

Major Factors affecting Health and Safety of Healthcare Workers During Covid-19 Pandemic

Bedasa Gidisa^{1,2*}, Bezatu Mengistie², Bacha Mekonnin¹, Dejene Getachew¹, Ayele Bizuneh¹

¹Ethiopian Public Health Institute, Addis Ababa, Ethiopia.

²Saint Pauls' Hospital Millennium Medical College, School of Public Health, Addis Ababa, Ethiopia.

*Corresponding author

Bedasa Gidisa, Ethiopian Public Health Institute, Addis Ababa, Ethiopia And Saint Pauls' Hospital Millennium Medical College, School of Public Health, Addis Ababa, Ethiopia.

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Abstract

Introduction: Healthcare workers around the world are at risk of contracting an infectious disease including the recent Coronavirus Disease 19 epidemic which had a profound effect, especially on hospitals and health workers. However, at the national level in Ethiopia, there is a lack of data on the current state of health and safety of health care professionals. Therefore, the purpose of this study was to determine the status and the health and safety of healthcare workers in public hospitals in the continued COVID-19 pandemic.

Objective: The purpose of this study was to determine the status of health and safety of healthcare workers and associated factors, at selected public hospitals in Addis Ababa in the continued Coronavirus Disease 19 pandemic.

Methodology: An institution based cross-sectional study was conducted From January 1 to January 30, 2022, for 360 participants. A simple random technique was used to select study participants. Data were collected using self-administered questioners and entered into EPI info version 3.1 before being exported to SPSS Software (version 23) for analysis. Logistic regression was used to identify significant variables and control confounding factors. The strength of the association was measured using an adjusted odds ratio with a 95 percent confidence interval at a 5% level of significance. A P-value < 0.05 indicated a significant relationship between factors.

Result: Out of a total of 360 study participants, 73.6% (95%Confidence Interval [CI]=68.9–78.3) had good occupational health and safety status. Work experiences(Adjusted Odds Ratio [AOR] =1.8, 95%Confidence Interval[CI]=1.12–3.2), Availability of Proper facemasks, (Adjusted Odds Ratio [AOR] =3, 95%Confidence Interval[CI]: 1.7–5.2), availability of disinfectants (Adjusted Odds Ratio [AOR] =2, 95%Confidence Interval[CI]=1.11–3.7), availability of water and handwashing facilities (Adjusted Odds Ratio [AOR] =2, 95%Confidence Interval[CI]=1.1–3.4), training on health and safety (Adjusted Odds Ratio [AOR]=1.8, 95%Confidence Interval[CI]=1.13–3.2) were significantly associated with health and safety status of health care workers.

Conclusion: The findings indicated that health and safety status was generally good in the study area. Availability of personal protective equipment, availability of water and handwashing facilities, availability of cleaning and disinfectants, and provision of health and safety training were predictors favoring good OHS status for health professionals. Ministry of Health and specific policy makers should formulate health and safety policy and monitoring and evaluation health and safety in HCF should be implemented

Keywords: Occupational Health, Safety, Infection Prevention, Covid-19, Healthcare Professional.

Introduction

Health care workers (HCW) around the world are at risk of contracting infectious diseases during work.[1] COVID-19 has underlined this concern, particularly in the early stages of the pandemic, when many health care facilities lack personal protective equipment (PPE).[2] HCWs continue to offer patient care in various situations around the world, even if they are afraid of becoming infected and infecting their family, friends, patients, and coworkers[3-5]. Because African countries, including Ethiopia, have limited health care facilities and lack individual protection equipment to prevent the pandemic, the stress of the COVID-19 risks for health professionals in Africa is significant[2,6]. SARS-CoV-2 infection is more likely in healthcare workers that work close in proximity to patients, such as ophthalmologists and dentists [7]. While people are encouraged to stay at home to prevent the diseases from spreading, healthcare workers must keep working, even though of the fact that their lengthy shifts expose them to infection. Many hospitals report mental and physical stress, as well as difficulty handling so many sick patients, an increase in mortality in general, and the deaths of their colleagues[5,8,9].

Little is said about the occupational health and safety of health care workers in Ethiopia, particularly in Addis Ababa. The busiest hospitals in the country are Saint Paul's Hospital Millennium Medical College and Ras Desta Memorial Hospital, which both act as referral hospitals. The health and safety of health care workers, safety risks, control measures, and safety practices of health care workers should be assessed in the continued COVID-19 pandemic in selected public hospitals, in Addis Ababa, Ethiopia. As a result, the goal of this study was to determine the health and safety status and associated factors in selected public hospitals, during the COVID-19 Pandemic.

Methods and Materials

Study Design and Period

An institutional-based cross-sectional study was undertaken from January 1 to January 30, 2022.

Study Setting

The study settings were Ras Desta Memorial Hospital and Saint Paul's Hospital Millennium Medical College, which are Public Referral Hospitals found in Addis Ababa, Ethiopia. Therefore, the research was carried out among health care workers in selected Hospitals. The Ras Desta Damtew Memorial Hospital is found under the Addis Ababa City Administration, and the hospital currently features a medical facility that provides health care services to both inpatients and outpatients. Currently, the hospital employs roughly 560 people, with 425 of them being health professionals, including 226 nurses, 88 doctors, and 5 pharmacists.

Saint Paul's Hospital, Millennium Medical College is an Addis Ababa-based referral hospital run by the Ethiopian Federal Ministry of Health. Saint Paul's Hospital, Millennium Medical College, is a teaching health institution as well as a health care provider. The hospital currently has 932 beds and treats 2310 new

and 4065 return patients per month on average. It has 2045 health professionals.

Source of Population

The sources of the population were all health care workers working at Ras Desta Memorial Hospital and Saint Paul's Hospital, Millennium Medical College in Addis Ababa during data collection.

Study Population

Study participants were health care workers who were selected by using a simple random sampling technique based on the proportion of each hospital's owner.

Inclusion and Exclusion Criteria

Inclusion Criteria

During the data collection period, health professionals working at Ras Desta Memorial Hospital and Saint Paul's Hospital Millennium Medical College were included.

Exclusion Criteria

Health care workers on annual leave as well as those who did not wish to take part in the study were also excluded.

Sample Size Determination and Sampling procedure

Sample Size Determination

The sample size was derived using a single population proportion formula and a 51 percent proportion of healthcare workers occupational health and safety practice taken from a previous study.[4] Considering 95% confidence interval and 5% marginal error with a 10% non-response rate, the calculated sample size was 384.

If the total population of both hospitals is less than 10,000, a correction formula will be considered.

Correction formula = $n/(1+n/N)$ where n = sample size and N = Total health workers of the two hospitals. Therefore, the smallest sample size needed was calculated by using correction formula $n/(1+n/N) = 384/(1+384/2470) = 332$. By adding a 10% non-response rate, the required sample size was **366**.

To determine the sample size for each hospital, we multiplied the number of health care workers employed by the total sample size and divide it by the total number of health care workers employed by the two hospitals. i.e.: N_1 = Number of health care workers from Ras Desta Hospital = **425**, n_1 was **63**. And N_2 = Number of health professional from Saint Paul's Hospital = **2045**, and n_2 was **303**, (where $N_1 = 2470$).

Dependent variables

Health safety status of the health professionals

Independent variables

The independent variables were: Age, sex, educational level, religion, monthly income, job experience, marital status, profession, family size, working section; Accessibility of supplies,

such as PPE, like gloves, masks, eyes/face shield, gown, water and handwashing facilities, policy and procedures for infection prevention, reducing the number of individuals who enter the room, minimizing the number of individuals who are present in the room, isolating suspected cases separately, and using engineering control to keep healthcare employees away from customers, COVID-19 vaccine availability, accessibility of cleaning and disinfection agents.

Operational Definitions

Health and Safety

Health and safety according to WHO (1995), is defined as “activity designed to safeguard and maintain the health and safety of health care professionals by eliminating occupational factors and conditions that are detrimental to their health and safety at HCF. It is the complete physical, mental, and social well-being, of health care workers[10]. Participants’ health and safety status issues were assessed in this study, using 16 questions (health and safety practices questions), each with an equal weighting. Each participant has received a maximum of 16 points and a minimum of 0 points. Finally, the results of each question were divided into two categories based on their health and safety status. In this study the participant’s the Health and safety issues were assessed in 16 questions and assessment items ranged from 0 to 16, and a score of ≥ 13 was reported as good Health and safety status, and a score of < 13 indicated as poor Health and safety status of health professionals during the COVID-19 as Ozturk, et al.; shibiru S. et al.; and Saqlain M. et al. categorization[11-13].

Data collection procedures (Instrument, personnel, data quality control)

Structured self-administered and interviewer-administered questionnaires were used to collect data. Various works of literature were adapted and modified to create the data collection tools[3,4]. The questionnaire was written in English and then translated into Amharic and back to English to ensure uniformity. For data collection and supervision, three environmental health specialists were chosen: two for data collection and one for

supervision. Data collectors and supervisors received one day of training on the study’s objectives, the contents of the questionnaire, confidentiality, respondents’ rights, and the way to collect data. A pretest of the data collection instrument was undertaken in 10% of the sample in Zawuditu hospital. Data collectors and supervisors discussed the questionnaire to determine the reliability of the data collection instruments and conclusions, and the tool was updated for any inconsistencies or ambiguity before actual data collection. A simple random sampling strategy was used to pick study participants from each public hospital.

Data processing and analysis

Data were collected, checked for completeness, coded, cleaned, and entered into EP-info software before being transferred to SPSS version 23 for data cleaning and analysis. Frequency tables, cross-tabulations, and proportions were produced as descriptive statistics. Before starting the regression analysis, the Hosmer-Lemeshow goodness of fit test was used to ensure that the model was fit. To discover variables associated with HCPs’ health and safety, Bivariable, and multivariable logistic regression analyses were used. To control the confounding impact and assess the relationship between the predictors and the outcome (health and safety status) of health professionals, all variables with a p-value of < 0.2 in the Bivariable analysis were included in the multivariable model. Significant components in the multivariable model were variables with a p-value of < 0.05 . The odds’ ratio with a 95 % CI was used to describe associations between study variables and outcome factors.

Result

Socio-demographic of study participants

A total of 360 people took part in the study, with a response rate of 98.4%. Males made up 54.7 % of study participants. The study participants (65.3 %) had more than five years of job experience, and the majority of them (70 %) had a bachelor’s degree, a master’s degree, and above (21.1%). In terms of the study participants’ occupations, the majorities (35.1%) were nurses and (31.4%) were doctors (Table 1).

Table 1: Socio-demographic Characteristic of health care professionals at Ras Desta Memorial Hospital and Saint Paul’s Hospitals Millennium Medical College, AA, (n=360)

| Variables | Category | Total Freq. (%) |
|-------------------|-------------------|-----------------|
| Age | 18-30 | 211 (58.6) |
| | >31 | 139 (41.4) |
| Sex | Female | 163 (45.3) |
| | Male | 197 (54.7) |
| Religion | Orthodox | 206 (57.2) |
| | Protestant | 68 (18.9) |
| | Muslim | 77 (21.4) |
| | Others | 9 (2.5) |
| Educational level | Diploma | 14 (3.9) |
| | B.Sc. Degree | 270 (75) |
| | Masters and above | 76 (21.1) |

| | | |
|-----------------|-----------------|------------|
| Work experience | <5 years | 125 (34.3) |
| | >5years | 235 (65.7) |
| Profession | HO | 12 (3.3) |
| | Laboratories | 17 (4.7) |
| | Pharmacists | 22 (6.1) |
| | Mid-wives | 70 (19.4) |
| | Nurse | 126 (35) |
| | MD | 113 (31.4) |
| Working hours/d | <8hrs | 179 (49.7) |
| | ≥8hrs | 181 (50.3) |
| Monthly income | <5000birr | 62 (17.2) |
| | 5000-10,000birr | 227 (63.1) |
| | >10,000birr | 71 (19.7) |
| Work Section | Laboratory | 17 (4.7) |
| | Drug store | 22 (6.1) |
| | ICU | 17 (4.7) |
| | Surgical Wards | 23 (6.4) |
| | pediatric | 28 (7.8) |
| | OPD | 32 (8.9) |
| | Gynecology | 74 (20.6) |
| | Emergency | 83 (23.1) |
| | Medical wards | 64 (17.8) |
| | Marital status | Single |
| Married | | 228 (63.3) |
| Family size | <3 | 292 (81.1) |
| | ≥3 | 68 (18.9) |

Footnote: HO=Health Officer, ICU=Intensive care Unit, MD= Medical Doctor, OPD=Out Patient, Others= indicate religions like waqefata and Catholic

Engineering control, Administrative control, and Availability of PPE

Regarding the availability of PPE, most health professionals (80.6%) had availability of face masks, (79.2%) of them had availability of cleaning and disinfectants, and (41.7%) of health care workers had not enough gloves in their working section. Regarding engineering and administrative control, most of the

study participants (81%) of them had said there was engineering control like (ventilation, isolation, and enough spaces between patient and health provider), especially at triage area and 78% of study participants had said there was a policy and procedure for COVID-19 prevention in their hospitals. Only 69% of study participants had got health and safety training regarding COVID-19 prevention (Table2).

Table 2: Availability of PPE, Administrative and engineering in selected public hospitals, Addis Ababa, Ethiopia (n=360)

| Variable | Category | Health and safety status | | |
|---|----------|--------------------------|-----------|------------|
| | | Poor | Good | Total (%) |
| Availability of PPE | | Frequency | Frequency | |
| Availability of proper face masks | No | 30 | 40 | 70 (19.4) |
| | Yes | 35 | 225 | 290 (80.6) |
| Availability of enough gloves | No | 50 | 100 | 150 (41.7) |
| | Yes | 45 | 165 | 210 (58.3) |
| Availability of eye/face protection | No | 71 | 152 | 223 (62) |
| | Yes | 24 | 113 | 137 (38) |
| Availability of cleaning and disinfectants agents | No | 33 | 42 | 75 (20.8) |
| | Yes | 62 | 223 | 285 (79.2) |

| | | | | |
|--|-----|----|-----|------------|
| Availability of water and handwashing facility | No | 39 | 60 | 99 (27.5) |
| | Yes | 56 | 205 | 261 (72.5) |
| Administrative and engineering control | | | | |
| Restriction of the number of personnel entering the room of a patient? | No | 10 | 10 | 20 (5.6) |
| | Yes | 85 | 255 | 340 (44.4) |
| Minimizing the number of staff during aerosol-generating procedures? | No | 41 | 75 | 116 (32.2) |
| | Yes | 54 | 190 | 244 (67.3) |
| Isolation of suspected cases separately to help prevent transmission? | No | 47 | 104 | 151 (42) |
| | Yes | 48 | 161 | 209 (58) |
| engineering control to shield healthcare workers from patients, | No | 27 | 41 | 68 (19) |
| | Yes | 68 | 224 | 291 (81) |
| Policy and procedure for COVID-19 prevention? | No | 25 | 54 | 79 (22) |
| | Yes | 70 | 211 | 281 (78) |
| Training on health and safety to prevent COVID-19? | No | 39 | 73 | 112 (31) |
| | Yes | 56 | 192 | 284 (69) |
| Do you vaccinate with COVID-19 Vaccination? | No | 2 | 5 | 7 (2) |
| | Yes | 93 | 260 | 353 (98) |

Health and safety practices of health care workers

Table 3 showed that from the total 360 participants, 73.6% (95% CI: 68.9–78.3) had good health and safety status in this continued COVID-19 Pandemics. Regarding health and safety practices of health care workers those who had performed hand hygiene after

removing PPE (88.3%), those who had performed cleaning and disinfection procedures (87.2%) and who performed hand hygiene after patient contact (86.1%) had the highest good health and safety status. On the other hand, health care workers who maintained their social distance (52.5%) during this COVID-19 pandemic had the lowest health and safety status.

Table 3: Health and safety practices of health care workers during the COVID-19 Pandemic in selected public hospitals, Addis Ababa, Ethiopia (n=360)

| Health and safety practices of health care workers | Category | Health and safety status | | |
|---|----------|--------------------------|------------|------------|
| | | Poor | Good | Total (%) |
| | | Frequency | Frequency | |
| wear of gloves during patients contact | No | 27 (28.4) | 58 (21.9) | 85 (23.6) |
| | Yes | 68 (71.6) | 207 (79.1) | 275 (76.4) |
| wear a proper face mask during patient service? | No | 31 (32.6) | 33 (12.5) | 64 (17.8) |
| | Yes | 64 (67.4) | 232 (87.5) | 296 (82.2) |
| clean and disinfect reusable instruments after each procedures? | No | 42 (44.2) | 37 (14) | 79 (22) |
| | Yes | 53 (55.8) | 228 (86) | 281 (78) |
| Proper hand washing before wearing PPE? | No | 40 (42) | 47 (17.7) | 87 (24.2) |
| | Yes | 55 (58) | 218 (82.3) | 273 (75.8) |
| Proper hand hygiene before contact with the patient? | No | 32 (32.9) | 49 (18.5) | 81 (22.5) |
| | Yes | 63 (67.1) | 216 (81.5) | 279 (77.5) |
| Proper hand hygiene after removing PPE | No | 27 (28.4) | 15 (5.7) | 42 (11.7) |
| | Yes | 68 (71.6) | 250 (94.3) | 318 (88.3) |
| Proper use of sanitizer before and after contacts | No | 52 (55.2) | 48 (18.2) | 100 (27.8) |
| | Yes | 43 (44.8) | 217 (81.8) | 260 (72.2) |
| proper handwashing before and after performing a procedure? | No | 46 (48.4) | 23 (8.7) | 69 (19.2) |
| | Yes | 49 (51.6) | 242 (91.3) | 291 (80.8) |
| Proper cleaning and disinfection procedures? | No | 32 (32.9) | 14 (5.2) | 46 (12.8) |
| | Yes | 63 (67.1) | 251 (94.8) | 314 (87.2) |

| | | | | |
|---|-------------|-------------|------------|------------|
| Proper differentiating PPE wearing area from PPE removing area? | No | 57 (60) | 45 (17) | 102 (28.3) |
| | Yes | 38 (40) | 220 (83) | 258 (71.7) |
| Proper hazardous waste handling | No | 55 (58) | 30 (11.3) | 85 (23.6) |
| | Yes | 40 (42) | 235 (89.7) | 275 (76.4) |
| Avoid touching faces, eyes, noses, and mouth before disinfection? | No | 49 (51.6) | 34 (12.8) | 83 (23) |
| | Yes | 46 (48.4) | 231 (87.2) | 277 (77) |
| Have you been tested for COVID-19? | No | 47 (48.8) | 87 (32.8) | 134 (37.2) |
| | Yes | 48 (51.2) | 178 (67.2) | 226 (62.8) |
| Proper social distance during the COVID-19 outbreak? | No | 65 (68.4) | 126 (47.5) | 191 (53.1) |
| | Yes | 30 (31.6) | 139 (52.5) | 269 (46.9) |
| Total status of health and safety of health care workers | Good status | 265 (73.6%) | | |
| | Poor status | 95 (26.4%) | | |

Factors Associated with Health and Safety status of health care workers

In the Bivariable analysis, different independent variables were tested for the presence of association with health and safety of health professionals. As a result of age, work experiences, working section, presence of enough gloves in the working room, having disinfectant, having accessible handwashing facilities, restriction of some personnel entering into the patient room, minimizing the number of staff during aerosol procedures, the possibility of isolation of suspected cases, engineering control at triage area, and policy and procedures to prevent COVID-19, and health and safety training had an association with the health and safety status of health care workers at $p < 0.2$, and these variables were taken to multivariable analysis.

In multivariable analysis work experiences, availability of face masks, availability of cleaning and disinfectants, availability of water and handwashing accessibility, health and safety training had a significant association with the health and safety status of health care workers at $p < 0.05$

Table 4 showed that health care workers who had more than five years of work experience were about 2 times more likely to have good health and safety status than their counterparts (AOR=1.8, 95% CI: 1.12-3.2).

Availability of PPE (face masks) need to wear during patient contact in the hospitals increases health and safety status of health care workers by 3 times (AOR=3, 95% CI: 1.7-5.2). Availability of PPE (face masks) that need to be worn during patient contact in the hospitals increases the health and safety status of healthcare professionals by 3 times (AOR=3, 95% CI: 1.7-5.2). The other important is cleaning and disinfectant agents, which are very important concepts in health care facilities. These agents are one of the control methods of infectious disease transmission. Cleaning and disinfection with these agents among HCW and patients is a critical component of safe healthcare delivery in all healthcare settings[14]. According to this study, the availability of cleaning and disinfection agents in the working section increases the health and safety status of HCW by 2 times (AOR=2, 95% CI: 1.11-3.7). Health care workers who had water and handwashing accessibility in their hospitals were 2 times more likely to have good health and safety than those who didn't have (AOR=2, 95% CI: 1.1-3.4).

Health care workers who had taken orientation, or training on health and safety to prevent COVID-19 were almost 2 times more likely to have good health and safety status than the counterpart (AOR=1.8, 95%CI: 1.13- 3.2). Health and safety training is very important in the healthcare setting to prevent infectious diseases, so this study revealed that lack of health and safety training for health professionals decreases the health and safety status of health professionals by almost 2 times (AOR=1.8, 95%CI: 1.13-3.2).

Table 4: Factors Associated with Health and Safety among health care workers in selected public hospitals, Addis Ababa, Ethiopia (n=360)

| Variables | Characteristics | Osh status | | Crude OR(95% CI), P-value | AOR(95% CI), p-value |
|------------------|-----------------|------------|------|---------------------------|-------------------------------|
| | | Poor | Good | | |
| Age | 18-30 | 67 | 154 | 1 | ---- |
| | >31 | 28 | 111 | 1.8 (1.1, 3), 0.02 | |
| Work experiences | <5yrs | 43 | 82 | 1 | 1 |
| | >5yrs | 52 | 183 | 1.9 (1.1, 2.8), 0.024 | 1.8 (1.12, 3.2), 0.012 |

| | | | | | |
|---|------------|----|-----|------------------------|-------------------------------|
| Working section | Laboratory | 9 | 8 | 1 | 1 |
| | Drug store | 9 | 13 | 1.6(0.4, 5.8), 0.4 | 0.69(0.23,4.1), 0.96 |
| | ICU | 0 | 17 | 1.5(0.3, 5.2), 0.5 | 1.25(0.93,5.23), 0.99 |
| | S.Wards | 8 | 15 | 2(0.6, 7.6), 0.25 | 1.84(0.46,7.42), 0.39 |
| | pediatric | 2 | 26 | 4(1.4, 12), 0.052 | 3.76(0.98,24), 0.071 |
| | OPD | 12 | 20 | 1.9(0.6, 6.7), 0.3 | 1.6(0.44,5.98), 0.46 |
| | Gyne | 22 | 52 | 2.7(0.9, 7.8), 0.075 | 2.4(0.75,7.88), 0.14 |
| | Emergency | 20 | 63 | 3.5(1.2, 10), 0.03 | 2.42(0.75,7.92), 0.14 |
| | M.wards | 13 | 51 | 4.4(1.4, 13), 0.01 | 2.9(0.84,9.8), 0.09 |
| Availability of enough gloves in your room? | No | 67 | 148 | 1 | 1 |
| | Yes | 28 | 117 | 1.89(1.15,3.13), 0.013 | 1.22(0.66,2.27), 0.52 |
| Availability of face mask to wear during patient contact? | No | 30 | 40 | 1 | 1 |
| | Yes | 35 | 225 | 5(2.5, 9.3), 0.008 | 3(1.7, 5), 0.014 |
| Disinfectants around the working area? | No | 32 | 42 | 1 | 1 |
| | yes | 62 | 223 | 2.55(1.49,4.35), 0.001 | 2(1.11, 3.7), 0.02 |
| Water and Handwashing accessibility | No | 39 | 60 | 1 | 1 |
| | yes | 56 | 205 | 2.4(1.4, 3.9), 0.001 | 2 (1.1, 3.4), 0.022 |
| Restriction of personnel to enter into the patient room | No | 10 | 10 | 1 | 1 |
| | yes | 85 | 255 | 3(1.2, 7.5), 0.018 | 1.6(0.54,4.8), 0.39 |
| minimize the number of staff during aerosol-generating | No | 41 | 75 | 1 | 1 |
| | yes | 54 | 190 | 2(1.2, 3.2), 0.088 | 1.3(0.64,2.7), 0.46 |
| Engineering control to shield HCP from patients, | No | 27 | 41 | 1 | 1 |
| | Yes | 68 | 224 | 2.2(1.2, 3.8), 0.076 | 1.3(0.64,2.63), 0.46 |
| Policy and procedure for infection prevention? | No | 25 | 54 | 1 | 1 |
| | Yes | 70 | 211 | 3(1.2,7.4), 0.018 | 0.7(0.33,1.52), 0.37 |
| Training on health and safety? | No | 39 | 73 | 1 | 1 |
| | Yes | 56 | 192 | 2 (1.1, 3.2), 0.015 | 1.8 (1.13, 3.2), 0.031 |

Footnote: ICU=Intensive care unit, s. wards=surgical wards, M.wards=Medical wards, Gyne=gynecology, OPD= outpatient disease

Discussion

This study aimed to determine the health and safety status and its associated factors among health care workers in the continued COVID-19 pandemic at SPHMMC and Ras Desta Memorial Hospitals, Addis Ababa, Ethiopia. In this study, we found that among the total 360 participants, 265 (73.6%) of them had good health and safety status. Regarding association factors; work experiences, availability of PPE, availability of disinfectants, availability of water and handwashing facilities, and availability of training on health and safety had a significant association with the health and safety status of healthcare professionals at $P < 0.05$.

Scientific assessments on health and safety of HCW are necessary for this continued COVID-19 pandemic to take suitable measures and maintain their health and safety and save their lives from this fatal pandemic. Therefore, this study showed that more than

half of study participants 73.6% (95% CI: 68.9–78.3) of health professionals had good health and safety. This finding revealed that there were improvements in the health and safety status of health care workers when compared to the other study conducted in Oromia, Turkey, and Pakistan at the early stage of the COVID-19 pandemic [4,12,13]. This difference might be due to variations in the study setting, sociocultural difference, availability of PPE and sanitizer at early stage of COVID-19 pandemics and current status to prevent COVID-19 infections of health care workers.

Regarding the availability of PPE (face coverings), HCFs should provide HCWs with appropriate medical face coverings to wear during patient care when performing aerosol-generating procedures according to the WHO and CDC IPC [15,16]. This study revealed that the availability of face masks increases the health and safety status of HCW by 3 times (AOR=3, 95%CI:

1.7-5.2). This indicated that the shortage of facemask in the hospitals decreases the health and safety status of HCW during this continued COVID-19 pandemic. This study was similar to a study conducted in Italy and the UK which stated that most health care workers had availability of proper medical facemasks and those who had availability of proper medical masks had low risks of COVID-19 and another infection and their health and safety status was good[5,26]. This study also showed improvement when compared with other studies conducted during at the early stage of the COVID-19 Pandemic, when there was a shortage of PPE[11]. The difference might be due to the availability of PPE increased especially facemasks, awareness, and training on the potential use of face masks and IPC use in this continued pandemic.

Health and safety risks from patients to HCWs usually follow contamination of the HCWs' hands after touching either patient, therefore, availability of waters and handwashing facilities for hand hygiene is considered as the most important prevention measure for healthcare-associated infections including COVID-19[21-23]. This study finding highlighted the importance of water availability and handwashing facilities in the studied hospitals. Availability of water and handwashing facilities in the working section increases the health and safety status of HCW by 2 times (AOR=2, 95% CI: 1.1-3.4) which is highly consistent with other research[14,26]. WHO and CDC COVID-19 Infection Control guidelines recommend that healthcare facilities should provide HCPs with access to a safe, continuous water supply at all outlets and access to the necessary facilities to perform handwashing[16,25]. Availability of disinfection and cleaning agents are essential for ensuring that medical, surgical instruments and working environments do not transmit infectious diseases to patients and healthcare professionals[27]. This study was also revealed that the availability of cleaning and disinfection agents had a significant association with occupational health and safety status of health professionals, HCW those who had availability of cleaning and disinfection agents were 2 times more likely to had good health and safety status than their counterparts (AOR=2, 95% CI: 1.1, 3.7). This finding indicated that lack of cleaning and disinfection agents in the working sections decreases the health and safety status of health professionals by 2 times.

According to WHO, Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164): rights, roles, and responsibilities, health professionals and their representatives have the right to receive adequate information and training on the health and safety to prevent health and safety hazards that arises from emerging and reemerging diseases in health care facilities[28]. In this study, training on health and safety had also an association with the health and safety status of HCW. Training on health and safety for health workers increases the health and safety status of HCW by almost 2 times (AOR=1.8, 95%CI: 1.13-3.2). This study was also similar to a study conducted in Colombia, which states that health and safety about patient care is essential to reduce HCW exposure during this continued Pandemic[29].

Strength of the study

The strength of this study was that, applied a mixed approach to both self-administered and interviewer-administered questionnaires to reduce data bias during data collection.

Limitation of the study

This study was carried out in only two public hospitals which limit generalizability to all public hospitals found in Addis Ababa. The other limitation of this study was since it was across-sectional study; it could only allow that a causal relationship exists but couldn't tell the reason behind its existence.

Conclusion

Health professionals are at the frontline in response to the COVID-19 pandemic, which makes them vulnerable to a higher risk of emerging and reemerging infection in addition to the COVID 19. Therefore, in general, this study found that health professionals' health and safety was good. Availability of PPE, availability of water and hand washing facilities, availability of cleaning and disinfectants, and provision of health and safety training for HCP were predictors favoring good occupational health and safety status of health professionals. HCF should create a conducive working environment for HCWs and FMOH and other policy makers should focus on health safety policy and regulation implementation in all HCFs.

Abbreviations

CDC: Center for Diseases Control and Prevention; **CI:** Confidence Interval; **COVID-19:** Coronavirus Disease 2019; **EFMoH:** Ethiopian Federal Ministry of Health; **HCF:** Health Care Facility; **HCW:** health care worker; **ILO:** International Labor Organization; **IPC:** Infection Prevention and Control; **OHS:** Occupational Health and Safety; **OR:** Odds Ratio; **PPE:** Personal Protective Equipment; **SPH MMC:** Saint Paul's Hospital Millennium Medical College; **SPSS:** Statistical Package for Social Science; **WHO:** World Health Organization

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from the institutional Review Board of Saint Paul's Hospital Millennium Medical College, (permit number: PM23/478). Letters of support were received from this College. The objective of the study was oriented to the hospital leaders and the study subjects. The study was conducted according to the Declaration of Helsinki. Before collecting the data, written informed consent was obtained from each participant. All data collected from the respondents were secured in confidential.

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Consent for publication

Not applicable,

Availability Of Data And Materials

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

Competing interests

There are no competing financial interests exist and no conflict of interest exists

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There was no fund for this project

Author Contributions

Bedasa Gidisa developed the original idea, and he was the principal investigator of the project. He developed the protocol, collected, analyzed, reported data, and prepared the manuscript for publication. Bezatu Mengistie, Dejene Getachew, Ayele Bizuneh and Bacha Mekonnen had played great roles (Methodology design, objectives, and formulation of research question) from starting to final report writing regarding this project. And all authors reviewed and agreed upon article before submission to the journal.

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