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Personal protective equipment utilization practice and psychological preparedness of health care workers against COVID-19 pandemic in Eastern Ethiopia

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Abstract

Objectives: Effective implementation of prevention and control actions by health professionals is substantial to contain the deadly COVID-19 pandemic. Thus, this study aimed to assess health care worker's practice of using personal protective equipment and psychological preparedness against the COVID-19 pandemic in Eastern Ethiopia.

Methods: A facility-based cross-sectional study design was used. The health care workers (HCW) who were working in the selected health facilities were randomly selected. Variables that had p-value of < 0.15 were transformed to multivariable logistic regression model. Finally, the significance level was declared at the p-value < 0.05 with a 95% confidence interval (CI).

Results: A total of 418 HCWs were randomly selected and included in this study. The study participants mean age was 27.96 years with a $\pm$5.6SD. HCWs who were male (adjusted odds ratio(AOR) = 2.21, 95% CI: 1.29–3.79), regularly using sanitizer, accessing COVID-19 management guideline (AOR = 2.83, 95% CI: 1.46–5.47), trained on COVID-19 prevention methods (AOR = 2.6, 95% CI: 1.4–4.7), hopeless of eventually getting COVID-19 at workplace (AOR = 1.9, 95% CI: 1.13–3.28), and feeling unsafe at work when using standard precautions (AOR = 0.46, 95% CI: 0.27–0.79) were associated with good PPE using compared to their counterparts. Moreover, nursing/midwifery professionals practiced good personal protective equipment compared to physicians (AOR = 3.7, 95% CI: 1.8–7.7).

Conclusion: The study demonstrated that being a male, being a nurse/midwifery, regularly sanitizing hands/medical equipment, having COVID-19 management guidelines, trained on COVID-19, and feeling of eventually getting COVID-19 at workplace had a positive association with PPE utilization. Besides, the study revealed that not feeling safe at work when using standard precautions was negatively associated with PPE utilization of HCWs. Therefore, the prevention priorities should be given to frontline HCWs by providing all possible support and strictly implementing the prevention and control guidelines of COVID-19 to prevent the health system from collapse.

Keywords

Associated factors, health care worker, COVID-19, personal protective equipment, psychological preparedness, SARS-CoV-2

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Introduction

Coronavirus disease infection that is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has become a global health threat with 159,319,384 confirmed cases and 3,311,780 deaths.[1] The new SARS-CoV-2 has now spread to 222 countries.[2] Controlling the spread of the disease and providing medical care to infected patients has been an unprecedented challenge. With health care systems under pressure to limit the spread of the novel coronavirus, a big part of this responsibility has been shouldered by health care workers (HCW). Hence, HCWs are part of the population segment who are inevitably at risk of getting the infection; 570,000 infected and 2500 died in the Americas,[3] and more than 10,000 HCWs were infected in Africa.[4]

Due to its high transmission rate, morbidity, and mortality, appropriate methods of donning and doffing personal protective equipment (PPE) according to infection prevention and control guidelines are important to protect HCWs, patients, and their families from inadvertent exposure to COVID-19. Adequate PPE is a central component of infection prevention control (IPC) and of paramount importance in the fight against COVID-19.[5] In Ethiopia, where there is a shortage of human power and PPE, the pandemic is terrifically rising; 264,960 confirmed cases and 3951 deaths.[6] The lack of awareness and training about the basic concept of PPE use may complicate the PPE using–related gaps.[7,8] Since pandemics are often unpredictable, along with mitigation and suppression strategies, health systems and, in particular, the preparedness of HCWs to respond to pandemics are critical to containing disease spread.[9–11] However, low-resource countries like Ethiopia were experiencing multilevel barriers to preparedness due to limited resources and weak health care infrastructure.[12,13] HCWs' inadequate preparedness (24%–57%)[14] to respond to an outbreak contributes to workers leaving their positions due to fear of infection and community distrust of government and HCWs.[15–17] Being a nurse, female, having an isolated ward, knowing COVID-19 management, good communication with management, and work experience >10 years had association with the PPE utilization.[14]

Many studies revealed that COVID-19 spread caused excessive hospital overload, a shortage of health care resources, workload for professionals, fear of transmission, burnout, and the scarcity of face masks, sanitizers, and gloves that may cause a further barrier communication and expressing compassion.[18–24] Owing to the heavy workload at the forefront and discomfort from wearing PPE for long periods, nurses in especially high-workload departments such as the emergency department have been suffering from considerable short- and long-term mental health problem burdens.[25–28] The psychological problem is the major outcome for staff providing health care amid the COVID-19 pandemic presenting with depression, anxiety, insomnia, and general psychological distress.[29–37] Educational level, increased workload, age 20–40 years, working at emergency unit, insufficient precaution measures, being a nurse, female, and direct contact with patients were associated with psychological distress.[12,25,31,32] The studies also revealed that COVID-19 impacts were manifested by the poor mental health status of health professionals such as the feeling of loneliness, depression, anxiety, and sleep disturbance.[38,39]

The purpose of this study is quite important to assess the availability of PPE in the health facilities, HCWs' practice of using PPE, and level of psychological preparedness to stop the further spread of the pandemic among HCW and between HCWs and the patients. Therefore, this study aimed to assess the PPE utilization practice and psychological preparedness among HCWs against the COVID-19 pandemic in Eastern Ethiopia.

Methods and materials

Study design, area, and period

This study was conducted among HCWs working in the Harari region and East Hararghe Zone using a facility-based cross-sectional study design from 21 August to 5 September 2020. The Harari regional state Health service coverage is 100%. Harari region contains three government hospitals (two public hospitals and one police hospital), two private hospitals, and one non-government hospital (Fistula Center). East Hararghe zone contains five hospitals and 67 health centers. Of these health facilities, two hospitals and six health centers are on the main road to Addis Ababa, the capital city of Ethiopia.

Population eligibility criteria

All the health facilities and HCWs in Harari Region and Oromia region East Hararghe zone were the target population. Based on their risk of encountering the disease, the health facilities immediate to the main road to the capital city of Ethiopia were purposively selected. Then, health care professionals who were working in the selected health facilities were selected randomly. The HCWs who were not available due to sickness, personal affairs, and facility's duty were excluded from the study.

Sample size determination, sampling technique, and sampling procedures

A sample size was determined by using single proportion population with $p=0.5$(no prior data from the study area), $z=95\%$ confidence interval (CI), margin of error $(d)=0.05$, $n=(z\alpha 2)^2pq/d^2=(1.96)^2\,(0.5)(0.5)/(0.05)^2$, $n=384$. By considering 10% non-response rate, the final sample size was determined to be 418. Thus, 418 frontline HCWs were included in the study (Figure 1).

Data collection methods

Fifteen BSc health professionals were involved in the data collection. Also, three public health professionals were

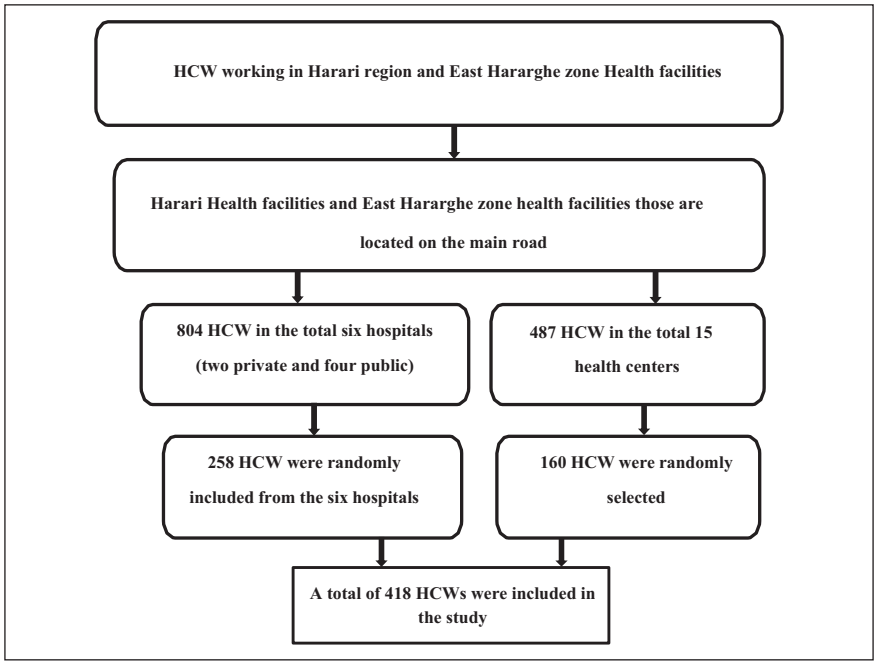

Figure 1. Schematic presentation of health workers selection of the study in Harari region and Eastern Hararghe Zone, 2020.

assigned to supervise. They started the data collection processes after taking 2 days of training from the principal investigator on the objective, relevance of the study, and technique of interview with demonstration. The questionnaires included socio-demographics: profession, types of health facility, HCW experiences, types of the health facilities, availability of PPE, utilization of PPE, HCWs' awareness, sources of information, and psychological preparedness toward COVID-19 developed from different literature. The participant information was kept confidential. Health professionals were provided with questionnaires asking the basics of COVID-19 pandemic preparedness.

Study variables and measurements

PPE using practice was the outcome variable of this study. Independent variables included socio-demographic characteristics, profession, types of health facility, HCW experiences, training on COVID-19, availability of PPE, availability of case definition for COVID-19, and psychological preparedness–related characteristics. The PPE utilization was assessed with a set of nine questions. Regarding the HCWs' psychological preparedness, the Likert-type scale consisting of two grades of responses (agree vs disagree) was used.

Operational definition

The PPE using practice was scored "good" when the health care professionals' PPE using scores were 5–9 on PPE practice–related questions, scored "poor" when scores were 0–4 out of a total of nine PPE using–related questions.

Data quality control

A tool was developed from different literatures; especially the COVID-19 management protocol manual of Ethiopia was used (suplementary 1). Moreover, the tool was pretested on non-selected health facilities' health care providers. Finally, a valid pretested questioner was distributed to collect the actual data from randomly selected HCWs.[40–42] There was intensive training involving all tools of data collection, which also had practical sessions. All data collectors and supervisors took 4 days of theoretical and 2 days of practical training. Data quality was kept by checking for consistency, completeness, and accuracy manually during data collection time.

Pretest was done on 5% of study participants in a non-selected health facility.

Statistical analysis

Data were entered in Epi-data 3.1 version and exported into and analyzed by SPSS 23 version. Descriptive statistical methods such as central tendency and measures of dispersions are done to summarize the data. The PPE utilization status was dichotomized into good versus poor. The HCWs' psychological preparedness questions were categorized into two grades of responses (agree vs disagree). The binary logistic regression was performed to identify the association between PPE utilization practice (good or poor) and independent variables, including psychological preparedness of HCWs. Odds ratio (OR) is used to determine the strength and direction of the association between the outcome and independent factors. Finally, the significance level was reported at the p-value < 0.05 at a 95% confidence interval.

Table 1. Socio-demographic characteristics of the health care professionals working in Harari region and East Hararghe zone health facilities from August to September 2020.

Variable	Category	Frequency	Percent
Health facility	Health center	160	38.9
	Hospital	258	61.1
Age (years)	Mean	27.96 (SD = 5.6)	
Sex	Male	228	55
	Female	190	45
Religion	Muslim	196	46.4
	Orthodox	162	39.3
	Protestant	55	13
	Other*	5	1.2
Work experience (years)	Median = 3 (inter-quartile range = 2–6)		
Marital status	Single	222	53.1
	Married	190	45.5
	Divorced	6	1.4
Profession	Nurse	193	46.2
	Midwifery	58	13.9
	Pharmacy	46	11
	Medical laboratory	37	8.8
	Medical doctors	84	20.1
Educational level	BSc and diploma	245	58.6
	Medical doctors	84	20.1
	Others#	16	3.8
Working unit	Outpatient	90	21.5
	Emergency	62	14.8
	Obstetric	51	12.1
	Pharmacy	34	8.3
	Laboratory	37	8.8
	Inpatient departments	117	28.2
	Operation theater	27	6.5

*Catholic and Wakefata, #Master of science and Master of public Health.

Ethical statement

Haramaya University College of Health and Medical Sciences Institutional Health Research Ethical Review Committee (IHRERC) ethically cleared the project (protocol code: IHRERC/189/2020 and date of approval: 19 August 2020). The college of Health and Medical Sciences sent a letter of cooperation to local authorities and health facilities. Before obtaining the information, a participant/head of the institutions was asked to give a written, informed voluntary, and signed consent. Finally, all randomly selected HCWs were informed and signed written consent voluntarily. The study participant's information was collected anonymously guaranteeing information confidentiality. The data collection process was conducted as per the Declaration of Helsinki.

Results

Socio-demographic characteristics

A total of 418 study participants were included in this study. The mean age of the study participants was 27.96 years with a ±5.6 standard deviation. Of the total HCWs who participated in this study, 258 (61.1%) were from the hospitals, and 160 (38.9%) were from health centers. The median experience of the study participants was 3 years with the inter-quartile range (IQR) of 2–6 years. Of a total of 418 participants, 196 (46.4%) were Muslims, (53.1%) were single in marital status, 117 (28.2%) were working in the inpatient departments, (58.6%) of them were bachelor's degree holders, and professionally 193 (46.2%) of them were nurses (Table 1).

Availability and practice of using PPE

Among a total of 418 HCWs, 261 (62.4%) practiced PPE use poorly, while the rest 157 (37.6%) had good practice of PPE use. Regarding PPE use, eye goggle, face mask, glove, apron, shoes, and other PPE were used by 122 (29.2%), 369 (88.3%), 230 (55%), 81 (19.4%), 76 (18.2%), and 29(6.9%) of HCWs, respectively. Each national guideline and booklet of COVID-19 was supplied to 269 (64.3%) of the HCWs. Moreover, about 259 (62%) workers received training on COVID-19 infection prevention and controls (Table 2).

Regarding the ways of COVID-19 prevention, hand hygiene, wearing a face mask, avoiding contact with an infected person, and avoid attending overcrowding areas

Table 2. PPE availability in Harari region and East Hararghe zone health facilities from August to September 2020.

PPE materials availability	Yes	No
Eye goggle	122 (29.2)	296 (70.8)
Face mask	369 (88.3)	49 (11.7)
Glove	230 (55)	188 (45)
Apron	81 (19.4)	337 (80.6)
Shoes	76 (18.2)	342 (81.8)
National COVID-19 guideline	269 (64.3)	149 (35.7)
COVID-19 booklets	269 (64.3)	149 (35.7)
Received training on COVID-19	259 (62)	159 (38)

PPE: personal protective equipment.

were reported by 319 (76.3%), 330 (78.9%), 234 (56%), and 222 (53.1%) HCWs, respectively. While performing CPR for COVID-19 patients, 181 (43.3%), 155 (37.1%), and 104 (24.9) of the HCWs believed that getting rid of disposable equipment, removing PPE, and rubbish double-bagged should be taken into consideration. Safety measures that the participants practiced during work were sanitizing phone, stethoscope, badge, bed, and room (255, 61%); hand washing/hygiene before and after dealing with every patient (291, 69.6%); avoiding handshake (222, 53.1%); always wearing appropriate PPE when indicated (223, 53.2%), respectively. Also, safety measures such as washing bag, clothes, and sanitize sta (255, 61%); leaving shoes at work or outside of home (198, 47.4%); taking bath immediately at home (176, 42.1%); and doing any sports activity (95, 23%) were practiced by HCWs after finishing work, respectively (Table 3).

Health care providers' level of psychological preparedness against COVID-19 pandemic

Among a total of 418 HCWs, 225 (61%) felt anxious when treating any febrile patients. Nearly half of the HCWs felt that their working place is not safe from contracting COVID-19. Nearly two-thirds of HCWs agreed that they had a high risk of contracting COVID-19 and were obliged to provide care for COVID-19 infected patients. Half of the participants, 210 (50.2%), felt hopeless about eventually getting COVID-19 at work. Nearly half of the participants agreed that they did not feel confident to get employees' care if they get COVID-19 (Table 4).

Factors associated with practices of PPE use

Variables that had a p-value less than 0.15 were transformed to multivariable logistic regression. In multivariable logistic regression, independent variables such as gender, profession, accessing national COVID-19 management guidelines, receiving training targeted to COVID-19 prevention methods, sanitizing medical equipment regularly, feeling hopeless of eventually getting COVID-19 at work, and feeling safe at work when using standard precautions had a statistically significant association with PPE use practice ($p < 0.05$)

In this study, odds of using PPE were higher among male HCWs 2.21 times more likely than females (AOR = 2.21, 95% CI: 1.29–3.79). HCWs who were nursing/midwifery professionals had good PPE using practice 3.7 times more likely than physicians (AOR = 3.7, 95% CI: 1.8–7.7). HCWs who accessed a national COVID-19 management guideline practiced good PPE using skills were 2.8 times more likely than their counterparts (AOR = 2.83, 95% CI: 1.46–5.47). HCWs who received training targeted to COVID-19 prevention methods had 2.6 times more likely than those who did not take the training (AOR = 2.6, 95% CI: 1.4–4.7). Health professionals who regularly practiced the sanitizing of phone, stethoscope, badge, bed, and room had good PPE using skill 6.16 times more likely than their counterparts (AOR = 6.16; 95% CI: 3.32–11.4).

The HCWs who felt hopeless of eventually getting COVID-19 at work were 1.9 times more likely than their counterparts (AOR = 1.9, 95% CI: 1.13–3.28). Moreover, the study participants who did not feel safe at work when using standard precautions practiced PPE using by 54% less likely compared to those who felt safe when using standard precautions (AOR = 0.46, 95% CI: 0.27–0.79) (Table 5).

Discussion

The contagiousness characteristic of COVID-19 makes its prevention and control challenging both in developed and developing countries, including Ethiopia. Moreover, a very swift contagion of the viruses diffused over 220 countries, including Ethiopia causing more than 161 million cases and 3.5 million deaths within a period of less than 1 year.

This study revealed that HCWs practiced different types of PPE during the COVID-19 pandemic; 369 (88.3%) used face masks, 230 (55%) gloves, 122 (29.2%) eye goggles, 81 (19.4) apron, and 76 (18.2) shoes, respectively. This was higher than a study finding in North Shewa which showed that health care providers used face mask (27.4%), gloves (31%), goggles (15.9%), apron (14.2%), and shoes (11.5%).[13] This difference could be due to the time elapsed and variation of the geographical distribution of COVID-19; the present study was conducted among HCWs working in health facilities found on main roads to the capital city of Ethiopia. However, it was lower than a study conducted in Northwest Ethiopia, 140 (93.3%) goggles.[43] Also, it was lower than a study conducted in Latin America where (91.1%) gloves and (67.3%) gowns were practiced, respectively.[44] This discrepancy might be related to less accessibility of information, and less availability and accessibility of PPE in low-income countries like Ethiopia. In addition, the variation of PPE items used from setups to another setup can be due to the possibilities of using different types of PPE recommendations by Centers for Disease Control and Prevention/World Health Organization (CDC/WHO).[45]

Table 3. COVID-19 prevention practices among health care professionals working in Harari region and East Hararghe zone health facilities from August to September 2020.

COVID-19 prevention practices	Response	
	Yes	No
Keeping hand hygiene	319 (76.3)	99 (23.7)
Wearing face mask	330 (78.9)	88 (21.1)
Avoiding contact with infected person	234 (56)	184 (44)
Avoiding going to overcrowded area	222 (53.1)	196 (46.9)
Get rid of disposable equipment	181 (43.3)	237 (56.7)
Appropriate doffing and donning the PPE	155 (37.1)	263 (69)
Rubbish double-bagged	104 (24.9)	314 (75.1)
Sanitize your phone, stethoscope, badge, bed, and room	255 (61)	163 (39)
Hand washing/hygiene before and after dealing with every patient	291 (69.6)	127 (30.4)
Avoid handshake	222 (53.1)	196 (46.9)
Wear appropriate PPE when indicated always	223 (53.2)	195 (46.8)
Wash your bag, clothes, and sanitize your staff	288 (68.9)	130 (31.1)
Leave shoes at work or outside home	198 (47.4)	220 (52.6)
Took a shower immediately at home	176 (42.1)	242 (57.9)
Did any sport activity	96 (23)	322 (77)

PPE: personal protective equipment.

Table 4. Psychological preparedness against COVID-19 pandemic among health care professionals working in Harari region and East Hararghe zone health facilities from August to September 2020.

Variables	Agree	Disagree
I feel anxious while working with febrile patients	225 (61)	193 (39)
I feel unsafe in working at my workplace	214 (51)	204 (49)
I feel at risk to contract COVID-19 infection at work	302 (72.2)	116 (27.8)
I feel obliged to care for COVID-19 infected patients	296 (70.8)	122 (29.2)
I felt hopeless I might eventually get COVID-19 at work	210 (50.2)	208 (49.8)
I feel threatened if one of my colleagues contracted COVID-19	271 (64.8)	147 (35.2)
If I get COVID-19, I do not feel confident employees care for me	203 (48.6)	215 (51.4)
I feel I will transmit COVID-19 to my family members	281 (67.2)	137 (32.8)
I feel that my family will avoid me since I work in a hospital	300 (71.8)	118 (28.2)
I feel I should avoid leaving my home due to COVID-19	186 (44.5)	232 (55.5)
I feel my family will not look after me if I will be infected	171 (40.9)	247 (59.1)
I do not feel confident in telling my family and friends if I am infected.	189 (45.2)	229 (54.8)
I feel that my institution did not support me in the COVID-19 crisis	209 (50)	209 (50)
I feel my institution losing control of the COVID-19 crisis	214 (51.2)	204 (48.8)
I feel overwhelmed with the new COVID-19 regulations	233 (55.7)	185 (44.3)
I feel COVID-19 crisis increased my workload	251 (60)	167 (40)
I feel absence from work reduce the chance of getting COVID-19	173 (41.4)	245 (58.6)
In case I have COVID-19, I feel ashamed of telling my manager/colleagues	140 (33.5)	278 (66.5)
I feel I should change my current job due to COVID-19 crisis	135 (32.3)	283 (67.7)
I am not confident with the current infection control measures	206 (49.3)	212 (50.7)
I do not feel proper infection control training has been offered to me	216 (51.7)	202 (48.3)
I do not feel an infection specialist is accessible to respond to my concerns	211 (50.3)	207 (49.7)
I do not feel there is COVID-19 outbreak plan set at my area	182 (43.5)	236 (56.5)
I do not feel safe at work when I use the standard precautions	162 (38.7)	256 (61.3)
Confidence in management of COVID-19 patients	195 (46.2)	224 (53.8)

This study revealed that being a male HCW was two times more likely to have a good practice of PPE than females. The finding is comparable with a report from Debre Tabor.[46] Since COVID-19 morbidity and mortality were higher among males, males may be alert about the risk of contracting the disease. Thus, they might practice PPE utilization than

Table 5. Factors associated with PPE utilization practice among health care professionals working in Harari region and East Hararghe zone health facilities from August to September 2020.

Variables	Response	PPE practice		COR	AOR	p-value
		Poor	Good			
Health Facilities	Health center	93	70	1	1	0.8
	Hospital	168	87	0.68 (0.45–1.03)	1.04 (0.61–1.76)	
Sex	Male	135	95	1.43 (0.95–2.1)	2.21 (1.29–3.79)	0.004
	Female	126	62	1	1	
Profession	Nurse/Midwifery	151	100	1.69 (0.99–2.9)	3.7 (1.8–7.7)	0.000
	Pharmacy	25	15	1.5 (0.67–3.3)	2.4 (0.94–6.34)	0.06
	Medical laboratory science	23	14	1.5 (0.67–3.44)	2.09 (0.75–5.8)	0.15
	Physician	60	24	1	1	
Having national COVID-19 management guideline	Yes	143	126	3.35 (2.11–5.32)	2.83 (1.46–5.47)	0.002
	No	118	31	1	1	
Having booklets of standard case definitions of COVID-19	Yes	147	122	2.7 (1.72–4.23	0.98 (0.5–1.9)	0.9
	No	114	35	1	1	
Receive training targeted on COVID-19 preventions	Yes	132	127	4.13 (2.56–6.52)	2.6 (1.4–4.7)	0.002
	No	129	30	1	1	
Sanitize phone, stethoscope, badge, bed, and room regularly	Yes	123	132	5.9 (3.6–9.6)	6.16 (3.32–11.4)	0.000
	No	138	25	1	1	
Wash hands regularly	Yes	167	124	2.1 (1.33–3.34)	1.39 (0.74–2.6)	0.2
	No	94	33	1	1	
Avoid handshaking with other people	Yes	114	108	1.3 (0.89–3.43)	1.79 (0.96–3.33)	0.06
	No	147	49	1	1	
Hopeless eventually getting COVID-19 at work	Agree	117	93	1.78 (1.19–2.67)	1.9 (1.13–3.28)	0.01
	Disagree	144	64	1	1	
Limiting social activities due to COVID-19	Agree	163	118	1.8 (1.17–2.82)	1.5 (0.85–2.66)	0.15
	Disagree	98	39	1	1	
Do not feel safe at work	Agree	118	44	0.47 (0.30–0.72)	0.46 (0.27–0.79)	0.005
	Disagree	150	106	1	1	

COR: Crude Odds Ratio; PPE: personal protective equipment; AOR: adjusted odds ratio.

females. Moreover, the majority of COVID-19-related deaths are caused by male-exercised behaviors than women. For instance, a higher level of smoking and drinking among men than women may cause the difference.[47,48] Therefore, this burden of COVID-19 among males may cause significant differences in the prevention practices.

Nurses/midwives had practiced good PPE using 3.7 times more likely compared to physicians. This finding is in line with the studies conducted in Nigeria and Ghana.[14,49] It might be due to that nurses/midwives are relatively more exposed to infectious diseases as they stay longer with the patients. Hence, HCWs should be reinforced and supported by health institutions for addressing their PPE needs.[50–54]

HCWs who had a national COVID-19 management guideline were almost three times more likely to have a good practice of PPE use. This report is supported by the studies conducted in Northwest Ethiopia,[43] Amhara,[55] and Bangladesh.[41] The National management guideline reminds and guides HCWs about preventive mechanisms and how to apply them to prevent infections at working places and accessing the required infection prevention equipment. If HCWs have infection prevention guidelines and know the risk of not practicing preventive strategies, they will apply all the possible preventive mechanisms to avoid infections.[42,56]

HCWs who received COVID-19 infection prevention and control training had a higher rate of good PPE using skills. HCWs who are well-informed about the severity of the pandemic are more likely to adhere to infection prevention methods like PPE use. Regular updating of HCW's skills and availing infection prevention and control guidelines through training are important.[50,57–59]

Participants who felt COVID-19 transmission at work were two times more likely to have a good practice of PPE use. This may be due to high accidental exposure of HCWs to droplets during close contact to treat COVID-19 patients. COVID-19 highlights the need to address occupational health and safety within health facilities, including through adequate resourcing and appointing implementation focal points to enable regular assessment and control of occupational health and safety hazards, and medical surveillance of health workers.

Participants who agree with not feeling safe at work when they use the standard precautions were 38.7% less likely to

have a good practice of PPE. This is supported by a study done in Northwest Ethiopia[56] and Bangladesh.[38] It needs facility leaders to provide training for HCWs regarding the strategies and advantages of obeying infection prevention and control. This study could reveal the HCWs' preparedness level through a face-to-face interview that might minimize the inaccuracy of information from web-based online data collection methods compared to the previous studies. Besides, the randomness of subjects' enrollment may also enable the finding to be generalized for HCW providing services in other similar health facilities. Even though this study has its strength, it is not without limitations. Purposive selection of health facilities on the main road to the capital city (Addis Ababa) may affect the representativeness of findings. Despite that the subjects were pleased to be genuine and assured their responses were anonymous, we suspected that the information from the self-report may not always unveil the actual activities of the respondents.

Conclusion

The study demonstrated that being a male, being a nurse/midwifery professional, regularly sanitizing hands/medical equipment, having national COVID-19 management guidelines, taking COVID-19 training, and feeling of eventually getting COVID-19 at the workplace had a positive association with PPE utilization. Besides, the study revealed that not feeling safe at work when using standard precautions was negatively associated with PPE utilization of the HCW. The prevention strategies and measurements should be strictly followed and implemented on the COVID-19 high-risk professionals like HCWs. Therefore, the government needs to strengthen the efforts of mobilizing the stakeholders, and upbeat the prevention practices of the HCWs through different communication forms by enforcing already stated rules and making them strict, especially in all health facilities preventing the health system from collapsing and tackling the virus's transmission from the community at large.

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Author contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the manuscript is submitted; and agree to be accountable for all aspects of the work.

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Data availability

The data used to support the findings of this study are available from A.B. upon reasonable request.

Ethics approval

Ethical approval for this study was obtained from Haramaya University College of Health and Medical Sciences Institutional Review Board (or Ethics Committee) (protocol code: IHRERC/189/2020 and date of approval: 19 August 2020).

Informed consent

Written informed consent was obtained from all subjects before the study.

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Supplemental material

Supplemental material for this article is available online.

References

1. WHO. Coronavirus disease (COVID-19) pandemic, 2021, https://www.who.int/health-topics/coronavirus/coronavirus#tab=tab_1
2. Rajamani A, Subramaniam A, Shekar K, et al. Personal protective equipment preparedness in Asia-Pacific intensive care units during the coronavirus disease 2019 pandemic: a multinational survey. *Aust Crit Care* 2021; 34(2): 135–141.
3. Pan American Health Organization and World Health Organization. COVID-19 has infected some 570,000 health workers and killed 2,500 in the Americas, 2020, https://www.paho.org/en/news/2-9-2020-covid-19-has-infected-some-570000-health-workers-and-killed-2500-americas-paho
4. WHO. Over 10 000 health workers in Africa infected with COVID-19, 2020, https://www.afro.who.Int/news/over-10-000-health-workers-africa-infected-covid-19 (accessed 27 October 2020).
5. WHO. Technical guidance on infection prevention and control during the coronavirus (COVID-19) outbreak for the Western Pacific Region, 2020, https://www.who.Int/westernpacific/emergencies/covid-19/technical-guidance/infection-prevention-control (accessed 27 October 2020).
6. WHO. World Health Organization corona virus disease (COVID-19), 2021, https://covid19.who.Int/region/afro/country/et (accessed 15 May 2021).
7. World Health Organization (WHO). Preferred product characteristics for personal protective equipment for the healthcare worker on the frontline responding to viral hemorrhagic fevers

in tropical climates, 2018, http://origin.who.int/medical_devices/publications/Personal_Protective_Equipment_tpp/en/
8. Lakshmi G, Meriton S and Christina M. A study on personal protective equipment use among health care providers, Tamil Nadu. *Int J Community Med Public Health* 2016; 5.
9. Dunlop C, Howe A, Li D, et al. The coronavirus outbreak: the central role of primary care in emergency preparedness and response. *BJGP Open* 2020; 4(1): bjgpopen20X101041.
10. Boyce MR and Katz R. Community health workers and pandemic preparedness: current and prospective roles. *Front Public Health* 2019; 7: 62.
11. Ferguson N, Laydon D, Nedjati Gilani G, et al. *Report 9: impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand*. London: Imperial College London, 2020.
12. Deressa W, Worku A, Abebe W, et al. Risk perceptions and preventive practices of COVID-19 among healthcare professionals in public hospitals in Ethiopia. *bioRxiv* 2020.
13. Mulu GB, Kebede WM, Worku SA, et al. Preparedness and responses of healthcare providers to combat the spread of COVID-19 among North Shewa Zone Hospitals, Amhara, Ethiopia, 2020. *Infect Drug Resist* 2020; 13: 3171–3178.
14. Afulani PA, Gyamerah AO, Aborigo R, et al. Perceived preparedness to respond to the COVID-19 pandemic: a study with healthcare workers in Ghana. *medRxiv* 2020.
15. Thiam S, Delamou A, Camara S, et al. Challenges in controlling the Ebola outbreak in two prefectures in Guinea: why did communities continue to resist? *Pan Afr Med J* 2015; 22(Suppl. 1): 22.
16. Belfroid E, van Steenbergen J, Timen A, et al. Preparedness and the importance of meeting the needs of healthcare workers: a qualitative study on Ebola. *J Hosp Infect* 2018; 98(2): 212–218.
17. Zhang L, Li H and Chen K. Effective risk communication for public health emergency: reflection on the COVID-19 (2019-nCoV) outbreak in Wuhan, China. *Healthcare* 2020; 8: 64.
18. Dai Y, Hu G, Xiong H, et al. Psychological impact of the coronavirus disease 2019 (COVID-19) outbreak on healthcare workers in China. *MedRxiv* 2020.
19. Dinibutun SR. Factors associated with burnout among physicians: an evaluation during a period of COVID-19 pandemic. *J Healthc Leadersh* 2020; 12: 85–94.
20. Galbraith N, Boyda D, McFeeters D, et al. The mental health of doctors during the COVID-19 pandemic. *BJPsych Bull* 2020; 45: 93–97.
21. Daria S and Islam MR. The second wave of COVID-19 pandemic in Bangladesh: an urgent call to save lives. *Asia Pac J Public Health* 2021; 33(5): 665–666.
22. Daria S, Asaduzzaman M, Shahriar M, et al. The massive attack of COVID-19 in India is a big concern for Bangladesh: the key focus should be given on the interconnection between the countries. *Int J Health Plann Manage* 2021; 36: 1947–1949.
23. Jiang Y. Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. *Med Sci Monit* 2020; 26: e924171.
24. Khanal P, Devkota N, Dahal M, et al. Mental health impacts among health workers during COVID-19 in a low resource setting: a cross-sectional survey from Nepal. *Global Health* 2020; 16(1): 89.
25. Alshekaili M, Hassan W, Al Said N, et al. Factors associated with mental health outcomes across healthcare settings in Oman during COVID-19: frontline versus non-frontline healthcare workers. *BMJ Open* 2020; 10(10): e042030.
26. Chekole YA, Yimer S, Mekuriaw B, et al. Prevalence and risk factors of perceived stress on COVID-19 among health care providers in Dilla Town Health institutions, Southern Ethiopia: a cross-sectional study, 2020, https://assets.research-square.com/files/rs-23476/v1/b41e1b3c-9664-42b4-8c44-f1489bc1459f.pdf?c=1631833865 (accessed 27 September 2021).
27. Si M, Su X, Jiang Y, et al. Psychological impact of COVID-19 on medical care workers in China. *Infect Dis Poverty* 2020; 9: 113.
28. Semo BW and Frissa SM. The mental health impact of the COVID-19 pandemic: implications for Sub-Saharan Africa. *Psychol Res Behav Manag* 2020; 13: 713–720.
29. Pappa S, Ntella V, Giannakas T, et al. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun* 2020; 88: 901–907.
30. Romero CS, Catalá J, Delgado C, et al. COVID-19 psychological impact in 3109 healthcare workers in Spain: the PSIMCOV group. *Psychol Med*. Epub ahead of print 14 May 2020. DOI: 10.1017/S0033291720001671.
31. Zhang XR, Huang QM, Wang XM, et al. Prevalence of anxiety and depression symptoms, and association with epidemic-related factors during the epidemic period of COVID-19 among 123,768 workers in China: a large cross-sectional study. *J Affect Disord* 2020; 277: 495–502.
32. Chen J, Liu X, Wang D, et al. Risk factors for depression and anxiety in healthcare workers deployed during the COVID-19 outbreak in China. *Soc Psychiatry Psychiatr Epidemiol* 2021; 56: 47–55.
33. Bender WR, Srinivas S, Coutifaris P, et al. The psychological experience of obstetric patients and health care workers after implementation of universal SARS-CoV-2 testing. *Am J Perinatol* 2020; 37(12): 1271–1279.
34. Gill S, Hao D, Hirte H, et al. Impact of COVID-19 on Canadian medical oncologists and cancer care: Canadian Association of Medical Oncologists survey report. *Curr Oncol* 2020; 27(2): 71–74.
35. Wang W, Song W, Xia Z, et al. Sleep disturbance and psychological profiles of medical staff and non-medical staff during the early outbreak of COVID-19 in Hubei Province, China. *Front Psychiatry* 2020; 11: 733.
36. Wańkowicz P, Szylińska A and Rotter I. Assessment of mental health factors among health professionals depending on their contact with COVID-19 patients. *Int J Environ Res Public Health* 2020; 17(16): 5849.
37. Sandesh R, Shahid W, Dev K, et al. Impact of COVID-19 on the Mental Health of Healthcare Professionals in Pakistan. *Cureus* 2020; 12(7): e8974.
38. Das R, Hasan MR, Daria S, et al. Impact of COVID-19 pandemic on mental health among general Bangladeshi population: a cross-sectional study. *BMJ Open* 2021; 11(4): e045727.
39. Repon MAU, Pakhe SA, Quaiyum S, et al. Effect of COVID-19 pandemic on mental health among Bangladeshi healthcare professionals: a cross-sectional study. *Sci Prog* 2021; 104(2).
40. COVID-19 guidelines for PPE use, 2020. https://r.search.yahoo.com/_ylt=AwrE1xhMeFxhXV8AwgpXNyoA;_ylu=Y29sbw

NiZjEEcG9zAzEEdnRpZANEMTA0NV8xBHNlYwNzcg-/RV=2/RE=1633478861/RO=10/RU=https%3a%2f%2fmed.stanford.edu%2fcontent%2fdam%2fsm%2fcovid19%2fdocuments%2fPPE-Use-and-Reuse-Guidelines-3_29_20.pdf/RK=2/RS=chGTG0KrVayp.CS7sO5oojDd5o0-

41. FMOH. National comprehensive covid-19 management handbook, 2020, https://covidlawlab.org/wp-content/uploads/2020/06/National-Comprehensive-COVID19-Management-Handbook.pdf (accessed 27 September 2021).
42. Hossain MA, Rashid MUB, Khan MAS, et al. Healthcare workers' knowledge, attitude, and practice regarding personal protective equipment for the prevention of COVID-19. *J Multidiscip Healthc* 2021; 14: 229–238.
43. Melaku D, Temesgen A, Nega S, et al. Knowledge, practice and associated factors of infection prevention among healthcare workers in Debre Markos Referral Hospital, northwest Ethiopia. *BMC Health Serv Res* 2018; 18: 465.
44. Delgado D, Wyss Quintana F, Perez G, et al. Personal safety during the COVID-19 pandemic: realities and perspectives of healthcare workers in Latin America. *Int J Environ Res Public Health* 2020; 17(8): 2798.
45. CDC. *Protecting healthcare personnel*. Atlanta, GA: CDC, 2020.
46. Eshetie Adane D, Demilew BC, Ayenew NT, et al. Preparedness level and associated factors of health professionals regarding COVID-19. *SAGE Open Med* 2021; 9: 20503121211001151.
47. Zhao Y, Zhao Z, Wang Y, et al. Single-cell RNA expression profiling of ACE2, the receptor of SARS-CoV-2. *Am J Respir Crit Care Med* 2020; 202(5): 756–759.
48. Karlberg J, Chong D and Lai W. Do men have a higher case fatality rate of severe acute respiratory syndrome than women do? *Am J Epidemiol* 2004; 159(3): 229–231.
49. Alao M, Durodola A, Ibrahim O, et al. Assessment of health workers' knowledge, beliefs, attitudes, and use of personal protective equipment for prevention of COVID-19 infection in low-resource settings. *Adv Public Health* 2020; 2020: 4619214.
50. Greenberg N and Tracy D. What healthcare leaders need to do to protect the psychological well-being of frontline staff in the COVID-19 pandemic. *BMJ Leader* 2020; 4: 101–102.
51. Hakim M, Khattak FA, Muhammad S, et al. Access and use experience of personal protective equipment among frontline healthcare workers in Pakistan during the COVID-19 emergency: a cross-sectional study. *Health Secur* 2021; 19(2): 140–149.
52. Mersha A, Shibiru S, Girma M, et al. Perceived barriers to the practice of preventive measures for COVID-19 pandemic among health professionals in public health facilities of the Gamo zone, southern Ethiopia: a phenomenological study. *BMC Public Health* 2021; 21(1): 1–10.
53. WHO. Coronavirus disease (covid-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health, 2020, https://www.who.int/docs/default-source/coronaviruse/who-rights-roles-respon-hw-covid-19.pdf?sfvrsn=bcabd401_0 (accessed 27 September 2021).
54. Barrett ES, Horton DB, Roy J, et al. Prevalence of SARS-CoV-2 infection in previously undiagnosed health care workers in New Jersey, at the onset of the US COVID-19 pandemic. *BMC Infect Dis* 2020; 20(1): 853.
55. Asemahagn MA. Factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in Amhara region, Ethiopia: a cross-sectional survey. *Trop Med Health* 2020; 48: 72–11.
56. Haile TG, Engeda EH and Abdo AA. Compliance with standard precautions and associated factors among healthcare workers in Gondar University Comprehensive Specialized Hospital, Northwest Ethiopia. *J Environ Public Health* 2017; 2017: 2050635.
57. Apisarnthanarak A, Apisarnthanarak P, Siripraparat C, et al. Impact of anxiety and fear for COVID-19 toward infection control practices among Thai healthcare workers. *Infect Control Hosp Epidemiol* 2020; 41(9): 1093–1094.
58. FMOH. National guideline for family planning services in Ethiopia, 2020, https://stage.prb.org/wp-content/uploads/2018/05/National-Guideline-for-Family-Planning-Services-in-Ethiopia2011.pdf#:~:text=National%20Guideline%20for%20Family%20Planning%20Services%20in%20Ethiopia,all%20MDGs%20in%20general%E2%80%94and%20MDG%205%20in%20particular
59. Norton EJ, Georgiou I, Fung A, et al. Personal protective equipment and infection prevention and control: a national survey of UK medical students and interim foundation doctors during the COVID-19 pandemic. *J Public Health* 2021; 43(1): 67–75.