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Vaccine and Immunization Research and Development

Research Article

Compliance to COVID-19 Preventive Measures and Associated Factors among Healthcare Workers in Public Health Hospitals of East Shoa Zone, Ethiopia

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Received: 2026 Jan 30 **Accepted:** 2026 Feb 19 **Published:** 2026 Apr 21

Abstract

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes the respiratory infection known as coronavirus disease 2019 (COVID-19). Healthcare workers (HCWs) who provide COVID-19 patient care run the risk of experiencing psychological and physical effects. HCWs' adherence to COVID-19 preventive measures has not significantly improved, despite these measures being the most important intervention for shielding them from infections like COVID-19. The study aims to assess Compliance to COVID-19 preventive measures and associated factors among health professionals in public hospitals, in the East Shewa zone, Ethiopia.

Methods

A descriptive hospital-based cross-sectional study was conducted among 324 health professionals in public hospitals of southeast Ethiopia from February to March 2024. A simple random sampling method was used to select the study's participants. Pretested and structured self-administered questionnaires were used to gather data. The data was entered using Epi Info version 7.2, and the analysis was conducted using SPSS version 26. Binary logistic regression was used to identify potential determinants of outcome variables at p-value < 0.05 and 95% confidence interval.

Results

A total of 324 health professionals have participated, making the response rate 99.4%. Of which, 51.9% were males and the median age of the participant was 32 (IQR: 7) years. Health professionals' overall good compliance and knowledge of COVID-19 preventative measures were 38% and 56.8%, respectively. Not having received the Covid19 vaccination [AOR = 0.52; 95% CI (0.27, 0.99)], having good knowledge [AOR = 1.93; 95% CI (1.13, 3.29)], being a nurse [AOR = 4.39; 95% CI (2.01, 9.60)], and not having any functional handwashing [AOR = 0.29; 95% CI (0.13,0.66)] were found to be significantly associated with COVID-19 preventive measures.

Conclusions

This study shows that there was low compliance with COVID-19 prevention practices, with nearly two-fifths of health professionals exhibiting good compliance. Therefore, it is essential to have a steady supply of COVID-19 prevention supplies and facilities, as well as to increase health professionals' knowledge through in- and outside-of-the-workplace training.

Keywords: Healthcare Workers, Covid-19, Prevention Measure, Compliance, Associated Factor, Ethiopia

Abbreviations and Acronyms

CDC: - Communicable Disease Control
CI: - Confidence Interval
COVID-19:- Coronavirus Disease 2019
HCW: - Health Care Workers
HP: - Health Professionals
IPC: - Infection Prevention Control
IRP: - Institutional Review Board
OR: - Odd Ratio
PPE: - Personal Protective Equipment
SPSS: - Statistical Package for Social Sciences
SARS-COV: - Severe Acute Respiratory Syndrome Coronavirus
WHO: - World Health Organization

1. Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes coronavirus disease 2019 (COVID-19), an infectious respiratory disorder [1]. In the preceding centuries, numerous viral epidemics such as the severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) were identified in different periods [2]. The known modes of transmission are droplets, contact, and aerosols [3,4]. The World Health Organization (WHO) declared the COVID-19 outbreak on March 11, 2020. On March 13, 2020, news broke of Ethiopia's first confirmed COVID-19 case [5,6]. More than 6.8 million deaths and more than 758 million confirmed cases have been reported worldwide as of February 26, 2023. In the Africa region, over 9.5 million confirmed cases and 175,295 deaths from COVID-19 were notified. Ethiopia reported 499,903 confirmed cases and 7,572 deaths [7]. Since the coronavirus (COVID-19) pandemic has drastically altered the world, healthcare workers' (HCWs') circumstances are also altering [8]. Because the disease is growing at an alarming rate, exceeding hospital capacity, and putting healthcare workers at high risk of exposure, this pandemic is posing serious difficulties to healthcare systems and healthcare workers worldwide [9]. Healthcare professionals are more vulnerable to contracting the COVID-19 virus while on the job and are essential in the fight against the pandemic [10]. Recent research, for example, revealed that healthcare professionals are more likely than the general population to be exposed to SARS-COV-2, which puts them at higher risk of contracting COVID-19 [11,12]. Thus, the COVID-19 pandemic has had a significant effect on healthcare professionals. But the best defense against the COVID-19 pandemic for healthcare workers is still prevention [13]. COVID-19 patient care puts healthcare workers (HCWs) at risk for both physical and psychological effects. Although HCWs' major responsibility is infection prevention and control (IPC), frontline hospital HCWs had a significantly greater seropositivity for COVID-19 than other frontline HCWs, particularly those assigned to COVID-19 wards [14,15]. Given the risk of COVID-19, it is imperative to protect healthcare professionals and their families [16]. To control the pandemic transmission, the World Health Organization endorses reducing contact, early identification and isolation of cases, and personal and material hygiene measures [17,18]. As part of these measures, the use of face masks, hand washing, physical distancing, cough etiquette, and avoidance of crowded places are strongly recommended [18]. Even though adherence to preventive measures is the only means to tackle the disease, reluctance to do so has been reported to be a major problem everywhere [19]. Social distancing, self-isolation, and travel restrictions, all public health efforts to avoid and control COVID-19, have led to a global economic catastrophe and the loss of many jobs [20]. COVID-19 patient care puts healthcare workers (HCWs) at risk for both physical and psychological effects [21]. To stop nosocomial infections, diseases, and deaths from spreading, they are crucial. However, they also live in constant fear of spreading the infection to their communities and families [22,23]. Frontline hospital HCWs reported a considerably higher seropositivity for COVID-19 than other frontline HCWs, especially those allocated to COVID-19 wards, despite the fact that infection prevention and control (IPC) is the primary duty of healthcare workers [24,25]. Protecting healthcare workers and their families is crucial given the risk of COVID-19 [26]. The World Health Organization (WHO) and other national and international public health authorities advise using personal protective equipment (PPE) appropriately and practicing good hand hygiene [27,28].

The capacity to halt any potential transmission often provides protection for healthcare workers. Although physically separating healthcare workers from infectious patients and bodily fluids is the most efficient way to protect them, more aggressive care that requires direct contact with these patients often reduces the death rates of people infected with COVID-19 [28,29]. Measures to prevent SARS-CoV-2 transmission in healthcare workers are an immediate priority because they are putting themselves at high risk of contracting COVID-19 [28,30]. As a result, healthcare workers must safeguard themselves and prevent transmission in the medical environment. Because the health, security, and economic prosperity of our country are based on the health and well-being of our healthcare professionals [27]. Since the start of the pandemic, 14,148 healthcare workers across various African countries have contracted COVID-19, reflecting the serious toll on medical professionals. The country with the most cases (4,842) is South Africa, followed by Algeria (2300), Ghana (2065), Nigeria (987), and other countries. Ethiopia (87) has also been affected [31,32]. Prior research conducted in Ethiopia revealed low HCW adherence to COVID-19 prevention [33,34]. There is evidence that HCWs' adherence to COVID-19 preventive measures is influenced by their characteristics, including sex, living in a rural area, having a chronic illness, and resources related to IPC guidelines, healthcare facility types, IPC training, lack of personal protective equipment (PPE), high workload, management support, and attitude [34,35]. A review of 26 findings found that HCWs' compliance with IPC guidelines for respiratory infectious diseases was influenced by three domains: organizational factors (safety climate, communication of IPC guidelines, and availability of training programs); environmental factors (physical environment and availability of PPE); and individual characteristics (knowledge, attitude, beliefs, and PPE discomfort) [36]. The final physical barrier between a healthcare professional and infectious bodily fluids in this situation is following PPE usage and hand cleanliness procedures [31,37]. However, there is a significant disparity in the availability and use of personal protective equipment (PPE) and hand hygiene practices, which are not always adhered to in many healthcare facilities while managing COVID-19 patients. An evaluation of the actual PPE use and hand hygiene practices of healthcare workers during the COVID-19 pandemic is necessary to determine how quickly the virus is spreading throughout the world [35,38,39]. HCWs' adherence to COVID-19 preventive measures has not significantly increased, despite the fact that these measures were the most important intervention

for shielding them from infections, including COVID-19 [40]. Numerous research on health care workers' adherence to COVID-19 preventive measures in Ethiopia reveal low adherence to these interventions [41]. This study aims to assess hospital healthcare Workers' adherence to COVID-19 prevention strategies and associated factors.

2. Methods and Materials

2.1. Study Area

This study was carried out in public health hospitals in the Oromia regional state's East Shewa Zone. East Shewa zone is one of the zones in Oromia with an estimated population of 1,584,024. The zone is bounded by the Southwest Arsi Zone, on North Amhara Regional State, on West Southern Nation, Nationality and population region, and on the East-West Hararge. Adama, the capital of the East Shewa Zone, is 100 kilometers from Addis Ababa, the capital of Ethiopia. There are six public hospitals in the study geographical area.

2.2. Study Design And Study Period

From February to March 2024, a hospital-based cross-sectional study was carried out to assess healthcare workers' compliance with COVID-19 preventive measures and associated factors at public health hospitals in the east Shoa Zone of Ethiopia.

2.3. Population

• Source Population

The source population of this study was all healthcare workers working in East Shoa Zone public hospitals.

• Study Population

The study population was all healthcare workers in East Shoa Zone selected public hospitals.

• Inclusion and Exclusion Criteria

The survey covered every permanent healthcare employee working in the hospitals. Supportive staff and non-permanent HCWs will be excluded.

• Sample Size Determination and Sampling Procedure

The sample size was determined using the single population proportion formula with the following assumptions: The degree of compliance with standard precautions (p = 22%) was taken from a survey conducted in public hospitals in Western Ethiopia [40].

$$n = \frac{Z_{\frac{\alpha}{2}}^{2} P(1-P)}{d^2} \quad (1)$$

Where, Z is the standard normal variable at a (1-α) % confidence level, where α is primarily 0.05, i.e., with 95% CI (z = 1.96), n is the ideal sample size needed, P is an estimate of the extent of compliance with standard precaution, and d is the margin of error to be accepted (%). The ideal sample size and resource availability were taken into consideration while determining the margin of error, with 5% representing the smallest sample size and 1% representing the maximum. A margin of 4% was applied for this investigation, which was based on the 22% percentage from the previously mentioned comparable study, which provided a sufficient sample $n = \frac{1.96^2 * 0.22(1-0.22)}{0.04^2} = 412$

Since the study population will be <10,000 the finite population correction was done by using the following formula.

$$n = \frac{n_o}{1 + \frac{n_o}{N}} \Rightarrow n = \frac{412}{1 + \frac{412}{1050}} = 296 \quad (2)$$

After adding a 10% non-response rate the final sample size was n = 326. There were six public hospitals in the East Shoa Zone from which three hospitals were selected randomly. All 326 estimated participants were proportionally allocated to each hospital based on their respective numbers of healthcare workers. The sample size from each hospital was proportionally allocated based on the types of professions (strata) and the numbers of their healthcare workers. The study participants were selected using a simple random sampling method within their strata using human resource records from each hospital.

2.4. Variables

2.4.1. Dependent Variables

Compliance to COVID-19 preventive measures (good compliance/poor compliance).

2.5. Independent Variables

• Socio-Demographic Factors

Age, sex, marital status, professional status, family size, educational status, work experience, and working unit.

• Institutional Factors

Levels of Hospital, Working room Ventilation status, Staff room's ventilation status, Functional handwashing facility, Availability of consistent water supply, Infection prevention committee (IPC), Hospital management support, and Availability of PPE.

• COVID-19 Related Factors

Knowledge, Vaccination status, and Reading material on COVID-19

• Behavioral Factors

COVID-19 IPC training, hand hygiene practice.

2.6. Operational Definitions

2.6.1. Compliance with COVID-19 Preventive Measures

14 questions with "Always, sometimes, and seldom" response options were used in this study to gauge participants' adherence to COVID-19 preventive measures. "Always" received a score of 1, while "sometimes and seldom" received a score of 0. As a result, the score has a minimum of 0 and a maximum of 14. HCWs were classified as "good compliance" if their score was ≥75%, and as "poor compliance" if their score was <75% [40].

2.6.2. Knowledge

The knowledge of health professionals was assessed using

10 COVID-19 prevention measure-related questions. Respondents who score < 50% (score below 5 out of total items), 50–79 %(score 5–7), and 80–100% (score 8–10) were considered to have poor, moderate, and good knowledge towards COVID-19 prevention measures [42].

2.6.3. Adequate Natural Ventilation

when working staff rooms have at least two air inlets and outlets with a room area of 12 m2 and below [42].

2.6.4. Functional Handwashing Facility

is functional handwashing sink with water and soap during data collection time [42].

2.7. Data Collection Tool and Procedures

To gather information from the participants, a pretested and standardized self-administered questionnaire in English was used. The study instrument was adapted from CDC recommendations and previously published studies. Three sections make up the self-administered questionnaire that was used to gather the data. The first one comprises the demographic and professional attributes of healthcare workers (independent variables), including sex, age, marital status, vaccination status, hospital level, professional type, education level, work experience, previous attendance at infection prevention/COVID-19 training, reading COVID-19 materials, and whether or not hospital management provided support to HCWs. The 14 items in the second section of the data collection tool are designed to assess HCWs' adherence to COVID-19 prevention. The Cronbach alpha for these items' dependability was 0.85. Three experienced research experts verified the legitimacy of these items. A three-point Likert scale was used to measure them (1 being seldom, 2 being occasionally, and 3 being always). The final responses were coded as "0" for the sometimes and rarely replies and "1" for the always answers. The score goes from zero, which is the lowest, to fourteen, which is the highest. HCWs were classified as "good compliance" if their score was ≥75%, and as "poor compliance" if their score was <75%. These classifications will be consistent with earlier publications [15,18]. For every hospital, two facilitators of data collection were hired. Training about COVID-19 prevention and control was given to data facilitators. The research team handed the questionnaire packets to the three public hospitals. Oral explanations of the study's goals and methods, data confidentiality, voluntary and anonymous participation, and the freedom to leave the study at any moment without fear or discrimination were provided to the participants. After the questionnaire was prepared, all HCWs who provided their consent were requested to complete it and send it back to the data facilitators. The questionnaire has been modified to eliminate ambiguity in light of the pretest results from General Hospital, which is outside the study area and represents 5% of the projected sample size.

2.8. Data Processing and Analysis

After entering the data into Epi Info version 7.2, the Statistical Package for Social Sciences (SPSS) version 26 was used to analyze it. Tables, figures, and texts were used to summarize the descriptive statistics, and the mean and standard deviation were used to display the continuous variables. We used binary logistic regression to evaluate the relationship between independent factors and outcome. The degree of association was assessed using the odds ratio (OR) with 95% confidence interval (CI) and the statistical significance of COVID-19, preventive compliance was determined by a p-value < 0.05.

2.9. Ethical Considerations

The Institutional Review Board (IRB) of Adama Hospital Medical College approved the study protocol. Additionally, each healthcare worker gave his or her written consent prior to data collection. All participants were informed of the study's goal and given the assurance that their data would only be utilized for scholarly research. Participants were made aware that their involvement was completely voluntary and that they might leave at any moment for any reason. By removing potential identifiers like the names of the study participants, confidentiality was preserved.

3. Results

3.1. Socio-Demographic, Professional, and Institution-Related Characteristics of Health Professionals

A total of 324 health professionals have participated, making the response rate 99.4%. Of them, 168 (51.9%) participants were males and 184 (56.8%) belonged to the 30–39 years old age group. The age range of the participants was 22–56 years old. The participants' median age was 32 years old (IQR: 7). Regarding health professionals, half of the participants are nurses, making up 162 (50%) of the total. Medical doctors account for 15.4% of the participants. Those working in medical laboratories represent 9.0%, while midwives constitute 8.6% of the group. Additionally, 17.0% of participants are involved in other professions within the healthcare field, and 203 (62.7%) were from the Specialized/referral hospital (Table 1). Additionally, 262 (80.5%) of the participants, or the majority, had been vaccinated against COVID-19. About 104 (32.1%) and 117 (36.1%) health professionals reported that working and staff rooms have no adequate natural ventilation respectively. In reference to the COVID-19 preventive facility, 73 (22.5%) and 85 (26.2%) health professionals, respectively, reported that their workplaces lacked continuous water supply and effective handwashing facilities. Of the participants, 217 (67%) confirmed the existence of a functional infection prevention committee, while 107 (33%) reported that they did not have one in place. Finally, 216(66.7%) participants said they felt supported by the hospital's management, while 108(33.3%) participants said they did not (Table 1).

Variables	Frequency	Percent (%)
Gender		
Female	156	48.1
Male	168	51.9
Age (years) (median: 32, IQR: 7) (range: 22–56)		
20-29	104	32.1
30-39	184	56.8
≥ 40	36	11.1
Marital Status		
Married	216	66.7
Single	97	29.9
Others	11	3.4
Level of Hospital		
General	70	21.6
Primary	51	15.7
Specialized/Referral	203	62.7
Professional occupation		
Medical Doctor	50	15.4
Medical Laboratory	29	9.0
Midwife	28	8.6
Nurse	162	50.0
Others	55	17.0
Working department		
Emergency	48	14.8
OPD	118	36.4
IPD	107	33.0
Others	51	15.7
Level of education		
BSc	225	69.4
Diploma	24	7.4
MD/MD+	48	14.8
MSc	27	8.3
Family Size		
≤2	97	29.9
3-4	138	42.6
≥5	89	27.5
Work experience (years)		
≤2	29	9.0
3-6	112	34.6
≥7	183	56.5
Covid-19 vaccination status		
No	62	19.1
Yes	262	80.9

Training on infection prevention/COVID-19		
No	111	34.3
Yes	213	65.7
Read informational materials on COVID-19.		
No	47	14.5
Yes	277	85.5
Continuous water supply availability		
No	73	22.5
Yes	251	77.5
Working rooms have adequate ventilation.		
No	104	32.1
Yes	220	67.9
Staff rooms have adequate ventilation.		
No	117	36.1
Yes	207	63.9
PPE availability		
No	60	18.5
Yes	264	81.5
Functional handwashing availability		
No	85	26.2
Yes	239	73.8
Functional infection prevention committee		
No	107	33.0
Yes	217	67.0
Hospital management support		
No	108	33.3
Yes	216	66.7

Table 1: Socio-Demographic-, and Institution-Related Characteristics of Health Professionals in Public Hospitals of East Shewa Zone, Ethiopia (n = 324)

3.2. Knowledge Regarding COVID-19 Preventive Measures

In this study, 184 (56.8%) of the health professionals had good knowledge of COVID-19 prevention measures. On the other hand, 140(43.2%) had poor knowledge. Only 0.6% of participants thought COVID-19 was a bacterial infection, and 0.9% were unsure. However, 98.5% of individuals correctly recognized the illness as viral. Regarding the primary routes of COVID-19 transmission, 54.3% of respondents know that droplets and close contact are the main ways, 43.2% identify respiratory transmission, and 0.6% incorrectly believe food is the main way. Merely 0.5% of people are unaware of the transmission routes. 66% of participants correctly identified the COVID-19 incubation period as lasting between two and four days. As per WHO guidelines, 59% of participants are aware that handwashing with soap and water should take between 20 and 30 seconds. The suggested duration for alcohol-based hand sanitizers is between 20 and 30 seconds, as 47.8% of respondents correctly state. When it comes to physical distancing, 78.7% of participants correctly suggested keeping a distance of two meters or more, while 20.7% suggested a distance of one to one and a half (Table 2).

Variable	Response	Frequency	Percent (%)
COVID-19 is caused by	Bacterial	2	0.6
	Viral	319	98.5
	I don't know	3	0.9
What is the main transmission route of COVID-19	Droplets and close contact	176	54.3
	Food	2	0.6
	Respiratory	140	43.2
	Water	1	0.3
	I don't know	5	1.5
How long is the incubation period for COVID-19	2-14 days	214	66.0
	3-7 days	58	17.9
	I don't know	20	6.2
	more than 14 days	32	9.9
Who is susceptible to COVID-19	I don't know	7	2.2
	People are generally susceptible	186	57.4
	People with pre-existing disease	29	9.0
	The old and children	72	22.2
	Young adults	30	9.3
The main clinical manifestations of COVID-19 are?	Diarrhea	3	.9
	Fatigue	47	14.5
	Fever and dry cough	231	71.3
	Sore throat and myalgia	43	13.3
Patients with underlying chronic disease are at a higher risk of infection	No	5	1.5
	Yes	319	98.5
Treatment option for COVID-19 is	Antiviral treatment provision	54	16.7
	I don't Know	2	.6
	No definitive management	19	5.9
	Supportive care	249	76.9
WHO recommended duration of handwashing with soap and water	1 hour	11	3.4
	20-30 sec	191	59.0
	40-60 sec	122	37.7
WHO recommended duration of alcohol hand rub using sanitizer is	10 sec	126	38.9
	20 sec	43	13.3
	20-30 sec	155	47.8
Recommend physical distance	0-1 meter	67	20.7
	2 and above meter	255	78.7
Over all Knowledge Level	Good	184	56.8
	Poor	140	43.2

Table 2: Knowledge of Health Professionals Regarding COVID-19 Preventive Measures in Selected Public Hospitals of East Shewa Zone, Ethiopia, 2024 (n = 324)

3.3. Compliance to COVID-19 Prevention Measures

Of the health professionals in the current study, 123 (38%) exhibited good compliance with COVID-19 preventive measures. Conversely, 201 (62%) had poor compliance regarding COVID-19 preventive measures. Notably, 259 (79.9%) participants donned gloves during intravenous blood draws, wound cleaning, and dressing, 253 (78.1%) participants washed their hands with soap and water after handling bodily fluids, and the majority of participants 277(85.5%) showed improved adherence in areas like discarding used gloves and masks in an infectious waste container. However, a significant number of them neglected other crucial COVID-19 preventive measures, resulting in the following findings; a considerable percentage 242 (74.7%) struggled to avoid crowded areas. While; 134(41.4%) failed to appropriately don personal protective equipment before entering patient areas and adjusted their gear (such as retying gowns or readjusting respirators/face masks) during patient care, with 171(52.8%) engaging in such practices (Table 3).

Preventive Measures	Level of compliance		
	Seldom n (%)	Sometimes n (%)	Always n (%)
Q1: I wash my hands with soap and water on arrival at the hospital	41(12.7)	123(38)	160(49.4)
Q2: I wash my hands with soap and water when leaving the hospital.	32(9.9)	122(37.7)	170(52.5)
Q3: I wash my hands with soap and water or use alcohol-based hand sanitizer, considering all patients as potentially infectious.	27(8.3)	123(38)	174(53.7)
Q4: I wash my hands with soap and water after exposure to body fluids.	13(4)	58(17.9)	253(78.1)
Q5: I wash my hands before a clean or aseptic procedure.	11(3.4)	83(25.6)	230(71)
Q6: I disinfect thoroughly any used shared patient care equipment after reuse.	22(6.8)	63(19.4)	239(73.8)
Q7: I change gloves between every patient contact.	19(5.9)	60(18.5)	245(75.6)
Q8: I don gloves when performing intravenous (IV) blood draw, wound cleansing, and dressing	15(4.6)	50(15.4)	259(79.9)
Q9: I use gloves when there could be contact with body fluids, mucus membranes, or open skin.	13(4)	36(11.1)	275(84.9)
Q10: I do not go where people are crowded.	81(25)	161(49.7)	82(25.3)
Q11: I wear personal protective equipment correctly before entering the patient area.	19(5.9)	115(35.5)	190(58.6)
Q12: I should not adjust (e.g., retying gown, adjusting respirator/ facemask) during patient care.	41(12.7)	112(34.6)	171(52.8)
Q13: I remove personal protective equipment slowly and deliberately in a sequence that prevents self-contamination	21(6.5)	71(21.9)	232(71.6)
Q14: I dispose of used gloves/facemasks in infectious waste containers.	10(3.1)	37(11.4)	277(85.5)

Table 3: Healthcare Workers' Compliance with COVID-19 Preventive Measures in Public Hospitals of East Shewa Zone, Ethiopia, 2024

3.4. Factors Associated with Compliance to COVID-19 Prevention Measures

To identify independent variables that might affect the outcome variable, binary logistic regression was employed. In a bi-variable analysis, the following factors were linked to the outcome variable: knowledge level, age, gender, professional occupation, working department, COVID-19 vaccination, ever-received training on the IPC of COVID-19, continuous water supply availability, adequate ventilation of staff and working rooms, PPE availability, functional infection prevention committee, and hospital management support. However, knowledge level, professional occupation, COVID-19 vaccination status, and functional handwashing facility were statistically significant variables influencing adherence to COVID-19 preventive measures in multivariable analysis. The likelihood that health professionals would comply well with COVID-19 preventive measures was 1.93 times higher for those with good knowledge than for those with poor knowledge.[AOR = 1.93; 95% CI (1.13,3.29)]. Health professionals whose professional occupation is Nurses were 4.39 times more likely to have good compliance towards COVID-19 prevention measures than other professionals in the fields of pharmacy, radiology, anesthesia, and other health fields [AOR = 4.39; 95% CI (2.01,9.60)]. The odds of having good compliance were 48.2% less likely among health professionals who did not take the COVID-19 vaccination

than their counterparts [AOR = 0.52; 95% CI (0.27, 0.99)]. Similarly, health workers without functional handwashing facilities had a nearly 70.5% lower chance of having good compliance with COVID-19 preventative measures than those with functional handwashing facilities [AOR = 0.29; 95% CI (0.13, 0.66)] at their working place (Table 4).

Variables	Category	Compliance with Covid-19 preventive practices		COR (95% CI)	AOR (95% CI)	P-value
		Good, n (%)	Poor, n (%)			
Knowledge level	Good Knowledge	80(43.5)	104(56.5)	1.74(1.09-2.76)	1.93(1.13-3.29)*	0.015
	Poor Knowledge	43(30.7)	97(69.3)	1	1	
The age category of the participant	20-29	37(35.6)	67(64.4)	0.44(0.20-0.95)	0.51(0.21-1.24)	0.138
	30-39	66(35.9)	118(64.1)	0.45(0.22-0.92)	0.48(0.21-1.11)	0.086
	≥ 40	20(55.6)	16(44.4)	1	1	
Gender	Female	67(42.9)	89(57.1)	1.51(0.96-2.36)	1.02(0.57-1.81)	0.959
	Male	56(33.3)	112(66.7)	1	1	
Professional Occupation	Medical Doctor	17(34)	33(66)	2.32(0.94-5.71)	2.27(0.89-5.83)	0.087
	Medical Laboratory	9(31)	20(69)	2.03(0.71-5.75)	1.65(0.56-4.87)	0.298
	Midwife	7(25)	21(75)	1.50(0.50-4.49)	1.55(0.49-4.85)	0.386
	Nurse	80(49.4)	82(50.6)	4.39(2.07-9.31)	4.39(2.01-9.60)*	<0.001
	Others	10(18.2)	45(81.8)	1	1	
Working department	Emergency	18(37.5)	30(62.5)	1.95(0.82-4.66)	0.87 (0.16-4.63)	0.870
	OPD	39(33.1)	79(66.9)	1.60(0.76-3.40)	1.08 (0.22-5.23)	0.924
	IPD	54(50.5)	53(49.5)	3.31(1.56-7.01)	0.58 (0.12-2.83)	0.504
	Others	12(23.5)	39(76.5)	1	1	
Vaccination status	Yes	107(40.8)	155(59.2)	1	1	
	No	16(25.8)	46(74.2)	0.50(0.27-0.94)	0.52(0.27-0.99)*	0.048
Ever received training on the IPC of Covid-19	Yes	87(40.8)	126(59.2)	1.44(0.89-2.33)	1.07(0.63-1.83)	0.709
	No	36(32.4)	75(67.6)	1	1	
Continuous water supply availability	Yes	107(42.6)	144(57.4)	2.65(1.44-4.86)	1.35(0.65-2.78)	0.191
	No	16(21.9)	57(78.1)	1	1	
Working rooms have adequate ventilation	Yes	98(44.5)	122(55.5)	2.54(1.51-4.28)	1.30(0.59-2.85)	0.513
	No	25(24)	79(76)	1	1	
Staff rooms have adequate ventilation	Yes	93(44.9)	114(55.1)	2.37(1.44-3.89)	1.20(0.58-2.49)	0.397
	No	30(25.6)	87(74.4)	1	1	
PPE availability	Yes	110(41.7)	154(58.3)	2.58(1.33-5.00)	0.75(0.31-1.83)	0.493
	No	13(21.7)	47(78.3)	1	1	

functional handwashing facility availability	Yes	109(45.6)	130(54.4)	1	1	
	No	14(16.5)	71(83.5)	0.24(0.13-0.44)	0.29(0.13-0.66)*	0.003
Functional Infection Prevention Committee	Yes	97(44.7)	120(55.3)	2.52(1.50-4.22)	1.36(0.60-3.07)	0.515
	No	26(24.3)	81(75.7)	1	1	
Hospital management support	Yes	93(43.1)	123(56.9)	0.51(0.31-0.84)	0.91(0.42-1.95)	0.794
	No	30(27.8)	78(72.2)	1	1	

Table 4: Factors Associated with Compliance Towards COVID-19 Prevention Measures in Public Hospitals, East Shewa Zone, Ethiopia, 2024 (n = 324)

4. Discussions

An infectious pandemic of rising concern for global public health is COVID-19. It is currently the most talked-about subject in everyone's life, particularly among patients and healthcare workers. Healthcare professionals are more susceptible to SARS-CoV-2 infection than the general population. The current cross-sectional study set out to assess the variables associated with health professionals' compliance with COVID-19 preventive measures in public hospitals located in the East Shewa Zone of Ethiopia. This study found that 38% of health professionals generally complied well with COVID-19 preventive measures. This outcome was in line with a study from northwest Ethiopia that found 38.7%[43]. This finding was lower than a study conducted in the Amhara region Ethiopia (62%), Uganda (74%), Pakistan (73%), and in China, 87% [43-46]. One explanation for this discrepancy could be that there are different numbers of outcome variable categories (two vs. three), the distribution of facilities and supplies for COVID-19 prevention (at various hospital levels, or inadequate managerial attention). Furthermore, the disease burden and study duration (early and late pandemic) may be the cause of the discrepancy in compliance. Another potential explanation might be the differences in research methodologies and economic standing when compared to other nations. Compliance may also be impacted by individual attitudes and perceptions regarding the seriousness of COVID-19 or the efficacy of preventive measures. According to this study, approximately 59% of medical personnel regularly wash their hands before and after interacting with patients. The fact that only half of HPs reported adhering to one of the crucial handwashing times advised by the WHO again makes this finding unexpected. This might be due to 73.8% and 77.5% of health professionals reported having a functional handwashing, facility and continuous water supply at their workplace, respectively. This study shows that 56.8% of health professionals have a good knowledge regarding COVID-19 prevention measures. This result is lower than the findings of studies in the Amhara Region, 70%; northwest Ethiopia, 73.8%; and in China, 88.4% [43,44,47]. The possible reason for this variation might be due to the study settings; participant's negligence to focus on all items listed to evaluate knowledge, varying levels of access to updated information and training, and cultural attitudes toward disease prevention. The availability of functional handwashing facilities, professional occupation, knowledge of health professionals, and COVID-19 vaccination status were all factors linked to compliance with COVID-19 preventive measures, according to the binary logistic regression model. Healthcare workers who are well-informed about COVID-19 preventive measures are more likely to demonstrate good compliance than those who are not, as the current study shows. Evidence from Ghana, Saudi Arabia, Ethiopia, and southeast Ethiopia backed up this report [48-50].

Knowledge is the foundation of any application, including the use of preventive measures, according to several studies. Another explanation for this would be that their practice standards are raised by their awareness of different information sources, the media, and experts [51,52]. Generally speaking, to perform a specific recommended activity, we must possess adequate awareness or comprehensive knowledge. According to the study, nurses were 4.39 times more likely to demonstrate good compliance with COVID-19 prevention measures compared to professionals in pharmacy, radiology, anesthesia, and other health fields corresponds with earlier studies that emphasize the vital role nurses play in infection prevention and control (IPC). This finding was supported by a study conducted in Bangladesh, China, and Addis Ababa. Compared to other healthcare professionals, nurses may be more directly exposed to COVID-19 cases because they frequently provide patient care [53-55]. This might be one reason why nurses are more likely to comply. Their awareness and dedication to following preventive measures, like hand hygiene, using personal protective equipment (PPE) appropriately, and disinfecting the environment, are increased by this increased exposure risk. The necessity of rigorous adherence to IPC protocols is highlighted by their frequent and extended interactions with patients. The nature of job duties may also be connected to the discrepancy in compliance. Because they spend more time with patients and are frequently the primary caregivers, nurses are more aware of the importance of IPC measures. However, radiologists and pharmacists might interact with patients less frequently, which could result in a lower perceived need

for compliance. This observation is consistent with research showing that individuals directly involved in patient care frequently have higher compliance rates with IPC measures. The finding shows that health professionals who did not take the COVID-19 vaccine were 48.2% less likely to have good compliance with COVID-19 preventive measures compared to those who were vaccinated underscores the relationship between vaccination status and adherence to preventive protocols. The results of other studies carried out in China and, as well as in northwest Ethiopia, provide evidence for this relationship [54,56]. These studies showed that healthcare workers who had received vaccinations were more likely to follow precautions like mask-wearing, hand hygiene, and social distancing.

This might be explained by their increased awareness of the dangers of COVID-19 and the advantages of prevention, which are frequently emphasized in vaccination awareness campaigns. Similarly, people who have received vaccinations tend to trust scientific advice more, which affects how they behave generally when it comes to taking preventative action. Infrastructure plays a crucial role in encouraging adherence to infection prevention and control (IPC) measures, as evidenced by the finding that health professionals without access to functional handwashing facilities were 70.5% less likely to follow COVID-19 preventive measures than those with access. The conclusion was corroborated by a study carried out in Nigeria, which discovered that healthcare workers' compliance with COVID-19 protocols was highly impacted by the availability of hand hygiene infrastructure [57]. This could be because health workers who had access to sufficient facilities were more likely to maintain good hand hygiene, which is essential for halting the spread of infections. The practical difficulties brought about by insufficient resources are also reflected in this, as they deter compliance even in cases where employees are aware of the significance of preventive measures. In contrast, the study conducted in Ghana, Accra found a negative correlation between COVID-19 preventive measures compliance and functional hand washing facilities [58]. This contradictory finding might point to compensatory behavior, whereby medical personnel without access to handwashing stations concentrate more on other preventive strategies, such as wearing masks, physically separating themselves from patients, or using hand sanitizers, as a result of increased awareness of the risks of infection. The main limitations of the study include the inability to determine causal relationships due to the nature of the cross-sectional study design. Additionally, social desirability; the possibility that respondents would provide information in a socially acceptable way may have an impact on the study's assessment of self-reported compliance with COVID-19 preventive measures. Notwithstanding these drawbacks, the data we obtained about health professionals' adherence to COVID-19 preventive measures is quite insightful.

5. Conclusions

According to this study, around two-fifths of health professionals in a selected number of public hospitals in Ethiopia's East Shewa zone complied well with COVID-19 prevention measures. Knowledge of health professionals, professional occupation, COVID-19 vaccination status, and availability of functional handwashing facilities were factors associated with compliance of health professionals toward COVID-19 preventive measures. Therefore, it is advised to ensure that handwashing facilities are available and maintained in all hospitals, as well as to enhance the knowledge of health professionals through on- and off-the-job training. Interventions that are specifically tailored to certain professional occupations that exhibit lower levels of compliance should be developed. The goal of these interventions ought to be to address the particular difficulties that various groups of health professionals encounter. In addition, local health authorities ought to collaborate with productive partners to bridge any gaps and oversee the execution of all COVID-19 preventive measures in hospitals.

Funding

Not applicable.

Availability of Data and Materials

By getting in contact with the Corresponding Author, one may reasonably request access to the data on which the outcome is based.

Declarations

Competing Interests

Authors declared that they has no competing interests

Acknowledgments

I would like to thank all who participated actively and played positive roles in the success of this research project and the manuscript emanated from its main findings. Nevertheless, my special thanks go to Adama Hospital Medical College, Hospital management and Staffs, data collectors, and Study Participants for their unreserved cooperation and support given to the success of this study.

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