ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING

DETERMINANT FACTORS OF THE KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS COVID-19 AMONG HEALTHCARE PROFESSIONALS WORKING IN NORTH WOLLO GOVERNMENTAL HOSPITALS, AMHARA REGIONAL STATE, ETHIOPIA, 2021

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A RESEARCH THESIS SUBMITTED TO THE SCHOOL OF NURSING AND MIDWIFERY, COLLEGE OF HEALTH SCIENCE, GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN ADULT HEALTH NURSING

JUNE, 2021

ADDIS ABABA, ETHIOPIA

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APPROVAL BY THE BOARED OF EXAMINATION

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ACRONYMS AND ABREVIATIONS

AAU	Addis Ababa University
AOR	Adjusted Odds Ratio
CFR	Case Fatality Rate
CI	Confidence Interval
COR	Crude Odds Ratio
COVID-19	Coronavirus Disease 2019
EPHI	Ethiopia Public Health Institute
EPI INFO	Epidemiological Information
FMOH	Federal Ministry of Health
HCW	Health care Workers
IP	Infection Prevention
IRB	Institution Review Board
KAP	Knowledge, Attitude and Practice
KPH	Kobo Primary Hospital
MERS CoV	Middle East Respiratory Syndrome Coronavirus
MPH	Mersa Primary Hospital
PPE	Personal Protective Equipment
SARS CoV	Sever Acute Respiratory Syndrome Coronavirus
SPSS	Statistical Package for Social Science
St. LGH	St. Lalibela General Hospital
WCSH	Woldia Comprehensive Specialized Hospital

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background: Coronavirus disease (COVID-19) is defined as an illness caused by a novel corona virus now called SARS-CoV-2 and declared as global health emergency on January 30, 2020 and global pandemic on 11 March, 2020 by WHO. As healthcare professionals are frontline workers to fight against the pandemic and to save lives of the people contracting the disease, there is shortage of information in knowledge, attitude and practices of healthcare professionals regarding COVID-19 in Ethiopia.

Objective: To assess knowledge, attitude and practice towards COVID-19 and determinant factors among healthcare professionals working in North Wollo Governmental Hospitals.

Methods: Institution based cross-sectional descriptive study design was utilized to asses knowledge, attitude and practice towards COVID-19 and determinant factors among 250 healthcare professionals. The sample size was determined by using a formula for estimating a single population proportion. Data collection carried out using self-administered structured questionnaire and analysed using SPSS version 25. Bivariate and multivariate logistic regression analysis was implemented to identify determinant factors at a significance level of $p < 0.05$ and 95%CI. Data were presented by tables and narrative forms accordingly.

Results: 230 healthcare professionals participated in the study with a response rate of 92%. 83.9% and 72.2% have good knowledge and practice respectively, 94.8% have favourable attitude. A respondent with Bachelor degree, respondent who has infection prevention guideline in the hospital and participants who took training on infection prevention were significantly associated with good knowledge, favourable attitude and good practice.

Conclusion: The overall level of knowledge and attitude was good. However, the practice was relatively low.

Key words: Ethiopia, Healthcare professionals, COVID-19, Knowledge, Attitude, Practice

1. INTRODUCTION

Coronavirus disease (COVID-19) is defined as an illness caused by novel corona virus now called sever acute respiratory syndrome coronavirus 2 (SARS CoV-2); formerly called 2019-novel coronavirus. As the novel coronavirus disease in 2019 (covid-19) first identified in the late December 2019 in the city of Wuhan, the Chinese province of Hubei city(1), WHO declare it as "Public Health Emergency of International Concern" (PHEIC), on January 30, 2020 and consequently, a pandemic on March 11, 2020(2). The virus first identified in a group of peoples visiting seafood market with unidentified symptoms that looks like symptoms of viral pneumonia. Since then, the virus spreads all over the world and causing large number of hospitalization and fatalities in many countries in the world(3). The main symptoms of COVID-19 are fever, fatigue, and cough, which are similar to that of SARS-CoV and MERS-CoV infected cases. Less commonly symptoms like sputum production, headache, haemoptysis, and diarrhoea are reported (4).

This ongoing rapid transmission of the virus has already influence all countries and territories around the world and caused over 172 million cases and over 3.7 million deaths reported globally since the start of the pandemic as of 04 June, 2021(5). In Ethiopia as the first case reported on March 13, 2020, a total of 272,285 cases and 4,185 deaths from 2,737,938 laboratory tests were reported on 04 June, 2021 which makes 4,923.889 cases and 131,879 deaths in the continent of Africa. As of May 25, 2021 case fatality rate (CFR) was 2% globally, 2.68% in Africa and 1.5% in Ethiopia(5).

Researchers in the world are trying to develop strategies to detect and target the virus even if nothing is approved by WHO as therapeutic till date. Besides non availability of therapeutic drugs, number of vaccine including Pfizer-BioNTech COVID-19 Vaccine and Moderna COVID-19 Vaccines were approved by the U.S. Food and Drug Administration, issued as the first emergency use authorization for a vaccine for the prevention of coronavirus disease on 11 December 2020(6).

Pertinently, SARS-CoV-2 has spelled devastation in various developed countries even though they have been acknowledged for their well-structured health service time and again its spread in Africa may be more catastrophic in the context of lack of adequate health systems. Various measures have been adopted globally to control and limit fast spread of the disease, including enforcement of 'lockdown' in various countries. Due to its global threat and alarming predictions, online courses on awareness and strategic preparedness and

response plan (SPRP) around the world were initiated to protect the states with weaker health infrastructures. In this backdrop, as well perceived, strong infection prevention control practices are the key to minimize the spread of the virus in both health care settings and the community(7). .

In the African context particularly in Ethiopia, a densely populated nation without a robust healthcare infrastructure, COVID-19 leaves high burden in the country to combat the viral assault. Ethiopian government is beavering to combat the debacle by ensuring timely execution of the viral detection test and through various suggestive measures prior to first case detection and modifying accordingly (8). These measure include preparing health institutions that will fully serve the patients of COVID-19, organizing the teams that will facilitate the control and prevention of the disease in different levels, declaration of a state of emergency for 5 months (April-August, 2020), preparing isolation and quarantine centres, resource mobilization from different bodies to support vulnerable groups and others which helps to prevent the spread of the virus like awareness creation in different methods about preventive measures(9); some of preventive measures are maintenance of social distancing, wearing of nose masks, frequent washing of hands using soap/appropriate sanitizer and avoidance of movement in crowded places, shutting down of schools and higher education, and door to door temperature check up to stop community spreading(9).

Although various measures have been taken to halt further spread of the virus, number of cases is increasing as preventive and control measure is not correctly implemented in Ethiopia(10). This may bring the virus to became uncontrolled in unorganized structure and poor healthcare service in addition to lack of well-equipped healthcare system in the country like mechanical ventilation, which is the main stay to treat critical patients due to COVID-19, which signals a need of long stay of aforementioned measures and other additional strong measures in Ethiopia (11).

Health professionals maintain health in humans through the application of the principles and procedures of evidence-based medicine and caring. Health professionals' study, diagnose, treat and prevent human illness, injury and other physical and mental impairments in accordance with the needs of the populations they serve. They advise on or apply preventive and curative measures, and promote health with the ultimate goal of meeting the health needs and expectations of individuals and populations, and improving population health outcomes. They also conduct research and improve or develop concepts, theories and operational

methods to advance evidence-based health care. Their duties may include the supervision of other health workers(12).

Healthcare professionals are at the frontline to defence against the coronavirus disease 2019 (COVID-19) pandemic(13). The transmission of the disease among healthcare professionals is exaggerated by overcrowding, absence of isolation facilities, contaminated environment and is likely enhanced by insufficient knowledge and awareness of infection control practices among healthcare workers(14). That inadequate knowledge and the incorrect attitudes among healthcare professionals can directly influence practices and lead to delayed diagnosis, poor infection control practice, and spread of disease(15).

The rapid transmission of the virus from person to person coupled with lack of effective medications and vaccines has posed serious challenges to control the spread of the disease (16). It is obvious that COVID-19 brings an extra strain to the health system of the countries in addition to economy and social life challenges(10). This becomes more complicated for countries like Ethiopia whose health system is not provide basic and regular health services adequately for their citizens in normal situations.

The health professional to population ratio in Ethiopia is 0.96 per 1000 populations (Medical Doctors, Health Officers, Nurses and Midwives)(17), which is much lower than the WHO recommended standards, (4.45 per 1000 populations) to meet the sustainable development goal health targets(18). This indicates that the health need of the country is not being addressed adequately and the addition of unplanned COVID-19 related needs worsen the problem.

COVID-19 cause healthcare professionals to experience emotional exhaustion, which may lead to medical errors, lack of empathy in treating patients, lower productivity, and higher turnover rates. The ability of healthcare workers to adequately cope with such like stressors is important for their patients, their families, their communities and themselves(19). Understanding the risks associated with the COVID-19 pandemic on healthcare workers, including the risk of acquisition at work vs. other settings, is crucial. Prediction of risk can inform how to protect HCW such as recommendations on use of personal protective equipment (PPE) at work or in the community(20).

Healthcare professionals while working in healthcare services are highly exposed to current pandemics due to risk of exposure to pathogens, long working hours, psychological distress, fatigue, occupational burnout, and physical violence(21). According to a national nurse

union in United States of America, over 1800 health workers have lost their lives to COVID−19 till September 29, 2020, whose report blames governmental failures for the number of deaths(22)

The ability of healthcare professionals to positively adapt and protect exposure to such like stressors depends on their knowledge, attitude and practice towards COVID-19 since inadequate awareness, improper practices and negative attitudes can directly affect the patient's care and increase the risk of infection among health care workers. Healthcare workers must continue to balance these existing obstacles to wellness while facing the unique challenges of a pandemic (19, 23).

The present review on studies of different researchers shows discrepancies between the studies reported on the level of knowledge, attitude, and practice towards COVID-19 among healthcare professionals. Collectively, the findings from different studies show that the majority of their participants has a sufficient knowledge, positive attitude, and good practice. This reflects that there are participants who had poor knowledge, a negative attitude, and poor practice in their studies, even though they are relatively low in number. In contrast to this, even if studies conducted in Ethiopia and Bangladesh show that the majority of their participants has good knowledge and attitude to COVID-19, insufficient practice to take preventive measures towards COVID-19 suggests that still extensive improvements are needed to manage and control this pandemic(24).

In fact, the role of healthcare professionals to mitigate and prevent further spread and damage from the virus all over the world is non-comparable, practice to take measures recommended to halt the transmission of the virus is poor among healthcare workers which leads to rapid spread of infections and increase the risk of healthcare professionals to contract the disease (25). Poor understanding of the disease in healthcare professionals can result in delayed diagnosis and treatment, and may be a cause for poor practice of preventive measures among healthcare professionals.

Even though governmental organizations provide preventive strategies and measures to prevent the spread of the virus, there is shortage of literatures concerning knowledge, attitude and practice among health care professionals to implement the strategies and preventive measures for COVID-19 in Ethiopia. In Ethiopia one study show that healthcare professionals have good knowledge(88.2%) and attitude (94.7%) towards the pandemic and 63.5% of participants applied preventive measures recommended by federal minister of

health and EPHI(4). In addition to poor healthcare service and infrastructures in Ethiopia, healthcare professionals knowledge, attitude, practice and misconception about COVID-19 leaves high burn in the country to stop the rapid progressive spread of the virus(4).

To prevent devastating spread of the virus all over the world and to address better understanding of progression, manifestation, method of control and prevention of the virus, guidelines for healthcare workers and online refresher courses have been developed by WHO, CDC, and various governmental organizations in various countries to boost the knowledge and prevention strategies for the virus(21). Even if as the frontline workers to fight and respond to COVID-19 and believed that disease progress and risk of prevalence is well understood by healthcare professionals, it is questionable in the current context of Ethiopia to ensure that the virus is well recognized by healthcare professionals(24).

In addition to lack of study conducted in the area, the time when some of related studies conducted (during early outbreak of the pandemic in the country and when healthcare professionals are eager to implement recommended measures to protect themselves and afraid of being infected by the virus) make it necessary to conduct studies to know current status of healthcare professional's knowledge, attitude, practice and determinant factors towards COVID-19. So that the purpose of this study is to assess current knowledge, attitude, practice and determinant factors towards COVID-19 among healthcare professionals.

Knowing current status of healthcare professionals including nurse's knowledge, attitude and practice towards COVID-19 in accordance with the rapid and ongoing nature of the disease is necessary to adopt an increased precaution measures in critical situation and the need to put effort to implement appropriate hygienic techniques and follow recommendations to prevent rapid progress of the pandemic.

In addition to its significance on amendment of preventive and control measures for policy makers, assessment of knowledge, attitude and practice towards COVID-19 among healthcare professionals is mandatory and compulsory to prevent misconception about the pandemics in the community and to terminate further spread due to negative attitude and poor practice of preventive measures for the pandemic and also knowing knowledge, attitude and practice of healthcare professionals towards COVID-19 is crucial, since the world is open to hear information regarding the progress, effect in individuals, measures to prevent

self and others and also the nature of the pandemics which will presented by healthcare professionals.

Moreover, the study helps researchers to share and address the nature of the pandemics, factors associated with pandemics, preventive and control measures used to terminate and eradicate the spread and further damage which helps first line workers to prepare and to have positive psychological response in addition to sharing experiences.

2. LITERATURE REVIEW

The COVID-19 pandemic has led to dramatic loss of human life worldwide and presents an unprecedented challenge to public health and the economic and social disruption cause millions of people at risk of falling in to extreme poverty, while number of undernourished people, currently estimated to be nearly 132 million by the end of the year 2020(26). The development of new strain brings extra strain to the world. Inadequate knowledge, attitude and practice to fight and minimize the impacts of the pandemic among the public and related factors undermined the preparedness and responses towards COVID-19 in Ethiopia. New cases and deaths are still increasing and becomes non-stoppable(27). Such negligence in the population brings extra burden to the healthcare professionals and also increase risk of acquiring the virus among healthcare professionals.

By searching results of literatures related to knowledge, attitude and practice among healthcare professionals, knowing current status knowledge, attitude and practice of healthcare professionals towards COVID-19 is important and mandatory. The literature review was accomplished by computer search of https://etd.aau.edu.et/handle/123456789/115/discover WHO, PubMed, Google Scholars, https://hinari.summon.serialssolutions.com/#!/search?ho=t&l=en&q=cihnal. Key words and terms used in the search included: COVID-19, healthcare professionals, knowledge, attitude, and practice.

2.1 Knowledge of healthcare professionals about COVID-19

On studies conducted at the early and middle stage of the outbreak in a non-pandemics but highly affected area in Henan, China; 89% of healthcare workers demonstrate sufficient knowledge on COVID-19, which is a prerequisite for positive attitude and effective practice to prevent the spread of the pandemic(28). Other studies conducted in Saudi Arabia indicates previous experience with MERS-CoV and subsequent campaign conducted in the country concerning about the virus course of action, mode of transmission and measures to prevent and control the ongoing spread of the virus increase healthcare workers knowledge about COVID-19 (29).

The study at Punjab, Pakistan show that 99% of participants are aware of disease mode of transmission, 80% know that COVID-19 is a virus related to SARS-CoV and MERS-CoV, but 37% of participants consider that antibiotic can be a treatment for COVID-19 and 17.9% of healthcare workers believed that COVID-19 is similar with normal flu (30). In other study

conducted at Peshawar, Pakistan 90% of the participant know the term COVID-19 and its mode of transmission, 84% is aware of the signs and symptoms and 72% identifies risk factors associated with COVID-19(31).

The majority of participants in the study conducted at Ho Chi Minh City, Vietnam know that COVID19 is a virus, how to prevent transmission between humans, and COVID-19 infected cases can result in death (99.1%, 98.2%, and 98.8%, respectively) and also about two-thirds of participants recognize that the transmission is due to close contact with the infected person, the suspected cases should be isolated for a minimum of two weeks, and antibiotics are not the first-line treatment (67.0%, 65.8%, and 58.4%, respectively). The overall response the participants possessing sufficient knowledge recorded as 88.4%(32).

Healthcare workers in Makere University Teaching Hospitals, Uganda have good knowledge (82.4%) on the transmission, diagnosis and preventive measures to the pandemics(21). Study conducted on assessment of knowledge, attitudes, and perception of health care workers regarding covid-19 in Egypt show that 80.4 % of the participants are aware of COVID-19 mode of transmission, signs and symptoms, and measures used to prevent and control the virus. Correct answers mostly identified for all items by more than half of participants with a significantly higher percent in physicians than in allied health professionals(13).

The results of the study in Ethiopia on Knowledge, attitude and practice of healthcare workers towards COVID-19 and its prevention shows higher knowledge (88.2%) among respondents regarding COVID-19 mode of transmission, symptoms, incubation period, vulnerable population and preventive measures(4). In other study conducted on assessment of nurse's knowledge, attitude and associated factors towards COVID-19 in South Gonder Zone Hospitals, 84.9% of the participants have good knowledge about clinical manifestation, source of infection, incubation periods and preventive measures for COVID-19 (33).

In studies conducted on pharmacists at Addis Ababa, most of the participants has good knowledge about the virus. Mainstream media and internet/social medias identified as sources of information by most of the respondents. 92.2% of respondents clearly identifies elderly as high risk for morbidity and mortality from the pandemics and 89.5% of the participants are aware of supportive measures and options to the management of the virus (3).

Study conducted on factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in Amhara Regional State, Ethiopia show that 70% of the participant have good knowledge about COVID-19. 88% of the respondents know that COVID-19 is a viral disease, 85% of the respondents reports COVID-19 has no effective treatment or vaccine yet, 69% states animals and humans are the primary sources of infection to COVID-19 and 66% healthcare workers mention respiratory droplets and close contact are the main transmission routes of COVID-19. Similarly the majority of the participants (85%) identifies chronically ill people are at the highest risk of COVID-19. In addition, 76% healthcare professionals point out typical signs and symptoms of COVID-19 are fever, dry cough and shortness of breath(34).

2.2 Attitude of healthcare professionals towards COVID-19

The attitude of healthcare workers on studies conducted at Henan, China show that healthcare workers with frontline workers, long time work experience and high educational status has positive attitude and effective performance in exercising protection measures like removal of contaminated glove, gown, mask and face shield recommended by WHO than those with short period of work experience, low educational attainment and non-frontline workers(28). And also 85% of participants doing in critical unit like in intensive care unit (ICU) and emergency unit are afraid of being infected by the virus during procedures and giving care for those critically ill clients(28). Another study published on September 17, 2020 in China show that besides healthcare workers have relatively high awareness(>85%) and attitude (92.3%) of COVID-19, 29.4% of the respondent disagree with the misconception regarding gargling with salt water for the prevention of COVID-19 and 47.7% disagreed that vitamin C and Banlangen granules are effective in protecting against COVID-19(35).

Healthcare workers worry in Saudi Arabia about contracting and transmitting COVID-19 is less than that of MERS-CoV at the early stage of COVID-19 pandemics. Current study on Knowledge, attitudes and practices of healthcare workers during the early COVID-19 pandemic show that healthcare workers previous experience with MERS-CoV associated with reduction of anxiety toward the COVID-19 pandemic(29). Other study on healthcare workers at Punjab, Pakistan shows 88.7% of the participant has positive attitude for COVID-19(30). 97% of the participant agree that the disease could be transmitted by coughing and sneezing and that regular hand washing and the use of sanitizer would help prevent the spread of infection. Moreover, around 94% agrees wearing masks can help to prevent

COVID-19 transmission to other people and 97.6% agrees isolating infected patients are beneficial in reducing the risk of cross-infection(30).

In Egypt, most of the participants in a study conducted on assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19 consider the virus as a severe disease and this disease can be prevented. The vast majority of healthcare workers agrees infection control standard precaution can protect against COVID-19 (95.6%), this percent is higher among allied health workers than physicians(13).

Most participants in the survey conducted on healthcare workers knowledge, attitude practice and its impact in a South-Eastern Nigerian state have either poor attitude (25.06%) or an indifferent attitude (57.82%) towards work during the COVID-19 pandemic(36). The poor attitude significantly influenced by various fears and perceived impact of the disease on the healthcare workers and associated with fear of death, avoidance of common places, and lack of personal protective equipment(36).

In a study conducted at Ethiopia on Knowledge, attitude and practice of healthcare workers towards COVID-19 and its prevention shows 94.7% of participants have a positive attitude towards COVID-19(4). The majority (75.6%) of respondents report COVID-19 is a seriously dangerous disease and 69.3% perceive they are at high risk of contracting the disease. About 51.4% of respondents believe taking hot drink prevent COVID-19 infection, 38.5% of respondents think COVID-19 will not spread in hot climate area and 15.4% of respondents believed herbal medication will cure COVID-19(4). Based on finding, in study conducted on nurses regarding knowledge and attitude towards COVID-19 at South Gonder zone 63.3% of respondents have favourable attitude for COVID-19 whereas the rest 36.7% have unfavourable attitude(33).

2.3 Practice of healthcare professionals to prevent COVID-19

The adaption of preventive practices is the only solution to defeat the COVID-19, as to date, there is no specific treatment for the novel coronavirus(37). In a study conducted at Henan, China 89.7% of HCWs reports as practices to prevent the virus spread are associated with work experience, working time, and other factors (28). In other studies conducted at China, among all participants, 97.7% agreed that they understand and follow the standards for wearing a mask during epidemics(35).

In studies conducted at Pakistan, 93.0% of participants advise their patients to eat properly cooked food and 96.9% advise using soaps and sanitizer for regular hand and face washing.

Moreover, more than 93% of healthcare professionals in most interactions with people advise them to keep themselves warm and hydrated, and 89% advise avoiding close contact with people with cough and flu-like symptoms and more than 92.0% of healthcare workers preferred to use personal protective equipment (PPE) during interaction with COVID-19-suspected patients. About 91% of respondents perform a hand hygiene and washing procedure before or after any medical intervention or procedures and 86% of healthcare staff observe social distancing in a majority of interactions and avoid unnecessary contact with the patients(30).

In other study conducted at Peshawar, Pakistan majority of respondents often practiced thoroughly cooked food (92%), keeping themselves warm and hydrated (69.6%), avoiding close contact with the people having cough and flu like symptoms (76%) and wearing personal protective equipment during interaction with COVID-19 patients (88.4%). Most of the participants had performed hand hygiene before and after interaction with COVID-19 patients (99.1%)(31).

Among healthcare workers participate on a study conducted at Makerere University Teaching Hospitals, Uganda 54% of the respondent wear a mask when coming into contact with the patients, up to 96% wash their hands before and after touching each patient and 60% of the participants avoid patients with symptoms similar to those of COVID-19. Overall, up to 74% of the participants has good practices and age ≥ 40 and HCWs with diploma significantly has good practices(21).

The study conducted in Ethiopia to assess COVID-19 knowledge, attitude and practice of healthcare workers show that 63.5% of participants maintains good practice towards COVID-19 and its prevention. Based on findings, 67.3% of respondents use a facemask, 81.4% practice hand washing and 22.4% of respondents practicing social distance. In fact knowledge and perceptions have great roles in behavioural changes, the practice among participants to prevent the rapid and progressive spread of pandemic in Ethiopia is poor(4). In studies conducted on pharmacists at Addis Ababa, practices to protect themselves and prevent the spread of the pandemic to their family as well as the community is poor (70.2%) (3).

2.4 Factors affecting healthcare professional's knowledge on COVID-19

Based on findings on studies regarding knowledge of healthcare professionals, knowledge on COVID-19 is significantly related to the level of education and higher among healthcare

workers aged 18–39, who used news media such as televisions and newspapers as source of information, (13, 21).

Study on healthcare workers knowledge, attitude and practice to COVID-19 at Makere University Teaching Hospitals, Uganda shows no difference on level of knowledge respective of level of education and professional difference(21).

Similarly, study conducted at Ethiopia, shows sources of information (media/internet, television, and telecommunication) has a positive association with knowledge of HCWs regarding COVID-19(4) as well as educational status of the participants, socio-demographic and access to information sources described as factors on knowledge of healthcare professionals to COVID-19(33, 34).

2.5 Factors affecting attitude of healthcare professionals to COVID-19

According to the study conducted at Henan, China, the attitude of healthcare professionals to COVID-19 is affected by work experience, low educational attainment and non-frontline workers and working unit as 85% of participants doing in critical unit like in intensive care unit (ICU) and emergency unit are afraid of being infected by the virus during procedures and giving care for those critically ill clients(28).

In a study conducted on assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19 in Egypt, show that positive attitude is observed among allied health workers than physicians related to the government's role in diagnosis, treatment, and dealing with COVID-19 infections (13). In South eastern Nigeria, availability of PPE and sex (female has poor attitude than male) affects the attitude of healthcare professionals to COVID-19(36).

2.6 Factors affecting healthcare professionals' practice to prevent COVID-19

In a study conducted at Henan, China 89.7% of HCWs reports as practices to prevent the virus spread are associated with work experience, working time, and other factors (28)

Shortage of protective equipment becomes the major reason for inadequate practice to fight the pandemics(3). Residence, shortage of PPE, high workload, comorbidities, knowledge, and access to IP training and guideline were factors limiting prevention practices(34).

In conclusion, even if knowledge and attitude regarding COVID-19 in most of the countries among healthcare professionals are going well, practice to use and apply preventive and control measure is poor. So further information regarding the reason behind poor practice of

preventive measures and additional information regarding good knowledge and positive attitude as they have positive relation with practice is needed among healthcare professionals.

2.4 Conceptual Framework

Conceptual framework that shows the relationship between dependent and independent variable is adapted from similar and related literatures on knowledge, attitude, practice and associated factors towards COVID-19 among healthcare professionals(4, 21, 28).

Knowledge on COVID-19 affects healthcare professionals' attitude and practice towards COVID-19 and also the attitude of healthcare professionals on COVID-19 affects their practice to take actions on preventive and control measures for COVID-19. Socio-demographic characteristics of healthcare professionals and institutional factors affects healthcare professional's attitude and practice in addition to knowledge on COVID-19.

Moreover, relationships between dependent and independent variable are clearly illustrated diagrammatically below on **figure: 1.**

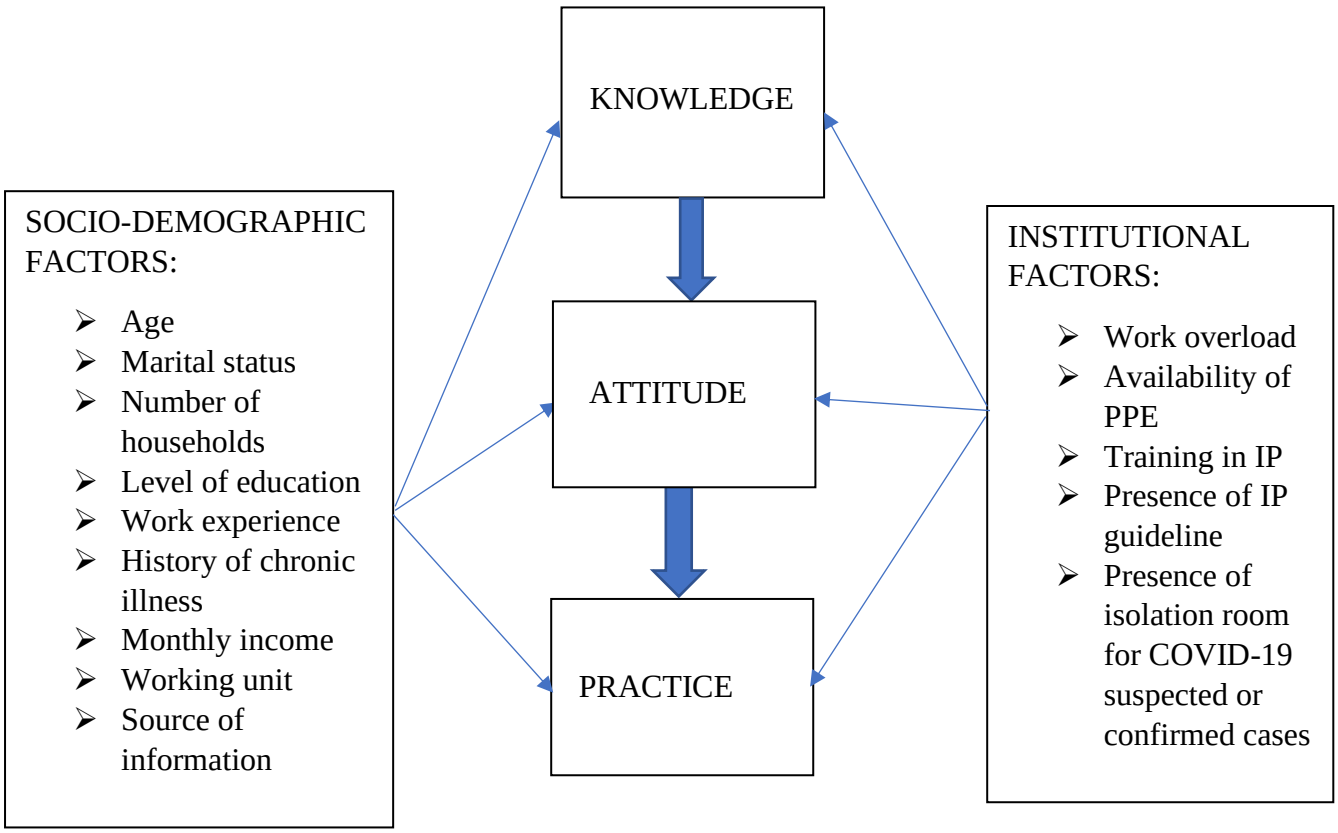

Figure 1*:* Conceptual framework on assessment of determinant factors of the knowledge, attitude, and practice towards COVID-19 among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia 2021(Adapted from different articles(4, 28, 37).

3. OBJECTIVE

3.1 General Objective

To assess determinant factors of the knowledge, attitude and practice towards COVID-19 among healthcare professionals working in North Wollo Governmental Hospitals, Amhara regional State, Ethiopia.

3.2 Specific Objectives

To determine level of knowledge regarding COVID-19 among healthcare professionals working at North Wollo Governmental Hospitals.

To assess healthcare professionals' attitude towards CVID-19 working at North Wollo Governmental Hospitals.

To assess practice on preventive and control measures to COVID-19 among healthcare professionals working at North Wollo Governmental Hospitals.

To identify factors associated with knowledge, attitude and practice towards COVID-19 among healthcare professionals.

4. MATERIALS AND METHODS

4.1 Study Area

The study was conducted in governmental hospitals found in North Wollo, Amhara Regional State, Ethiopia. North Wollo is one of 10 zones in Amhara region and bordered on the south-by-South Wollo, on the west by South Gonder, on the north by Wag Hemra, on the northeast by Tigray Region, and on the east by Afar Region. Its highest point is mount Abune Yosef and town includes Woldia (largest and capital city of the zone), Lalibela (location of Rock-hewn Churches) and Kobo. Based on the 2007 Census conducted by the central statistical agency of Ethiopia, this Zone has a total population of 1,500,303, of whom 752,895 are men and 747,408 women. The study was conducted at randomly selected four governmental hospitals among a total of six in the zone. Selected hospitals include Woldia Comprehensive Specialized Hospital, Kobo Primary Hospital, St. Lalibela General Hospital and Mersa Primary Hospital. Among 1836 healthcare professionals in the zone, 620 of them are from selected hospitals.

4.2 Study Period

Data was collected from February 08, 2021 to March 08, 2021.

4.3 Study Design

Institution based descriptive cross-sectional study design was used to assess COVID-19 knowledge, attitude and practice among healthcare professionals in selected hospitals.

4.4 Population

4.4.1 Source Population

All health care professionals working in North Wollo governmental hospitals.

4.4.2 Study Population

All healthcare professionals working in selected hospitals who fulfil the inclusion criteria.

4.5 Eligibility Criteria

4.5.1 Inclusion Criteria

Healthcare professionals who are available at the time of data collection

Healthcare professionals who are on job

Healthcare professionals who are permanent worker and

Healthcare professionals who have six months of experience or more in the hospital.

4.5.2 Exclusion Criteria

Healthcare professionals who are on annual or emergency leave

Healthcare professionals who have no direct contact with patients

4.6 Sample Size Determination and Sampling Procedure

4.6.1 Sample Size

To determine estimated sample size of the population the following assumption is used. **63.5%** Prevalence of COVID-19 knowledge, attitude and practice among healthcare workers is used in previous study conducted in Ethiopia with a 95% confidence level and margin of error (0.05). With 10% non-response rate, the total sample size required for this study appears to be **250** healthcare professionals in selected Hospitals.

4.6.2 Sampling Procedure

A proportionate systematic random sampling technique is employed to select intended study subjects after randomly selected four hospitals out of six governmental hospitals in North Wollo Amhara Regional State, Ethiopia. Selected hospital includes Woldia Comprehensive Specialized Hospital, St. Lalibela General Hospital, Kobo Primary Hospital and Mersa Primary Hospital. Number of healthcare professionals working in those hospitals taken from in each hospital's human resource management office. Then selection of **250** healthcare professionals was performed using Proportional to size allocation formula

4.7 Operational Definition

Healthcare professionals: Study, diagnose, treat and prevent human illness, injury and other physical and mental impairments in accordance with the needs of the population they serve which includes medical doctors, nurses, midwifes, medical laboratories, medical radiologic technologist, pharmacist, public health officer, anaesthetist

Medical doctors (physicians): Healthcare professionals who make clinical decisions and carry out diagnostic and healing/therapeutic interventions.

Nurse: Healthcare professionals who give autonomous and collaborative care for individuals of all ages, families, groups and communities, sick or well and in all settings.

Midwife: Healthcare professionals who deals with pregnancy, childbirth, post-partum period including care for the new born, the sexual and reproductive health of adolescents and women throughout their lives.

Medical laboratories: Healthcare professionals who are vital for healthcare detectives, uncovering and providing laboratory information from laboratory analyses that assist physicians in patient diagnosis and treatment.

Medical radiologic technologist: Healthcare professionals who contribute to improved patient outcome and more cost-efficient healthcare in all major disease entities by using many different imaging modalities such as x-ray, computed tomography, magnetic resonance imaging and ultrasound.

Pharmacist: Healthcare professionals who serve patients by providing medications they need to recover from illnesses and injuries.

Public health officers: Are professionals who undertake promotive, preventive, curative and rehabilitative services in all healthcare facilities in general and in primary health units in particular.

Anaesthetist: Healthcare professionals who keeps a patient comfortable, safe and pain-free during surgery by administering local or general anaesthetic.

COVID-19: Infectious disease caused by a novel corona virus now called sever acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-novel corona virus.

Knowledge: General awareness of healthcare professionals about COVID-19.

Attitude: An opinion or general feeling of healthcare professionals towards COVID-19.

Practice: Healthcare professionals' way of performing activities repeatedly in order to prevent and control COVID-19 transmission.

Good knowledge: Healthcare professionals score of greater than 60% according to Blooms cut-off point on a given knowledge items.

Poor knowledge: Healthcare professionals score of less than 60% from a given knowledge items according to Blooms cut-off point.

Good practice: Healthcare professionals score of greater than 60% according to Blooms cut-off point on a given practice items.

Poor practice: Healthcare professionals score of less than 60% from a given practice items according to Blooms cut-off point.

Favourable attitude: Healthcare professionals score of greater than 60% from a given attitude items.

unfavourable attitude: Healthcare professionals score of less than 60% from a given attitude items.

4.8 Variables

4.8.1 Dependent Variables

Knowledge, attitude, practice

4.8.2 Independent Variable

Socio-demographic characteristics

Sex, age, marital status, family size, presence of chronic illness in the household

History of chronic illness, history of smoking cigarette, history of drinking alcohol,

Educational status, qualification, work experience, monthly income, working unit

Source of information

Institutional factors

Availability of PPE

Training in IP

Presence of Ip guidelines in the hospital

Presence of isolation room for COVID-19 suspected or confirmed patient

Work overload

4.9 Methods of Data Collection

4.9.1 Data Collection Tools

Self-administered structured questionnaire was performed by reviewing different similar and related literatures, on assessment of COVID-19 knowledge, attitude, practice and associated factors among healthcare professionals and modified in a way that can meet the objectives of this study(4). The questionnaire is prepared in English. The questionnaires contain two portions. The first portion is socio-demographic characteristics and in the second portion healthcare professionals' knowledge, attitude, practice and determinant factors to COVID-19 was assessed by using self-administered questionnaires. Each sub

scale has their own item. Participants overall response is categorized as good and favourable if the score is ≥60% and poor and unfavourable if the score is less than 60%(4).

4.9.2 Data Collection Procedure

Data collector is selected in each hospital and one-day training was given for data collector focusing on the objective of the study and ways of data collection and handling after collection. Data's were collected by taking measures from WHO that prevent the transmission of COVID-19. Questionaries' administered after identifying the study subjects and informed consent is obtained to confirm willingness. Confidentiality was ensured to all of the study subjects. The questionnaire consists all the variables that directly meet the objective of the study. The respondents are encouraged to respond to all items in the questionnaire with in the time they devoted as much as possible to minimize large non-response rate.

4.10 Data Quality Assurance

The quality of data is assured by pre testing the questionaries before two weeks in the actual data collection period and necessary amendment was made. Reliability of items were checked using Cronbach's alpha (0.71). Similarly, training will be offered to the data collectors to avoid hypothetical bias and ensure proper categorization and coding of questionnaires. Furthermore, data collector and the investigators checked the collected data thoroughly on daily basis for its completeness.

4.11 Methods of Data Analysis

Data analysis was started by sorting and performing quality control check-up at field (each hospital). Data is checked in the field to ensure that all the information is properly collected and recorded. IBM SPSS version 25 were employed for data entry and analysis using appropriate descriptive statistics, and summarized by frequency, percentage and mean.

The level of knowledge, attitude, and practice were dichotomized into "good" and "poor" or "favourable" and "unfavourable" for attitude based on a 60% cut-off point of the total score within each domain of knowledge, attitude and practice(4). Healthcare workers attitude and practice towards COVID-19 was assessed by using five-point Likert scale as individual responding to favourable attitude and good practice were given for a score of 5, 4, 3 and unfavourable attitude and poor practice for a score of 1 and 2. Both binary and multivariable logistic regression analysis are performed to identify associated factors.

The strength of association of factors with knowledge, attitude and practice demonstrated by computing crude odds ratio (COR) and the adjusted odds ratio (AOR) with a 95% confidence interval (CI). All variables with a P-value <0.25 in univariate analysis were entered to multiple logistic regression jointly and odds ratios were calculated at 95%CI, p-value <0.05 is considered significant. The analysis included checking errors and describing the data to be collected by numerical summary tables, charts and measures of association, all of which are instruments for interpretation of the data that are collected. Finally, the analysed data is organized and presented in the tabular, graphical, and narrative form accordingly. Multi-collinearity was checked using VIF, and tolerance and also model fit was assessed using Chi-Square Goodness-of-Fit Test.

4.12 Ethical Consideration

Letter of cooperation request is obtained from Institution Review Board (IRB) of Addis Ababa University College Health Sciences, Department of Nursing. Official letter of co-operation was written to the Zone health bureau from department of nursing. Letter of cooperation was given to secure permission of access to the hospitals included in the study. After obtaining permission from the hospital directors, & unit coordinators, informed (verbal) consents is obtained from the study participants, and the objectives and expected outcomes of the study provided to the participants.

5. RESULTS

Socio-demographic characteristics

Of the total 250 healthcare professionals, 230(92% response rate) responded to the self-administered questionnaires and 150(65.2%) were males. Over half 159(69.1%) healthcare professionals aged ≤30 years (mean age =29. 6 ± 4.775) and 153(66.5%) of respondents live with their families. Nearly half of the respondents 118(52.3%) were nurses and over half 149(64.8%) of respondents have Bachelor degrees. 53.5% of the participants have monthly income between 5000 to 8000 Ethiopian birr and only 0.4%, 3% of respondents has history of smoking cigarettes and drinking alcohol respectively.

131(57%) of healthcare professionals use social media as source of information regarding COVID-19 and 86(37.4%) of participants take training on infection prevention. Over half, 118(51.3%), of healthcare professionals noted the presence of adequate PPE in their health facilities and IP guidelines in their working areas. Greater than half, 191(83%), of the healthcare professionals reported as high workload prevented them from practicing COVID-19 prevention and control methods (Table 1).

Table 1: Sociodemographic characteristics of healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia, 2021

		N	%
Age in years	≤ 25	38	16.5%
	26-30	121	52.6%
	31-35	44	19.1%
	≥36	27	11.7%
"Sex"	male	150	65.2%
	female	80	34.8%
"Marital status"	Single	98	42.6%
	Married	132	57.4%
"Living with"	Family	153	66.5%
	Alone	77	33.5%
Family size	<4	159	78.3%
	>5	44	21.7%

"If living with families and relatives, is there anyone is the household having history of chronic illness"	Yes	18	8.9%
	No	185	91.1%
"Level of education"	masters	6	2.6%
	bachelor	149	64.8%
	diploma	75	32.6%
"Qualification"	medical doctors	36	15.7%
	nurse	118	51.3%
	midwives	31	13.5%
	laboratory	16	7%
	pharmacy	16	7%
	Others*	13	5.7%
Monthly income	Income less than ETB 5,000	46	20%
	Income between 5000 and 8000	123	53.5%
	Income greater than 8000	61	26.5%
"History of chronic illness"	Yes	1	0.4%
	No	229	99.6%
"History of smoking cigarette"	Yes	0	0.00%
	No	230	100.0%
"History of drinking alcohol"	Yes	7	3%
	No	223	97%
Work experience	experience less than 2 and half years	48	24.4%
	experience of 2 and half year to six year	101	51.3%
	experience above six year	48	24.4%
"Hospital you are working"	Woldia comprehensive specialized hospital	122	53%
	St. lalibela general hospital	60	26.1%
	kobo primary hospital	23	10%

	mersa primary hospital	25	10.9%
"Working department(unit)"	Ward	60	26.1%
	ICU	14	6.1%
	Emergency	47	20.4%
	OPD	61	26.5%
	Other units**	48	20.9%
Source of information	Governmental source	99	43%
	Social media	131	57%
Training in IP	No	144	62.6%
	Yes	86	37.4%
Presence of infection prevention guideline	No	112	48.7%
	Yes	118	51.3%
Presence of hand hygiene stations (water, soap, paper towel, alcohol-hand rub), and waste bins	No	104	45.2%
	Yes	126	54.8%
presence of isolation room for COVID-19 confirmed or suspected cases	No	93	40.4%
	Yes	137	59.6%
PPE supply to the staff on time and adequately?	No	112	48.7%
	Yes	118	51.3%
Workload affect your infection prevention practice	No	39	17.0%
	Yes	190	83.0%

*: Anaesthetist, Medical Radiology Technologist, Health Officer

**: ONS/GYN ward, OR, Recovery

Knowledge of healthcare professionals about COVID-19

This study revealed that 193 (83.9%) of participants had good knowledge about COVID-19. 229(99.6%) of participants revealed that virus as the cause of COVID-19. The respondents' correct answer rates on the clinical manifestation of COVID-19 were 76.5%. About 94.3% and 56.5% of participants said, that COVID-19 has no specific treatment and has authorized vaccine currently available in use respectively. 101(43.9%) of the respondents said that the

source of the virus is not known till date and 194(84.3%) know that young infant and children's need to be take necessary measures to prevent them from acquiring the virus (table 2 and figure 2).

Table 2: Knowledge towards COVID-19 among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia (N=230), 2021.

	Incorrect answer		Correct answer	
	N	%	N	%
what causes COVID-19	1	0.4%	229	99.6%
Source of COVID-19	129	56.1%	101	43.9%
clinical symptoms of COVID-19	175	76.1%	55	23.9%
how long the virus survives in the environmental air	74	32.2%	156	67.8%
What is the incubation period of the virus	97	42.2%	133	57.8%
Is the virus transmitted through air borne aerosols	18	7.8%	212	92.2%
Is the virus transmitted via contaminated objects	6	2.6%	224	97.4%
Do you think asymptomatic carrier can spread the infection	14	6.1%	216	93.9%
Can the COVID-19 infection present as diarrhoea, vomiting, and gastrointestinal upset?	49	21.3%	181	78.7%
Can the COVID-19 infection present as neurological symptoms?	54	23.5%	176	76.5%

What is the current Case Fatality Rate (CFR) of COVID-19 infection in the world?	105	45.7%	125	54.3%
What is the current Case Fatality Rate (CFR) of COVID-19 infection in Africa?	97	42.2%	133	57.8%
. What is the current Case Fatality Rate (CFR) of COVID-19 infection in Ethiopia?	54	23.5%	176	76.5%
What is the other name of COVID -19?	126	54.8%	104	45.2%
What is the name of currently available authorized and recommended vaccines against COVID-19 in the world?	100	43.5%	130	56.5%
There is currently no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients	13	5.7%	217	94.3%
Not all persons with COVID-19 will develop severe cases. Only those who are elderly, have chronic illnesses, and are	24	10.4%	206	89.6%

Eating or contacting wild animals would result in the infection by the COVID-19 virus	47	20.4%	183	79.6%
Persons with COVID-19 cannot transmit the virus to others when a fever is not present	79	34.3%	151	65.7%
It is necessary for children and young adults to take measures to prevent the infection by the COVID?19 virus	36	15.7%	194	84.3%

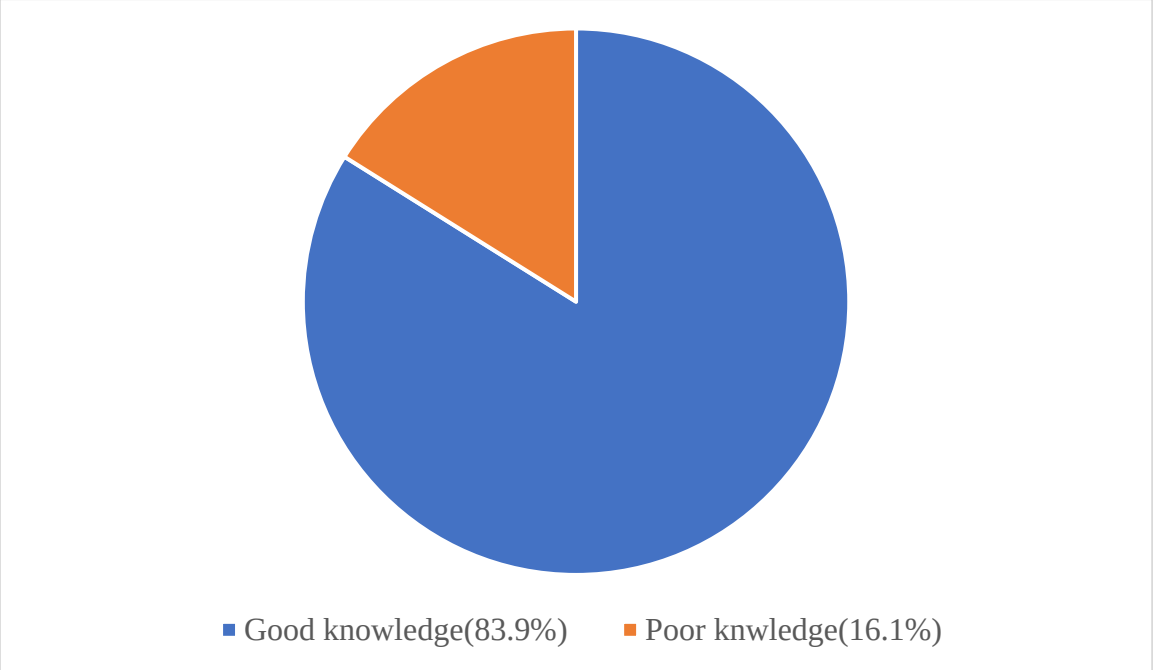

Figure 2: Knowledge towards COVID-19 among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia, 2021.

Healthcare professionals' attitude towards COVID-19

This finding revealed that 218(94.8%) of participants have favourable attitude towards COVID-19. The majority (208 or 90.4%) of respondents said that COVID-19 is a seriously dangerous disease and 129(56.1%) perceived that black race is protective against the virus. About 76(33%) of respondents believed that taking hot drink prevent COVID-19 infection, 120(52.2%) of respondents said COVID-19 will not spread in hot climate area and 77(33.5%) of respondents believed that herbal medication will cure COVID-19(table 3 and figure 3).

Table 3: Attitude towards COVID-19 among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia(N=230), 2021

	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%
"Black race is protective towards COVID-19 disease"	46	20.0%	55	23.9%	68	29.6%	41	17.8%	20	8.7%
"Avoiding touching nose, mouth and eyes can reduce the risk of COVID-19 infection"	4	1.7%	9	3.9%	16	7.0%	84	36.5%	117	50.9%
"Patients with COVID-19 infection should be isolated avoid transmission of inf"	3	1.3%	3	1.3%	13	5.7%	92	40.0%	119	51.7%
"COVID-19 disease can be transmitted by coughing and sneezing"	7	3.0%	2	0.9%	6	2.6%	80	34.8%	135	58.7%

"Transmission of COVID-19 infection can be prevented through wearing face mas"	3	1.3%	6	2.6%	14	6.1%	100	43.5%	107	46.5%
"Transmission of COVID-19 infection can be prevented through washing hands an"	4	1.7%	12	5.2%	13	5.7%	85	37.0%	116	50.4%
"Transmission of COVID-19 infection can be prevented through isolation of COV"	9	3.9%	8	3.5%	14	6.1%	90	39.1%	109	47.4%
"Restricting the travel of COVID-19 infected people to other areas of the work"	4	1.7%	11	4.8%	15	6.5%	106	46.1%	94	40.9%
"Transmission of COVID-19 infection can be prevented by taking antibiotics"	31	13.5%	81	35.2%	41	17.8%	53	23.0%	24	10.4%
"The vaccine developed against COVID-19 can significantly reduce the epidemic"	15	6.5%	19	8.3%	45	19.6%	92	40.0%	59	25.7%
"The available information about COVID-19 disease is sufficient in Ethiopian"	19	8.3%	65	28.3%	63	27.4%	50	21.7%	33	14.3%
"The Government in our country has all the necessary healthcare facilities an"	33	14.3%	67	29.1%	50	21.7%	51	22.2%	29	12.6%

"COVID-19 is seriously dangerous disease"	12	5.2%	10	4.3%	20	8.7%	54	23.5%	134	58.3%
"Children and infants need to take preventive measures against COVID-19"	12	5.2%	7	3.0%	24	10.4%	117	50.9%	70	30.4%
"Taking hot drinks can prevent from contracting COVID-19 disease"	28	12.2%	48	20.9%	70	30.4%	66	28.7%	18	7.8%
"COVID-19 cannot spread in hot climate areas"	34	14.8%	86	37.4%	47	20.4%	46	20.0%	17	7.4%
"Herbal medication can cure COVID-19"	27	11.7%	50	21.7%	90	39.1%	44	19.1%	19	8.3%
"Wearing PPE such as face mask, can prevent from contracting COVID-19 disease"	8	3.5%	4	1.7%	17	7.4%	87	37.8%	114	49.6%

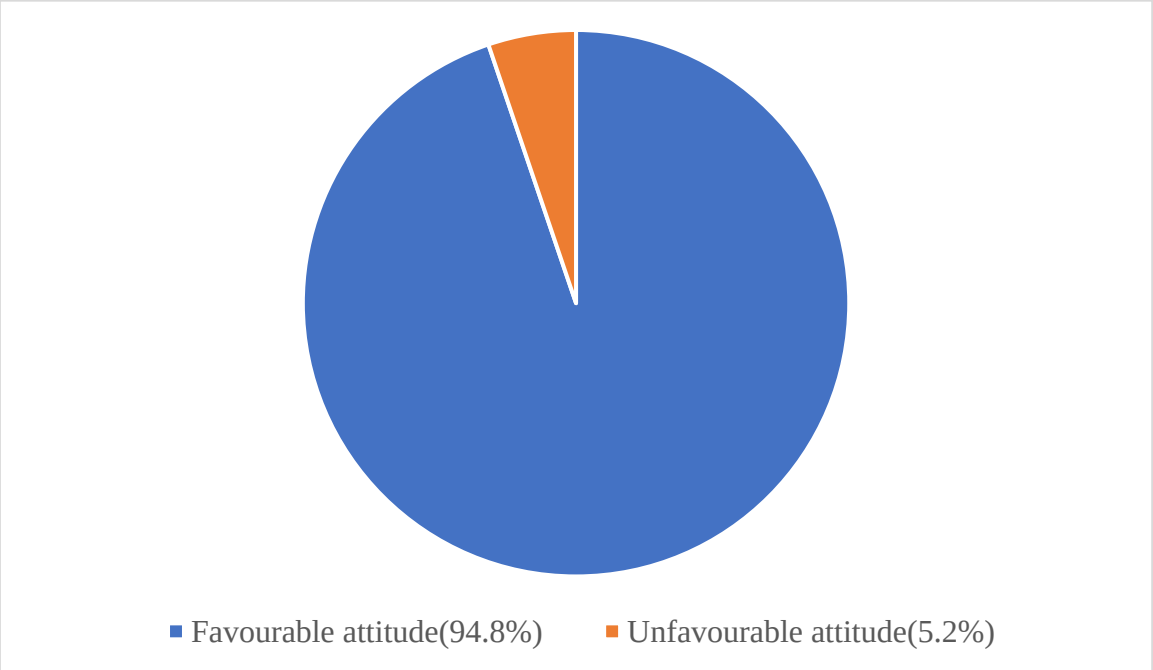

Figure 3: Attitude towards COVID-19 among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia, 2021.

Practice of healthcare professionals to prevent and control COVID-19

This study showed that 166(72.2%) of participants had good practice towards COVID-19 prevention and control mechanisms. Based on this result, 177(77%) of respondents are using a facemask while in contact with patients and practicing handwashing regularly, 146(63.5%) of participants had still participating in meeting and other ceremonies and 195(84.8%) of the respondents maintaining safe physical distance (minimum of one metre) from anyone who is coughing and sneezing. Only 35.2% of respondents were avoid touching their mouth, nose and eyes (table 4 and figure 4).

Table 4: Practice to prevent COVID-19 transmission among healthcare professionals workin in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia(N=230), 2021.

	Never		Rarely		Sometimes		Often		Always	
	N	%	N	%	N	%	N	%	N	%
"Wear PPE when in contact with patients"	18	7.8%	35	15.2%	60	26.1%	56	24.3%	61	26.5%
"Going to any crowded place"	35	15.2%	49	21.3%	100	43.5%	23	10.0%	23	10.0%
"Direct contact with colleagues or others"	39	17.0%	32	13.9%	89	38.7%	47	20.4%	23	10.0%
"Washing hands with water and soap before and after handling each patient"	19	8.3%	34	14.8%	72	31.3%	45	19.6%	60	26.1%
"Carry sanitizer in day-to-day activities during the COVID-19 outbreak"	19	8.3%	35	15.2%	55	23.9%	43	18.7%	78	33.9%
"Transfer patients with signs and symptoms suggestive of COVID-19 to isolation"	23	10.0%	27	11.7%	56	24.3%	71	30.9%	53	23.0%

"Touching eyes, nose and mouth with hands"	47	20.4%	34	14.8%	75	32.6%	51	22.2%	23	10.0%
"Clean and disinfect frequently touched surfaces daily"	13	5.7%	33	14.3%	76	33.0%	34	14.8%	74	32.2%
"Ventilate rooms to prevent COVID-19 transmission"	13	5.7%	38	16.5%	61	26.5%	29	12.6%	89	38.7%
"Avoid close contact with people having cough and flu like symptoms, keep your"	4	1.7%	22	9.6%	66	28.7%	38	16.5%	100	43.5%
"Maintain safe physical distance from anyone who is coughing or sneezing"	15	6.5%	20	8.7%	69	30.0%	43	18.7%	83	36.1%
"Cover your nose and mouth with your bent elbow or a tissue when you cough or"	12	5.2%	11	4.8%	60	26.1%	44	19.1%	103	44.8%

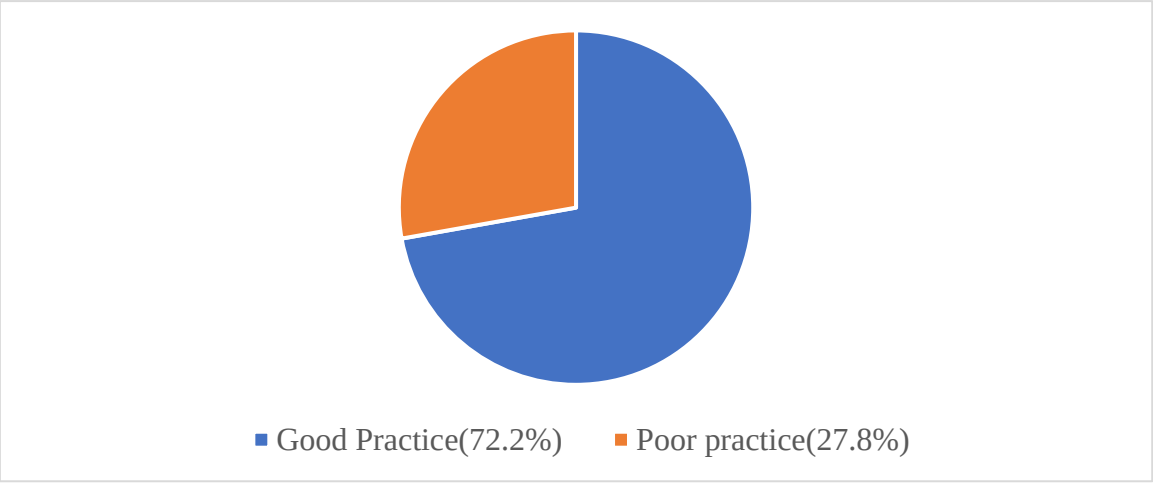

Figure 4: Practice to prevent COVID-19 transmission among healthcare professionals workin in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia, 2021.

Association between knowledge, attitude, and practice

The result of binary logistic regression model shows statically significant association between attitude and practice (COR: 5.786, 95%CI: 1.678-19.955, p-value: 0.005).

Factors associated with knowledge of healthcare professionals about COVID-19

In multinomial logistic regression model, level of education, monthly income and presence of infection prevention guideline were significantly associated with level of knowledge. Respondents who had bachelor degree were 3 times to have good knowledge when compared with participants who have diploma (AOR: 2.987, 95%CI: 1.119-7.979, p-value: 0.029), participants who had monthly salary of 5,000-8,000 have 93.7% less likely to have good knowledge when compared with participants who got monthly salary of greater than 8,000 Ethiopian birrs (AOR: 0.063, 95%CI: 0.007-0.528, p-value: 0.011). participants in hospitals which have infection prevention guideline were three times to have good knowledge when compared with participants who have no infection prevention guideline in their hospital (AOR: 3.017, 95%CI: 1.113-8.177, p-value:0.030) (table 5).

Table 5: Factors associated with knowledge about COVID-19 in bivariate and multivariate logistic regression model among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia(N=230), 2021.

		COVID-19 Knowledge		Binary logistic regression		Multivariate logistic regression	
		Good N (%)	Poor N (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Age	<25	28(73.7%)	10(26.3%)	1.607(.682-3.787)	0.278	0.194(0.014-2.599)	0.215
	26-30	99(81.8%)	22(18.2%)	3.571(1.017-12.542)	0.047	0.239(0.019-2.949)	0.264
	31-35	40(90.9%)	4(9.1%)	9.286(1.110-77.655)	0.040	0.469(0.031-7.021)	0.583
	>36	26(96.3%)	1(3.7%)	Ref			
Sex	Male	126(84%)	24(16.1%)	0.982(0.470-2.052)	0.961		
	Female	67(83.8%)	13(16.3%)	Ref			
Marital status	Single	83(84.7%)	15(15.3%)	0.904(0.442-1.848)	0.781		
	Married	110(83.3%)	22(16.7%)	Ref			
Living with	Family	129(84.3%)	24(15.7%)	0.916(0.438-1.917)	0.816		
	Alone	64(83.1%)	13(16.9%)	Ref			
Family size	≤4	131(82.4%)	28(17.6%)	1.354(0.522-3.510)	0.533		
	≥5	38(86.4%)	6(13.6%)	Ref			
Level of education	Bachelor	137(88.4%)	18(11.6%)	2.582(1.262-5.283)	0.009	2.987(1.119-7.979)	0.029
	Diploma	56(74.7%)	19(25.3%)	Ref		Ref	
Qualification	Medical doctor	36(100%)		***	0.998		
	Nurse	97(82.2%)	21(17.8%)	1.386(0.351-5,474)	0.642		

	Midwives	25(80.6%)	6(19.4%)	1.25(0.261-5.996)	0.780		
	Laboratory	14(87.5%)	2(12.5%)	2.1(0.294-14.978)	0.459		
	Pharmacy	11(68.8%)	5(31.3%)	0.66(0.124-3.499)	0.625		
	Others	10(76.9%)	3(13.1%)	Ref			
Monthly income in Ethiopian Birr	≤5,000	38(82.6%)	8(17.4%)	0.714(0.299-1.707)	0.449	0.362(0.033-3.957)	0.405
	5,000-8,000	95(77.2%)	28(22.8%)	12.632(1.519-105.046)	0.019	0.063(0.007-0.529)	0.011
	≥8,000	60(98.4%)	1(1.6%)	Ref		Ref	
History of chronic illness	Yes	1(100%)		***			
	No	192(83.8)	37(16.2%)				
History of smoking	Yes			***			
	No	193(83.9%)	37(16.1%)				
History of drinking alcohol	Yes	5(71.4%)	2(28.6%)	2.149(0.401-11.517)	0.372		
	No	188(84.3%)	35(15.7%)	Ref			
Work experience	$\leq 2\frac{1}{2}$ Years	40(83.3%)	8(16.7%)	0.863(0.348-2.141)	0.751		
	$2\frac{1}{2} - 6\ years$	82(81.2%)	19(18.8%)	1.171(0.388-3.533)	0.779		
	>6 years	41(85.4%)	7(14.6%)	Ref			
Working hospital	Woldia comprehensive	108(88.5%)	14(11.5%)	0.356(0.16-0.792)	0.011	1.833(0.423-7.939)	0.418

	specialized hospital						
	St. Lalibela general hospital	44(73.3%)	16(26.7%)	0.864(0.227-3.284)	0.830	0.686(0.163-2.884)	0.607
	Kobo primary hospital	20(87%)	3(13%)	0.681(0.204-2.272)	0.532	1.249(0.198-7.879)	0.813
	Mersa primary hospital	21(84%)	4(16%)	Ref		Ref	
Working department/unit	Ward	53(88.3%)	7(11.7%)	1.717(0.194-15.209)	0.627	2.128(0.638-7.094)	0.219
	ICU	13(92.9%)	1(7.1%)	0.345(0.125-0.953)	0.040	5.9(0.549-63.426)	0.143
	Emergency	34(72.3%)	13(27.7%)	1.019(0.334-3.104)	0.974	0.551(0.17-1.79)	0.322
	OPD	54(88.5%)	7(11.5%)	0.572(0.196-1.67)	0.307	1.411(0.403-4.945)	0.590
	Other units	39(81.3%)	9(18.8%)	Ref		Ref	
Source of information about COVID-19	Governmental source	79(79.8%)	20(20.2)	1.698(0.837-3.444)	0.143	0.490(0.197-1.217)	0.124
	Social media	114(87%)	17(13%)	Ref		Ref	
Training taken in infection prevention in the last one year	Yes	121(84%)	23(16%)	0.978(0.473-2.02)	0.951		
	No	72(83.7%)	14(16.3%)	Ref			

Presence of infection prevention guideline in the hospital	Yes	105(89%)	13(11%)	0.454(0.218-0.944)	0.034	3.017(1.113-8.177)	0.030
	No	88(78.6%)	24(21.4%)	Ref		Ref	
Presence of hand hygiene stations (water, soap, paper towel, alcohol-hand rub), and waste bins	Yes	110(87.3%)	16(12.7%)	0.575(0.283-1.169)	0.127	1.76(0.678-4.569)	0.246
	No	83(79.8%)	21(20.2%)	Ref		Ref	
Presence of isolation room for COVID-19 confirmed or suspected cases	Yes	112(81.8%)	25(18.2%)	1.507(0.715-3.175)	0.281		
	No	81(87.1%)	12(12.9%)	Ref			
PPE supply on time and adequately	Yes	98(83.1%)	20(16.9%)	1.140(0.563-2.309)	0.715		
	No	95(84.8%)	17(15.2%)	Ref			
Does workload affect your infection prevention practice	Yes	161(84.7%)	29(15.3%)	0.698(0.292-1.669)	0.419		
	No	31(79.5%)	8(20.5%)	Ref			

Ref : Reference category ***: Extreme value

Factors associated with attitude of healthcare professionals towards COVID-19

In multinomial logistic regression model; sex, history of drinking alcohol and training in infection prevention have significantly associated with attitude of healthcare professionals towards COVID-19. Male respondents have seven times favourable attitude towards COVID-19 when compared with female respondents(AOR: 7.137, 95%CI: 1.264-40.284, p-value: 0.026), among the participants those who drinks alcohol are 98.5% times less likely to have favourable attitude when compared with who did not drink(AOR: 0.015, 95%CI: 0.001-0.267, p-value: 0.004) and participants who took training on infection prevention guideline have 9 times to have favourable attitude when compared with participants who did not took training on infection prevention(AOD: 8.876, 95%CI: 1.753-44.939, p-value: 0.008)(table 6).

Table 6: Factors associated with attitude towards COVID-19 in bivariate and multivariate logistic regression model among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia(N=230), 2021.

		COVID-19 Attitude		Binary logistic regression		Multivariate logistic regression	
		Favourable N (%)	Unfavourable N (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Age	<25	33(86.8%)	5(15.2%)	3.55(0.959-12.879)	0.058	0.357(0.028-4.4861)	0.425
	26-30	116(95.9%)	5(4.1%)	6.515(0.726-58.472)	0.094	1.364(0.118-15.790)	0.804
	31-35	43(97.7)	1(2.3)	3.939(0.433-35.828)	0.224	2.759(0.116-65.553)	0.530
	>36	26(96.3%)	1(3.7%)	Ref		Ref	
Sex	Male	146(97.3%)	4(2.7%)	0.247(0.072-0.846)	0.026	7.137(1.264-40.284)	0.026
	Female	72(90%)	8(10%)	Ref		Ref	
Marital status	Single	93(94.9%)	5(5.1%)	0.96(0.295-3.12)	0.946		
	Married	125(94.7%)	7(5.3%)	Ref			
Living with	Family	142(92.8%)	11(7.2%)	5.887(0.746-46.469)	0.093	0.148(0.014-1.521)	0.108
	Alone	76(98.7%)	1(1.3%)	Ref		Ref	
Family size	≤4	150(94.3%)	9(5.7%)	0.82(0.212-3.168)	0.774		
	≥5	41(93.2%)	3(6.8%)	Ref			
Level of education	Masters	6(100%)		***			
	Bachelor	142(95.3%)	7(4.7%)	1.449(0.444-4.729)	0.539		
	Diploma	70(93.3%)	5(6.7%)	Ref			
Qualification	Medical doctor	36(100%)		***			

	Nurse	110(93.2%)	8(6.8%)	1.146(0.132-9.9610	0.902		
	Midwives	28(90.3%)	3(9.7%)	0.778(0.073-8.254)	0.835		
	Laboratory	16(100%)		***			
	Pharmacy	16(100%)		***			
	Others	12(92.3%)	1(7.7%)	Ref			
Monthly income in	≤5,000	42(91.3%)	4(8.7%)	1.369(0.392-4.784)	0.623		
Ethiopian Birr	5,000-8,000	115(93.5%)	8(6.5%)	***	0.997		
	≥8,000	61(100%)		Ref			
History of chronic illness	Yes	1(100%)		***			
	No	217(94.8%)	12(5.2%)				
History of smoking	Yes			***			
	No	218(94.8%)	12(5.2%)				
History of drinking alcohol	Yes	5(71.4%)	2(28.6%)	8.520(1.468-49.432)	0.017	0.015(0.001-0.267)	0.004
	No	213(95.5%)	10(4.5%)	Ref		Ref	
Work experience	$\leq 2\frac{1}{2}$ Years	43(89.6%)	5(10.4%)	2.233(0.614-8.116)	0.223		
	$2\frac{1}{2} - 6\ years$	96(95%)	5(5%)	2.674(0.493-14.519)	0.254		
	>6 years	46(95.8%)	2(4.2%)	Ref			
Working hospital	Woldia comprehensive	115(94.3%)	7(5.7%)	1.765(0.355-8.768)	0.487		

	specialized hospital						
	St. Lalibela general hospital	58(96.7%)	2(3.3%)	0.406(0.097-1.702)	0.218		
	Kobo primary hospital	20(87%)	3(13%)	***	0.998		
	Mersa primary hospital	25(100%)		Ref			
Working department/unit	Ward	57(95%)	3(5%)	0.684(0.066-7.117)	0.751		
	ICU	13(92.9%)	1(7.1%)	0.566(0.120-2.661)	0.471		
	Emergency	43(91.5%)	4(8.5%)	1.553(0.25-9.639)	0.637		
	OPD	59(96.7%)	2(3.3%)	1.211(0.194-7.553)	0.838		
	Other units	46(95.8%)	2(4.2%)	Ref			
Source of information about COVID-19	Governmental source	91(91.9%)	8(8.1%)	2.791(0.816-9.55)	0.102	0.743(0.163-3.388)	0.701
	Social media	127(96.9%)	4(3.1%)	Ref		Ref	
Training taken about infection prevention in the last one year	Yes	139(96.5%)	5(3.5%)	0.406(0.125-1.322)	0.134	8.876(1.753-44.939)	0.008
	No	79(91.9%)	7(8.1%)	Ref		Ref	

Presence of infection prevention guideline in the hospital	Yes	114(96.6%)	4(3.4%)	0.456(0.133-1.559)	0.211	3.427(0.743-15.817)	0.114
	No	104(92.9%)	8(7.1%)	Ref		Ref	
Presence of hand hygiene stations (water, soap, paper towel, alcohol-hand rub), and waste bins	Yes	119(94.4%)	7(5.6%)	1.165(0.359-3.784)	0.800		
	No	99(95.2%)	5(4.8%)	Ref			
Presence of isolation room for COVID-19 confirmed or suspected cases	Yes	128(93.4%)	9(6.6%)	2.109(0.556-8.009)	0.273		
	No	90(96.8%)	3(3.2)	Ref			
PPE supply on time and adequately	Yes	109(92.4%)	9(7.6%)	3.000(0.791-11.381)	0.106	0.233(0.039-1.406)	0.112
	No	109(97.3%)	3(2.7%)	Ref		Ref	
Does workload affect your infection practice	Yes	180(94.7%)	10(5.3%)	1.028(0.216-4.885)	0.973		
	No	37(94.9%)	2(5.1%)	Ref			
Knowledge	Good	185(95.9%)	8(4.1)	0.357(0.102-1.253)	0.108	1.584(0.331-7.587)	0.565
	Poor	33(89.2%)	4(10.8%)	Ref		Ref	

Factors associated with practice of healthcare professionals to prevent COVID-19

In multinomial logistic regression model; training in infection prevention and presence of isolation room for COVID-19 suspected and confirmed patients were significantly associated with practice of healthcare professionals. Respondents who took training on infection prevention have 2.7 times to have good practice when compared with those who did not got training (AOR: 2.685, 95%CI: 1.298-5.551, p-value: 0.008). In participants who have isolation room for COVID-19 suspected and confirmed cases in their hospital were two times to have good practice when compared with those who have not (AOR: 2.009, 95%CI: 1.027-3.929, p-value: 0.042) (table 7).

Table 7: Factors associated with practice to prevent COVID-19 transmission in bivariate and multivariate logistic regression model among healthcare professionals working in North Wollo Governmental Hospitals, Amhara Regional State, Ethiopia(N=230), 2021.

		COVID-19 practice		Binary logistic regression		Multivariate logistic regression	
		Good N (%)	Poor N (%)	COR (95%CI)	p-value	AOR (95%CI)	p-value
Age	<25	27(71.1%)	11(28.9%)	0.825(0.372-1.83)	0.636	0.655(0.150-2.868)	0.575
	26-30	81(66.9%)	40(33.1%)	1.584(0.575-4.367)	0.374	0.421(0.116-1.520)	0.186
	31-35	35(79.5%)	9(20.5%)	2.343(0.656-8.361)	0.190	0.661(0.160-2.725)	0.566
	>36	23(85.2%)	4(14.8%)	Ref		Ref	
Sex	Male	112(74.7%)	38(25.3%)	0.705(0.389-1.278)	0.249	1.610(0.789-3.286)	0.190
	Female	54(67.5%)	26(32.5%)	Ref		Ref	
Marital status	Single	66(67.3%)	32(32.7%)	1.515(0.848-2.707)	0.16	0.655(0.327-1.313)	0.233
	Married	100(75.8%)	32(24.2%)	Ref		Ref	
Living with	Family	110(71.9%)	43(28.1%)	1.042(0.565-1.924)	0.894		
	Alone	56(72.7%)	21(27.3%)	Ref			
Family size	≤4	119(74.8%)	40(25.2%)	0.65(0.317-1.334)	0.24		
	≥5	29(65.9%)	15(34.1%)	Ref			
Level of education	Masters	6(100%)		***	0.999		
	Bachelor	104(69.8%)	45(30.2%)	0.784(0.419-1.468)	0.447		
	Diploma	56(74.7%)	19(25.3%)	Ref			
Qualification	Medical doctor	24(66.7%)	12(33.3%)	1.235(0.55-2.747)	0.866		

	Nurse	84(71.2%)	34(28.8%)	0.909(0.331-2.498)	0.883		
	Midwives	20(64.5%)	11(35.5%)	3.5(0.682-17.965)	0.764		
	Laboratory	14(87.5%)	2(12.5%)	7.5(0.883-63.718)	0.24		
	Pharmacy	15(93.8%)	1(6.3%)	1.125(0.287-4.412)	0.112		
	Others	9(69.2%)	4(30.8%)	Ref			
Monthly income in Ethiopian Birr	≤5,000	31(67.4%)	15(32.6%)	1.267(0.609-2.634)	0.527		
	5,000-8,000	89(72.4%)	34(27.6%)	1.484(0.635-3.466)	0.362		
	≥8,000	46(75.4%)	15(24.6%)	Ref			
History of chronic illness	Yes	1(100%)		***			
	No	165(72.1%)	64(27.9%)				
History of smoking	Yes			***			
	No	166(72.2%)	64(27.8%)				
History of drinking alcohol	Yes	3(42.9%)	4(57.1%)	3.622(0.788-16.66)	0.098	0.278(0.049-1.574)	0.148
	No	163(73.1%)	60(26.9%)	Ref		Ref	
Work experience	≤$2\frac{1}{2}$ Years	31(64.6%)	17(35.4%)	1.298(0.626-2.692)	0.484		
	$2\frac{1}{2} - 6\ years$	71(70.3%)	30(29.7%)	1.332(0.564-3.143)	0.513		
	>6 years	34(70.8%)	14(29.2%)	Ref			
Working hospital	Woldia comprehensive specialized hospital	86(70.5%)	36(29.5)	1.151(0.576-2.3)	0.690		

	St. Lalibela general hospital	44(73.3%)	16(26.7%)	0.957(0.363-2.523)	0.919		
	Kobo primary hospital	16(69.6%)	7(30.4%)	1.674(0.583-4.806)	0.338		
	Mersa primary hospital	20(80%)	5(20%)	Ref			
Working department/unit	Ward	40(66.7%)	20(33.3%)	1.25(0.348-4.486)	0.732	0.876(0.358-2.142)	0.771
	ICU	10(71.4%)	4(28.6%)	0.882(0.396-1.966)	0.76	0.822(0.184-3.669)	0.797
	Emergency	30(63.8%)	17(36.2%)	2.55(1.074-6.054)	0.034	0.651(0.246-1.722)	0.387
	OPD	51(83.6%)	10(16.4%)	1.346(0.585-3.095)	0.484	1.904(0.698-5.190)	0.208
	Other units	35(72.9%)	13(27.1%)	Ref		Ref	
Source of information about COVID-19	Governmental source	67(67.7%)	32(32.3%)	1.478(0.827-2.639)	0.187	0.621(0.312-1.238)	0.176
	Social media	99(75.6%)	32(24.4%)	Ref		Ref	
Training taken about infection prevention in the last one year	Yes	111(77.1%)	33(22.9%)	0.527(0.293-0.949)	0.033	2.685(1.298-5.551)	0.008
	No	55(64%)	31(36%)	Ref		Ref	
Presence of infection prevention guideline in the hospital	Yes	90(76.3%)	28(23.7%)	0.657(0.368-1.174)	0.156	1.448(0.668-3.139)	0.348
	No	76(67.9%)	36(32.1%)	Ref		Ref	

Presence of hand hygiene stations (water, soap, paper towel, alcohol-hand rub), and waste bins	Yes	95(75.4%)	31(24.6%)	0.702(0.394-1.252)	0.231	1.325(0.620-2.834)	0.468
	No	71(68.3%)	33(31.7%)	Ref		Ref	
Presence of isolation room for COVID-19 confirmed or suspected cases	Yes	105(76.6%)	32(23.4%)	0.581(0.324-1.041)	0.068	2.009(1.027-3.929)	0.042
	No	61(65.6%)	32(34.4%)	Ref		Ref	
PPE supply on time and adequately	Yes	87(73.7%)	31(26.3%)	0.853(0.479-1.519)	0.589		
	No	79(70.5%)	33(29.5)	Ref			
Does workload affect your infection prevention practice	Yes	139(73.2%)	51(26.8%)	0.826(0.389-1.751)	0.617		
	No	27(69.2%)	12(30.8%)	Ref			
Knowledge	Good	140(72.5%)	53(27.5%)	0.895(0.413-1.938)	0.778		
	Poor	26(70.3%)	11(29.7%)	Ref			
Attitude	Favourable attitude	162(74.3%)	56(25.7%)	5.786(1.678-19.95)	0.005	3.598(0.913-14.177)	0.067
	Unfavourable	4(33.3%)	8(66.7%)	Ref		Ref	

6. DISCUSSION

COVID-19 is an emerging, rapidly changing global health challenge affecting all sectors(38, 39). Healthcare professionals are not only at the forefront of the fight against this highly contagious infectious disease but are also directly or indirectly affected by it, the likelihood of acquiring this disease is higher among healthcare professionals compared to the general population(22). It is therefore of paramount importance that healthcare professionals across the world have adequate knowledge about all aspects of the disease from clinical manifestation, diagnosis, proposed treatment, and established prevention strategies.

This study was conducted to fill the gap in the literature and providing a reference on knowledge, attitude, practice and determinant factors towards COVID-19 among health care professionals.

The majority of the participants (83.9%) in this study had good knowledge about COVID-19. This percentage of knowledge about COVID-19 among healthcare professionals is due to prolonged exposure to information since its global topic of discussion in the media and public. In fact it is lower when compared with related studies conducted earlier in Ethiopia in which 88.2% of the participant have good knowledge about COVID-19(4).

The result of this study show that level of education, monthly income and presence of infection prevention guidelines have significance association with healthcare professional's knowledge about COVID-19. For instance, 64.8% of participants with Bachelor degree had good knowledge compared with participants with Diploma in whom only 32.6% had good knowledge. Similar findings were reported in Ethiopia(34), but differ in Egypt and Uganda(13, 21) in which level of education has no significance association on knowledge of healthcare professionals about COVID-19.

The majority of healthcare professionals (89.6%) aware that patients with comorbid illness are at high risk of infection and mortality from COVID-19. This finding is consistent with the result of studies conducted in Nepal healthcare professionals knowledge about the virus(40).

In addition, findings in this study show that consistency of healthcare professionals' knowledge about COVID-19 based on experience, level of education and source of information with that of previous study findings in China and Nigeria(35, 36). On the other hand current knowledge level of healthcare professionals about COVID-19 was found to be

lower when compared with former study findings in South Gonder (84.9%), 93.2% from Pakistan, 89% and 90% from China and Uganda(21, 28, 33, 41) and higher when compared with related studies conducted in Amhara Regional State (70%)(34). The time where the study was conducted and the topic might contribute to this variation. This study is about healthcare professional's knowledge about COVID-19 that is not fully practiced in rural healthcare facilities due to lack of treatment centres and inadequate concern in the area.

Furthermore, this study revealed that healthcare professional's knowledge about COVID-19 was positively correlated with having a positive attitude and good practice towards COVID-19 and its prevention.

The overall favourable attitude towards COVID-19 was 94.8% which is similar with previously conducted studies which has 94.7%(4). Although overall attitude of healthcare professionals towards COVID-19 are favourable, 56.15 of participants perceived that black race is protective against the virus, 67% and 66.5% believed that hot drink is protective against COVID-19 and herbal medication can cure from the virus respectively, which is consistent with related studies conducted in China(28). Male respondents when compared with that of female have positive attitude towards COVID-19. This perception is possibly related to inadequate training on COVID-19 and the fact that the disease mostly affects men.

About 72.2% of healthcare professionals had good practice towards prevention methods of COVID-19; around 77% of healthcare professionals wore facemask and practice frequent hand washing with soap. These practices were lower when compared with related studies from other countries, 81.39% in Nigeria, 90% in China and 88.7% in Pakistan but higher with that of similar studies conducted in Ethiopia which was 63.5%(4, 35, 36, 41). The possible reason for this difference might be due to shortage of PPE, and inadequate training provided for the healthcare professionals. This suggests further implementation and encouragement from the government is required for the application of good practice.

Strength of the Study

As COVID-19 is still affecting many peoples and spreads widely in Ethiopia, conducting such like study is crucial and timely. Since the result of the study helps to know healthcare professional's readiness to respond for the pandemic and at the same time to prevent themselves while serving the vast population.

The result of the study on Knowledge, attitude and practice is also important to recommend responsible bodies like Zonal Health Bureau, Regional Health Bureau on healthcare professionals' current status on knowledge, attitude, and practice towards COVID-19 and to take appropriate measures accordingly: like providing training and PPE supply.

Limitation of the Study

Besides data was collected by assigning trained staffs in each hospital, respondents bias may be there since they fill all the questionnaires without external monitoring as it was difficult to follow all the participants till the fill all the questionnaires. In addition, this study is cross-sectional and therefore, cannot conclude any direct causality between independent and dependent variables.

Even though preferable to assess healthcare professionals' practice towards preventive and control measures of COVID-19 by observation, location of the hospitals and travel cost in addition to time cost make it necessary to assess through self-administer questionnaires.

7. CONCLUSION

In conclusion, the majority of healthcare professionals appeared to have good knowledge and positive attitude about COVID-19 despite relatively poor practice when compared with knowledge and attitude regarding COVID-19 prevention during the outbreak.

Recommendation

For healthcare professionals:

As HCPs are central to the COVID-19 pandemic response at the same time balancing additional service delivery needs while preserving access to essential health services and deploying COVID-19 vaccines, they face higher risks of infection in their efforts to protect the greater community and are exposed to hazards. To address these challenges, healthcare professionals must be alert to prevent themselves from contracting the disease by taking appropriate preventive measures.

For hospitals:

All healthcare facilities needed to establish and implement IPC programmes with protocols that ensure health worker safety and prevent infections with SARA-CoV-2 in the work environment and prepare latest advice, guidance and training for both healthcare professionals and administrators to halt the rapid spread of the pandemics.

For Zonal health bureau:

Preventing SARS-CoV-2 infection in health workers requires a multi-pronged, integrated approach of infection prevention and control (IPC) measures and guidelines. Health authorities and policymakers needs to provide the necessary resources to allow healthcare professionals to work in a safe environment.

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9. APPENDIX

9.1 Questionnaires

Part I: Socio demographic information

101. Age:__
102. Sex: Male: _____ Female: _____
103. Marital Status: A. single B. married C. Widowed D. divorced
104. Living with: A. family B. relatives C. alone
105. If living with family and relatives, Number of households: _____
106. If living with family or relatives, is there anyone in the household having history of chronic illness? A. Yes B. No
107. Level of Education: PhD: _____ Masters: _____ Bachelor: _____ Diploma: _____ Certificate: _____
108. Qualification: A. Medical Doctor B. Nurse C. Midwives D. Laboratory E. Pharmacy Others; specify……
109. Monthly income in birr in Ethiopian Birr: _____
110. History of chronic illness: Yes: _____ No: ____, if yes Specify illness (name it): _____
111. History of smoking cigarette: Yes: __ No: ___; if yes how long (put in year and month): __
112. History of drinking alcohol: Yes: __ No: ___: if yes how long (put in year and month): ___
113. Work experience in year or month: _____
114. The hospital you are working in: A. Woldia Comprehensive Specialized Hospital

B. St. Lalibela General Hospital C. Kobo Primary Hospital D. Mersa Primary Hospital	
115. Working department(unit):	A. Ward B. Intensive care unit (ICU) C. Emergency D. Outpatient department (OPD) E. Others, specify: _____
116. Source of information:	A. International health organization e.g., WHO B. Governmental sites and media e.g., FMOH, and EPHI C. Social media e.g., WhatsApp, Facebook, telegram D. News media e.g., TV, radio, newspaper, E. Journals F. Other, specify……

Part II: Assessment of Knowledge

201. What causes CVID-19?	A. Virus B. bacteria C. Fungi D. Protozoa
202. What do you think is the source of this COVID-19 pandemic?	A. Natural cause B. Animal source C. Biological weapon D. The source is not known
203. The main clinical symptoms of COVID-19 are; (Tick all that apply)	A. Cough B. fever C. sore throat D. runny nose E. myalgia (muscle pain) F. Diarrhoea
204. How long does the virus survive in the environmental air?	A. Hours (3-4 hours) B. Days (2-5 days) C. Months (1-2 months) D. Years (1-2 years)
205. What is the incubation period of the virus?	A. >21 days B. 2-14 days C. 7 days D. >14 days
206. Is the virus transmitted through airborne aerosols?	A. Yes B. No C. I don't know
207. Is that the virus is transmitted via contact with contaminated objects?	A. Yes B. No C. I don't know

208. Do you think there are "asymptomatic carriers" of this virus can spread the infection?	A. Yes B. No C. I don't know
209. Can the COVID-19 infection present as diarrhea, vomiting, and gastrointestinal upset?	A. Yes B. No C. I don't know
210. Can the COVID-19 infection present as neurological symptoms?	A. Yes B. No C. I don't know
211. What is the current Case Fatality Rate (CFR) of COVID-19 infection in the world?	A. < 5% of total infection B. 25% of total infection C. 50% of total infection D. 90% of total infection
212. What is the current Case Fatality Rate (CFR) of COVID-19 infection in Africa?	A. < 5% of total infection B. 25% of total infection C. 50% of total infection D. 90% of total infection
213. What is the current Case Fatality Rate (CFR) of COVID-19 infection in Ethiopia?	A.< 5% of total infection B. 25% of total infection C. 50% of total infection D. 90% of total infection
214. What is the other name of COVID -19?	A. MERS-CoV virus B. SARS-CoV virus C. SARS-CoV2 virus D. Don't know
215. What is the name of currently available authorized and recommended vaccines against COVID-19 in the world?	A. Pfizer-BioNTech B. Moderna's

	C. Both Pfizer-BioNTech and Moderna's are available and in use D. There is no vaccine till date
216. There is currently no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection	A. True B. false
217. Not all persons with COVID-19 will develop severe cases. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severe cases	A. True B. false
218. Eating or contacting wild animals would result in the infection by the COVID-19 virus	A. True B. false
219. Persons with COVID-19 cannot transmit the virus to others when a fever is not present	A. True B. false
220. It is necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus	A. True B. false

<u>Part III</u>: Assessment of Attitude

Likert scale measurement is used to assess attitude of healthcare professionals with a score of 1 (strongly disagree) to 5 (strongly agree):

1. Strongly Disagree
2. Disagree
3. Neutral/undecided
4. Agree
5. Strongly Agree

Stem Question	Response				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
301. Black race is protective toward COVID-19 disease.					
302. Avoiding touching nose, mouth and eyes can reduce the risk of COVID-19 infection.					
303. Patients of COVID-19 infection should be immediately isolated to avoid the transfer of infection to other people					
304. The disease can be transmitted by coughing and sneezing					
305. Transmission of COVID-19 infection can be prevented through wearing masks					
306. Transmission of COVID-19 infection can be prevented through washing hands and face regularly with antiseptics and sanitizers					
307. Transmission of COVID-19 infection can be prevented through					

the isolation of COVID-19 infected patients					
308. Restricting the travel of COVID-19 infected people to other areas of the world and of people in other areas to affected areas can be beneficial to prevent the spread of the infection					
309. Transmission of COVID-19 infection can be prevented by taking antibiotics					
310. The vaccine developed against COVID-19 can significantly reduce the epidemic spread					
311. The available information about COVID-19 disease is sufficient in Ethiopian society					
312. The government in our country has all the necessary healthcare facilities and is able to control the epidemic situation.					
313. COVID-19 is seriously dangerous disease.					
314. Children and infants need to take preventive measures against COVID-19					
315. Taking hot drinks can prevent COVID-19 infection.					
316. COVID-19 cannot spread in hot climate areas.					
317. Herbal medication can cure COVID-19.					

318. Wearing PPE such as face mask, can prevent from contracting COVID-19.					

Part IV: Assessment of Practice

Likert scale is used to assess practice among healthcare professionals and have a score of 1 (never) to 5 (always).

1. Never
2. Rarely
3. Sometimes
4. Often
5. Always

Stem Question	Response				
	Never	Rarely	Sometimes	Often	Always
401. Wear a mask when in contact with patients and when physical distance is not possible.					
402. Going to any crowded place (e.g., participate in meeting, ceremony...)					
403. Avoid shaking hands with others.					
404. Wash hands with water and soap before and after handling each patient.					
405. Carry sanitizer in day-to-day activities during the COVID-19 outbreak.					
406. Transfer patients with signs and symptoms suggestive of COVID-19 to isolation room.					
407. Touching eyes, nose and mouth with hands					

408. Clean and disinfect frequently touched surfaces daily (this includes tables, doorknobs, light switches, countertops, handles, desks, phones, sinks, toilets					
409. Ventilate rooms to prevent COVID-19 transmission					
410. Avoid close contact with people with cough and flu-like symptoms, keep yourselves warm and hydrated and eat thoroughly cooked food, especially meat products.					
411. Maintain a safe distance (minimum of one meter) from anyone who is coughing or sneezing					
412. Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze					

Part V: Assessment of Institutional Factors

STEM QUESTION	**Yes**	**No**
501. Have you got trained in infection prevention in the last one year?		
502. Did you have infection prevention guideline in your hospital?		
503. Does hand hygiene stations (water, soap, paper towel, alcohol-hand rub), and waste bins are at strategic locations across the hospital.		
504. Does your hospital have isolation room for COVID-19 confirmed or suspected cases		
505. Does your hospital supply PPE for the staff on time and adequately?		
506. Does work overload affect your infection prevention practice?		