Infection and Drug Resistance

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

An Analysis of Various Factors Underlying Covid-19 Prevention Practice and Strategy in Jigjiga Town, Northeast Ethiopia

Buzuneh Tasfa Marine[1], Dagne Tesfaye Mengistie[2]

[1]Department of Epidemiology, Faculty of Public Health, Jimma University, Jimma, Ethiopia; [2]Department of Statistics, College of Natural and Computational Science, Jigjiga University, Jigjiga, Ethiopia

Correspondence: Buzuneh Tasfa Marine; Dagne Tesfaye Mengistie, Tel +251975646793, Email bizutesfa44@gmail.com; dagne.tesstat1216@gmail.com

Background: COVID-19, a severe respiratory illness, is caused by the SARS-CoV-2 virus. The pandemic has devastated public health, economies, and social structures worldwide. In Ethiopia, the government and health authorities have implemented various COVID-19 prevention strategies to contain the spread of the virus. This study aims to investigates the factors influencing the implementation and effectiveness of COVID-19 prevention strategies in Jigjiga Town, Ethiopia.

Methods: A community-based cross-sectional study was conducted from April 2022 to December 2022, involving 593 participants in Jigjiga town. Multi-stage sampling techniques were used, and data was collected using a structured questionnaire covering demographic characteristics, socioeconomic status, attitude, knowledge, prevention practices, misconceptions, and COVID-19 prevention strategies. A multivariate model was developed to control for confounding, using variables suitable for multivariate logistic regression analysis with p-values less than 0.25. A variable is considered significant in multivariable logistic regression analysis if its p-value is less than 0.05.

Results: The study found that only 12.2% of participants used COVID-19 prevention strategies. Those with a bachelor's degree or higher had a strong association with prevention strategies (AOR: 20.08, 95% CI: 2.13–188.85). Participants informed about COVID-19 prevention were 6.886 times more likely to use strategies (95% CI: 2.975–15.938). People who received the COVID-19 vaccine were 1.14 times more likely to engage in reasonable preventive measures compared to those who did not get vaccinated.

Conclusion: The study reveals low COVID-19 prevention practices among participants, with only 12.2% utilizing preventive strategies. The covariate, the kinds of information received on COVID-19 prevention mechanisms, participants with a favorable attitude toward COVID-19, educational level, mask-wearing, social distancing, vaccination, hand hygiene, public health communication, and household income were significantly associated with COVID-19 prevention strategies. The COVID-19 vaccination promotes preventive practices, reduces infection risk, protects against severe illness, and decreases community spread.

Keywords: COVID-19, preventive practice, knowledge, attitude, misconceptions, prevention strategy

Introduction

Background of Study

COVID-19, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged as one of the most severe respiratory illnesses associated with the 1918 global influenza pandemic. This virus belongs to the coronavirus family and is known to cause upper respiratory tract infections.[1] The global impact of the COVID-19 pandemic, initiated by the novel coronavirus SARS-CoV-2, has been profound, posing significant challenges to healthcare systems, economies, and social structures worldwide. Initially identified in late 2019, the virus swiftly spread across continents, leading to the World Health Organization (WHO) declaring it a pandemic in March 2020.[2] This unprecedented public health crisis has spurred widespread responses such as lockdowns, travel restrictions, and the rapid development and distribution of vaccines, all aimed at curbing the virus's spread and lessening its impact on global health and well-being.[1,2]

Received: 12 October 2023
Accepted: 18 January 2024
Published: 22 January 2024

The rise of COVID-19 has presented significant obstacles and underscored the significance of global collaboration, scientific advancement, and readiness in public health.[3] The outbreak has emphasized the interdependence of the modern world, highlighting the necessity for unified actions to manage the transmission of contagious diseases. As the globe continues to confront the enduring impacts of COVID-19, addressing the pandemic has become a multi-faceted effort, covering medical research, public health measures, economic stability, and societal resilience.[1,3] The unparalleled scope and intricacy of the COVID-19 pandemic have transformed how societies approach public health crises, emphasizing the importance of proactive measures, scientific cooperation, and fair access to healthcare resources.[4]

COVID-19 has been substantial, impacting millions of individuals worldwide and leading to extensive disruptions in healthcare, economies, and societal frameworks. As of August 2021, there have been more than 200 million confirmed cases and over 4 million deaths globally, with these figures continuing to increase.[3,5] The pandemic has disproportionately affected marginalized groups, such as the elderly, individuals with underlying health conditions, and those in low-income countries with limited healthcare access.[6] Additionally, COVID-19 has brought about significant economic repercussions, resulting in numerous business closures and escalating unemployment rates. The crisis has underscored existing healthcare disparities and inequalities, emphasizing the necessity for fair access to healthcare resources and social support systems.[7]

The effectiveness of COVID-19 preventive strategies is closely connected to a complex interaction of socio-cultural, economic, and healthcare-related elements. Socio-cultural norms and beliefs significantly influence individual and community behaviors, affecting the adoption of preventive measures such as mask-wearing, social distancing, and hygiene practices.[6,7] The availability of healthcare facilities, testing, and medical resources also plays a crucial role, as communities with limited access may encounter difficulties in implementing and following preventive strategies. Additionally, public awareness and education, economic stability, government policies, and vaccine access all impact the success of preventive efforts.[8] Recognizing and addressing these multifaceted factors is essential for developing and implementing comprehensive and tailored COVID-19 preventive strategies that effectively cater to different populations' diverse needs and circumstances.[9]

Furthermore, ensuring the fair distribution and availability of COVID-19 vaccines is crucial for attaining broad immunity and managing the virus's spread. Vaccine accessibility and distribution, along with addressing vaccine reluctance and inequalities in global vaccine availability, are pivotal elements in determining the effectiveness of vaccination efforts as a primary preventive measure.[10] Government policies and regulations that endorse vaccination initiatives and public health communication strategies that tackle vaccine-related apprehensions are essential in influencing public attitudes and behaviors regarding vaccination.[5,8]

The World Health Organization has recommended various strategies to prevent the spread of COVID-19. COVID-19 vaccines have been developed to provide immunity against the virus, and vaccination campaigns aim to achieve widespread coverage to establish herd immunity, thereby reducing overall virus transmission within the population.[11] Wearing face masks, especially in indoor or crowded settings, effectively prevents the transmission of respiratory droplets that may contain the virus. Masks serve as a barrier, lowering the risk of virus spread from person to person. Regular hand washing with soap and water for at least 20 seconds or using hand sanitizer with at least 60% alcohol helps kill the virus and reduce the risk of transmission through contaminated hands. Social distancing, or maintaining a physical distance from others, typically at least 6 feet, decreases the risk of coming into contact with respiratory droplets containing the virus.[7]

Before the first case of the COVID-19 pandemic in Ethiopia, the government had already implemented several precautionary strategies. Ethiopia's federal and regional governments have initiated various policy adjustments in response to COVID-19. These measures include the closure of schools, restrictions on public transportation, limitations on large gatherings, and cancelling sports and religious events.[9,11] However, COVID-19 has become normalized, and schools have reopened with specific COVID-19 preventive protocols. In Ethiopia, the effective implementation of COVID-19 preventive strategies has been hindered by several factors. Limited access to healthcare resources, including testing facilities, medical supplies, and healthcare infrastructure, has impeded the country's ability to implement comprehensive preventive strategies.[9] Additionally, the lack of widespread access to vaccines has further complicated the achievement of comprehensive preventive strategy, as vaccination campaigns have encountered significant obstacles in reaching vulnerable populations.[12]

In Jigjiga Town, the successful implementation of COVID-19 preventive strategies faces various obstacles, such as economic instability and poverty, which make it difficult for people to follow public health guidelines due to challenges in obtaining essential items like masks, hand sanitizers and suitable living conditions that allow for social distancing.[12,13] Additionally, a lack of public awareness and education about COVID-19 and preventive measures has added to the difficulties in implementing effective strategies. Misformation and a lack of understanding about the virus and how it spreads have affected community adherence to preventive measures.

Addressing the diverse challenges in Jigjiga Town requires customized approaches that take into account the town's specific economic, healthcare, and socio-cultural circumstances, as well as concerted efforts to enhance access to resources and education about COVID-19 prevention.[7] Therefore, this research examines the existing literature on COVID-19 prevention strategies, public health interventions, and the socio-economic and cultural context of Jigjiga Town. By exploring these aspects, the study offers a comprehensive understanding of the obstacles and prospects for preventing the spread of COVID-19 in Jigjiga Town, Northeast Ethiopia. This study aimed to investigate and comprehend the various factors influencing the implementation and effectiveness of COVID-19 prevention strategies in Jigjiga Town, Ethiopia.

Methods and Materials

Study Area and Period

The study was conducted in the Somali regional state, located in the eastern part of Ethiopia, 635 kilometers from Addis Ababa, the nation's capital. Jigjiga, the capital of the Somali Region, is an urban center with a diverse population, serving over eight million people in the zones and districts of the Somali regional state and portions of Oromia and Somalia. The selection of Jigjiga Town as the study area was based on its significance as a regional hub and its diverse demographic, cultural and socioeconomic characteristics were likely to influence COVID-19 prevention strategies and measures.

Study Period

The study was conducted over a specific period of time, which is outlined in this section. The study period of this research was conducted between April 2022 and December 2022 for data collection and analysis.

Study Design

A community-based cross-sectional study design was conducted. This study could be a valuable approach to assessing the factors underlying COVID-19 prevention strategies in Jigjiga Town, providing a comprehensive understanding of the community's knowledge, attitudes, and behaviors related to COVID-19 prevention strategies.

Source Population

Our source population for the study was all Jigjiga town residents aged 18 years and older in Jigjiga Town, Northeast Ethiopia, who are directly involved in or affected by COVID-19 prevention strategies.

Study Population

Our study population was considered to be all 18-year-olds and older from selected households in selected kebeles.

Study Unit

Adults in Selected Households was our study unit.

Variables of the Study

Dependent/Outcome Variable

COVID-19 Preventive Practice.

Independent Variables

Socio-demographic variables like, (Age of participant, Sex of Participants, Marital status of participant, Education level of the participant, Family Size of the participants, Religion of participant, Occupation of the participants and Household's monthly income in ETB), source of information(Community HW, Family members, Health worker, TV, Radio), Information Exposure(Origin of COVID-19 pandemic, COVID-19 be transmitted from, common symptoms of Covid-19, recommended quarantine period for COVID-19 suspect, can asymptomatic persons with COVID-19 transmit the disease to other people, information about higher risk group/developing sever disease from COVID-19, mode of COVID-transmission and conditions make transmission of COVID −19 be higher), Attitude towards COVID-19 prevention, Knowledge about COVID-19 (about how early detection of COVID-19 helps to prevent disease transmission, about how prevention practices can help to protect from COVID-19, how far one should stand or sit from a person to prevent contracting COVID-19 infection, and about specific treatments that can cure COVID-19 as of today) and COVID-19 preventive strategies were independent variables.

Sampling Size and Strategies

Using the single population proportion formula, the sample size (n) was computed taking into account a 95% confidence interval (CI), a 5% margin of error (d) to optimize the size of the sample, a percentage (P) of 50% (32), and 1.5 of the design impact. The total sample consisted of 634 people after adding the 10% non-response rate.

$$n = \frac{(Za/2)^2 * P(1-P)}{(W)^2}$$

Where

n = initial sample size, Z = 1.96, the corresponding Z-score for the 95% CI, P = proportion = 50%, d = margin of error = 5% = 0.05.

In order to avoid sampling errors throughout the stage, we used the design effect and the sample size. After considering the design effect (384*1.5 = 576), the response rate was 10% = 576*1.1 = 634, and accordingly, the required sample size was 634.

Sampling Techniques

A multi-stage sampling strategy was used in this study. A multi-stage sampling strategy involves a sequential process of selecting samples in multiple stages, often used when the target population is large and geographically dispersed. This approach allows researchers to efficiently obtain a representative sample by dividing the population into smaller, more manageable subgroups at each stage of sampling. The settlement was first divided into two strata: urban and rural kebeles. A simple random selection method was used to choose 5 kebeles from the total of 17 kebeles in Jigjiga town. Our sample and study units were the list of houses and the people in the chosen household. Each study participant was selected using a systematic selection from a list of houses in each matching kebele after the complete sample was proportionately designated to every kebele with respect to the number of homes in every kebele.

Inclusion and Exclusion Criteria

Inclusion Criteria

Individuals aged 18 years and older.

Residents of Jigjiga town for a minimum of six months.

Willingness to participate in the study and provide informed consent.

Exclusion Criteria

Individuals who are unable to provide informed consent.

Non-residents of Jigjiga town.

Individuals below the age of 18.

Data Collection Procedure

The data collection instrument was adopted and modified to our context after reviewing previously published literature.[14] The tool (questionnaire) was translated into Somali, and the English translation of the instrument was then reversed to ensure consistency. The translated questionnaire was pretested on 32 individuals outside of the chosen kebele, and adjustments were made as needed in light of the results. A questionnaire was given away regarding previous understanding, attitudes, and compliance with COVID-19 prevention strategies. Six data collectors and two supervisors received training about the study's primary goals, data collection tools, collection techniques, and ethical considerations to be respected when choosing participants and data gathering. Primary data was gathered by interviewing participants in chosen families at their homes using pre-written questionnaires. Regular communication between the supervisor and data collectors was maintained throughout the data-collecting process, and checks were made to ensure that all assigned research samples had been addressed. The interviewers were physically separated from the data collectors and required to wear a face mask and use hand sanitizer as safeguards.

Data Processing and Analysis

The data was processed, visually reviewed, entered into Epi-data version 4.6, then exported to SPSS version 23 and Stata version 17 for further statistical analysis. A descriptive analysis was conducted for each independent variable. The frequency and percentage of descriptive variables were presented using tables and figures. Logistic regression is a statistical model used to examine the relationship between a binary dependent variable and one or more independent variables. It is commonly used when the outcome of interest has two possible outcomes.[15] The binary logistic regression model assumes that the independent factors and the log odds of the dependent variable are linearly related The log-odds, also known as the logit function, represents the natural logarithm of the odds of the event occurring. By applying an inverse transformation to the log-odds, we can derive the predicted probabilities of the binary outcome. The logistic regression model assumes a linear relationship between the log-odds of the outcome and the predictor variables.[16]

The data was analyzed using bivariate and multivariate logistic regression to investigate the relationship with the outcome variable, which was preventive practices. Maximum likelihood estimation (MLE) was utilized to estimate the parameters of the logistic regression model, aiming to find the coefficients that maximize the likelihood of observing the given data. Multivariable logistic regression was applied to candidate variables with a p-value of less than 0.25 from the bivariable analysis.[15] The independent factors of COVID-19 prevention strategies were identified using multivariable logistic regressions. To ascertain the strength, direction, and statistical significance of the relationship between the dependent and independent variables, the adjusted odds ratio with a 95% confidence interval and the p-value were computed. Variables with a p-value lower than 0.05 were considered significant in the multivariable logistic regression model. The model's goodness of fit was evaluated using Hosmer Lemeshow's test, and the results indicated a very good fit, with a p-value of 0.76.[16]

Operational Definitions

COVID-19: The novel coronavirus, which causes coronavirus disease and discovered in Dec. 2019.

COVID-19 Preventive practice: Practice not going to crowded places, practice not shaking hands, practice wearing a face mask, practice keeping a 2-meter distance, practice staying at home, practice proper and frequent hand washing with soap and water/use of sanitizer, avoid traveling abroad or to risky areas, practice covering mouth and nose while sneezing or coughing, practice avoiding touching infected people, and practice self-isolation if necessary) are the results of a combination of 10 "yes/no" Each item received a score of "1" if the research participant attested to adhering to the measure, or "0" otherwise. The research participants who replied can be regarded as using good COVID-19 preventive methods. The score varied from 0 to 10 by adding replies to the preventative practice's 10 questions. The Bloom's cut-off point was used to classify practices into two levels: Adequate practices (≥6-10 score), whereas <6 score were classified as inadequate practices.[17]

Information Exposure: - It was created using eight COVID-19 composite question variables. When the research participants were asked if they learned such facts or not, their answers suggested "Yes" if they had been exposed to

knowledge regarding COVID-19 and "No" if they had not. A good degree of information exposure to COVID-19 was deemed to exist in individuals who scored above the median on the information exposure assessment questions, and a poor level of information exposure was deemed to exist in those who scored below the median.[18]

Knowledge: Knowledge of the participant generated from a combination of variables in the knowledge question (early detection of COVID-19 helps to prevent the disease's spread, prevention practices can help to protect from COVID-19, how far one should stand or sit from a person to avoid contracting an infection from COVID-19, and specific treatments that can currently treat COVID-19). Participants were classified as having "good knowledge" and "poor knowledge" according to their responses to the four COVID-19 knowledge questions, which had a median score of three or above (>3 scores).[18]

Attitude: Positive and negative attitudes were used to create a dummy variable called attitude. For each question, the respondents who chose to strongly disagree, disagree, or remain neutral were grouped together and given the label "negative attitude", whereas the respondents who chose to agree or strongly agree received the label "positive attitude". Participants who replied with median and above scores (>5 scores) on the attitude questions concerning COVID-19 and its preventative measures were categorized as having a "favorable attitude." Overall, attitude was obtained using the dummy variables created from the Likert scale items. If not, it is classified as having "unfavorable attitudes".[19]

Results

Sociodemographic Characteristics of the Participants

The study included 592 participants, yielding a 93.4% response rate. Of the total participants, more than half (56.8%) of them were in the age group of 18–28 years. Out of the total study participants, 40.5% were male and 59.5% were female. The majority (71.6%) of study participants were married. And nearly three-quarters (74.5%) of households had fewer than five family members. Out of the total study participants, nearly one-third (32.8%) of participants' education status was at the diploma level. Almost half of the total study participants (49.8%) were Muslims, followed by 39.7% of Orthodox, as presented in Table 1.

COVID-19 Prevention Practice

The study findings showed that good preventive practice was 12.2% and that COVID-19 preventive practice was very low. Of the prevention measures, 338 (57.1%) respondents confirmed that they are willing to isolate themselves if they become infected with COVID-19. Among the prevention measures, avoiding touching infected people, frequently hand

Table 1 Socio-Demographic Characteristics of the Participants "COVID-19 Preventive Practice and Its' Associated Factors in Jigjiga Town, Northeast Ethiopia"

Variables	Categories	Frequency(n)	Percent (%)
Age of participant	18 to 28 years	336	56.8
	29 to 39 years	139	23.5
	40–50 years	59	10.0
	51–61yaers	39	6.6
	≥62yaers	19	3.2
	Total	592	100
Sex of Participants	Male	240	40.5
	Female	352	59.5
	Total	592	

(*Continued*)

Table 1 (Continued).

Variables	Categories	Frequency(n)	Percent (%)
Marital status of participant	Single	150	25.3
	Married	424	71.6
	Divorced	8	1.4
	Widowed	10	1.7
	Total	592	
Education level of the participant	Unable to read and write	25	4.5
	Read and write only	109	18.4
	Grade 1–8	116	19.6
	Grade 9–12	81	13.7
	Certificate to Diploma	194	32.8
	Degree and above	67	11.3
Family Size of the participants	<5 Members	441	74.5
	>5 Members	151	25.5
Religion of participant	Muslim	295	49.8
	Orthodox	235	39.7
	Catholic	53	9.0
	Protestant	9	1.5
Occupation of the participants	Farmer	3	0.5
	House wife	26	4.4
	Merchant	117	19.8
	Government Employed	235	39.7
	Health professional	6	1.0
	Private or NGO	195	32.9
	Daily Laborer	9	1.5
	Others	1	0.2
Household's monthly income in ETB	0 to 1500 Birr	196	33.1
	1500 to 2000 Birr	29	4.9
	2000 to 2500 Birr	104	17.6
	2500 to 3000 Birr	136	23.0
	3000 to 4000 Birr	78	13.2
	> 4000 Birr	49	8.3

Abbreviations: NGO, Non-governmental Organization; ETB, Ethiopian Birr.

washing with soap, and avoiding hand shaking were practiced by less than one-fourth of the respondents (23.3%), (23.5%), and 126 (21.3%), respectively. Less than one participant in ten adhered to our study's findings, which included keeping a 2 m distance, using a face mask, and avoiding crowded areas (Figure 1). According to our study findings, keeping a 2 m distance, wearing a face mask, and avoiding going to crowded places were done by less than one out of ten participants, as presented in Figure 1.

Among the prevention measures, more than one third 227 (38.3%) of the study participants scored 3 points among the listed COVID-19 prevention measures, the prevention practices as showed Figure 2 below.

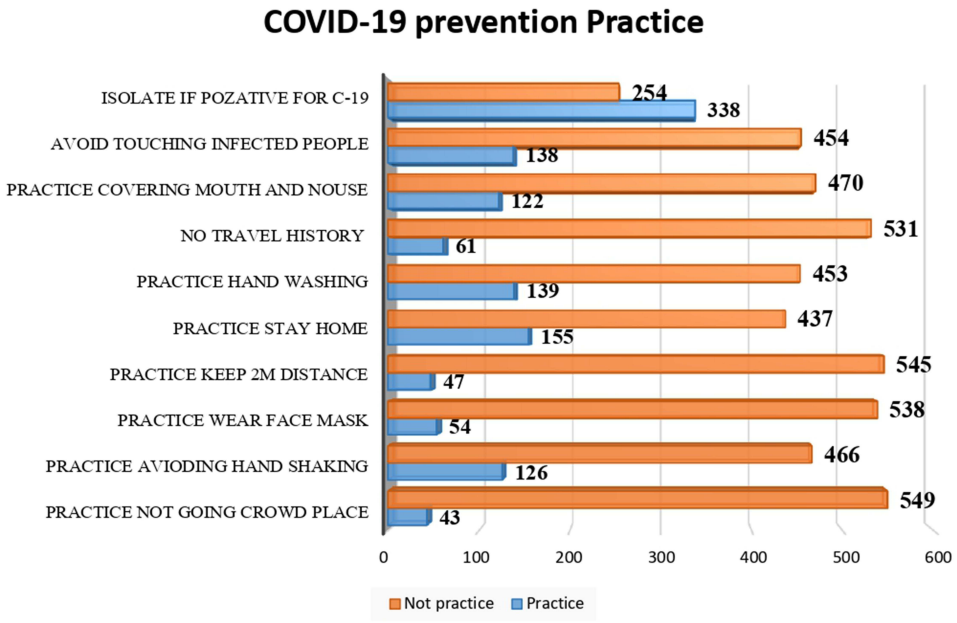

Figure 1 Level of COVID-19 preventive practice of Jigjiga town, Northeast Ethiopia.

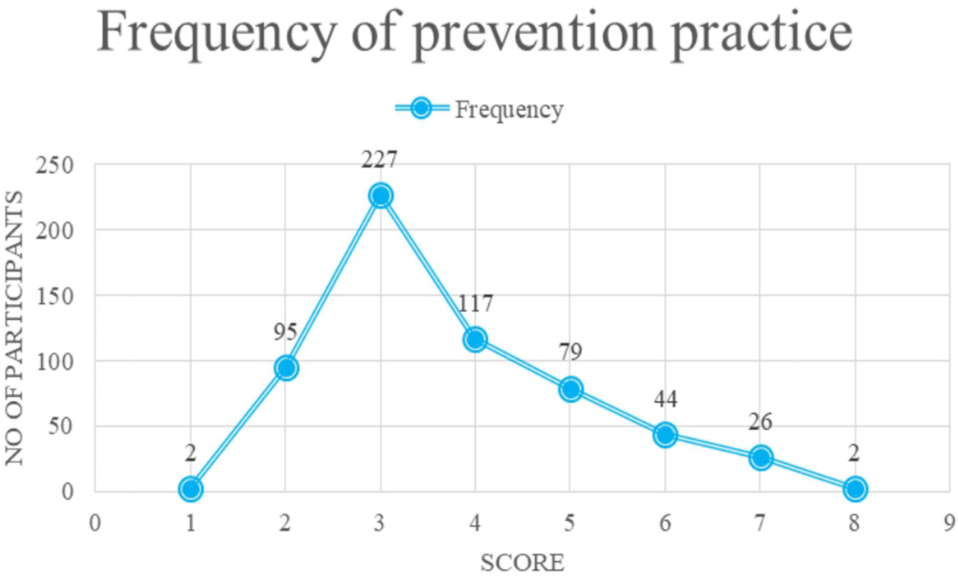

Figure 2 Frequency of level COVID-19 preventive practice in Jigjiga town, Northeast Ethiopia.

Information Exposure for COVID-19 Prevention

The majority of study participants, 443 (74.8%), had good exposure levels to information about COVID-19, and among that information, participants had exposure to information about the location of the first case 480 (81.1%), the source of COVID-19 transmission 524 (88.5%), and asymptomatic transmission 508 (85.8%), as well as high-risk groups for COVID-19 (537, 90.7%). Of the study participants, all (100%) had ever heard about the new coronavirus disease (COVID-19). More than half (331, 55.9%) of the study participants get information from television, followed by radio and health workers, 112 (18.9%) and 107 (18.1%), respectively, as presented in Figure 3.

COVID-19 Prevention Strategy

Based on the "Table 2" result, of the total 592 respondents, 240 (40.5%) regularly wore a mask when in public places or interacting with others outside their household, while 352 (59.5%) did not regularly wear a mask when in public places or interacting with others outside your household. Most of the respondents (322, or 54.4%) practice social distancing by maintaining at least 1 meter or 6 feet of distance from others in public settings, and the rest (270, or 45.6%) practice social distancing by maintaining at least 1 meter or 6 feet of distance from others in public settings. Maintaining social distancing in public transport, grocery stores and markets, and workplace situations is difficult. People can be asymptomatic and spread the virus without knowing they are sick, making it especially important to remain 6 feet away from others, whether inside or outside. Plus, the more people you interact with at a gathering and the longer you spend interacting with each, the higher your risk of becoming infected with the virus by someone who has it.

Among 592 respondents, most (270, or 45.6%) frequently wash their hands with soap and water for at least 20 seconds, while 52 (8.8%) rarely wash their hands with soap and water for at least 20 seconds. Most of the respondents have a good stay at-home, 402 (67.9%), while 352 (59.5%) of the respondents wear masks well, and 342 (57.8%) of the respondents do not take vaccinations. Although some people have some mobility, they still make fewer efforts to protect themselves from the spread of the virus. And most do not use masks because the condition is very hot. Wearing a mask that covers your mouth and nose can prevent those who have COVID-19 from spreading the virus to others. Recent evidence suggests that masks may even benefit the wearer, offering some level of protection against infections.

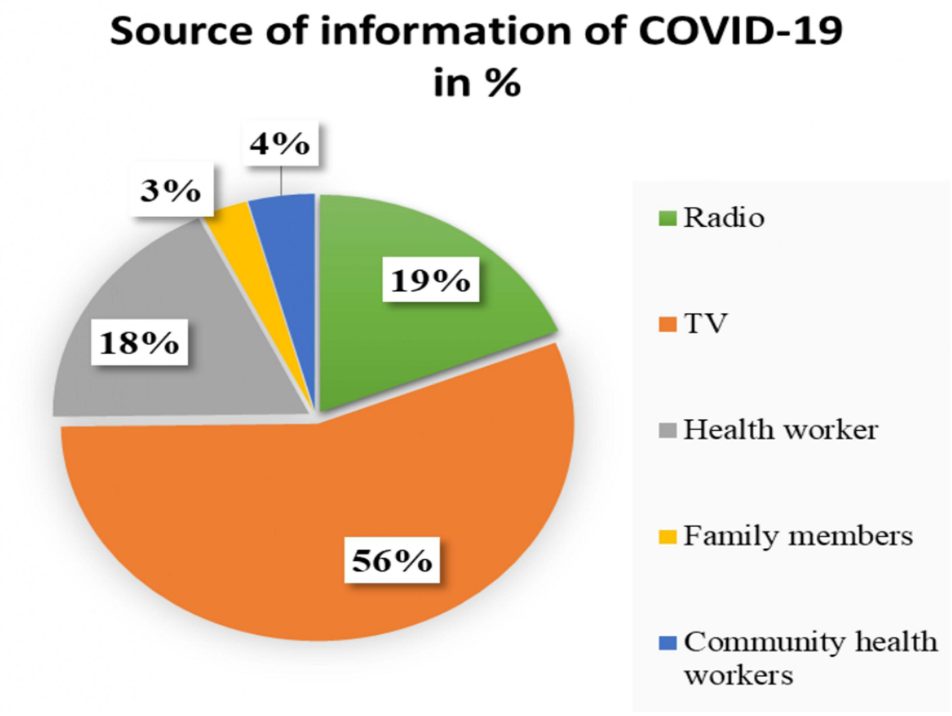

Figure 3 COVID-19 sources of information of the participants, "COVID-19 preventive practice and its' associated factors in Jigjiga town, Northeast Ethiopia".

Table 2 COVID-19 Prevention Strategy in Jigjiga Town, Northeast Ethiopia

Variable	Categories	Frequency	Percent
Do you regularly wear a mask when in public places or interacting with others outside your household?	Yes	240	40.5
	No	352	59.5
Do you practice social distancing by maintaining at least 1 meter or 6 feet distance from others in public settings?	Yes	322	54.4
	No	270	45.6
How easy or difficult is it for you to maintain social distancing in the following situations?	Public transportation	240	40.5
	Grocery stores/ markets	160	27.1
	Workplaces	100	16.9
	Restaurants/cafes	92	15.5
Have you received the Covid-19 vaccine?	Yes	250	42.2
	No	342	57.8
Hand hygiene	Yes	360	60.8
	No	232	39.2
How frequently do you wash your hands with soap and water for at least 20 seconds?	Rarely	52	8.8
	Occasionally	180	30.4
	Frequently	270	45.6
	Always	90	15.2
How often do you seek information about Covid-19 prevention strategies from reliable sources (eg, government websites, WHO)	Yes	260	43.9
	No	332	56.1
Stay at home	Good	402	67.9
	Not good	190	32.1

They used to wash their hands and stay at home. Nevertheless, the level of exposure to COVID-19 is still high. From this study, one of the problems with the spread of the virus is that people find it very difficult to avoid crowds when they have to leave their homes and carry out daily activities such as work. This condition will increase the potential risk of COVID-19 spreading in the community of Jigjiga City. 260 (43.9%) of the respondents sought information about COVID-19 prevention strategies from reliable sources (eg, government websites, WHO, and CDC). However, most of the respondents (332, or 56.1%) have less information about COVID-19 prevention strategies from reliable sources (eg, government websites, WHO, and CDC), as presented in Table 2 below.

Knowledge of Study Participants

Nearly sixty-five percent of participants were classified as having a strong understanding of COVID-19 when they answered knowledge questions with a median and above score (>3 scores); this amounted to 383 individuals (64.5%), as shown in Table 3.

Attitude of Study Participants

320 individuals in our survey, or 54.1%, felt that COVID-19 would ultimately be successfully managed. Nearly half of the study participants, 320 (54.1%), think that Ethiopia can successfully control the COVID-19 pandemic. The majority of study

Table 3 Knowledge About COVID-19 of the Study Participants, "COVID-19 Preventive Practice and Its' Associated Factors in Jigjiga Town, Northeast Ethiopia"

Variables	Response	Frequency (#)	Percent (%)
Known as early detection of COVID −19 can help to prevent the disease transmission	No	210	35.5
	Yes	382	64.5
Have a knowledge of prevention practices can help to protect from COVID-19?	Yes	592	100.0
Know distance to be kept from a person to another prevent contracting from COVID-19 infection	No	12	2.0
	Yes	580	98.0
Have a Knowledge about specific treatments that can cure COVID-19 as of today	No	455	76.9
	Yes	137	23.1
Level of knowledge	Poor Knowledge	210	35.5
	Good Knowledge	382	64.5

participants (>90%) had a positive attitude toward prevention methods (like hand washing, keeping distance, and avoiding touching the mouth and nose prior to cleaning hands). Overall, our findings indicate that 397 respondents (67.5%) had a good opinion of COVID-19, as presented in Table 4.

Table 4 Attitude Towards COVID-19 Prevention Practice of the Study Participants of COVID-19 Preventive Practice and Its' Associated Factors in Jigjiga Town, Northeast Ethiopia

No	Attitude variables	Negative Attitude		Positive Attitude	
		Count	%	Count	%
1	COVID-19 will finally be successfully controlled	320	54.1	272	45.9
2	COVID-19 is a serious disease	562	94.9	30	5.1
3	COVID-19 can be treated at home	294	49.7	298	50.3
4	If anyone get infected with COVID-19 has no any probability o	96	16.2	496	83.8
5	Do you believe that you may get infected with COVID −19?	565	95.4	27	4.6
6	Most of our cultural values are jeopardized due to the prevention measures by Govt	338	57.1	254	42.9
7	Black people are less likely to be infected with COVID-19	39	6.6	553	93.4
8	Feel well protected from COVID-19 while you stay at home	496	83.8	96	16.2
9	Ethiopia can fully control the COVID-19 pandemic	323	54.6	269	45.4
10	Avoiding touching eyes, nose, or mouth with hands can protect from being infected by COVID-19	550	92.9	42	7.1
11	COVID-19 is preventable applying hand washing	575	97.1	17	2.9
12	Applying physical distancing is important in controlling the	566	95.6	26	4.4
13	Applying staying at home is important in controlling the spread of COVID-19	566	95.6	26	4.4
14	Accept to be quarantine if you get suspected of COVID −19	374	63.2	218	36.8
15	Accept to be isolated if you get infected of COVID −19 infection	296	50.0	296	50.0

Risk Perception of Study Participants

According to the study findings, 245 (41.4%) of the study participants agreed that older people are at higher risk of contracting COVID-19. Of the study participants, 532 (89.9%) perceived the dangerousness of COVID-19 and were worried about it, as presented in Figure 4.

Misconception About COVID-19

Eighty-four and a half percent (84.2%) of the pupils said Dessie City could contain the disease. 27.6% of the students said drinking lots of water and consuming garlic or mitmita (a spicy pepper) would help prevent coronavirus illness, as shown in Table 5 below.

Factors Associated with COVID-19 Prevention Practices

Univariate and Bivariate Logistic Regression Analysis

For each factor related to sociodemographic data, information exposures, knowledge, attitude, risk perception, and misperception regarding COVID-19, bivariate logistic regression analysis was used to select candidate variables for multivariable logistic regression. Six variables with bivariate logistic regression p-values less than 0.25 were fitted to the multivariable model to limit the confounding impact and be eligible for multivariable logistic regression analysis. These factors included participant knowledge, COVID-19 preventive attitudes, sex, educational attainment, and household income (Table 6).

Multivariable Logistic Regression Analysis

In multivariable logistic regression, the kinds of information received on COVID-19 prevention mechanisms, participants with a favorable attitude toward COVID-19, prevention participants' educational level, mask-wearing, social distancing, vaccination, hand hygiene, public health communication, and household income were significantly associated with COVID-19 prevention strategies. The results of Table 6 showed that participants who reported wearing masks had significantly better COVID-19 preventive practices than those who did not. The adjusted odds ratio (AOR) of 1.54 indicates that participants who wore masks were 1.54 times more likely to engage in good preventive practices. Similarly, participants who practiced social distancing had significantly better preventive practices than those who did not. The AOR of 3.54 suggests that participants who practiced social distancing were 3.54 times more likely to have good COVID-19 preventive practices.

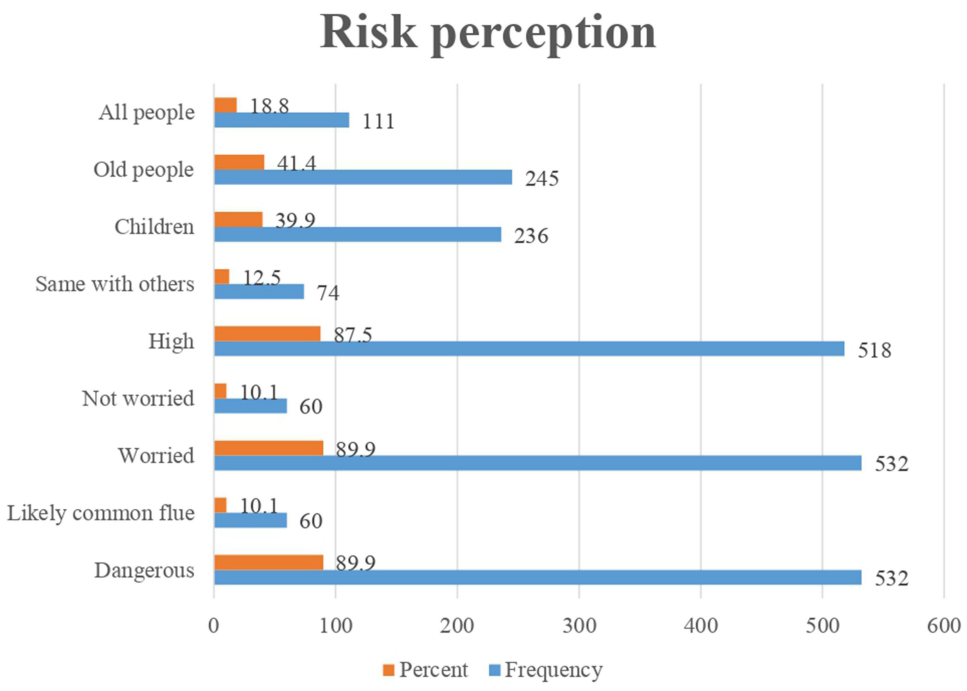

Figure 4 Risk Perception Study participants of COVID-19 preventive practice and its' associated factors in Jigjiga Town, Northeast Ethiopia.

Table 5 Misconceptions About COVID-19 of the Study Participants, "COVID-19 Preventive Practice and Its' Associated Factors in Jigjiga Town, Northeast Ethiopia"

Variables	Responses	Frequency (#)	Percent (%)
COVID-19 mainly affects older	Yes	39	6.6
	No	553	93.4
There are effective preventive measures	Yes	442	74.7
	No	150	25.3
Easy to become infected with COVID-19 on an airplane	Yes	188	31.8
	No	404	68.2
Drinking alcohol does not protect you against COVID-19	Yes	459	77.5
	No	133	22.5
Wearing face mask is enough to protect you from COVID-19	Yes	11	1.9
	No	581	98.1
Novel coronavirus is a lab-made virus	Yes	496	83.8
	No	96	16.2
Coffee or tea will help kill the virus	Yes	119	20.1
	No	473	79.9
Eating garlic and onions ward off the virus	Yes	416	70.3
	No	176	29.7
Antibiotics are not necessary for treating COVID-19	Yes	77	13.0
	No	515	87.0
COVID-19 does not affect Africans	Yes	69	11.7
	No	523	88.3

Table 6 Bivariate Analysis of Factors Associated with COVID-19 Preventive Practice in Jigjiga Town, East Ethiopia

Variables		Prevention Practice Group		P. Value	COR (C.I 95%)
		Poor prevention practice	Good Prevention practice		
Kind of information received about COVID −19	About prevention mechanisms of COVID-19	473 (91%)	51 (70.8%)	<0.001	4.144 (2.297–7.476)*
Attitude of the participants	Unfavorable attitude	155 (98.8%)	40 (55.6%)		
	Favorable attitude	365 (70.2%)	32 (44.4%)	<0.001	2.944 (1.783–4.86)*
Sex	Male	200 (38.5%)	40 (55.6%)	0.006	2(1.22–3.29)*
	Female	320 (61.5%)	32 (44.4%)		

(*Continued*)

Table 6 (Continued).

Variables		Prevention Practice Group		P. Value	COR (C.I 95%)
		Poor prevention practice	Good Prevention practice		
Knowledge of the participant	Good Knowledge	346 (66.5%)	36 (50%)	0.007	1.989 (1.21–3.267)*
Education level of the participant	Unable to read and write	24 (4.6%)	1(1.4%)	1	
	Read & write	100 (19.2%)	9(12.5%)	0.48	2.16 (0.26–17.88)
	Grade 1–8	105 (20.2%)	11 (15.3%)	0.39	2.51 (0.31–20.42)
	Grade 9–12	74 (14.2%)	7(9.7%)	0.45	2.27 (0.27–19.4)
	To Diploma	177 (34%)	17 (23.6%)	0.43	2.31 (0.293–18.11)
	≥Degree	40 (7.7%)	27 (37.5%)	0.01	16.2 (2.08–126.99)*
Household's monthly income in birr	0 to 1500 Birr	179 (34.4%)	17 (23.6%)	0.749	0.78 (0.171–3.57)
	1500 to 2000 Birr	27 (5.2%)	2(2.8%)	0.128	1.78 (0.85–3.72)
	2000 to 2500 Birr	89 (17.1%)	15 (20.8%)	0.26	1.50 (0.74–3.06)
	2500 to 3000 Birr	119 (22.9%)	17 (23.6%)	0.185	1.73 (0.77–3.88)
	3000 to 4000 Birr	67 (12.9%)	11 (15.3%)		
	>4000 Birr	39 (7.5%)	10 (13.9%)	0.023	2.7 (1.15–6.35)*
Mask-wearing	Yes	200 (83%)	40 (17%)	0.047	2.73 (0.87–4.88)
	No	300 (85.2%)	52 (14.8%)		
Social distancing	Yes	270 (83.9%)	52 (16.1%)	0.025	1.43 (1.23 −3.18)
	No	190 (70.4%)	80 (29.6%)		
Vaccination:	Yes	190 (76%)	60 (24%)	0.001	1.14 (1.5–2.18)
	No	300 (87.7%)	42 (12.3%)		
Hand hygiene	Yes	290 (78.4%)	80 (29.6%)	0.043	2.54 (1.40–4.58)
	No	180 (77.6%)	52 (22.4%)		
Public health communication	Yes	200 (76.9%)	60 (23.1%)	0.003	3.26 (2.30–5.98)
	No	270 (81.3%)	62 (18.7%)		
Stay at home	Yes	122 (30.3%)	280 (69.7%)	0.015	4.14 (3.41–7.80)
	No	140 (73.7%)	50 (26.3%)		

Note: *= p <0.05.
Abbreviations: COR, Crude Odds Ratio; CI, Confidence Interval.

Furthermore, participants who had received the COVID-19 vaccine also had significantly more preventive practices than those who were not vaccinated. The AOR of 1.14 indicates that vaccinated participants were 1.14 times more likely to engage in good preventive practices. Additionally, participants who practiced good hand hygiene had significantly better preventive practices t than those who did not, with an AOR indicating that they were 2.54 times more likely to have good preventive practices. The participants who received information on COVID-19 prevention mechanisms were [AOR: 6.886; 95% CI (2.975–15.938)], the participants with a favorable attitude were [AOR: 2.535; 95% CI (1.403–4.581)], the participants with a bachelor's degree or higher education level were [AOR: 20.08; 95% CI (2.13–188.85)], the participants with mask-wearing were [AOR: 1.54; 95% CI (2.40–3.58)], the participant with keeping Social distancing was [AOR: 3.54; 95% CI: 2.60–5.58], and public health communication was [AOR: 3.26; 95% CI: 2.30–5.98]. Stay-at-home [AOR: 4.14; 95% CI: 3.41–7.80] and participants from households with higher income (very high ETB per month) [AOR: 2.98; 95% CI: 1.04–8.52] had been significantly associated with COVID-19 prevention practice (Table 7).

Table 7 Multivariable Analysis of Factors Independently Associated with COVID-19 Preventive Practice in Jigjiga Town, Northeast Ethiopia

Variables		Prevention practice		COR (C.I 95%)	AOR (95% CI)	P-value
		Poor prevention practice	Good Prevention practice			
Kind of information	About prevention mechanisms of COVID-19	473 (91%)	51 (70.8%)	4.14 (2.30–7.48)	6.89 (2.98–15.94)**	<0.001
Attitude of participant	Unfavorable attitude	155 (98.8%)	40 (55.6%)	1	1	
	Favorable attitude	365 (70.2%)	32 (44.4%)	2.94 (1.78–4.86)	2.54 (1.40–4.58) **	0.002
Education level	Grade 9–12	75 (14.4%)	8(11.1%)	3.36 (0.44–25.94)	1	
	≥Degree	40 (7.7%)	40 (7.7%)	16.2 (2.08–126.99)	20.08 (2.13–188.85)**	0.009
H/H monthly income in ETB	1500 to 2000 birr	179 (34.4%)	17 (23.6%)	0.78 (0.17–3.57)	1	0.041
	2000 to 2500 birr	27 (5.2%)	2(2.8%)	1.78 (0.85–3.72)	1	
	2500 to 3000 Birr	89 (17.1%)	15 (20.8%)	1.50 (0.74–3.06)	1	
	3000 to 4000 Birr	119 (22.9%)	17 (23.6%)	1.73 (0.77–3.88)	1	
	>4000 Birr	39 (7.5%)	10 (13.9%)	2.7 (1.15–6.35)	2.98 (1.04–8.52) **	
Mask-wearing	Yes	200 (83%)	40 (17%)	2.73 (0.87–4.88)	1.54 (2.40–3.58) **	0.047
	No	300 (85.2%)	52 (14.8%)	3.7 (2.15–5.35)	1	
Social distancing	Yes	270 (83.9%)	52 (16.1%)	1.43 (0.37–2.18)	3.54 (2.60–5.58) **	0.025
	No	190 (70.4%)	80 (29.6%)	2.7 (2.15–5.35)	1	
Vaccination:	Yes	190 (76%)	60 (24%)	4.73 (1.77–5.88)	1.14 (1.4 −2.18) **	0.001
	No	300 (87.7%)	42 (12.3%)	3.17 (2.25–5.55)	1	

(*Continued*)

Table 7 (Continued).

Variables		Prevention practice		COR (C.I 95%)	AOR (95% CI)	P-value
		Poor prevention practice	Good Prevention practice			
Hand hygiene	Yes	290 (78.4%)	80 (29.6%)	1.73 (0.77–3.88)	2.54 (1.40–4.58) **	0.043
	No	180 (77.6%)	52 (22.4%)	2.63 (1.15–3.65)	1	
Public health communication	Yes	200 (76.9%)	60 (23.1%)	4.73 (2.5–7.43)	3.26 (2.30–5.98) **	0.003
	No	270 (81.3%)	62 (18.7%)	3.23 (2.55–5.95)	1	
Stay at home	Yes	122 (30.3%)	280 (69.7%)	1.73 (0.77–3.88)	4.14 (3.41–7.80) **	0.015
	No	140 (73.7%)	50 (26.3%)	2.61 (4.15–10.35)	1	

Note: **p <0.048 (significant variables).
Abbreviations: ETB, Ethiopian Birr; HH, house hold; COR, Crude Odds Ratio; AOR, Adjusted odds Ratio; CI, Confidence Interval.

Discussion

This study's goals were to determine the extent to which Jigjiga Town inhabitants practice COVID-19 prevention and to pinpoint the variables that affect it. The worldwide epidemic continues to raise worries about worldwide public health. The only way to prevent the COVID-19 pandemic from spreading is to follow the advised preventive measures, as no successful solution is currently available. Adherence to COVID-19 prevention strategies, such as educating the public about the illness's characteristics and mode of transmission, avoiding crowded areas, keeping a physical distance, washing hands, and donning face masks, is essential and reveals regional differences.[12,20]

From the moment they learned about COVID-19, all research participants reacted, according to the study's findings. More than half (56%) of the interviewees cited television as their information source. 58.4% of the study's total participants had an excellent level of expertise. This outcome was less favorable than studies conducted in China (90%), Nigeria (99.5%), and Sudan (78.2%) (34, 39, 40). However, it is nearly identical to the results of a study done in two dual-national African nations, Egypt and Nigeria, which revealed that 61.6% of participants had a decent degree of understanding of COVID-19 preventative measures.[21]

Our study indicates that 67.1% of survey participants expressed favorable attitudes concerning COVID-19 preventative interventions., compared to a different study, it was greater, and to a different study, it was greater and more significant than the one done in Dirashe, Southern Ethiopia, at 54.6%.[20] The research's findings (68.9%) are consistent with those of a binational study done in Egypt and Nigeria.[22]

Only 12.2% of research participants had outstanding preventive habits, as our study's COVID-19 prevention evaluation determined. The results were less significant than those of studies conducted in Uganda (495, 29%), Northwest Ethiopia (52.7%), and Ethiopia's North Shoa zone (44.1%) (27–29). However, the study's findings were higher than those of the study conducted in Oromia regional state, where the level of adherence to COVID-19 preventive measures was 8.3%.[23]

Our findings were consistent with a study conducted in Dirashe, Southern Ethiopia, in which 12.2% of participants adhered to the COVID-19 prevention protocol.[24] The possible explanation for this discrepancy is the study period. Previous studies were conducted at the start of the pandemic's emergence, and regardless of their knowledge or attitude, the majority of people were taking preventive measures at the time. Currently, there is a wealth of information pertaining to COVID-19, but the majority of it has not been properly implemented. In addition, the occurrence of morbidity and

mortality due to COVID-19 were decreasing post-initiation of COVID-19 vaccines, which can be a reason for the reluctance seen in the community.[12,25]

In terms of preventive measures mitigation towards COVID-19 prevention protocols for each of the 10 study variables, the practice of the study participants towards not going to crowded places as a prevention measure was the least commonly used method of mitigating the spread of COVID-19 infection in the study area. 7.3% of research participants avoided congested regions, which is smaller than studies on KAP conducted among visitors to Jigjiga University Medical Center in Northeast Ethiopia (33.1%), Egypt (87.1%), and the northwest region of Ethiopia (40.55%). Living conditions in the local communities, local religious practices (such as a culture of fellowship when visiting religious institutions), and a lower level of COVID-19 dissemination than when the study was done are some of the probable factors.[24]

Avoiding handshaking (21.3%) is also less common than visits to the Jigjiga University health center, among whom an investigation was conducted on understanding, mindsets, and preventative actions (53.8%).[5,12] Among the 10 study's mitigation approaches, participants indicated self-isolation practice (57.1%) was the most frequently used preventative technique. Overall, the COVID-19 preventative technique has been low (7.3–57.1%), which may be related to the COVID-19 distribution level as it is today and fatigue-associated ignorance.[24]

The study's findings indicated that the participants' views regarding COVID-19 prevention, their level of education, their understanding of COVID-19 prevention techniques, and their household's financial situation all significantly contributed to how frequently they committed to COVID-19 preventive measures. As a result, people with bachelor's degrees or higher levels of education were 20 times more likely than those with lower educational levels to employ COVID-19 preventative techniques.[26]

Compared to participants' families with lesser incomes, households with a monthly salary of more than 4000.00 ET birr every month were more than three times more likely to pay attention to COVID-19 prevention strategies. Vaccination has been a worldwide effort that has proven to be crucial in preventing disease. There has been a global effort to develop vaccines during the pandemic. Several platforms have been used, with the most popular being mRNA, inactivated virus, and subunit.[23–25] The efficacy rates of these vaccines have been impressive, particularly in preventing severe disease. However, waning immunity has been a concern, with booster dosages developed to prevent disease further. As new strains arise, existing vaccine efficacy comes into question, as does the need for newer vaccines. The dissemination of infection has been prevented by using vigorous national control measures, such as country border restrictions, proactive case identification using electronic contact tracing, quarantine of suspicious and confirmed cases, enhancing hygiene and sanitation, mandatory masking, social distancing, healthcare resource allocation, and efforts in reassurance and education of citizens.[7,22] However, a second-wave outbreak of the COVID-19 pandemic has emerged in North Taiwan since May 14, 2021, and has spread into other regions of the country.

The result of this study was that a sizeable proportion of the rural population does not have access to the media platforms used to publicize COVID-19 prevention measures. Moreover, without aggressive interventions, current levels of access to water and soap are suboptimal to adopt the hand-washing recommendations, particularly in rural areas. The low proportion of households with electricity, refrigeration, or internet connection and the relatively high prevalence of partner violence suggest that implementing the stay-at-home and work-from-home measures will be challenging. Public health measures that slow down the transmission of the virus should be continued, and efforts to prevent transmission to rural areas should be prioritized. Communication platforms and messaging must be adapted to different local realities to make any COVID-19 containment recommendations operational. WASH-related support should be ramped up, and addressing barriers to staying at home, such as the risk of partner violence, should be considered. The efforts needed to end the current pandemic in Ethiopia and similar pandemics in the future illuminate the serious challenges related to WASH and the inequalities between rural and urban areas that need urgent attention.[5,22]

The individuals who learned about COVID-19 preventive strategies showed an almost seven-times (AOR: 6.89) higher likelihood of adhering to these strategies than the other participants, and they also had greater COVID-19 prevention strategy knowledge.[27] Participants' attitudes toward COVID-19 prevention were strongly related to their commitment to COVID-19 preventative measures, with favorable opinions almost three times (AOR: 2.54) more likely

than negative attitudes to have greater adherence. The findings of the current investigation were consistent with those of a study carried out in Northwest Ethiopia (AOR: 2.54; 95% CI (1.79, 3.60)).[28]

The coronavirus pandemic also had a major effect on the sporting calendar as countries tried to restrict mass rallies. In addition to the shutdown, large-scale testing is also important because this virus, in some conditions, may not show symptoms in people but may make this person a large-scale transmitter of this virus.[5,9,22] With this, the countries were also focused on creating and transforming different places like banquet halls, stadiums, school buildings, and even big ships, especially in the US, into large quarantine centers to provide sufficient beds to each citizen. If the quarantine centers and hospitals run parallelly, the situation of increasing rates of patients infected will also increase as the patients who are already in the hospital or in other healthcare centers due to their health issues other than corona are already have weak immune systems, which will make them easy prey for the coronavirus to attack. So, these are needed to be separated in support of the other strategies.[26]

Conclusions

The majority of study participants received enough information on COVID-19. Nearly 65% of participants demonstrated that they comprehended COVID-19 in full. The study's conclusions showed that the mass media (television and radio) and medical authorities were the greatest resources for spreading knowledge about the COVID-19 epidemic. The covariate, the kinds of information received on COVID-19 prevention mechanisms, participants with a favorable attitude toward COVID-19, prevention participants' educational level, mask-wearing, social distancing, vaccination, hand hygiene, public health communication, and household income were significantly associated with COVID-19 prevention strategies. Participants who reported wearing masks had better preventive practices than those who did not. The adjusted odds ratio (AOR) indicates that mask-wearing was significantly associated with good preventive practices, with an AOR of 1.54. Participants who practiced social distancing had better COVID-19 prevention strategies than those who did not. The AOR suggests that social distancing was significantly associated with good preventive practices, with an AOR of 3.54. Participants who had received the COVID-19 vaccine had better COVID-19 prevention strategies than those who were not vaccinated. The AOR indicates that vaccination status was significantly associated with good preventive practices, with an AOR of 1.14. Participants who practiced good hand hygiene had better COVID-19 prevention strategies than those who did not. The AOR suggests that hand hygiene The general results regarding the COVID-19 preventive intervention showed low levels of involvement (7.3–57.1%).

This finding indicates that COVID-19 vaccination, mask-wearing, social distancing, hand hygiene, and public health communication promote and encourage individuals to adopt and adhere to recommended COVID-19 preventive strategies in Jigjiga town. Vaccination can reduce the risk of infection and transmission by boosting the immune response, providing protection against severe illness, and decreasing community spread. When participants learned about COVID-19 prevention strategies and had a positive attitude toward COVID-19 prevention when they had more education and when individuals came from households with high monthly incomes, effective preventive practices tended to be positively correlated.

Recommendations

According to the COVID-19 viral pandemic, all accountable bodies (JEOC, Jigjiga Town Health Offices, and healthcare facilities) must do more to supply communities with the most updated information. All of the previously mentioned organizations and medical facilities place much importance on targeted information distribution. To reduce the period of endemicity, the Ethiopian Minister of Health, Regional Health Bureau of Ethiopia, and Jigjiga Town Health Department would be more effectively served by dedicating their efforts to the availability of COVID-19 immunization and concentrating on improving vaccine coverage. We recommend that Jigjiga town and Jigjiga Zonal Health Department, JEOC, give due attention to the initiation of another study on COVID-19 prevention methods, specifically COVID-19 vaccination, which is very important.

Limitation of the Study

There are possible limitations that should be considered when interpreting the results. Our study's shortcoming may be that our design prevents us from establishing cause-and-effect linkages.

Abbreviation

COVID, coronavirus disease; OR, odds ratio; ETB, Ethiopian Birr; COR, Crude Odds Ratio; AOR, Adjusted odds Ratio; CI, Confidence Interval; NGO, Non-governmental organization.

Data Sharing Statement

The corresponding author can provide access to the datasets used and analyzed during the current investigation upon reasonable request.

Ethics Approval and Consent to Participants

The study was approved by the Ethical Committee of Jigjiga University's Institutional Review Board (IRB). Written informed consent was obtained from all the study participants after they had read the objective and importance of the study. The written consent was approved by the institutional review board committees of Jigjiga University. The information gathered from the respondents will be handled with confidence. The Declaration of Helsinki's guiding principles were followed during the study's execution.

Author Contributions

The authors granted their final consent for the version that will be published, agreed to submit it to this journal, and agreed to be accountable for any acceptances of the work. Additionally, they all contributed significantly to the idea and design, data gathering, essential writing for key intellectual interaction, and submission of the work. The authors have reviewed and approved the final manuscript.

Funding

This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosure

The authors declared that there is no conflict of interest.

References

1. Joseph TN, Chen AL, Di Cesare PE. Use of antibiotic-impregnated cement in total joint arthroplasty. *JAAOS*. 2003;11(1):38–47. doi:10.5435/00124635-200301000-00006
2. Satariano WA, Ragland DR. The effect of comorbidity on 3-year survival of women with primary breast cancer. *Ann Internal Med*. 1994;120(2):104–110. doi:10.7326/0003-4819-120-2-199401150-00002
3. Zikargae MH. COVID-19 in *Ethiopia*: assessment of how the Ethiopian government has executed administrative actions and managed risk communications and community engagement. *Risk Manage Healthc Pol*. 2020;Volume 13:2803–2810. doi:10.2147/RMHP.S278234
4. Joseph TN, Chen AL. Public Health Scotland and the EAVE II Collaborators. SARS-CoV-2 Delta VOC in Scotland: demographics, risk of hospital admission, and vaccine effectiveness. PMC free article; 2003.
5. Asres AK, Cherie A, Bedada T, et al. Frequency, nursing managements and stroke patients' outcomes among patients admitted to Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia a retrospective, institution based cross-sectional study. *Int J Africa Nurs Sci*. 2020;13:100228. doi:10.1016/j.ijans.2020.100228
6. Bhagavathula AS, Aldhaleei WA, Rahmani J, et al. Knowledge and perceptions of COVID-19 among health care workers: cross-sectional study. *JMIR public Health Surveil*. 2020;6(2):e19160. doi:10.2196/19160
7. Lippi G, Lavie CJ, Sanchis-Gomar F. Cardiac troponin I in patients with coronavirus disease 2019 (COVID-19): evidence from a meta-analysis. *Prog Cardiovasc Dis*. 2020;63(3):390. doi:10.1016/j.pcad.2020.03.001
8. Anand P, Stahel VP, Jathanna V, Nath K, M R. The safety of Covid-19 mRNA vaccines: a review. *Patient Safe Surg*. 2021;15(1):1–9. doi:10.1186/s13037-020-00273-3
9. Tregoning JS. Progress of the COVID-19 vaccine effort: viruses, vaccines and variants versus efficacy, effectiveness and escape. *Nat Rev Immunol*. 2021;21(10):626–636. doi:10.1038/s41577-021-00592-1

10. MacNeil JR, Su JR, Broder KR, et al. Updated recommendations from the advisory committee on immunization practices for use of the Janssen (Johnson & Johnson) COVID-19 vaccine after reports of thrombosis with thrombocytopenia syndrome among vaccine recipients—United States, April 2021. *MMWR*. 2021;70(17):651. doi:10.15585/mmwr.mm7017e4
11. Ji W, Wang W, Zhao X, et al. Cross-species transmission of the newly identified coronavirus 2019-nCoV. *J med virol*. 2020;92(4):433–440. doi:10.1002/jmv.25682
12. Wan Y, Shang J, Graham R, et al. Receptor recognition by the novel coronavirus from Wuhan: an analysis based on decade-long structural studies of SARS coronavirus. *J Virol*. 2020;94(7):10.1128/jvi. doi:10.1128/JVI.00127-20
13. World Health Organization. *Global Surveillance for COVID-19 Caused by Human Infection with COVID-19 Virus: Interim Guidance*. World Health Organization; 2020.
14. Balachandar V, Mahalaxmi I, Kaavya J, et al. COVID-19: emerging protective measures. *Eur Rev Med Pharmacol Sci*. 2020;24(6):3422–3425. doi:10.26355/eurrev_202003_20713
15. Speelman D, Logistic regression. Corpus methods for semantics: quantitative studies in polysemy and synonymy, 2014. 43: p. 487–533.
16. Maroof DA. *Binary Logistic Regression, in Statistical Methods in Neuropsychology: Common Procedures Made Comprehensible*. Springer; 2012:67–75.
17. Baye K. *COVID-19 Prevention Measures in Ethiopia: Current Realities and Prospects*. Vol. 141. Intl Food Policy Res Inst; 2020.
18. Lennon RP, Sakya SM, Miller EL, et al. Public intent to comply with COVID-19 public health recommendations. *HLRP*. 2020;4(3):e161–e165. doi:10.3928/24748307-20200708-01
19. Ning L, Niu J, Bi X, et al. The impacts of knowledge, risk perception, emotion and information on citizens' protective behaviors during the outbreak of COVID-19: a cross-sectional study in China. *BMC Public Health*. 2020;20(1):1–12. doi:10.1186/s12889-020-09892-y
20. Kwok KO, Li KK, Chan HHH, et al. Community responses during early phase of COVID-19 epidemic, Hong Kong. *Emerging Infectious Diseases*. 2020;26(7):1575. doi:10.3201/eid2607.200500
21. Bante A, Mersha A, Tesfaye A, et al. Adherence with COVID-19 preventive measures and associated factors among residents of Dirashe district, southern Ethiopia. *Patient Preference Adherence*. 2021;Volume 15:237–249. doi:10.2147/PPA.S293647
22. Akalu Y, Ayelign B, Molla MD. Knowledge, attitude and practice towards COVID-19 among chronic disease patients at Addis Zemen Hospital, Northwest Ethiopia. *Infect Drug Resist*. 2020;1949–1960. doi:10.2147/IDR.S258736
23. Wolf MS, Serper M, Opsasnick L, et al. Awareness, attitudes, and actions related to COVID-19 among adults with chronic conditions at the onset of the US outbreak: a cross-sectional survey. *Ann Internal Med*. 2020;173(2):100–109. doi:10.7326/M20-1239
24. Azene ZN, Merid MW, Muluneh AG, et al. Adherence towards COVID-19 mitigation measures and its associated factors among Gondar City residents: a community-based cross-sectional study in Northwest Ethiopia. *PLoS One*. 2020;15(12):e0244265. doi:10.1371/journal.pone.0244265
25. Ditekemena JD, Nkamba DM, Mutwadi A, et al. COVID-19 vaccine acceptance in the Democratic Republic of Congo: a cross-sectional survey. *Vaccines*. 2021;9(2):153. doi:10.3390/vaccines9020153
26. Van Scoy LJ, Miller EL, Snyder B, et al. Knowledge, perceptions, and preferred information sources related to COVID-19 among central Pennsylvania adults early in the pandemic: a mixed methods cross-sectional survey. *Anna Family Med*. 2021;19(4):293–301. doi:10.1370/afm.2674
27. Mansuri FM, Zalat MM, Khan AA, et al. Estimating the public response to mitigation measures and self-perceived behaviours towards the COVID-19 pandemic. *J Taibah Univ Sci*. 2020;15(4):278–283. doi:10.1016/j.jtumed.2020.06.003
28. Kebede Y, Yitayih Y, Birhanu Z, et al. Knowledge, perceptions and preventive practices towards COVID-19 early in the outbreak among Jimma university medical center visitors, Southwest Ethiopia. *PLoS One*. 2020;15(5):e0233744. doi:10.1371/journal.pone.0233744