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3 Risk perceptions and preventive practices of COVID-19 among healthcare

4 professionals in public hospitals in Ethiopia

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16 Short title: Risk perceptions and preventive practices of COVID-19 among healthcare
17 professionals

18 **Abstract**

19 Healthcare professionals are at higher risk of contracting the novel coronavirus due to their work
20 exposure in the healthcare settings. Practicing appropriate preventive measures to control COVID-
21 19 infection is one of the most important interventions that healthcare workers are expected to use.
22 The aim of this study was to assess the level of risk perception and practices of preventive measures
23 of COVID-19 among health workers in Addis Ababa, Ethiopia. A hospital-based cross-sectional
24 study was conducted from 9th to 26th June 2020 among healthcare professionals working at six
25 public hospitals in Addis Ababa. Data were collected using a self-administered structured
26 questionnaire. Frequency, percentage, and mean were used to summarize the data. A binary
27 logistic regression analyses were performed to identify factors associated with risk perception
28 about COVID-19. A total of 1,134 participants were surveyed. Wearing facemask (93%), hand
29 washing for at least 20 seconds (93%), covering mouth and nose while coughing or sneezing
30 (91%), and avoiding touching eyes, nose, and mouth (91%) were the commonly self-reported
31 preventive practices. About 88% perceived that they were worried about the risk of becoming
32 infected with coronavirus, and majority (91%) worried about the risk of infection to their family.
33 The mean score of overall fear and worry of COVID-19 was 2.37 on a scale of 1 to 3. Respondents
34 who ever provided clinical care to COVID-19 patients were more likely to report fear and worry
35 (adjusted OR=1.34, 95% CI:1.02-1.91), however those who ever participated in Ebola or SARS
36 outbreaks were less likely to report fear and worry due to COVID-19 crisis (adjusted OR=0.66,
37 95% CI:0.48-0.90). This study has revealed widespread practices of preventive measures and the
38 highest perceived risk of COVID-19 among healthcare workers. Therefore, an effective risk
39 communication intervention should be implemented to ensure the maintenance of appropriate
40 practices during the current COVID-19 pandemic.

41

42 **Keywords:** *Coronavirus, COVID-19, Ethiopia, Healthcare professionals, Preventive practices,*
43 *Risk perception, SARS-COV-2*
44

45 **Introduction**

46 The novel coronavirus disease 2019 (COVID-19) that was declared as a pandemic by the World
47 Health Organization (WHO) on the 11th of March 2020 [1] has affected over 37 million people
48 and has caused more than one million deaths globally as of 12th October 2020 [2]. The new severe
49 acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has now spread to 213 countries and
50 territories around the world. Up to 20th September 2020, Ethiopia reported a total of 68,820
51 confirmed coronavirus disease 2019 (COVID-19) cases and 28,314 recoveries from over
52 1,202,818 total tests, among whom 1,096 have died [3]. Over 1,311 health workers have contracted
53 coronavirus in Ethiopia as of 17th September 2020.

54

55 Healthcare providers who are in the healthcare settings to care for the COVID-19 patients are
56 highly vulnerable to SARS-CoV-2 infection [4]. Most healthcare workers are working in isolation
57 units, critical care units, intensive care units (ICUs), emergency units, working in frontline
58 positions, and having contact with suspected and confirmed COVID-19 cases. During the early
59 stage of COVID-19 pandemic in the USA, the prevalence of SARS-CoV-2 infection among
60 healthcare workers was 7.3% and particularly, infections were most common among nurses [5]. In
61 the south of the Netherlands, 96 (5%) of 1796 health care workers screened in three hospitals were
62 tested positive for SARS-CoV-2 just 10 days after the first reported COVID-19 case in the country
63 [6]. More than 278 physicians from almost all medical specialties have died due to COVID-19 as
64 of 15 April 2020 with the majority (44%) from Italy mainly because of lack understanding of the
65 virus and its preventive measures [7]. Studies in China reported 3,387 COVID-19 cases among
66 HCWs (4.4% of all cases), with 23 attributable deaths [8]. In some countries at the peak of their
67 infection, such as Spain, they have reported that 13% to 14% of the country's cases were in

68 healthcare workers [9]. Overall, as much as 10% of healthcare workers are infected with SARS-
69 CoV-2 in some countries [4] and the WHO has developed infection prevention and control
70 guidance to be implemented at the national and healthcare facility level in order to reduce
71 coronavirus infection among healthcare workers [10].

72

73 Studies have identified major sources of worry and anxiety among healthcare professionals due to
74 lack of appropriate PPE; being exposed to COVID-19 at work and taking the infection home to
75 their family; not having rapid access to testing if they develop COVID-19 symptoms and
76 concomitant fear of propagating infection at work; uncertainty that their organization will
77 support/take care of their personal and family needs if they develop infection; access to childcare
78 during increased work hours and school closures; and support for other personal and family needs
79 as work hours and demands increase [11]. A recent qualitative study from China reported the
80 challenges facing frontline healthcare workers during the COVID-19 outbreak, including a high
81 risk of infection, insufficient PPE, heavy workloads and manpower shortages, confusion,
82 discrimination, isolation, separation from their families, and burnout [12]. Under these stressful
83 conditions, healthcare professionals have been challenged to effectively engaged in the fight
84 COVID-19.

85

86 A good level of understanding the risk perception and preventive practices of healthcare
87 professionals is essential to protect the health workers and prevent the COVID-19 pandemic
88 through effective risk communication. Studies conducted during the early stages of a pandemic
89 have suggested that perceived personal risk of infection and the health effects are linked to
90 engagement in protective behaviors [13]. Since the occurrence of the epidemic in Ethiopia, the

91 MoH, in collaboration with its partners, conducted different trainings on preventive measures for
92 healthcare professionals at several hospitals and health centers, with supplies of PPE materials.
93 However, so far, no study has been undertaken in Ethiopia on risk perception and preventive
94 practices of healthcare professionals during the current COVID-19 pandemic. In addition, levels
95 of confidence and feelings of healthcare workers about COVID-19 are unknown. It was therefore
96 necessary to carry out this study to investigate the level of risk perception and preventive practice
97 of healthcare professionals towards the COVID-19.

98

99 **Methods**

100 **Study setting and design**

101 This hospital-based cross-sectional study was conducted from 9th to 26th June 2020 at six public
102 hospitals in Addis Ababa city administration, three months after the first confirmed COVID-19
103 case in Ethiopia in March 2020. Addis Ababa city is the most populated urban city in the country,
104 and had a population of about 3.6 million in 2019 [14]. The city also had better health infrastructure
105 and the highest number of qualified medical personnel compared with any city or region in the
106 country. There were 12 hospitals and close to 100 health centers belonging to the public center,
107 and about 25 private hospitals in Addis Ababa city. There were also over 17,000 healthcare
108 professionals in the city, including 2,441 (14%) physicians and 8,172 (47%) nurses by the end of
109 July 2019 (MOH 2011 EC Health Indicators). The hospitals selected for the current study provide
110 outpatient and inpatient services for the city residents and patients coming from different parts of
111 the country.

112

113

114 **Study population and sampling**

115 The study was conducted among all healthcare professionals working in the different clinical
116 departments or units of six public hospitals in Addis Ababa, mainly Gyn&Ob, Surgery, Pediatrics,
117 Internal Medicine, OPD, emergencies, intensive care, operation room/ward, screening/triage,
118 laboratory and anesthesia. The selected hospitals included: Tikur Anbessa Specialized Hospital
119 (TASH), Zewditu Memorial Hospital (ZMH), Ghandi Memorial Hospital (GMH), Menelik II
120 Hospital, Yekatit 12 Hospital Medical College (Y12HMC) and St. Paul Hospital Millennium
121 Medical College (SPHMMC). The study population included intern doctors, resident doctors,
122 general practitioners, medical specialists and sub-specialists, health officers, anesthetists, nurses,
123 midwives, pharmacists, laboratory technologists, physiotherapists, X-ray and laboratory
124 technicians, all of whom may expect to encounter suspected or confirmed COVID-19 patients.

125

126 A multi-stage sampling, using a mix of purposive and non-random sampling, was applied to select
127 the study participants. In the first stage, the six hospitals were purposively selected from 12
128 hospitals in the city. In the second stage, clinical departments or units were selected, and in the
129 third stage, study participants were selected proportionally to the estimated number of healthcare
130 professionals working in different departments and units of the hospital. All eligible participants
131 in each department/unit who consented to participate were recruited into the study. Since COVID-
132 19 is a new disease, we assumed that at least 50% of study participants had higher risk perception
133 regarding COVID-19, and the estimated sample size was calculated with 95% confidence limit,
134 with 4% precision and a design effect equal to 1.5 using 20 % non-response rate. Accordingly, the
135 minimum total sample size targeted for this survey was 1,080 respondents. A total of 1,200
136 participants were targeted for the study.

137

138 **Data Collection**

139 A structured paper-based self-administered questionnaire was used to collect the data. The
140 questionnaire is composed of parts on the demographic (gender, age) and occupational
141 characteristics of the respondents (hospital, department/unit, professional category, and work
142 experience), as well as their preparedness to combat COVID-19, potential risk of becoming
143 infected with the virus, worries about the potential risk to their family and loved ones, feelings and
144 fears about COVID-19. Questions related to measures taken to prevent infection from the virus
145 included hand washing for at least 20 seconds, use of disinfectants, wearing facemask, physical
146 distancing, covering mouth and nose while coughing and sneezing and other preventive measures.
147 The questionnaire was developed in English by the authors of the study based on the previously
148 conducted studies and visiting the WHO websites for frequently asked questions on risk perception
149 of healthcare professionals. Most of the questions were designed as 'yes/no', 'agree/disagree', and
150 'worried/not worried' using different rating scales.

151

152 A total of 12 experienced data collectors with health backgrounds were involved in the data
153 collection of this survey. A guideline was developed by the research team to guide the data
154 collectors and supervisors for data collection, quality assurance of data and ethical conduct.
155 Training and orientation on the survey tool and methodology including how to administer the SAQ
156 were conducted for the data collectors using webinar on 2nd June 2020. After explaining the
157 purpose of the study and obtaining written or oral informed consent, study participants were given
158 a paper-based questionnaire at their workplace and they filled out their own questionnaires. The
159 purpose of the study was clearly stated in the questionnaire and the participants were asked to

160 complete the questionnaire with honest answers after giving their consents. The study participants
161 were encouraged to fill out the questionnaire whilst the data collectors were still in the hospital
162 during the data collection period. A collection center was also prepared in the Hospital Director's
163 office to also gather the questionnaires from the healthcare workers that were unable to directly
164 deliver the completed questionnaires to the data collectors. The data collection took place
165 simultaneously in the six hospitals. The questionnaires were checked for completeness and
166 consistency upon collection. All responses were anonymous.

167

168 Risk perception among the healthcare professionals in this study was measured using questions on
169 perceived fears and worries, vulnerability and feelings, and behavioral responses regarding
170 COVID-19 [15-16]. Preventive practices of COVID-19 in this study include hygiene behaviors
171 (such as hand washing; covering mouth and nose with a hand or tissue while coughing or sneezing;
172 avoiding touching eyes, nose and mouth with unwashed hands; using hand sanitizer; disinfecting
173 surfaces); mask wearing, physical distancing and avoiding crowds and public places [17].

174

175 **Data analysis**

176 Data were entered into the Census Surveys Professional (CSPro) Version 7.2 statistical software
177 package and subsequently exported to SPSS version 23.0 (SPSS Inc., IBM, USA) for cleaning and
178 data analysis. Descriptive analysis was applied to calculate the frequencies, proportions and mean
179 scores, and the results were presented as a proportion for the categorical variables, and as a mean
180 \pm standard deviation for the quantitative variables. A Chi-square was used to establish significance
181 and relationship between variables. The study participants were asked 12 questions related to their
182 fears and worries (risk perception) about COVID-19, such as losing someone they love due to the

183 disease, health system overcrowding, mental and physical health, etc., on a 3-point scale, where
184 1=don't worry at all, 2=worry somehow and 3=worry a lot. A sum of scores (ranged 12-36) was
185 made and the level was classified into two groups using the Visual Binning in SPSS (low
186 fear/worry ≤ 29 and high fear/worry > 29 score). Univariate odds ratios (crude OR) and multivariate
187 odds ratio (adjusted OR) were derived by using univariate and multivariate logistic regression
188 models, respectively, to identify the main factors associated with healthcare workers high risk
189 perception. Statistical significance was considered for $P < 0.05$. The internal consistency
190 (reliability) of the questions was tested by applying Cronbach's alpha and the Cronbach's alpha
191 coefficient of the reliability of scale was estimated at 0.91, which is highly acceptable.

192

193 **Ethical considerations**

194 The study protocol was reviewed and approved by the Institutional Review Board of the College
195 of Health Sciences at Addis Ababa University (AAU). Permission to undertake this study was
196 obtained from every relevant authority at all levels. Official letters from AAU were written to each
197 hospital to cooperate and participate in the survey. The purpose and significance of the study was
198 introduced to the study participants, and all participants provided written or oral consent before
199 participating in the study. Anonymity and data confidentiality were ensured, and no identifiable
200 data from participants were collected. All study respondents were asked to only fill the
201 questionnaire once to avoid duplication of data and that their participation in the study was entirely
202 on voluntary basis. All personnel involved in the survey received orientation on COVID-19
203 infection prevention and control measures.

204

205

206 **Results**

207 **Characteristics of study participants**

208 A total of 1,134 (92%) healthcare professionals consented and completed the questionnaires, out
209 of 1,228 possible participants from six public hospitals in Addis Ababa. Among 1,134 healthcare
210 personnel, nearly 40% of them were nurses, followed by physicians (22.4%) and interns (10.8%).
211 Table 1 summarizes the demographic and occupational characteristics of the study participants and
212 their professional affiliation. Among 1,102 respondents reporting gender, 45.9% were males, with
213 females making 51.3% of all respondents. Among 982 participants with available data on age, the
214 mean (\pm SD) age was 30.3 ± 6.4 years and ranged from 22 to 70 years old, with the majority within
215 the age group of 20-29 years (57.9%) (31.0 \pm 5.6 years for physicians, 25.6 \pm 3.3 years for interns
216 and 30.7 \pm 6.5 years for nurses). Among 252 physicians participated in the study, general
217 practitioners and resident doctors accounted for 44.8% and 42.9%, respectively, while medical
218 specialists and sub-specialists accounted for the remaining 12.3%. About 17% of the respondents
219 represented other professional categories such as anesthetist, pharmacist, health officer,
220 radiographer and laboratory technologist. Majority (17.2%) of the respondents worked in Gny&Ob
221 department, while 13.8% were in surgical department, 13.3% in pediatrics, 13.0% in medical and
222 10.5% in OPD departments. Most respondents worked as staff for less than 10 years in the hospital
223 (73.2%), and nearly 10% worked for 10 or more years.

224

225 Table 1. Characteristics of study participants by professional category (n=1134)

Characteristics	Professional category, n (%)					Total, n (%)
	Physician	Intern	Nurse	Midwife	Other*	
Gender (n=1134)						
Male	157 (62.3)	58 (47.2)	175 (38.6)	44 (37.6)	103 (54.5)	537 (47.4)
Female	95 (37.7)	65 (52.8)	278 (61.4)	73 (62.4)	86 (45.6)	597 (52.6)
Age group (years) (n=982)						
20-29	101 (45.9)	99 (91.7)	220 (57.0)	80 (79.2)	69 (41.3)	569 (57.9)
30-39	106 (48.2)	8 (7.4)	119 (30.8)	14 (13.9)	70 (41.9)	317 (32.3)
≥40	13 (5.9)	1 (0.9)	47 (12.2)	7 (6.9)	28 (16.8)	96 (9.8)
Mean (±SD)	31.0 (±5.6)	25.6 (±3.3)	30.7 (±6.5)	28.3 (±5.7)	32.6 (±7.5)	30.3 (±6.4)
Median (Range)	30.0 (22-70)	25.6 (22-45)	30.7 (22.57)	28.3 (22-52)	32.3 (23-60)	30.3 (22-70)
Department/Unit (n=1134)						
Gyn&Ob	27 (10.7)	31 (25.2)	36 (7.9)	97 (82.9)	4 (2.1)	195 (17.2)
Surgical	43 (17.1)	31 (25.2)	65 (14.3)	2 (1.7)	16 (8.5)	157 (13.8)
Pediatrics	39 (15.5)	35 (28.5)	71 (15.7)	2 (1.7)	4 (2.1)	151 (13.3)
Medical	62 (24.6)	17 (13.8)	62 (13.7)	0.0	6 (3.2)	147 (13.0)
OPD/Screening/Triage	16 (6.3)	2 (1.6)	83 (18.3)	6 (5.1)	37 (19.6)	144 (12.7)
Emergency	28 (11.1)	4 (3.3)	34 (7.5)	10 (8.5)	19 (10.1)	95 (8.4)
Anesthesia/OR/IC	12 (4.8)	1 (0.8)	66 (14.6)	0.0	14 (7.4)	93 (8.2)
Other***	25 (9.9)	2 (1.6)	36 (7.9)	0.0	89 (47.1)	152 (13.4)
Hospital (n=1134)***						
TASH	79 (31.3)	17 (13.8)	128 (28.3)	19 (16.2)	40 (21.2)	283 (25.0)
ZMH	39 (15.5)	36 (29.3)	54 (11.9)	15 (12.8)	33 (17.5)	177 (15.6)
GMH	17 (6.7)	7 (5.7)	51 (11.3)	21 (17.9)	19 (10.1)	115 (10.1)
Y12HMC	35 (13.9)	12 (9.8)	48 (10.6)	15 (12.8)	42 (22.2)	152 (13.4)
MH	39 (15.5)	29 (23.6)	68 (15.0)	20 (17.1)	18 (9.5)	174 (15.3)
SPHMMC	43 (17.1)	22 (17.9)	104 (23.0)	27 (23.1)	37 (19.6)	233 (20.5)
Work experience (n=938)						
<5	167 (79.5)	84 (90.3)	168 (44.0)	65 (67.0)	68 (43.6)	552 (58.8)
5-9	33 (15.7)	7 (7.5)	160 (41.9)	25 (25.8)	53 (34.0)	278 (29.6)
10-14	5 (2.4)	2 (2.2)	29 (7.6)	4 (4.1)	21 (13.5)	61 (6.5)
15-34	15 (2.4)	0.0	25 (6.5)	3 (3.1)	14 (9.0)	47 (5.0)
Total, n (%)	252 (22.2)	123 (10.8)	453 (39.3)	117 (10.3)	189 (16.7)	1134 (100)

226 *Other: Includes anesthetist, pharmacist, health officer, lab technologist and radiographer.

227 **Other: Includes Isolation room/ward, Pharmacy, Oncology, etc.

228 ***TASH: Tikur Anbessa Specialized Hospital; ZMH: Zewditu Memorial Hospital; GMH:Ghandi Memorial Hospital; Y12HMC: Yekatit 12

229 Hospital Medical College; MH: Menelik II Hospital; SPHMMC: St. Paul Hospital Millennium Medical College.

230

231 COVID-19 preventive practices

232 The self-reported prevalence of different preventive measures practiced by healthcare
 233 professionals to prevent themselves from coronavirus infection is shown in Table 2. The overall
 234 highest practice showed among healthcare participants were wearing facemask (93%), hand
 235 washing for at least 20 seconds (92.7%), covering mouth and nose when coughing or sneezing
 236 (90.9%), and avoiding touching eyes, nose, and mouth with unwashed hands (90.5%). These
 237 measures were commonly reported (>90%) for physicians, intern doctors, nurses and other

238 healthcare professionals except the midwives who reported <90%. A lower percentage of self-
239 reported practices were observed in physical distancing (84.3%), the use of disinfecting surfaces
240 (76.1%), and staying home when feeling cold or sick (64.6%), with similar pattern across the
241 different categories of healthcare workers.

242 Table 2. Self-reported prevalence of preventive measures practiced by healthcare professionals to
243 prevent coronavirus infection by professional category (n=1134)

Variable	Professional category, %					Total, %
	Physician	Intern	Nurse	Midwife	Other*	
Wearing face mask	95.6	95.9	90.9	89.7	94.7	93.0
Hand washing for at least 20 seconds	95.2	95.1	90.9	88.9	94.2	92.7
Covering your mouth and nose when you cough or sneeze	93.7	96.7	89.0	87.2	90.5	90.9
Avoiding touching your eyes, nose, and mouth with unwashed hands	90.9	92.7	90.1	88.0	91.0	90.5
Use of disinfectants to clean hands when water and soap was not available for washing hands	92.9	93.5	83.9	83.8	90.5	88.0
Physical distancing	84.1	85.4	85.9	79.5	83.1	84.3
Disinfecting mobile phone	84.2	82.1	83.4	84.6	83.6	83.6
Disinfecting surfaces	73.0	73.2	79.0	74.4	76.2	76.1
Staying home when you were sick or when you had a cold	63.1	65.9	66.9	61.5	62.4	64.6
Total, n (%)	252 (22.2)	123 (10.8)	453 (39.3)	117 (10.3)	189 (16.7)	1134 (100)

244
245 This study also investigated the attitude of the healthcare workers with regard to which group of
246 people they recommend to use a facemask or N95 respirator. The vast majority of the respondents
247 (94.8%) recommended the use of a facemask by all healthcare professionals, all healthy people to
248 protect themselves from coronavirus infection (90.1%), and people with close contact with
249 suspected or confirmed COVID-19 (88.8%). About 87% of all respondents suggested that N95
250 respirator should be used by all healthcare professionals as well as by people who are being in

251 close contact with suspected or confirmed COVID-19 patients. About five in 10 (48%) of the
252 respondents recommended the use of N95 respirator by healthy people to protect themselves
253 against coronavirus infection. About 65% and 48% of the respondents from TASH and SPHMMC,
254 respectively, recommended the use of N95 respirator for all healthy people to protect themselves
255 from COVID-19.

256

257 **Exposure and preparedness in providing care to COVID-19 and other infectious disease
258 outbreaks**

259 Only about one-third (30.7%) of the study participated reported that they ever participated in direct
260 clinical care to patients affected by infectious disease outbreaks such as Ebola, SARS and cholera.
261 Nearly three in 10 (28.9%, n=328) respondents reported that they ever provided direct clinical care
262 to at least one suspected/confirmed COVID-19 patient, with 39.1% participants from SPHMMC,
263 34.5% from MH and 31.1% from TASH. Regarding the level of preparedness of healthcare
264 professionals to provide direct clinical care to COVID-19 patients, 33.6% (n=381) reported that
265 they were prepared to provide direct clinical care to COVID-19 patients. In contrast, about two-
266 third (66.4%) of the healthcare workers reported that they were not prepared to manage COVID-
267 19 patients.

268

269 ***Risk perception of healthcare professionals due to their role in the COVID-19 pandemic***

270 The study participants were asked questions about their personal health, potential risks of
271 becoming infected with COVID-19 or the potential risks to their families and loved ones due to
272 their clinical role in the hospital. About 30% and 43% of the participants somewhat or strongly
273 worried, respectively, that their personal health is at risk during the COVID-19 pandemic due to
274 their role in the hospital (Table 3). Nevertheless, 6% and 13.5% of respondents reported that they

275 somewhat not worried or even not worried at all that their personal health was not at risk due to
276 COVID-19. About 38% and 50% of all respondents perceived that they were somewhat worried
277 or extremely worried about themselves, respectively, due to the potential risk of becoming infected
278 with coronavirus by their clinical role in the hospital setting these days, with only 5.6% perceived
279 that they were not worried about the risk of being infected with the virus. Majorities of the
280 respondents (64.4%) extremely worried about the potential risk of infection to their family and
281 loved ones, and the remaining 26.7% were somewhat worried. Only 4.4% of the respondents were
282 not worried about the risk of COVID-19 to their family and loved ones.

283
284 Table 3. Healthcare professional's worry about their clinical role in the hospital during COVID-19
285 by professional category (n=3 items)

Variable	Professional category, %				
	Physician (n=244)	Intern (n=120)	Nurse (n=431)	Midwife (n=108)	Other* (n=181)
How worried are you about your personal health due to your role in the hospital during COVID-19 pandemic?					
Extremely worried	47.1	50.0	39.7	40.7	42.0
Somewhat worried	35.2	27.5	25.5	28.7	37.0
Average	4.9	8.3	9.5	6.5	5.5
Somewhat not worried	3.7	5.0	7.9	7.4	4.4
Not worried at all	9.0	9.2	17.4	16.4	11.0
How worried are you about the potential risk of becoming infected with COVID-19 due to your role in the hospital?					
Extremely worried	47.1	56.7	48.5	58.3	46.4
Somewhat worried	47.5	35.0	34.8	29.6	40.3
Average	3.3	6.7	8.6	5.6	6.6
Somewhat not worried	2.0	1.7	5.1	2.8	4.4
Not worried at all	0.0	0.0	3.0	3.7	2.2
How worried are you about the potential risk COVID-19 to your family, loved ones or others due to your role in the hospital?					
Extremely worried	66.8	75.8	61.9	63.0	60.2
Somewhat worried	29.5	19.2	25.5	28.7	29.3
Average	2.5	4.2	7.4	4.6	5.0
Somewhat not worried	0.4	0.8	3.2	2.8	2.8
Not worried at all	0.8	0.0	1.9	0.9	2.8

286

287 The study participants were asked 12 questions to quantify their fears and worries (risk perception)
288 about COVID-19 crisis, on a 3-point scale, where 1=don't worry at all, 2=worry somehow and
289 3=worry a lot. Of the total 1134 study participants, 952 (84%) had complete responses on all the
290 12-items for computing the total score. About 66% of the respondents reported that they worried
291 a lot about losing someone due to COVID-19, 66.7% worried a lot about the health of their loved
292 ones, and 67.5% worried a lot about the health system being overloaded by the patients of COVID-
293 19, followed by a lot of worries about the economic recession in the country (58%), and restricted
294 access to food supplies (56.1%) (Table 4). The study also revealed that there were respondents
295 who were ambivalent or didn't worry at all about COVID-19 crisis.

296

297

298 Table 4. Healthcare professional's fears and worries about COVID-19 crisis by hospital (n=12 items)

299

Fear and worry question	Professional category, %					Total, % (n=952)
	Physician (n=221)	Intern (n=110)	Nurse (n=374)	Midwife (n=95)	Other* (n=152)	
Loosing someone I love						
Don't worry at all	7.2	10.0	12.6	15.8	12.5	11.3
Worry somehow	25.3	19.1	21.1	22.1	23.7	22.4
Worry a lot	67.4	70.4	66.3	62.1	63.8	66.3
Health system being overloaded						
Don't worry at all	7.7	5.5	8.8	9.5	9.2	8.3
Worry somehow	17.2	30.0	24.1	29.5	27.0	24.2
Worry a lot	75.1	64.5	67.1	61.1	63.8	67.5
My own mental health						
Don't worry at all	19.9	30.0	22.2	21.1	25.0	22.9
Worry somehow	44.8	30.9	35.6	37.9	36.2	37.5
Worry a lot	35.3	39.1	42.2	41.1	38.8	39.6
My own physical health						
Don't worry at all	11.8	12.7	17.4	11.6	17.8	15.0
Worry somehow	45.2	40.9	38.8	45.3	38.2	41.1
Worry a lot	43.0	46.4	43.9	43.2	44.1	43.9
My loved ones' health						
Don't worry at all	12.7	8.2	10.2	10.5	9.2	10.4
Worry somehow	21.3	14.5	26.5	26.3	20.4	22.9
Worry a lot	66.1	77.3	63.4	63.2	70.4	66.7
Restricted liberty of movement						
Don't worry at all	13.6	18.2	12.8	13.7	13.2	13.8
Worry somehow	44.8	41.8	43.9	43.2	49.3	44.6
Worry a lot	41.6	40.0	43.3	43.2	37.5	41.6
Small companies running out of business						
Don't worry at all	10.9	13.6	14.2	16.8	12.5	13.3
Worry somehow	50.2	50.0	37.2	35.8	38.2	41.7
Worry a lot	38.9	36.4	48.7	47.4	49.3	45.0
Economic recession in my country						
Don't worry at all	7.7	7.3	9.1	7.4	10.5	8.6
Worry somehow	37.1	47.3	29.7	36.8	25.0	33.4
Worry a lot	55.2	45.5	61.2	55.8	64.5	58.0
Restricted access to food supplies						
Don't worry at all	11.3	5.5	9.9	6.3	8.6	9.1
Worry somehow	37.1	35.5	31.6	36.8	37.5	34.8
Worry a lot	51.6	59.1	58.6	56.8	53.9	56.1
Becoming unemployed						
Don't worry at all	51.1	27.3	25.4	22.1	28.9	31.8
Worry somehow	19.5	27.3	32.9	32.6	26.3	28.0
Worry a lot	29.4	45.5	41.7	45.3	44.7	40.1
Not being able to pay my bills						
Don't worry at all	30.8	23.6	18.2	17.9	17.1	21.5
Worry somehow	37.1	33.6	42.2	43.2	41.4	40.0
Worry a lot	32.1	42.7	39.6	38.9	41.4	38.4
Unable to visit people who depend on me						
Don't worry at all	10.9	14.5	8.8	4.2	12.5	10.1
Worry somehow	32.6	29.1	34.8	40.0	27.6	33.0
Worry a lot	56.6	56.4	56.4	55.8	59.9	56.9

300

301 An overall fear and worry index about COVID-19 was created using 12 questions. The overall
302 score for the scale was calculated by summing up the score of all questions (from 12 to 36). The
303 higher the score, the greater the fear and worry of the COVID-19. Table 5 presents the mean scores
304 for each and the overall worry indicators of COVID-19 crisis by professional category. Overall,
305 the participants reported an average of moderate-to-high levels of COVID-19 worry (2.37) on each
306 item, ranging from 2.1 on 'becoming unemployed' to 2.6 on 'losing someone they love', 'health
307 system being overloaded' and 'someone's loved health'. The overall average worry score of the
308 12 items for the COVID-19 crisis was high, with a mean (\pm SD) of 28.4 (\pm 5.9), ranging from 12 to
309 36. The total average fear and worry scores for the hospitals ranged from 25.6 (\pm 6.8) at TASH to
310 31.3 (\pm 5.0) at GMH; and was further categorized into three levels i.e. low, moderate, and high fear
311 and worry level. Figure 1 shows the pattern of the total fear and worry scores of COVID-19 crisis,
312 and about 56% of respondents from TASH showed a relatively low fear and worry score compared
313 to the highest (50.9%) fear and worry score reported by participants from GMH.

314

315

316 Table 5. Mean fear and worry scores of healthcare professionals about COVID-19 crisis by
317 professional category (n=12 items)

318

COVID-19 worry items	Professional category, Mean (SD)*					Mean (SD) (n=952)
	Physician (n=221)	Intern (n=110)	Nurse (n=374)	Midwife (n=95)	Other* (n=152)	
Losing someone I love	2.6 (0.6)	2.6 (0.7)	2.5 (0.7)	2.5 (0.8)	2.5 (0.7)	2.6 (0.7)
Health system being overloaded	2.7 (0.6)	2.6 (0.6)	2.6 (0.6)	2.5 (0.7)	2.6 (0.7)	2.6 (0.6)
My own mental health	2.2 (0.7)	2.1 (0.8)	2.2 (0.8)	2.2 (0.8)	2.1 (0.8)	2.2 (0.8)
My own physical health	2.3 (0.7)	2.3 (0.7)	2.3 (0.7)	2.3 (0.7)	2.3 (0.7)	2.3 (0.7)
My loved one's health	2.5 (0.7)	2.7 (0.6)	2.5 (0.7)	2.5 (0.7)	2.6 (0.7)	2.6 (0.7)
Restricted liberty of movement	2.7 (0.7)	2.2 (0.7)	2.3 (0.7)	2.3 (0.7)	2.2 (0.7)	2.3 (0.7)
Companies running out of business	2.3 (0.7)	2.2 (0.7)	2.4 (0.7)	2.3 (0.7)	2.4 (0.7)	2.3 (0.7)
Economic recession in my country	2.5 (0.6)	2.4 (0.6)	2.5 (0.7)	2.5 (0.6)	2.5 (0.7)	2.5 (0.7)
Restricted access to food supplies	2.4 (0.7)	2.5 (0.6)	2.5 (0.7)	2.5 (0.6)	2.6 (0.6)	2.5 (0.7)
Becoming unemployed	1.8 (0.9)	2.2 (0.8)	2.2 (0.8)	2.2 (0.8)	2.2 (0.8)	2.1 (0.8)
Not being able to pay my bills	2.0 (0.8)	2.2 (0.8)	2.2 (0.7)	2.2 (0.7)	2.2 (0.7)	2.2 (0.8)
Not able to visit people	2.5 (0.6)	2.4 (0.7)	2.5 (0.7)	2.5 (0.6)	2.5 (0.7)	2.5 (0.7)
Overall mean (SD)	27.9 (5.9)	28.5 (5.6)	28.7 (6.1)	28.6 (5.8)	28.6 (5.7)	28.4 (5.9)

319 *Numbers in parentheses represent standard deviations.

320

321

322 Fig. 1. Pattern of fear and worry scores of COVID-19 crises by hospital

323

324 The total fear and worry scores of COVID-19 was finally changed into binary using the Visual
325 Binning in SPSS (low fear/worry ≤ 29 and high fear/worry > 29 score). Table 6 shows the results
326 of bivariate and multivariable logistic regression analyses of predictors associated with
327 respondents mean scores of fears and worries about COVID-19 crisis. In the bivariate analyses
328 departments/units and the hospitals were significantly associated with fear and worry scores of
329 COVID-19 crises. Nurses were 1.52 times more likely to report fear and worry (OR=1.52, 95%
330 CI:1.09-2.13, $P<0.015$), and healthcare workers who ever participated in clinical care to Ebola,
331 SARS and cholera patients were 0.67 times less likely to report fear and worry due to COVID-19
332 crisis (OR=1.67, 95% CI:0.51-0.88, $P<0.005$).

333

334 Table 6. Factors associated with worries about COVID-19 crisis in the study population using
 335 multiple logistic regression analyses (n=952)

336

Predictor	Fear and worry level, n (%)		Crude OR (95% CI)*	P-value	Adjusted OR (95% CI)	P-value
	Low (≤ 29)	High (> 29)				
Gender						
Male	255 (55.8)	202 (44.7)	0.84 (0.65-1.09)	0.186	0.96 (0.73-1.28)	0.792
Female	255 (51.5)	240 (48.5)	1.0		1.0	
Professional category						
Physician	131 (59.3)	90 (40.7)	1.0		1.0	
Intern	61 (55.4)	49 (44.5)	1.17 (0.74-1.86)	0.507	0.78 (0.47-1.30)	0.336
Nurse	183 (48.9)	191 (51.1)	1.52 (1.09-2.13)	0.015	1.33 (0.91-1.93)	0.139
Midwife	54 (56.8)	41 (43.2)	1.11 (0.68-1.80)	0.687	0.69 (0.37-1.26)	0.226
Other***	81 (53.3)	71 (46.7)	1.28 (0.84-1.94)	0.252	1.37 (0.83-2.24)	0.218
Department/Unit						
Gyn&Ob	78 (45.9)	92 (54.1)	1.0			
Surgical	75 (59.1)	52 (40.9)	0.59 (0.37-0.94)	0.025	0.65 (0.37-1.16)	0.142
Pediatrics	69 (51.9)	64 (48.1)	0.79 (0.50-1.24)	0.300	0.82 (0.47-1.44)	0.492
Medical	74 (60.2)	49 (39.8)	0.56 (0.35-0.90)	0.016	0.63 (0.35-1.13)	0.119
OPD/Screening/Triage	57 (47.9)	62 (52.1)	0.92 (0.58-1.48)	0.735	0.84 (0.47-1.50)	0.546
Emergency	55 (68.8)	25 (31.3)	0.39 (0.22-0.68)	0.001	0.40 (0.21-0.77)	0.006
Anesthesia/OR/IC	31 (40.8)	45 (59.2)	1.23 (0.71-2.13)	0.458	1.11 (0.57-2.16)	0.761
Other***	71 (57.3)	53 (42.7)	0.63 (0.40-1.01)	0.055	0.52 (0.28-0.96)	0.0.8
Hospital						
TASH	154 (68.8)	70 (31.1)	0.44 (0.30-0.66)	<0.001	0.49 (0.32-0.75)	0.001
ZMH	64 (45.1)	78 (54.9)	1.18 (0.77-1.82)	0.448	1.34 (0.85-2.11)	0.209
GMH	38 (33.9)	74 (66.1)	1.89 (1.17-3.06)	0.009	1.87 (1.10-3.18)	0.020
Y12HMC	88 (62.2)	45 (33.8)	0.50 (0.34-0.78)	0.003	0.52 (0.32-0.84)	0.008
MH	69 (47.9)	75 (52.1)	1.05 (0.69-1.62)	0.809	1.12 (0.72-1.75)	0.607
SPHMMC	97 (49.2)	100 (50.8)	1		1	
Prepared to provide direct care to COVID-19 cases						
Yes	165 (49.5)	168 (50.5)	1.28 (0.98-1.67)	0.068	1.04 (0.78-1.40)	0.776
No	345 (55.7)	274 (44.3)	1.0		1.0	
Ever provided clinical care to suspected/confirmed COVID-19 patients						
Yes	147 (50.3)	145 (49.7)	1.21 (0.92-1.59)	0.184	1.34 (1.02-1.91)	0.037
No	363 (55.0)	297 (45.0)	1.0		1.0	
Ever participated in clinical care to Ebola, SARS and cholera patients						
Yes	181 (60.3)	119 (39.7)	0.67 (0.51-0.88)	0.005	0.66 (0.48-0.90)	0.009
No	329 (50.5)	323 (49.5)	1.0		1.0	

337

338 In the multivariable logistic regression analyses, hospitals retained the statistical significance for
 339 the fear and worry score, where respondents from TASH (adjusted OR=0.49, 95% CI:0.32-0.75,
 340 $P=0.001$) and Y12HMC (adjusted OR=0.52, 95% CI:0.32-0.84, $P=0.008$) were less likely to report

341 fear and worry about COVID-19 crisis (Table 6). In contrast, respondents from GMH were more
342 likely to fear and worry for COVID-19 crisis (adjusted OR=1.77, 95% CI:1.10-3.18) than those
343 from the SPHMMC respondents. Healthcare professionals ever provided clinical care to suspected/
344 confirmed COVID-19 patients were 1.34 times more likely to report fear and worry due to COVID-
345 19 crises (OR=1.34, 95% CI:1.02-1.91, $P=0.037$), however respondents who ever participated in
346 clinical care to Ebola, SARS and cholera patients were 0.66 times less likely to report fear and
347 worry due to COVID-19 crisis (OR=0.66, 95% CI:0.48-0.90, $P=0.009$). Gender, professional
348 category and preparedness to provide direct care to COVID-19 patients did not appear significant
349 in the multivariable logistic regression model to predict the odds of fear and worry score for
350 COVID-19 crisis.

351

352 **Discussion**

353 Since its emergence in December 2020, the COVID-19 pandemic is a global public health concern
354 and the most current topic of discussion across every facet of life, especially among the healthcare
355 professionals and patients. This study was conducted in Addis Ababa city during 09-26 June 2020,
356 three months after detection of the first confirmed case of COVID-19 in Ethiopia. Addis Ababa
357 city is the most affected part in the country. The study aimed to assess the risk perceptions and
358 protective behaviors of COVID-19 among healthcare professionals in the city. Our study
359 participants include medical doctors, interns, nurses, midwives, pharmacists, medical laboratory
360 technologists, and technicians. These categories of healthcare professionals have direct or indirect
361 close personal exposures with suspected or confirmed COVID-19 patients while performing their
362 clinical duties.

363

364 The overwhelming majority of the participants in our study reported a high level of practice
365 towards the prevention of COVID-19 infection particularly regarding using facemask, hand
366 washing for at least 20 seconds, covering mouth and nose when coughing or sneezing, and
367 avoiding touching eyes, nose, and mouth with unwashed hands as far as possible. This finding is
368 consistent with the finding of a similar study conducted in China, where the risk of spread of
369 COVID-19 has largely improved the infection prevention and control behaviors of healthcare
370 professionals working in hospitals [18]. In a study conducted in Egypt, hand washing, refraining
371 from touching eyes, mouth and nose, and using surgical facemask were the most frequently
372 accepted preventive measures among health workers [19]. The WHO recommends the use of
373 primary preventive measures that includes regular hand washing, social distancing, and respiratory
374 hygiene (covering mouth and nose while coughing or sneezing) by healthcare workers in order to
375 prevent the spread of the virus among themselves and patient's close contacts [20].

376

377 Studies conducted during the early stage of the pandemic revealed that healthcare workers had
378 insufficient knowledge about COVID-19 pandemic to protect themselves from coronavirus
379 infection [21]. In one study in Greece, only 25% of healthcare practitioners washed their hands
380 after touching a patient, despite the fact that 94% of the respondents knew that SARS-CoV-2
381 transmission could be reduced with hand washing [22]. Although hand washing is recommended
382 for the general public in order to prevent the transmission of COVID-19, hand hygiene is
383 mandatory for health care practitioners, in order to prevent infections, both for oneself and for the
384 patients [23]. In the present study, the use of facemask was reported to be 93%. A recent study
385 conducted in Addis Ababa just before our study revealed that about two-third of the healthcare
386 workers demonstrated a poor practice of facemask utilization [24]. Similar results were reported

387 in North-East India that majority of the healthcare workers (91%) reported that they used surgical
388 masks, 97% were using hand sanitizer and 97% participants were properly using hand hygiene
389 [25].

390
391 In the present study, the majority of the study participants recommended mask-wearing by all
392 healthcare professionals, all healthy people to protect themselves from coronavirus infection, and
393 people with close contact with suspected or confirmed COVID-19. Similarly, about 87% of the
394 respondents suggested that N95 respirator should be used by all healthcare professionals as well
395 as by people who are being in close contact with suspected or confirmed COVID-19 patients. In
396 Pakistan, 71% of the healthcare workers believed that wearing general medical masks was
397 protective against COVID-19 [26], and studies also suggested that surgical masks are similarly as
398 effective as N95 respirators if used with hand wash and other infection prevention precautions
399 [27]. However, a rapid systematic review on the efficacy of facemasks and respirators against
400 coronaviruses and other respiratory transmissible viruses reported that continuous use of
401 respirators is more protective compared to the medical masks, and medical masks are more
402 protective than cloth masks among health workers in healthcare settings [28].

403
404 This study demonstrated that about one-third of all respondents in our study either participated in
405 direct clinical care to patients affected by an infectious disease outbreak (e.g., Ebola virus, SARS,
406 cholera, Zika virus) (31%) or provided direct clinical care at least for one suspected or confirmed
407 COVID-19 patients (29%) during the current COVID-19 epidemic. This percentage is higher from
408 other studies on this subject in the early days of the COVID-19 outbreak in China [29]. A
409 significant number (38%) of healthcare professionals in the current study expressed lack of or low
410 level of preparedness to manage suspected or confirmed COVID-19 patients. This raises a concern

411 regarding the ability and confidence of the healthcare workers to combat COVID-19 infection.
412 Despite these concerns, along with the shortage of PPE and inadequate training during the COVID-
413 19, the healthcare workers continue to work with the management of suspected or confirmed
414 COVID-19, working in the hospital setting where COVID-19 patients were admitted, risking their
415 lives to save their patients. However, this could highlight the risk of infection among healthcare
416 workers and cross-contamination within hospitals and could lead to a higher rate of hospital-
417 acquired infections. Therefore, our study provides considerable insights into the necessity of
418 immediate and determined efforts focused on training programs and providing an adequate supply
419 of PPE to ensure the safety of health personnel during the COVID-19 pandemic [30].

420
421 In the present study, about 88% of the healthcare professionals were afraid of being infected with
422 the disease and about 91% were worried about the potential risk of transmitting the virus to their
423 family and loved ones. The risk of contracting the virus was perceived to be very high at the time
424 of the study. Healthcare workers expressed worry and fear of infection due to the contagious nature
425 of the virus, close contact with suspected and confirmed COVID-19 patients, and infection
426 happening to their family and colleagues. In Iran, it was found that about 92% of the healthcare
427 workers worried about being infected with the virus and transmitting it to the family [31]. In a
428 study conducted in Henan province of China, 89% of healthcare workers had sufficient knowledge
429 of COVID-19, 85% were concerned about infection with the virus, and 90% followed correct
430 practices regarding the prevention of COVID-19 [32]. About 83% of the healthcare workers in
431 Egypt reported increased risk perception because of the concern of being infected with COVID-
432 19 and fear of transmitting the disease to their families, and 89% stated that they were more
433 susceptible to COVID-19 infection mainly due to the shortage of PPE [19].

434

435 In the current study, the overall risk perception expressed in fear and worry score of the study
436 participants regarding COVID-19 crisis was considerably higher, with a mean of 28, ranging from
437 12 to 36. Various studies have reported the psychological impact of COVID-19 on healthcare
438 professionals [33]. A recent scoping review found that the frontline healthcare workers are at an
439 increased risk of direct physical and mental consequences as the result of providing care to patients
440 with COVID-19 [34]. Studies demonstrated that more than 50% of healthcare professionals report
441 symptoms of depression, insomnia, and anxiety due to COVID-19 [35]. A recent study carried out
442 in Pakistan on fear and anxiety among healthcare professionals reported that about three-fourth of
443 them had fear of getting infected during the management of COVID-19 patients, and another two-
444 third reported severe anxiety, which was particularly more common among nurses [36]. Studies
445 also reported excessive workload, isolation, mental stress and discrimination among frontline
446 health professionals, thus, contributing to physical exhaustion, emotional disturbance, worry and
447 fear [37]. A Cochrane review reported the suffering of healthcare workers from work-related or
448 occupational stress, which can be reduced by cognitive-behavioral training as well as mental and
449 physical relaxation [38]. A multicenter study conducted among frontline nurses in China showed
450 poor mental health during the COVID-19 outbreak, mainly due to the fear of contracting the virus
451 and high workload [39]. Moreover, the same study revealed that nurses who were confident in
452 their infection control knowledge and skills had lower stress levels than those who felt less
453 prepared.

454

455 Finally, this study had several limitations. First, the study had a potential to be affected by selection
456 bias and eligible participants might be excluded. Second, this study was conducted in six public
457 hospitals in Addis Ababa, and may possibly limit the generalization of the results and findings to
458 other public and private hospitals. Third, the study focused on more general populations of

459 healthcare professionals similar to other studies [32,40] rather than healthcare workers who might
460 have direct contact with COVID-19 patients [41]. Finally, the results of this study are based on
461 self-reported data, and the respondents may overestimate or underestimate the responses in a way
462 that they believe is socially acceptable rather than reporting actual or genuine answers. Despite
463 these limitations, the results obtained provide important information to guide health
464 communication efforts that can support prevention efforts of COVID-19 among healthcare
465 professionals.

466

467 **Conclusions**

468 In conclusion, our study has illuminated the current level of risk perception and preventive
469 practices of COVID-19 among healthcare professionals, with a special focus on those working in
470 the clinical departments of the hospitals who have direct or indirect contact with COVID-19
471 patients. The present study findings demonstrated that healthcare professionals participated in the
472 study showed a universally higher preventive practices to prevent COVID-19 infections. The
473 healthcare workers perceived high level of COVID-19 risk particularly due to shortage of PPE,
474 and majority reported that they didn't receive any training in infection prevention and control
475 measures since COVID-19, although they had adequate level of practice to protect themselves
476 from the infection of novel coronavirus. Likewise, majority of the participants reported that they
477 worried about the potential risk of becoming infected with COVID-19 and transmitting the disease
478 to their family. The present study also was able to identify factors associated with fear and worry
479 related to COVID-19 crisis in order to address them during the implementation of risk
480 communication programs with the public and healthcare during the current COVID-19 pandemic.

481

482

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487

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489 Ethical clearance was obtained from the Institutional Review Board of the College of Health
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496

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506 All the authors read and approved the final manuscript.

507

508 **Competing interests**

509 The authors declare no competing interests.

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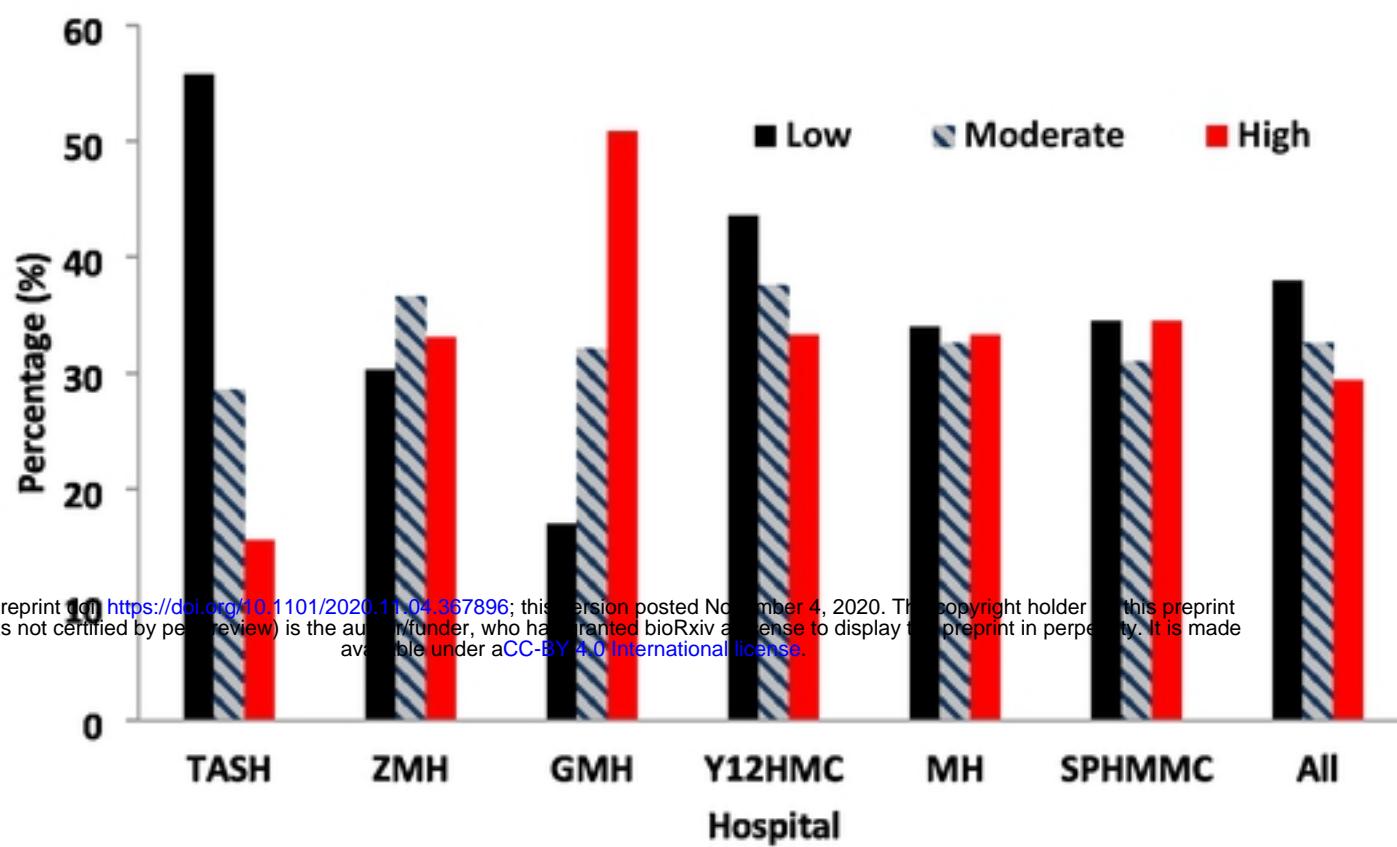


Fig. 1. Pattern of fear and worry scores of COVID-19 crises by hospital

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