**Covid-19 Prevention: Level and Determinants of Knowledge, Attitude and Practice toward WHO Recommended Covid-19 Prevention Measures Among Harar Population, Eastern Ethiopia: A Community-Based Cross-Sectional Study**

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**Abstract**

**Objective**

Covid-19 is one of the varieties that causes sickness in humans. Therefore, public awareness and practice in prevention measures are critical in combating the pandemics. Thus, the aim of this study was to assess the status of level of knowledge, attitude, practice and determinants toward covid-19 recommended prevention measure among general population of Harar, Eastern Ethiopia, 2021

**Method**

A community based cross-sectional study design was conducted among 845 randomly selected individuals from September 17 to 30, 2021 G.C. Data was analyzed using SPSS V.26. Descriptive summary statistics was done. Bivariate and Multivariate analysis was computed to identify association between dependent and independent variables and those variables with p-value <0.05 were declared as having statistically significant association.

**Result**

In this study, 75.1%, 44.7%, and 52.8% of participants had a good knowledge, positive attitude and good practice toward COVID-19 prevention, respectively. Occupation and educational status were found to have significant strong association with level of knowledge. Occupation, educational status, monthly income and family size were found to have significant strong association with level of attitude. Marital status, educational status and family size were found to have significant strong association with level of practice toward Covid-19 recommended prevention measures.

**Conclusion**

Overall, there is high level of knowledge and medium level of attitude and practice toward Covid-19 recommended prevention measures. Repeated tailored information using different media should be provided to the community regarding Covid-19 prevention methods. Existing Covid-19 prevention efforts should be strengthened and evaluated to improve community preventive practices.

**Key words**

Covid-19, Knowledge, Attitude, Practice, Prevention

**Summary Box**

Article type: Original Research

**What is the current understanding of this subject?**

- So far, studies conducted in different areas addressed or assessed only knowledge, attitude and practice towards COVID-19 infection. which reported variable (high and low level) results for COVID-19 infection.

**What does this report add to the literature?**

- Our study focused on the level and determinants of knowledge, attitude, and practice toward the recommended COVID-19 preventive measures.

- This study revealed novel determinants toward the Covid-19 recommended prevention measure, which were not reported in other studies.

**What are the implications to public health practice?**

- The results of this study will serve as an input for policy and decision makers, to revise the current strategies and design better programs which address in combating COVID-19 pandemic.

Introduction

Covid-19 is one of the varieties of virus that causes sickness in humans. In December 2019, officials in Wuhan, China, initially characterized the condition caused by the new coronavirus COVID-19, later dubbed SARS-CoV-2. COVID-19 was declared a pandemic by the World Health Organization on March 11, 2020. By 2020, the global spread had been rapid, with at least one case documented in 182 of 202 nations. However, as of January 28, 2020, there had been no confirmed occurrences in Africa. In Ethiopia, FMoH confirmed the first case of COVID-19 in Addis Ababa on March 13, 2020.[1-5]

Globally, as of September 3 of 2021, there had been 218,946,836 and 4,539,723 COVID-19 confirmed cases and deaths, respectively. In Africa, there have been more than 5,689, 356 confirmed COVID-19 cases, with 136,742 deaths. Between 3 January 2020 and 3 September 2021, there were 310,994 confirmed cases of COVID-19 in Ethiopia, with 4,711 deaths.[6, 7]

Nations across the world have launched various Covid-19 prevention measures, including restricted movement, quarantine, and nationwide lockdown. Additionally, individual and community actions to improve hand hygiene, physical distancing, and the use of face masks were also implemented. Despite global implementation of such measures, the burden of the pandemic has not been reduced significantly. Thus, a large-scale awareness-creation campaign on prevention, including a vaccination campaign across the globe, seems to be the only way out of this epidemic.[8-11]

Regardless of the enormous national steps taken to battle the outbreak, the success or failure of these initiatives is mostly determined by public behavior. To prevent the spread of the disease, public compliance with WHO and CDC recommended preventive measures is critical. The public's knowledge, attitude and practice of COVID-19 are likely to influence compliance to suggested prevention measures. [12-14]

Therefore, public awareness and practice of prevention measures are critical in combating pandemics. Thus, the aim of this study was to assess the status of the level of knowledge, attitude, practice, and determinants toward COVID-19 recommended prevention measures among the general population of Harar, Eastern Ethiopia, in 2021.

**Method and Material**

**Study area and period**

The study was carried out in the Harari region and a community-based cross-sectional study design was used from September 17 to 30, 2021. Harari is one of the ten regions in Ethiopia, located 526 km away from the capital city, Addis Ababa, with an estimated area of 334 square km. The total estimated population of Harar was 246,000 and approximately 60% of the population lives in urban areas. There are nine woredas and there are 19 urban and 17 rural kebeles in the Harari region. This study was conducted in Harar, Eastern Ethiopia. A community-based cross-sectional study design was used to assess the level of knowledge, attitude, practice, and determinants toward COVID-19 recommended prevention measures among the general population of Harar, Eastern Ethiopia, in 2021.

**Sample size determination and sampling technique**

We used a single proportion formula with a 95 percent confidence interval, 5% margin of error, and with assumption of 50% proportion to calculate required samples. Then multiplied by 2 (design effects), and finally a 10% non-response rate was added.

n= = n= =384, 384 x 2 = 768, by adding 10% (77)

The study participants were divided into two groups based on where they lived (urban and rural). Our source population was the whole population of Harar. Our study unit consisted of all participants that were randomly chosen from each stratum. During the data collection period, study participants who volunteered to engage in the study were included. Those who did not want to participate in the study were excluded from the study.

**Data collection tool and procedure**

Data was collected by the face-to-face interview method using the pretested structured questioner. The questioner was prepared in the English language and translated into the local languages (Afan Oromo and Amharic), which was adapted after reviewing relevant literature and reports. The questioner consisted of two parts; sociodemographic variables and COVID-19 recommended prevention measure related variables including knowledge, attitude, and practice questions were our outcome variables. Data was collected by eight 4th-year nursing students.

**Data quality control**

To assure the quality of data, a three-day training was given for data collectors on how to interview and collect data. A pretest was done on 5% of the questionnaire on Haramaya woreda. Close supervision of the data collectors was made by the authors. Collected data was checked both in the field and at the end of each day after data collection, before data entry for completeness and missing values. Double data entry was performed by two authors (AA and MY).

**Data processing and Analysis**

Data was examined for completeness, clarity, and consistency after it was collected. The data was coded and entered into Epidata v.3.0, and SPSS v.26 was used to analyze it. To summarize the results, summary statistics were produced in the form of percentages, mean, and standard deviation. Bivariate and multivariate analysis was computed to assess the association between the dependent and independent variables and to adjust the effect of confounding variables, respectively. Finally, those variables in the multivariate analysis with a p-value < 0.05 were declared as having a statistically significant association.

# Result

**Sociodemographic characteristics of study participant**

A total of 845 participants participated in the study, which is a 100% response rate. Out of these participants, the majority, 512 (60.6%), were between 18 and 30 years of age, with a mean of 30.7 (±10.5). Regarding their educational status, 327 (38.7%) attended above secondary school. Of these, 233 (71.2%) lived in urban areas. Among these, 497 (58.8%) were married and 286 (57.5%) lived in urban areas. (Table 1).

Table 1: Sociodemographic characteristics of study participants by residence in Harar, Ethiopia, 2021

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sociodemographic variables | Urban  (n= 515) | Rural  (n= 330) | Total  (N= 845) | Percentage |
| Age in years  18 – 30  31 – 45  46 – 60  > 60 | 318 (37.6%)  153 (18.1%)  28 (3.3%)  16 (1.9%) | 194 (22.9%)  109 (12.9%)  15 (1.8%)  12 (1.4%) | 512  262  43  28 | 60.6%  31%  5.1%  3.3% |
| Sex  Male  Female | 255 (30.1%)  260 (30.8%) | 179 (21.2%)  151 (17.9%) | 434  411 | 51.4%  42.6% |
| Marital status  Single  Married  Divorced  Widow  Separated | 193 (22.8%)  286 (33.8%)  18 (2.1%)  13 (1.5%)  5 (0.6%) | 93 (11%)  211 (24.9%)  12 (1.4%)  6 (0.7%)  8 (0.9%) | 286  497  30  19  13 | 33.8%  58.8%  3.6%  2.3%  1.5% |
| Religion  Orthodox  Muslim  Catholic  Protestant  Wakefata | 151 (17.9%)  302 (35.7%)  15 (1.8%)  41 (4.8%)  6 (0.7%) | 17 (2%)  308 (36.4%)  1 (0.1%)  1 (0.1%)  3 (0.3%) | 168  610  16  42  9 | 19.9%  72.2%  1.8%  4.9%  1.1% |
| Occupational status  Housewife  Marchant  Civil servant  Labor work  Farmer | 92 (10.9%)  161 (19%)  162 (19.2%)  87 (10.3%)  13 (1.5%) | 60 (7.1%)  50 (5.9%)  44 (5.2%)  56 (6.6%)  120 (14.2%) | 152  211  206  143  133 | 17.9%  24.9%  24.3%  16.9%  15.7% |
| level of Educational  Unable to read and write  Primary education  Secondary education  Above secondary education | 21 (2.9%)  124 (14.7%)  137 (16.2%)  233 (27.6%) | 92 (10.9%)  55 (6.5%)  89 (10.5%)  94 (11.1%) | 113  179  226  327 | 13.3%  21.2%  26.7%  38.7% |
| Average Monthly Income  < 5000 ETB  5000 - 9999 ETB  10000 -14999 ETB  ≥15000 ETB | 292 (34.5%)  167 (19.8%)  46 (5.4%)  10 (1.2%) | 210 (24.8%)  87 (10.3%)  21 (2.5%)  12 (1.4%) | 502  254  67  22 | 59.4%  30.1%  7.9%  2.6% |
| Family size  < 5  5 - 9  ≥ 10 | 371 (43.9%)  136 (16.1%)  8 (0.9%) | 219 (25.9%)  102 (12.1%)  9 (1.1%) | 590  238  17 | 69.8%  28.1%  2.1% |

n= frequency number in each stratum, N: total number, ETB: Ethiopian Birr

**Knowledge toward Covid-19 prevention measure among study participants**

Out of 845, the majority, 735 (86.9%) of them knew that washing their hands for 20 seconds could prevent the virus. Of these, 447 (60.8%) lived in urban areas. Eighty six percent of study participants knew that sneezing/ coughing into arm/elbow can prevent virus transmission. Regarding social distancing, 683 (80.8) knew that maintaining social distance can prevent virus transmission, among these, 416 (60.9%) live in urban areas (Table 2).

**Attitude toward Covid-19 prevention measure among study participants**

Among the total 845 participants, 606 (71.7%) believe that staying at home during a pandemic can reduce the risk of virus transmission, among these, 380 (62.7) and 226 (37.3%) of them live in urban areas, respectively. Among a total of 845 respondents, 715 (84.6%) thought that using a sanitizer could reduce virus transmission (Table 2).

**Practice toward Covid-19 prevention measure** **among Harar Population**

Among the total respondents, 580 (68.6%) of the participants wash their hands for twenty seconds. Of these, 353 (60.9%) live in urban areas. The majority, 695 (82.2%) of them used face masks. Out of these, 435 (62.6%) and 260 (37.4%) live in urban and rural areas, respectively. Only 46% of them stay at home quite often during pandemic period (Table 2).

Table 2: Knowledge, attitude and practice toward Covid-19 prevention among population in Harar, Ethiopia, 2021

|  |  |  |
| --- | --- | --- |
| Questions | Answer = n (%) | |
| **Yes (%)** | **No (%)** |
| Knowledge Questions toward Covid-19 prevention  K1. Washing hands for 20 seconds can prevent the virus  K2. Sneezing or coughing into arm/elbow can prevent spread of virus  K3. Virus can be transmitted by shaking hands  K4. Maintaining safe distance at least one meter can protect from the virus  K5. Touching face can transfer the virus  K6. Staying at Home can decrease the chance of getting infected  K7. Wearing the mask can prevent the virus | **Correct**  735 (86.9%)  732 (86.8%)  726 (85.9%)  683 (80.8%)  680 (80.5%)  648 (76.7%)  799 (94.6%) | **Incorrect**  110 (13.1%)  113 (13.2%)  119 (14.1%)  162 (19.2%)  165 (19.5%)  197 (23.3%)  46 (5.4%) |
| Attitude Questions toward Covid-19 prevention  A1. Think social distancing reduce virus transmission  A2. Think using sanitizer can reduce virus transmission  A3. Believe staying at home keep you safe  A4. Think traditional food/mixture can prevents virus  A5. Believe chewing chat prevent the virus  A6. Believe being vaccinated can prevent the virus | **Positive (%)**  662 (78.3%)  715 (84.6%)  606 (71.7%)  540 (63.9%)  244 (28.9%)  645 (76.3%) | **Negative (%)**  183 (21.7%)  130 (15.4%)  239 (28.3%)  305 (36.1%)  601 (71.1%)  200 (23.7%) |
| Practice toward Covid-19 Prevention  P1. Washing a hand for 20 second  P2. Sneezing/coughing into arm/elbow  P3. Avoid shaking hands  P4. Maintain a social distance at least one meter  P5. Avoid touching face  P6. Staying at home quite often  P7. Use face mask | **Correct (%)**  580 (68.6%)  598 (70.8%)  469 (55.5%)  505 (59.8%)  468 (55.4%)  389 (46%)  695 (82.2%) | **Incorrect (%)**  265 (31.4%)  247 (29.2%)  376 (44.5%)  340 (40.2%)  377 (44.6%)  456 (54%)  150 (17.8%) |

K1-K7, knowledge question 1 up to 7; A1- A6, Attitude question 1 up to 6; P1- P7, practice question 1 up to 7; n, number

**Level of Knowledge, Attitude and Practice toward Covid-19 prevention** **measure**

Among the 845 participants, a majority of 635 (75.1%) of them had good knowledge. Of these, 388 (61.1%) and 247 (38.9%) live in urban and rural areas, respectively. Regarding their attitude toward COVID-19 prevention, most, 476 (55.3%) of them had a negative attitude. About 446 (52.8%) had a good level of practice toward COVID-19 prevention.

**Factors Associated with Knowledge, Attitude and Practice Toward Covid-19 Prevention**

In the multivariate analysis model, sociodemographic characteristics were computed to assess significant associations with level of knowledge, attitude, and practice toward COVID-19 prevention.

**Factors associated with level of knowledge toward Covid-19 Prevention** **measure**

House wives were 8 (AOR: 8.3, 95%CI: 1.1, 68) times more likely to have good knowledge of COVID-19 prevention when compared with drivers. People unable to read and write were 9 (AOR: 9.7, 95%CI: 5.1, 18.9) times more likely to have good knowledge of Covid-19 prevention than people educated above secondary school. Similarly, people who attended primary education were 2 (AOR: 2.1, 95%CI: 1.2, 3.9) times more likely to have good knowledge of Covid-19 prevention than people educated above secondary school. (Table 3)

Table 3: Factor associated with knowledge toward Covid-19 prevention among Harar Population in Harar, Ethiopia, 2021

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor variables | Knowledge toward Covid-19 Prevention | | COR  CI: 95% | P-value | AOR  CI: 95% | P-value |
| Good | Poor |
| Age  18 – 30  31 – 45  46 – 60  > 60 | 380  200  32  23 | 132  62  11  5 | 1.6 (0.6, 4.3)  1.4 (0.5, 3.9)  1.6 (0.5, 3.9)  1 | 0.352  0.490  0.45 | 1.2 (0.4, 3.9)  1.4 (0.4, 4.6)  1.8 (0.5, 6.8)  1 | 0.71  0.566  0.383 |
| Sex  Male  Female | 323  312 | 111  99 | * 1. (0.8, 1.5)   1 | 0.617 | 1.5 (0.9, 2.2)  1 | 0.053 |
| Marital status  Single  Married  Divorced  Widowed  Separated | 231  369  16  9  10 | 55  128  14  10  3 | 0.8 (0.2, 2.9)  1.2 (0.3, 4.3)  2.9 (0.6, 12.7)  3.7 (0.7, 17.8)  1 | 0.732  0.827  0.155  0.103 | 1.8 (0.4, 8.3)  1.4 (0.3, 6.4)  3.6 (0.7, 19.4)  4.5 (0.7, 26.9)  1 | 0.446  0.631  0.13  0.101 |
| Occupational status  Housewife  Marchant  Civil servant  Labor work  Farmer  Driver | 96  158  168  84  109  20 | 56  53  38  38  24  1 | 11.6 (1.5, 89)  6.7 (0.8, 51)  4.5 (0.5, 34)  9 (1.17, 69)  4.4 (0.5, 34)  1 | 0.018  0.066  0.147  0.035  0.158 | 8.3 (1.1, 68)  6.3 (0.8, 49)  8.1 (0.9, 66)  6.4 (0.8, 51)  3.3 (0.4, 26)  1 | **0.049**  0.08  0.051  0.082  0.263 |
| level of Educational  unable to read and write  Primary education  Secondary education  Above secondary | 47  132  177  279 | 66  47  49  48 | 8.1 (5, 13.2)  2.1 (1.3, 3.2)  1.6 (1.1, 2.4)  1 | 0.0001  0.002  0.034 | 9.7 (5.1, 18.9)  2.1 (1.2, 3.9)  1.8 (1.1, 3.1)  1 | **0.0001**  **0.011**  **0.034** |
| Average Monthly Income  < 5000 ETB  5000 - 9999 ETB  10000 -14999 ETB  ≥15000 ETB | 367  198  51  19 | 135  56  16  3 | 2.3 (0.7, 7.9)  1.8 (0.5, 6.3)  1.9 (0.5, 7.6)  1 | 0.179  0.362  0.316 | 1.6 (0.4, 6.1)  1.2 (0.3, 4.6)  1.6 (0.4, 6.8)  1 | 0.486  0.782  0.511 |
| Family size  < 5  5 - 9  ≥ 10 | 450  172  13 | 140  66  4 | 1.1 (0.3, 3.1)  1.2 (0. 4, 3.9)  1 | 0.985  0.708 | 2.1 (0.6, 7.6)  2.5 (0.7, 9.2)  1 | 0.249  0.154 |

Note: Bold\*, p-value <0.05 significant

Abbreviation: COR, Crude odds ratio; CI, Confidence interval; AOR, Adjusted odds ratio

**Factor Associated with level of Attitude toward Covid-19 Prevention measure**

People unable to read and write were 5 (AOR: 5.2, 95%CI: 2.7, 10.1) times more likely to have a positive attitude toward COVID-19 prevention than people educated above secondary school. Civil servants were 2 (AOR: 2.1, 95%CI: 1.2, 3.8) times more likely to have a positive attitude than drivers. Individuals with a monthly average income of < 5000 ETB were 3 (AOR: 3.2, 95%CI: 1.1, 9.5) times more likely to have a positive attitude toward Covid-19 prevention than individuals with a monthly average income of ≥ 15000 ETB. People who had < 5 family members were 83% less likely to have a positive attitude toward COVID-19 practice than individuals who lived with 10 family members (Table 4).

Table 4: Factor associated with attitude toward Covid-19 prevention among Harar Population in Harar, Ethiopia, 2021

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor variables | Attitude toward Covid-19 Prevention | | COR  CI: 95% | P-value | AOR  CI: 95% | P-value |
| Positive | Negative |
| Age  18 – 30  31 – 45  46 – 60  > 60 | 210  117  25  17 | 302  145  18  11 | 2.2 (1.1, 4.8)  1.9 (0.8, 4.2)  1.1 (0.4, 2.9)  1 | 0.044  0.11  0.83 | 1.8 (0.7, 4.5)  1.7 (0.7, 4.5)  1.1 (0.3, 3.2)  1 | 0.202  0.231  0.919 |
| Sex  Male  Female | 193  176 | 241  235 | 0.93 (0.9, 1.2)  1 | 0.629 | 0.87 (0.6, 1.2)  1 | 0.41 |
| Marital status  Single  Married  Divorced  Widowed  Separated | 125  218  15  5  6 | 161  279  15  14  7 | 1.1 (0.4, 3.4)  1.1 (0.4, 3.3)  0.85 (0.2, 3.1)  2.4 (0.5, 10.7)  1 | 0.862  0.87  0.817  0.251 | 1.6 (0.5, 5.5)  1.3 (0.4, 4.3)  0.74 (0.2, 3.1)  1.9 (0.4, 9.8)  1 | 0.448  0.695  0.683  0.412 |
| Occupational status  Housewife  Marchant  Civil servant  Labor work  Farmer  Driver | 57  88  131  35  46  12 | 95  123  75  87  87  9 | 2.2 (0.8, 5.6)  1.8 (0.7, 4.6)  0.76 (0.3, 1.9)  3.3 (1.3, 8.5)  2.5 (0.9, 6.4)  1 | 0.9  0.17  0.56  0.013  0.53 | 1.3 (0.8, 2.2)  0.74 (0.4,1.3)  2.1 (1.2, 3.8)  1.7 (0.9, 3.1)  0.56 (0.2, 1.6)  1 | 0.32  0.323  **0.012**  0.064  0.288 |
| level of Educational  unable to read and write  Primary education  Secondary education  Above secondary | 18  67  99  185 | 95  112  127  142 | 6.8 (3.9, 11.9)  2.2 (1.5, 3.2)  1.7 (1.2, 2.3)  1 | 0.0001  0.0001  0.003 | 5.2 (2.7, 10.1)  1.7 (1.1, 2.8)  1.1 (0.7, 1.7)  1 | **0.0001**  **0.026**  0.563 |
| Average Monthly Income  < 5000 ETB  5000 - 9999 ETB  10000 -14999 ETB  ≥15000 ETB | 204  126  24  15 | 298  128  43  7 | 3.1 (1.2, 7.8)  2.2 (0.8, 5.5)  3.8 (1.4, 10.7)  1 | 0.014  0.101  0.01 | 3.2 (1.1, 9.5)  3 (1.1, 8.7)  5.1 (1.6, 16.4)  1 | **0.029**  **0.043**  **0.006** |
| Family size  < 5  5 - 9  ≥ 10 | 204  83  2 | 306  155  15 | 0.14 (0.1, 0.6)  0.25 (0.1, 1.1)  1 | 0.01  0.069 | 0.17 (0.3, 0.9)  0.28 (0.1, 1.4)  1 | **0.033**  0.127 |

Note: Bold\*, p-value <0.05 significant

Abbreviation: COR, Crude odds ratio; CI, Confidence interval; AOR, Adjusted odds ratio

**Factor Associated with level of Practice toward Covid-19 Prevention** **measure**

Married peoples were 5 (AOR: 5.2, 95%CI: 2.1, 13.1) times more likely to have a good practice toward Covid-19 prevention than separated people. People unable to read and write were 3 (AOR: 3.8, 95%CI: 2.1, 6.8) times more likely to have good practice than people educated above secondary school. People who have ≥ 10 family members were 8 (AOR: 8.9, 95%CI: 1.9, 43) times more likely to have good practice toward covid-19 practice than individual live in <5 family members in the house (Table 5).

Table 5: Factor associated with practice toward Covid-19 prevention among Harar Population in Harar, Ethiopia, 2021

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor variables | Practice toward Covid-19 Prevention | | COR  CI: 95% | P-value | AOR  CI: 95% | P-value |
| Good | Poor |
| Age  18 – 30  31 – 45  46 – 60  > 60 | 262  144  25  15 | 250  118  18  13 | 2.2 (1.1, 4.8)  1.9 (0.8, 4.2)  1.1 (0.4, 2.9)  1 | 0.044  0.11  0.829 | 0.84 (0.3, 2.1)  0.93 (0.4, 2.3)  0.70 (0.2, 2.1)  1 | 0.7  0.88  0.52 |
| Sex  Male  Female | 247  199 | 187  212 | 0.93 (0.7, 1.2)  1 | 0.629 | 0.76 (0.5, 1.1)  1 | 0.099 |
| Marital status  Single  Married  Divorced  Widowed  Separated | 184  241  7  6  8 | 102  256  23  13  5 | 1.1 (0.3, 3.3)  1.1 (0.4, 3.3)  0.86 (0.2, 3.2)  2.4 (0.5, 10.7)  1 | 0.862  0.87  0.817  0.251 | 1.5 (1.1, 2.2)  5.2 (2.1, 13.1)  2.5 (0.9, 7.3)  0.85 (0.3, 2.8)  1 | **0.016**  **0.001**  0.082  0.792 |
| Occupational status  Housewife  Marchant  Civil servant  Labor work  Farmer  Driver | 64  107  128  60  76  11 | 88  104  78  62  57  10 | 2.2 (0.9, 5.6)  1.8 (0.7, 4.6)  0.8 (0.3, 1.9)  3.3 (1.2, 8.5)  2.5 (0.9, 6.4)  1 | 0.09  0.17  0.561  0.013  0.053 | 0.66 (0.2, 1.9)  0.88 (0.3, 2.3)  0.84 (0.3, 2.2)  0.84 (0.3, 2.3)  0.74 (0.2, 1.9)  1 | 0.669  0.804  0.737  0.734  0.559 |
| level of Educational  unable to read and write  Primary education  Secondary education  Above secondary | 32  82  119  213 | 81  97  107  114 | 6.8 (3.9, 11.9)  2.2 (1.5, 3.2)  1.7 (1.2, 2.3)  1 | 0.0001  0.0001  0.003 | 3.8 (2.1, 6.8)  2.1 (1.3, 3.4)  1.7 (1.1, 2.6)  1 | **0.0001**  **0.002**  **0.013** |
| Average Monthly Income  < 5000 ETB  5000 - 9999 ETB  10000 -14999 ETB  ≥15000 ETB | 271  136  25  14 | 231  118  42  8 | 3.1 (1.2, 7.8)  2.2 (0.8, 5.5)  3.8 (1.4, 10.7)  1 | 0.014  0.101  0.01 | 1.9 (0.7, 5.3)  2.1 (0.8, 5.9)  4.2 (1.4, 13.2)  1 | 0.16  0.145  **0.013** |
| Family size  < 5  5 - 9  ≥ 10 | 342  102  2 | 248  136  15 | 1  1.7 (1.3, 2.4)  6.9 (1.6, 30) | 0.001  0.01 | 1  1.8 (1.3, 2.4)  8.9 (1.9, 43) | **0.001**  **0.006** |

Note: Bold\*, p-value <0.05 significant

Abbreviation: COR, Crude odds ratio; CI, Confidence interval; AOR, Adjusted odds ratio

# Discussion

This study is the first survey in the eastern part of Ethiopia, Harari Region State, as far as our knowledge, that aimed to assess the public's level of knowledge, attitude, and practice towards the COVID-19 recommended preventive measure as well as to assess the determinant factors among the general population. The comparison of our study with the findings reported from Sidama, Southern Ethiopia; Washing a hand, using a face mask, avoiding touching the face, and staying at home were 68.7%, 82.2%, 55.4%, and 46%, respectively. Whereas the findings in Sidama reported that washing their hands, using a face mask, avoiding touching their faces, and staying at home were 96%, 67.1%, 29.6%, and 80.9%, respectively[15]. This discrepancy might be due to the difference in sample population and sample size.

In our finding the level of knowledge toward Covid-19 prevention measure among Harar population was 75.1% of them had a good knowledge. This is higher than the studies conducted in different parts of Ethiopia; 70.7% in Dire Dawa [16], 60.7% in Gondar[17], 60.5% in southern Ethiopia[18], 45.89% in North East Ethiopia[19], but this is lower than the studies conducted in Uganda[20] and China[21], 83.9% and 85.2%, respectively. The reason for this discrepancy could be due to a difference in the source population, sample population, and access to technologies.

Our study revealed that, only 43.7% of the participants had positive attitude toward Covid-19 prevention measure. This is higher than 34.1%, study conducted in Gondar, Norther Ethiopia, but lower than studies conducted in Tigray, Ethiopia[22], Uganda[20], and China[21] which reported 55.6%, 72.4% and 92.9%, respectively. The reason for this discrepancy could be due to differences in source population, sample population, measurement variation, and access to information and technologies.

Of the total participants, nearly half, 52.8%, of them had a good level of practice toward Covid-19 Prevention. This is higher than studies reported from different parts of Ethiopia, 15.6%, 40.7%, and 47.5%, in Gondar, Dire Dawa, and Tigray, respectively. but lower than the reports from studies conducted in Ethiopia, Sidama[15] and Addis Ababa[23]; China[21], and Uganda[20], 55.4%, 59.8%, 84.4%, and 85.3%, respectively. The reason for this discrepancy could be due to differences in source population, sample population, measurement variation, and access to information and technologies.

Occupational status of the participants was significantly associated with level of knowledge toward Covid-19 prevention. House wife were 8 time more likely to have a good knowledge level toward Covid-19 prevention measure as compared with drivers. This is consistent with the study conducted in Uganda[24]

Participant educational level was significantly associated with level of knowledge toward Covid-19 prevention measure. Those participants who are unable to read and write and those with primary education were 9 and 2 times more likely to have good knowledge towards Covid-19 prevention measures than participants who attended above secondary school, respectively. This is consistent with other similar study conducted in Dessie, South East Ethiopian[19], but our finding was contradictory to the study conducted in Tigray which indicated having no formal education was significantly associated with lower knowledge toward Covid-19 prevention measures[25]. This difference could be due to differences in sample size, sample populations, and measurement tools.

This study revealed novel determinants of attitude toward the Covid-19 prevention measure. That is, individuals unable to read and write and those with primary education were 5 and 1.7 times more likely to have a positive attitude toward the measure than those who attended above secondary school, respectively. This might be due to the overconfidence developed by educated people in the study area. Civil servants were 2 times more likely to have a positive attitude toward COVID-19 prevention measures than drivers. Individuals living in < 5 family size were 83% less likely to a have positive attitude than those who live in ≥10 family size. Individuals with < 5000 ETB average monthly income were 3 times more likely to have positive attitude toward Covid-19 prevention measure than those who had ≥ 15000 ETB average monthly income. These factors, which have shown a significant association with the level of attitude toward Covid-19 prevention measure in our study, have not been reported in other similar studies.

In this study, married individuals were 5 times more likely to have good practice than those who are separated. This is consistent with study conducted in Dire Dawa[16]. This could be due to married individuals may feel more responsible to have good prevention practice in order to protect their families.

In our study, people who are unable to read and write were 3 times more likely to have good practice toward Covid-19 prevention than those who are above secondary school. This finding was inconsistent with studies from Gondar[17] and Tigray[22], which reported that people with above secondary school are more likely to have good practice than those who are unable to read and write. This difference could be due to difference in the sample population and sample size. The other possible reason could be that people with higher education even though they have better knowledge about Covid-19 infection, may feel inappropriately overconfident and neglect to apply recommended Covid-19 prevention practices.

In this study, family size was found to be significantly associated with Covid-19 prevention measures, which has not been reported in other similar studies. People with ≥ 10 family members were 8 times more likely to have good practice towards Covid-19 prevention than those with < 5 family members. This could be due to the fact that the more family members the more they feel responsible for protecting their family from the Covid-19 infection and compelled to adhere to recommended Covid-19 prevention practices.

# Conclusion

Overall, there is a high level of knowledge and a medium level of attitude and practice toward Covid-19 recommended prevention measures.

Being a housewife, unable to read and write, and having a primary education were found to be significantly associated with a good level of knowledge toward Covid-19 prevention measures. People unable to read and write, being civil servants, and having < 5000 ETB monthly income, were found to have a positive association with attitude towards the recommended Covid-19 prevention measures, and having < 5 family members was negatively associated with the attitude toward Covid-19 prevention measures. Marital status, level of education, monthly income and family size were found to be significantly associated with practice toward Covid-19 recommended prevention measures.

Repeated tailored information using different medias should be provided to the community regarding Covid-19 prevention methos. Existing Covid-19 prevention efforts should be strengthened and evaluated to improve community preventive practices.

**Limitation of the study**

The study used a cross-sectional study design. Therefore, there is a temporal issue.

**Abbreviations**

CDC, Communicable Disease Control; IHREC, Institutional Health Research Ethics Committee; FMoH, Federal Ministry of Health; MERS, Middle East Respiratory Syndrome; SARS, Severe Acute Respiratory Syndrome; SARS Cov-2, Severe Acute Respiratory Syndrome Corona-virus 2; SPSS, Statistical Package for Social Science; WHO, World Health Organization

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**Disclosure**

**Ethics approval**

Ethical Approval letter was obtained from Harar Health Science College IHREC with reference no. IHREC 02/596/01/02/14 and informed consent was obtained from participants before collecting data. Confidentiality of all information had been maintained.

**Consent to participate**

Not applicable

**Consent for publication**

Not applicable

**Data availability**

Any time, the corresponding author provides an additional resource on request.

**Conflict of interests**

The authors declare that they have no conflict of interests.

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**Author contributions**

AA, MY and AD participated in the study from inception to design, acquisition of data, analysis, and interpretation of the results. KM, DF, AT, AGL and YA participated in methods, analysis, interpretation and writing manuscript of the results.

**Reference**

1. Union, A., *WHAT YOU SHOULD KNOW ABOUT THE 2019 NOVEL CORONAVIRUS DISEASE*, in *Safegaurding African Health*, A. CDC, Editor. 2020.

2. WHO, *Coronavirus disease 2019 (COVID-19) Situation Report – 94*. 2020.

3. Patrick GT Walker, C.W., Oliver Watson et al., *The Global Impact of COVID-19 and Strategies for Mitigation and Suppression.* Imperial College COVID-19 Response Team, 2020.

4. Aaron, K., *Coronavirus cause: Origin and how it spreads*, in *MedicalNewsToday*. 2020, Medical News Today NewsLetter.

5. Africa, W. *First case of COVID-19 confirmed in Ethiopia*. 2020 [cited 2021 15 May]; Available from: <https://www.afro.who.int/news/first-case-covid-19-confirmed-ethiopia>

6. WHO. *WHO Coronavirus (COVID-19) Dashboard* 2021 [cited 2021 September 4]; Available from: <https://covid19.who.int/>

7. WHO. *WHO Coronavirus (COVID-19) Dashboard*. 2021 [cited 2021 September 4]; Available from: <https://covid19.who.int/region/afro/country/et>

8. Baye, K., *COVID-19 prevention measures in Ethiopia: Current realities and prospects.* International Food Policy Research Institute (IFPRI), 2020(ESSP Working Paper 141).

9. Emre, A. *Steps taken by countries in fighting COVID-19 pandemic*. 2020; Available from: [https://www.aa.com.tr/en/health/steps-taken-by-countries-in-fighting-covid-19-pandemic/1812009#](https://www.aa.com.tr/en/health/steps-taken-by-countries-in-fighting-covid-19-pandemic/1812009)

10. Zikargae, M.H., *COVID-19 in Ethiopia: Assessment of How the Ethiopian Government has Executed Administrative Actions and Managed Risk Communications and Community Engagement.* Risk management and healthcare policy, 2020. **13**: p. 2803-2810.

11. Güner, R., I. Hasanoğlu, and F. Aktaş, *COVID-19: Prevention and control measures in community.* Turkish journal of medical sciences, 2020. **50**(SI-1): p. 571-577.

12. Al-Hanawi, M.K., et al., *Knowledge, attitude and practice toward COVID-19 among the public in the Kingdom of Saudi Arabia: a cross-sectional study.* Frontiers in public health, 2020. **8**: p. 217.

13. WHO. *Coronavirus disease (COVID-19) advice for the public | Protect yourself and others from COVID-19*. 2021 2 September, 2021 [cited 2021 September 17]; Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>.

14. CDC. *How to Protect Yourself & Others*. 2021 August 13, 2021 [cited 2021 September 17]; Available from: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>

15. Yoseph, A., A. Tamiso, and A. Ejeso, *Knowledge, attitudes, and practices related to COVID-19 pandemic among adult population in Sidama Regional State, Southern Ethiopia: A community based cross-sectional study.* PLoS One, 2021. **16**(1): p. e0246283.

16. Amsalu, B., et al., *Practice of COVID-19 Prevention Measures and Associated Factors Among Residents of Dire Dawa City, Eastern Ethiopia: Community-Based Study.* J Multidiscip Healthc, 2021. **14**: p. 219-228.

17. Asmelash, D., et al., *Knowledge, Attitudes and Practices Toward Prevention and Early Detection of COVID-19 and Associated Factors Among Religious Clerics and Traditional Healers in Gondar Town, Northwest Ethiopia: A Community-Based Study.* Risk Manag Healthc Policy, 2020. **13**: p. 2239-2250.

18. Aweke, Z., et al., *Knowledge of COVID-19 and its prevention among residents of the Gedeo zone, South Ethiopia. Sources of information as a factor.* Curr Med Res Opin, 2020. **36**(12): p. 1955-1960.

19. Kassa, A.M., et al., *Knowledge level and factors influencing prevention of COVID-19 pandemic among residents of Dessie and Kombolcha City administrations, North-East Ethiopia: a population-based cross-sectional study.* BMJ open, 2020. **10**(11): p. e044202-e044202.

20. Ssebuufu, R., et al., *Awareness, knowledge, attitude and practice towards measures for prevention of the spread of COVID-19 in the Ugandans: A nationwide online cross-sectional Survey.* medRxiv, 2020: p. 2020.05.05.20092247.

21. Yang, K., et al., *Knowledge, attitude and practice of residents in the prevention and control of COVID‐19: An online questionnaire survey.* Journal of advanced nursing, 2021. **77**(4): p. 1839-1855.

22. Adhena, G. and H.D. Hidru, *Knowledge, Attitude, and Practice of High-Risk Age Groups to Coronavirus Disease-19 Prevention and Control in Korem District, Tigray, Ethiopia: Cross-Sectional Study.* Infect Drug Resist, 2020. **13**: p. 3801-3809.

23. Desalegn, Z., et al., *COVID-19 and the public response: Knowledge, attitude and practice of the public in mitigating the pandemic in Addis Ababa, Ethiopia.* PLoS One, 2021. **16**(1): p. e0244780.

24. Ssebuufu, R., et al., *Knowledge, Attitude, and Self-Reported Practice Toward Measures for Prevention of the Spread of COVID-19 Among Ugandans: A Nationwide Online Cross-Sectional Survey.* Frontiers in Public Health, 2020. **8**(890).

25. Adhena, G. and H.D. Hidru, *Knowledge, Attitude, and Practice of High-Risk Age Groups to Coronavirus Disease-19 Prevention and Control in Korem District, Tigray, Ethiopia: Cross-Sectional Study.* Infection and drug resistance, 2020. **13**: p. 3801-3809.