Our results also showed that HCWs working in the Greater Accra Region (GAR) perceived a greater risk of becoming infected compared with other healthcare workers in the Ashanti and Central regions (OR = 2.05, 95%CI = 1.102–3.839, $p < 0.023$). Several factors and explanations can be adduced for this finding. First, GAR is the epicentre of COVID-19 with the highest prevalence of COVID-19 infections in the country as of 19th April 2021 [10]; second, the health worker population distribution in the country is skewed to the GAR with a high proportion of health professionals (both clinical and non-clinical) working in the GAR [22]; third, the majority of public health facilities are concentrated in the GAR and Ashanti regions than the other regions in the country as well as other private, and faith-based hospitals. Thus, government hospitals record a high attendance of the insured and non-insured population for a wide range of health care services. Essentially, for HCWs working in the GAR of Ghana, all these myriad factors underscore their constant exposure to the risks of contracting COVID-19 since they more often provide health care for many possibly infected clients daily.

The study found that health workers working in government health facilities were as likely to perceive the risk of becoming infected compared to those working in CHAG and quasi-government hospitals (OR = 1.97 95%CI = 1.059–3.659 $p < 0.032$). The choice of receiving health care from government health facilities is based on many factors: availability of specialized services, geographical access and proximity, cost issues specifically related to insurance package for selected medical services, and referral services. Since the pandemic, selected government-owned health facilities were designated for COVID-19 testing, treatment, isolation, and management of cases. In addition, inadequate supply and unavailability of PPE were reported in such facilities and therefore increased HCW susceptibility to the risk and exposure to HCWs contracting the virus from possibly infected and asymptomatic individuals visiting such hospitals.

We also found a statistically strong association between the type of HCW and perceived risk of COVID-19. Compared to non-clinical staff, clinical HCWs (such as physicians, nurses, midwives, allied health staff

and laboratory technologists) were as likely to perceive the risk of becoming infected (OR = 0.46 95%CI = 0.286–0.734 $p < 0.001$). During patient care delivery, exposure to infected patients are unavoidable; except when strict observance to infection prevention is adhered with to minimize the exposure and transmission of the virus. Clinical health professionals are directly involved in providing care to clients/patients daily and this places them at the ‘front line’ of contracting any type of infection when appropriate patient care procedures are not adhered to. As reported in other contexts, physicians, and nurses are characterized as having critical and essential roles in healthcare delivery, thus making them frontline staff [1]. Since the first cases of COVID-19 was recorded in Ghana, there has been no clear consensus on who a frontline HCW is despite the pre-existing roles and contributions played by all health workers in the country’s health sector in mitigating the effects of the pandemic.

The results of the study further showed a significant relationship between compliance with hand hygiene practices and perceived risk of COVID-19 at $p < 0.05$. HCWs who were sometimes compliant and not compliant at all with hand hygiene practices were less likely to perceive a risk of becoming infected compared to those HCWs who were always compliant with hand hygiene practices (OR = 0.39 95%CI = 0.184–0.830; OR = 0.47 95%CI = 0.245–0.892). While this finding was not expected, it is supported by other studies which found HCWs practicing suboptimal handwashing practices, improper use, and reuse of PPE, and working in high-risk department as critical risk factors for infection [6, 19]. Generally, with regards to the four aspects of infection prevention practices examined in our study, the results suggests that adherence to hand hygiene practices alone is not a sufficiently protective measure against transmission of the coronavirus. It is possible that health workers who always adhered to hand hygiene practices did so because of the nature of their work (for instance, being in a high-risk department, continuous exposure to direct patient care) and which they felt increased their susceptibility to getting infected. Also, multiple factors could have mitigated against adherence to hand hygiene preventive practices such as fatigue, forgetfulness, apathy, negligence, and inadequate PPE as has been reported in studies elsewhere [12, 13].

Our study has a few limitations. First, like other studies which employed online-based data collection procedures, and given the non-probability sampling techniques, generalizations of the findings are limited. Second, some potentially mediating variables were excluded during the statistical modelling such as HCWs knowledge and awareness of the transmission of COVID-19, symptoms of COVID-19, average number of patients attended to daily, access to and availability of PPE.

Conclusions

Poor preventive behaviours and suboptimal compliance to COVID-19 guidelines at the health facility during patient care increases HCWs risk of the coronavirus. The results of our study imply that health system factors mostly contribute to influence HCWs risk of COVID-19 compared to individual factors. While these risk factors increase health professionals’ vulnerability to the coronavirus, effective communicative strategies, management support, training and behavioural change mechanisms are necessary to enforce health workers’ compliance with COVID-19 protocols. Future research could

qualitatively explore HCWs barriers to non-compliance to COVID-19 safety guidelines. In addition, other researchers could design an experimental study on HCWs who have contracted and recovered from COVID-19 with HCWs who are not infected but perceive the risk of infection and the associated risk factors.

Abbreviations

CHAG Christian Health Association of Ghana

GAR Greater Accra Region

GHS Ghana Health Service

GMA Ghana Medical Association

HCW Healthcare worker

PPE Personal Protective Equipment

Declarations

Ethics approval and consent to participate

The study was approved by the University of Ghana Ethics Committee for the Humanities (ECH016/20-21) and the Ghana Health Service Ethics Review Committee (GHS-ERC 012/08/20). Written consent was obtained from all study participants for the paper-based questionnaires while a statement of consent was included in the Google form prior to starting the questionnaire.

Consent for publication

Not applicable

Availability of data and materials

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

Competing interests

“The authors declare that they have no competing interests”.

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Author's contributions

EAK conceptualised the study and DOB, GAA and NNAA designed the methodology and collected data for the study. EAK and DOB executed the statistical analysis. EAK drafted the manuscript. DOB, GAA and NNAA reviewed and revised the manuscript. All authors read and approved the final manuscript.

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