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## Knowledge, Attitude, and Practices towards COVID-19 and associated factors among adult hospital Visitors in South Gondar Zone Hospitals, Northwest Ethiopia --Manuscript Draft--

<b>Manuscript Number:</b>	PONE-D-20-36453R1
<b>Article Type:</b>	Research Article
<b>Full Title:</b>	Knowledge, Attitude, and Practices towards COVID-19 and associated factors among adult hospital Visitors in South Gondar Zone Hospitals, Northwest Ethiopia
<b>Short Title:</b>	Knowledge, Attitude, and Practices towards COVID-19 and associated factors among adult hospital Visitors
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<b>Keywords:</b>	Knowledge, attitude, practice, associated factors, COVID-19, Ethiopia
<b>Abstract:</b>	<p><b>Background</b></p> <p>Coronavirus disease 2019 is currently the critical health problem of the globe, including Ethiopia. Visitors of healthcare facilities are the high-risk groups due to the presence of suspected and confirmed cases of coronavirus 2019 in healthcare setting. Increasing the knowledge, attitude and practices towards COVID-19 prevention among hospitals visitors are very important to prevent transmissions of the pandemic despite lack of evidence remains a challenge in Ethiopia. Therefore, this study was designed to investigate the status of knowledge, attitude, and practice towards COVID-19 and associated factors among hospital visitors in South Gondar Zone Hospitals, Northwest Ethiopia.</p> <p><b>Methods</b></p> <p>A facility-based cross-sectional study design was employed during August 1 to 30, 2020 from randomly selected 404 hospital visitors in South Gondar Zone Hospitals, northwest Ethiopia. Data was collected using interviewer administered questionnaire. The outcome of this study was good or poor knowledge, positive or negative attitude and good or poor practice towards COVID-19. A binary logistic regression model with 95% CI (Confidence interval) was used for data analysis. Bivariable analysis with (COR [crude odds ratio]) and multivariable analysis (AOR [adjusted odds ratio]) was used during data analysis. From the bivariable analysis, variables with a p-value &lt; 0.25 were retained into the multivariable logistic regression analysis. From the multivariable logistic regression analysis, variables with a significance level of p-value &lt; 0.05 were taken as factors independently associated with knowledge, attitude and practices towards COVID-19.</p> <p><b>Main findings</b></p> <p>About 69.3% of the respondents had good knowledge, 62.6% had positive attitude, and 49.3% had good practice towards the prevention of COVID-19. We found that factors significantly associated with good knowledge about COVID-19 were educational status who can read and write (AOR=2.78; 95%CI: 1.18, 6.56) and college and above (AOR=6.15; 95%CI: 2.18-17.40), and use of social media (AOR=2.96; 95%CI: 1.46, 6.01). Furthermore, factors significantly associated with positive attitude towards COVID-19 includes presence of chronic illnesses (AOR=5.00; 95%CI: 1.71-14.67), training on COVID-19 (AOR=3.91; 95%CI: 1.96-7.70), and peer/family as a source of information (AOR=2.45; 95%CI: 1.06-5.63). Being a student (AOR=7.70; 95%CI: 1.15-15.86) and participants who had a good knowledge on COVID-19 (AOR=4.49; 95%CI: 2.41-8.39) were factors significantly associated with good practice towards COVID-19.</p> <p><b>Conclusion</b></p> <p>We conclude that the status of knowledge, attitude and practice towards COVID-19 prevention was not satisfactory. Factors significantly associated with good knowledge were educational status who can read and write and college and above and use of social media. Factors significantly associated with positive attitude include presence of chronic illnesses, training on COVID-19, and peer/family as a source of information.</p>

	<p>Being a student and participants who had a good knowledge were factors significantly associated with good practice towards COVID-19. Hence, intervention strategies such as health education and infection prevention and control that could improve the knowledge, attitude and practice status towards COVID-19 preventions are urgently needed to control the transmission of COVID-19.</p>
<p><b>Order of Authors:</b></p>	<p>Gete Berihun, MSc  Zebader Walle Belete  Awoke Keleb  Ayechew Ademas  Leykun Berhanu  Masresha Abebe  Adinew Gizeyatu  Seada Hassen  Daniel Teshome  Mistir Lingerew  Alelgne Feleke  Tarikuwa Natnael  Metadel Adane</p>
<p><b>Response to Reviewers:</b></p>	<p>Date: March 12 2021  Manuscript ID: PONE-D-20-36453R1  Preventive Practice and Associated Factors towards COVID-19 among Medical Visitors in Hospitals of South Gondar Zone, Northwest Ethiopia  Corresponding authors: Gete Berihun (MSc)</p> <p>Dear Dr, Francesco Di Gennaro (PhD)  Academic Editor  PLOS ONE</p> <p>Thank you for your letter dated January 27, 2021 with a decision of major revision needed. We were pleased to know that our manuscript was considered potentially acceptable for publication in PLoS ONE, subject to adequate revision as requested by the reviewers, academic editors and the journals. Based on the instructions provided in your letter, we uploaded the file of the rebuttal letter; the marked up copy of the revised manuscript highlighting the changes made in the original submitted version and the clean copy of the revised manuscript.</p> <p>We have revised the manuscript by modifying the abstract, introduction, methods, results, discussion and other sections, based on the comments made by the reviewers and using the journal guidelines. Therefore, we have marked in red color all the changes made during the revision process. Appended to this letter is our point-by-point response (rebuttal letter) to the comments made by the reviewers.</p> <p>We have agreed with almost all the comments and questions raised by the reviewers and academic editors. We also provided justification for those comments and questions for disagreeing. We would like to take this opportunity to express our thanks to the reviewers for their valuable comments and to thank you for allowing us to resubmit a revision of the manuscript.</p> <p>I hope that the revised manuscript is accepted for publication in PLoS ONE.</p> <p>Sincerely yours,  Gete Berihun (Wollo University)  Response to the Journal Requirements Questions  Response to editor</p> <p>Question #1 Please ensure that your manuscript meets PLOS ONE's style requirements, including those for file naming.</p> <p>Response: Thank you for this remark. We re-formatted the revised manuscript using the PLoS ONE format guidelines. The whole content of the manuscript, including the abstract, introduction, methods, discussion and reference are formatted using the guidelines (Please see the revised version for each section).</p>

Question #2. Data availability  
Response. We have attached the data on the supplementary information

Question #3. Please amend either the title on the online submission form (via Edit Submission) or the title in the manuscript so that they are identical.  
Response: Thank you for your comment. We made the title identical on the online submission and the title in the manuscript.

Question #4. Please amend either the abstract on the online submission form (via Edit Submission) or the abstract in the manuscript so that they are identical.  
Response: Thank you for your comment and we did it accordingly.

Question #5. Your ethics statement should only appear in the Methods section of your manuscript. If your ethics statement is written in any section besides the Methods, please move it to the Methods section and delete it from any other section. Please ensure that your ethics statement is included in your manuscript, as the ethics statement entered into the online submission form will not be published alongside your manuscript.  
Response: Thank you. We did it.

Question #6. We note that you have included a table to which you do not refer in the text of your manuscript. Please ensure that you refer to Table 2 in your text; if accepted, production will need this reference to link the reader to the Table.  
Response: We have accepted the comments and hence the text written in Table 1 is changed in to Table 2.  
Response to reviewer 1

Question #1. What is the difference between patient and visitors in your study?  
Response: Sorry for the confusion about the two terms. We understand that we used the two terms interchangeably and now we updated the manuscript by hospital visitors. the patient is all persons who came to health care facilities for medical treatment. But visitors are any persons who came to the health care facilities for different purposes including seeking of medical treatment. Therefore, to avoid confusion we used visitors since the study was done on visitors, not only to patients (see the revised version).

Question #2. The document has not page number please incorporate  
Response: Based on your comment, we gave the page number accordingly. Thank you.

Question # 3. Some sentences are incomplete which need intensive editing.  
Response: We tried to assess errors like incomplete sentence, grammatical and language error from title up to discussion of the manuscript. As a result, the amendment was done accordingly in the revised version of the manuscript.

Questions #4. In the abstract section please add space between 'of' and 'south' as 'To assess COVID-19 preventive practice and associated factors among visitors in 30 hospitals of South Gondar Zone, Northwest Ethiopia.  
Response: Thank you for your comment. We made a correction in the revised manuscript.

Question #5. In abstract section, "The questionnaire was pre-tested in 5% of the final sample size to establish the validity of the data collection instrument. The data were collected using face-to-face interviews by considering physical distancing and wearing of face masks. The data was entered in Epi-data version 3.1 and exported to Statistical Package for Social Science (SPSS) Version 25 for analysis." It is better delete and replace by tool of outcome variable measurement.  
Response: Based on your comment we removed less important points from the abstract and amendment was done accordingly (see the revised new version of the manuscript).

Question #6. In abstract section, Bi-variate Crude Odd Ration (COR) with 95% confidence intervals (CI) and p-values of less than 0.25 were applied to select candidate variables for multi-variable analysis. Then, multi-variable Adjusted Odd Ratio (AOR) using binary logistic regression analysis at a p-value of less than 0.05 at 95% CI was shall be rephrased.  
Response: Thank you for this key comment, we revised accordingly and please see the data analysis in page 9 and 10.

Question #7. In the abstract section, (AOR=2.96; 95% CI: 1.46, 6.01) were significantly associated with knowledge of COVID-1.' This is incomplete and does not give sense. It is better rewrite it again.  
Response: We have accepted your comment hence this sentence rewritten as ...were associated significantly with visitors' knowledge towards the prevention of COVID-19 (Please see the revised version of the abstract).

Question #8. In abstract section, the conclusion did not in line the finding. Please

conclude according to the finding.  
 Response: We have accepted your comment. The conclusion was amended based on the finding of the study (see the revised version of the manuscript).

Question #9. In Methods and Materials section, the patient flow data were estimated by reviewing the patients' logbook in the last three months and the average number of the patient for a month was calculated to determine the interval. Then, we used a systematic random sampling technique to select study participants of the study'. This paragraph is not clear. How to reach to apply systematic random sampling technique? What is the sampling frame? Is your study population are patients or patients attendance or any visitor of the hospital?

Response: We found that our way of writing was confusing. Sorry for the mistakes. After selecting the two hospitals randomly out of the 8 hospitals, we proportionally allocated sample size based on total estimated visitors of hospitals in the last three months. Then, 303 sample size was allocated for Debre Tabor general hospitals and 117 for Mekane Eyesus hospitals. Then hospitals visitors flow data during the previous 3 months in emergency ward, surgical ward, medical ward, gynecology/obstetrics ward and pediatrics ward considered for sample size allocation for each hospitals departments. Finally, randomly selection of visitors for each ward was selected until the allocated sample size was achieved (See the revised version in page 7.

Question #10. Under outcome and explanatory variables: please delete sensitive words like poor knowledge, attitude, and practice. It shall be replaced with 'favorable/unfavorable'

Response: We accepted your reflections, however, most studies used good/poor knowledge, positive and negative attitude and good/poor practice. We used these terms accordingly throughout the paper.

Question #11. Delete subtopic of 'operational definition.' This is already state in the outcome variables. Please avoid bolding words like 'good knowledge, poor knowledge, positive attitude, and Practice

Response: Thank you for your comment; we deleted subtopic of operational definition

Question#12. A pre-test was conducted using 5% (21) of the final sample size in the Andabet district to establish the validity of the questionnaire and amendment was made accordingly.' What type of amendment you made? Can you explain that amendment?

Response: The pre-test is aimed for amendment of measuring tool. Therefore, some of the amendments were arrangement, editing of unclear questions, and avoiding irrelevant questions.

Question 13. Under Statistical analysis: what is the different between bi- variate and multi-variable? What do you mean 'multi-variable'?

Response: Bivariate analysis refers one independent variable with outcome variables. However, multivariable means that more than one independent variables with the outcome variable. From the adjusted analysis, all variables that has a p-value less than 0.25 were included into the adjusted multivariable analysis to control confounders. In our study, in the case of this study we used bivariable and multivariable analysis. Furthermore, the word bivariate analysis was changed to bivariable analysis throughout the manuscript.

Question#14. Result section, use one of result presentation. Almost all tables are explained in the text. Please follow rule of text and table presentation together.

Response: Based on your comments we reduced more than half of the explanation. As a result, only pertinent finding of the study was explained (Please see all result section).

Question #15. In result section, similarly, 283 (70%) of the respondents knew that COVID-19 can be transmitted from one person to another even in the absence of COVID-19 (Table 1).' Table 1 presents socio-demographic characteristics of the participants but not knowledge of participants. Please cite the table appropriately.

Response: We made a correction accordingly (See the revised version of the manuscript).

Question #16. The finding of the study revealed seven out of ten 280 (69.3%) respondents had good knowledge towards COVID-19 while 253 (62.6%) had a positive attitude towards COVID-19. The finding of the study showed the pillar of prevention practice was much lower and only half 199(49.3%) of the participants had a score of good prevention practice of COVID-19 (Figure 1).' This paragraph is not clear.

Response: This idea is rewritten as'...280 (69.3% of study participants had favorable knowledge towards COVID-19 prevention. '... almost half of the study participants 119

(49.3%) are practiced the recommended COVID-19 prevention methods.'

Question #17. In result section, the finding revealed that those who can read and write were 2.78 times more likely to have good knowledge than those who can't read and write is not clear and should be re-write.

Response: We have rewritten as "The finding revealed that those who can read and write were 2.78 times more likely to have good knowledge towards COVID-19 prevention methods than those who can't read and write".

Question #18. In discussion section, this discrepancy 274 might be due to Spatio-temporal variation.' This is not a justifiable reason to the knowledge people towards novel coronal virus discrepancy of between Ethiopia and Egyptian population. Please search another justification of this discrepancy.

Response: Based on comment we tried to elaborate better justification for variation in this study with the finding of other researches conducted in different parts of the world.

Question #19. In discussion section, this deviation may be due to the change in the study population (health care professionals vs. general population) and residents of the study population. This makes confuse reader please rephrase again

Response: This idea is rewritten as" the deviation may be due to the difference in the study subjects. In the present study, the study subjects were visitors of Hospitals while the study conducted in Egypt were only health care professionals.

Response to reviewer 2

Question #1. The outcome variable and the title is not congruent. If your outcome variables are knowledge, attitude and practice towards COVID -19 prevention, your title should be modified to KAP of visitors towards COVID-19 prevention. Otherwise, if your title is focused only practice and associated factor, you have to include knowledge and attitude as part of associated factor, rather than the outcome variable.

Response: Based on the comment, we tried to make the title in line with its outcome variable. Therefore the title is modified in to KAP of visitors towards COVID-19 prevention while the outcome variables of the study are Knowledge, attitude, and practice towards COVID-19 prevention

Response to reviewer 3

Question #1. Result and discussion part 1. Please use software modeling for clear elaboration the topic of CVID 19 Examples OLS Model, add other better software

Response: We have already used logistic regression analysis using crude odds ratio (COR) and adjusted odds ratio (AOR) for determining the associated factors with the outcome variables. Associations between independent variables and knowledge, attitudes and practices towards COVID-19 were determined using a binary logistic regression model at 95% CI (Confidence interval). We used three different logistic regression models: The first model (Model 1) identified factors associated with good knowledge about COVID-19, the second model (Model II) identified factors associated with favorable attitudes and the third model (Model III) identified factors associated factors with good preventive practices towards COVID-19. For each model, bivariable analysis with (COR [crude odds ratio]) and multivariable analysis (AOR [adjusted odds ratio]) was used.

From the bivariable analysis, variables with a p-value <0.25 were retained into the multivariable logistic regression analysis. From the multivariable analysis of each model, variables with a significance level of p-value <0.05 were taken as factors independently associated with knowledge, attitude and practices towards COVID-19. The presence of multicollinearity among independent variables was checked using standard error at the cutoff value of 2 and we found that a maximum standard error of 0.97, which indicated no multi-collinearity. Model fitness was checked using the Hosmer-Lemeshow test for Model I, Model II and Model III and found a p-value of 0.650, 0.871 and 0.913, respectively and indicated that all models were fit. We hope that the data analysis we used above is very sufficient to our study, which we could able to explain the result and discussion as we did it.

Question #2. Adding Images as possible

Response: We have 7 Tables and including more Figure is repeating of the result of the Table in another forms.

Question #3. Edit grammatical error and other

Response: This comment was also raised by other reviewers. We tried to revise of grammar, language, and punctuation errors starting from the title of the manuscript up to discussion (see the revised version of the manuscript). We appreciate your comment.

Response to reviewer 4

Question #1. What does medical visitor mean? is that for only visiting the medical

ward? if not, it is better to say among visitors.  
Response: The study subjects all visitors of the health care facilities. So that, the title is modified to Knowledge, Attitude, and Practices towards COVID-19 and associated factors among hospital Visitors in South Gondar Zone Hospitals, Northwest Ethiopia

\Question #2. In the background section, please also include information on preventive practices of COVID-19.

Response: The title of the revised is modified to Knowledge, Attitude, and Practices towards COVID-19 and associated factors among hospital Visitors in South Gondar Zone Hospitals, Northwest Ethiopia. Therefore the emphasis is given not only for prevention measures but also for knowledge and attitude towards prevention of COVID-19. But in the revised manuscript, we elaborate detail COVID-19 prevention measures.

Question #3. Replace the word "face-to-face administered" by "interviewer administered"

Response: The phrase "face-to-face administered" is replaced by "interviewer administered". (See the revised version of the manuscript).

Question #4. Please include the confidence intervals for these percentages with 95% CI.

Response: Knowledge, attitude, and practice of respondents are presented in the result and discussion section of the revised manuscript. According to this study, 69.3% (95%CI;65.1-73.8%) had a favorable knowledge, 62.6% (95%CI;57.2-67.6) had a favorable attitude, and 49.3%(95%CI;) had a favorable practice towards the prevention of COVID-19.

Question #5. If you did the associations for knowledge, attitude and practice of visitors towards COVID- 19 prevention, please rewrite your title as knowledge, attitude and practice of hospital visitors towards COVID-19 prevention....

Response: We have accepted your comment and the title was modified accordingly.

Question #6. Bivariate analysis refers two paired data sets/with two outcome variables. But your study has single outcome so, better to use bivariable.

Response: The word bivariate analysis was replaced by bivariable analysis throughout the revised version of the manuscript.

Question #7. Where does your pretest conducted and what are the psychomotor properties of that pretest? Particularly state clearly in your methods section, than the abstract.

Response: the pretest was conducted in other districts hospital visitors (andabet hospital) other than the study area. The psychomotor domains of the pretest are reliability and validity.

Question #8. How the response rate becomes 95.7%, if you use interviewer administered questionnaire?

Response: As we know the response rate of interviewer administered questionnaire is higher than self-administered once. But in the case of our study, the study subjects were visitors of health care facilities who came for different activities including medical treatments. The non-response rate of the study participants means that those study participants who are unable to provide data due to shortage of time, unwillingness to be part of the study and etc.

Question #9. Most paragraphs emphasized what COVID -19 entails and may be considered as too lengthy. Introduction should follow a structured and sequential order while capturing relevant information to be included in this section. What are the current issues about COVID -19 prevention? Some of these points were included in one of your paragraphs. What are the quantifiable effect/issue around the points identified on COVID- 19 prevention? Based on the earlier identified issues about COVID-19 prevention, what are the points to be addressed in your study? What is the rationale for the study? and lastly what is the aim of the study?

Response: We thank you for this key comment. Based on your comment we tried to shorten the introduction part. Furthermore we point out the current issues of COVID-19 prevention measures, earlier identified COVID-19 prevention measures, points to be addressed, rational of the study and finally aims of the study are explained in the revised version of the manuscript (See the updated manuscript).

Question #10. If you exclude individuals whose age is <18 years , it is better to modify your title as ... among adult visitors... otherwise, why you exclude these groups?

Response: Based on your comment we modified the title as to only adult visitors.

Question #11. You stated the total population of South Gondar Zone. However, it is better to state the average number of monthly visitors to hospitals within the zone because you are aiming to study visitors...

Response: we tried to modify this point method section particularly in study design, setting, and period of the revised version of the manuscript.

Question #12. If these are your outcome variables, your title should be revised as KAP (knowledge, attitude, and practice of visitors towards COVID-19 prevention...) otherwise use practice as your outcome variable and use knowledge, attitude, socio-demographic.... as your independent variables. Doing research without knowing the variables is meaningless.

Response: The title of the manuscript are modified in to KAP of adult visitors towards prevention of COVID- 19 to make in line with the outcome variable of favorable/ unfavorable knowledge, attitude, and practice towards prevention of COVID-19.

Question #13. Sampling procedure is not clear

Response: Sorry for the confusion. We rewrite the sampling procedure in a more clear manner. After selecting the two hospitals randomly out of the 8 hospitals, we proportionally allocated sample size based on total estimated visitors of hospitals in the last three months. Then, 303 sample size was allocated for Debre Tabor general hospitals and 117 for Mekane Eyesus hospitals. Then hospitals visitors flow data during the previous 3 months in emergency ward, surgical ward, medical ward, gynecology/obstetrics ward and pediatrics ward considered for sample size allocation for each hospitals departments. Finally, randomly selection of visitors for each ward was selected until the allocated sample size achieved.

Question #14. Attitude measurement is not clear. What does 26.4 (80%) score mean? is that the mean or median score of the overall attitude score?

Response: The attitude of the participants was measured using 11 items based three measurement scales with agree (3 points), neutral (2 points), and disagree (1 point). As a result the score varied from 11 to 33. Therefore, respondents with a mean score of  $\geq 27$  (80%) were considered as having a favorable attitude towards the prevention of COVID-19.

Question #15. Conducting of pre-test and keeping of the recommended physical distances should be considered as parts of ethical consideration rather than data collection.

Response: Based on the comment we moved the statement of keeping recommended physical distance during data collection to ethical consideration from method section (Please see the ethical consideration section).

Question #16. Is it feasible to conduct double data entry?

Response: We have written in a different term what we did, which is wrong. Thank you for your commitment in brining such errors for correction. We mean that and what we did was data entry was re-checked for 10% of the sample size in order to control data entry errors of the entered data and data cleaning was carried before statistical analysis. Thank you so much.

Question#17. The overall knowledge of the respondents should also be stated in figures, percentages using 95% CI based on the operational definitions stated in the methods section.

Response: Based on the operational definition, the knowledge of the respondents' was presented using figures and percentages with 95%CI. Therefore, about 280 (69.3%) (CI; 65.1-73.8) of the participants had a good knowledge towards prevention of COVID-19.

Question #18. Your sample size is 422. However, you collect from 404 participants alone. Why? None response rate is rare in interviewer administered/ face to face questionnaire. Why this discrepancy arises?

Response: The response rate of the study was 95.7%. The response rate of interviewer administered questionnaire is higher than self-administered once. But in the case of our study, the study subjects were visitors of health care facilities who came for different activities including medical treatments. The non-response rate of the study participants means that those study participants who are unable to provide data due to shortage of time, unwillingness to be part of the study and etc. Since the study subjects were all visitors of the healthcare facilities who came for different activities including medical treatment. Therefore they withdraw from the interview for different personal reasons which made the non-response rate higher than the expected one. Of course

	<p>the 95.% response rate is good for such type of study.</p> <p>Question #19. The heading of Status of Knowledge, attitude, and preventive practice of COVID-19. It is better to avoid this title and write in their own parts as I comments above. Response: Based on your comment we omitted this subheading and the contents were written in their own parts accordingly.</p> <p>Question #20. Predictor is used for more advanced studies like cohort study. In this cross - sectional study, it is better to say associated factors. Response: Yes, this is excellent idea too. The word predictor is replaced by associated factors throughout the revised version of the manuscript.</p> <p>Question #21. Discuss only your pertinent findings like knowledge, attitude, and practice rather than discussing on sources of information towards COVID-19. Response: Thank you very much for your comment. We tried to discuss only the pertinent finding of knowledge, attitude, and practices towards prevention of COVID-19. As a result, other less important points like sources of information are removed in the revised version of the manuscript.</p> <p>Question #22. Why your justification becomes similar throughout your discussion? Please give reasonable justifications for each Response: We tried to write specific justification for each variation in the finding of this study with other study finding</p> <p>Question #23. Conclude based on your objective. Please also include the major factors affecting practice in the conclusion section. Finally, your recommendations should be based on your results. Does it mean, there is no problem on knowledge and attitude? Please rewrite it Response: In the original version of the manuscript our emphasis was only on prevention practice of COVID-19 rather than knowledge and attitude of visitors towards COVID-19 prevention measures. But now the title is modified in to knowledge, attitude, and practice. Therefore the conclusion is amended according to finding of the study. (See the revised version of the manuscript.</p> <p>Question #24. Avoid variables which contain a confidence interval of 1 in binary logistic regression. Response: All variables in logistic analysis which contains a confidence interval of 1 are excluded</p> <p>: Question #25. Check the figure digits Response: We have accepted the comment and all figure digits are presented with two digit value</p> <p>I hope that the revised manuscript is accepted for publication in PLoS ONE.</p> <p>Sincerely yours,</p> <p>Gete Berihun</p> <p>Department of Environmental Health Wollo University Dessie, Ethiopia.</p>
<b>Additional Information:</b>	
<b>Question</b>	<b>Response</b>
<p><b>Financial Disclosure</b></p> <p>Enter a financial disclosure statement that describes the sources of funding for the work included in this submission. Review the <a href="#">submission guidelines</a> for detailed requirements. View published research articles from <a href="#">PLOS ONE</a> for specific</p>	<p>The author(s) received no specific funding for this work</p>



examples.

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General guidance is provided below. Consult the [submission guidelines](#) for detailed instructions. **Make sure that all information entered here is included in the Methods section of the manuscript.**

The study was approved by the ethical review committee of Debre Tabor University. Permission to conduct the study was obtained from the respective hospital managers of the study site. Before the data collection, the purpose of the study was explained and verbal consent was obtained from each participant. Individuals who were volunteer to participate in the study were also told as they have the right to withdraw from the study at any stage of the interview. The confidentiality of the study participants was ensured by avoiding possible identifiers. Data collectors wear a facemask and keep a physical distancing of two feet. Facemask was provided for the study participants who did not wear during the data collection.

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- Include an approval number if one was obtained
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**Data Availability**

Authors are required to make all data underlying the findings described fully available, without restriction, and from the time of publication. PLOS allows rare exceptions to address legal and ethical concerns. See the [PLOS Data Policy](#) and [FAQ](#) for detailed information.

Yes - all data are fully available without restriction

A Data Availability Statement describing where the data can be found is required at submission. Your answers to this question constitute the Data Availability Statement and **will be published in the article**, if accepted.

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All relevant data are within the manuscript and its Supporting Information files.

<p><i>and contact information or URL).</i></p> <ul style="list-style-type: none"><li>• This text is appropriate if the data are owned by a third party and authors do not have permission to share the data.</li></ul> <p>* typeset</p>	
Additional data availability information:	

1 **Knowledge, Attitude, and Practices towards COVID-19 and**  
2 **associated factors among adult hospital Visitors in South**  
3 **Gondar Zone Hospitals, Northwest Ethiopia**

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13

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16

17

18

19

## 20 **Abstract**

### 21 **Background**

22

23 Coronavirus disease 2019 is currently the critical health problem of the globe, including  
24 Ethiopia. Visitors of healthcare facilities are the high-risk groups due to the presence of  
25 suspected and confirmed cases of coronavirus 2019 in healthcare setting. Increasing the  
26 knowledge, attitude and practices towards COVID-19 prevention among hospitals visitors are  
27 very important to prevent transmissions of the pandemic despite lack of evidence remains a  
28 challenge in Ethiopia. Therefore, this study was designed to investigate the status of knowledge,  
29 attitude, and practice towards COVID-19 and associated factors among hospital visitors in South  
30 Gondar Zone Hospitals, Northwest Ethiopia.

### 31 **Methods**

32

33 A facility-based cross-sectional study design was employed during August 1 to 30, 2020 from  
34 randomly selected 404 hospital visitors in South Gondar Zone Hospitals, northwest Ethiopia.  
35 Data was collected using interviewer administered questionnaire. The outcome of this study  
36 was good or poor knowledge, positive or negative attitude and good or poor practice towards  
37 COVID-19. A binary logistic regression model with 95% CI (Confidence interval) was used for  
38 data analysis. Bivariable analysis with (COR [crude odds ratio]) and multivariable analysis  
39 (AOR [adjusted odds ratio]) was used during data analysis. From the bivariable analysis,  
40 variables with a  $p$ -value  $<0.25$  were retained into the multivariable logistic regression analysis.  
41 From the multivariable logistic regression analysis, variables with a significance level of  $p$ -value  
42  $<0.05$  were taken as factors independently associated with knowledge, attitude and practices  
43 towards COVID-19.

## 44 **Main findings**

45 About 69.3% of the respondents had good knowledge, 62.6% had positive attitude, and 49.3%  
46 had good practice towards the prevention of COVID-19. We found that factors significantly  
47 associated with good knowledge about COVID-19 were educational status who can read and  
48 write (AOR=2.78; 95%CI: 1.18, 6.56) and college and above (AOR=6.15; 95%CI: 2.18-17.40),  
49 and use of social media (AOR=2.96; 95%CI: 1.46, 6.01). Furthermore, factors significantly  
50 associated with positive attitude towards COVID-19 includes presence of chronic illnesses  
51 (AOR=5.00; 95%CI; 1.71-14.67), training on COVID-19 (AOR=3.91; 95%CI: 1.96-7.70), and  
52 peer/family as a source of information (AOR=2.45; 95%CI: 1.06-5.63). Being a student  
53 (AOR=7.70; 95%CI: 1.15-15.86) and participants who had a good knowledge on COVID-19  
54 (AOR=4.49; 95%CI: 2.41-8.39) were factors significantly associated with good practice towards  
55 COVID-19.

## 56 **Conclusion**

57  
58 We conclude that the status of knowledge, attitude and practice towards COVID-19 prevention  
59 was not satisfactory. Factors significantly associated with good knowledge were educational  
60 status who can read and write and college and above and use of social media. Factors  
61 significantly associated with positive attitude include presence of chronic illnesses, training on  
62 COVID-19, and peer/family as a source of information. Being a student and participants who had  
63 a good knowledge were factors significantly associated with good practice towards COVID-19.  
64 Hence, intervention strategies such as health education and infection prevention and control that  
65 could improve the knowledge, attitude and practice status towards COVID-19 preventions are  
66 urgently needed to control the transmission of COVID-19.

67 **Keywords: Knowledge, attitude, practice, associated factors, COVID-19, Ethiopia**



## 68 **Introduction**

69 Corona virus 2019 (COVID-19) is a rapidly emerging pandemic respiratory disease caused by a  
70 novel Coronavirus of Severe Acute Respiratory Syndrome (SARS/COV-2). The disease was  
71 reported initially in Wuhan city, Hubei Province, China at the end of December 2019 (1–3).  
72 Later on, World Health Organization (WHO) announces the disease as a public health  
73 emergency of international concern at the end of January 2020 and then declared as a global  
74 pandemic on March 11 (4–6). Two days later, the government of Ethiopia reported the first  
75 confirmed case of COVID-19 (7,8).

76 COVID-19 transmits mainly through droplets, airborne transmission, and contact between  
77 humans (6,9–11). The major sign and symptoms of COVID-19 cases are fever, dry cough,  
78 fatigue, myalgia, shortness of breath, and dyspnoea (4–6). The Severe cases of the disease may  
79 lead to the developments of cardiac injury, respiratory failure, acute respiratory distress  
80 syndrome, and death. Elders and patients with chronic medical illnesses like hypertension,  
81 cardiac disease, lung disease, cancer, or diabetes have been identified as potential risk factors for  
82 disease severity and mortality (6,11).

83 According to the Worldometer report, as of October 6, 2020, 9:54 am, COVID-19 spreads to  
84 more than 214 countries across the world. Worldwide, a total of 35,707,844 confirmed cases  
85 were reported. Of them, 26,907,997 were recovered and 1,049,700 were died of the pandemic  
86 (12). In case of Ethiopia, 79,437 confirmed cases of COVID-19 were reported. Of this, 1,230 and  
87 34,016 were died and recovered, respectively (13).

88

89 Due to the absence of cure (6,11) prevention is recommended as the only strategy to prevent  
90 the spread of COVID-19. Different COVID-19 prevention measures are implemented such as  
91 respiratory hygiene, hand washing, social distancing, use of Personal Protective Equipment  
92 (PPE), and environmental disinfection (6,15–18). WHO designed different guidelines and online  
93 training sessions to increase the awareness of the community towards the prevention of the  
94 pandemic (19).But still, there is a deficiency of information mainly for vulnerable groups (6,18).

95 The government of Ethiopia has also implemented different prevention measures. Later on, the  
96 country declares and enforces a state of emergency for about six months since March 2020 But  
97 most populations of Ethiopia perceived that as the disease was eliminated since the termination  
98 of a state of emergency. Therefore, prevention measures towards COVID-19 are becoming  
99 neglected from time to time. Healthcare facilities are one the vulnerable area for transmission of  
100 COVID-19.As a result, visitors of healthcare facilities are one of the victim groups of population  
101 for COVID-19 due to close contact with suspected and confirmed cases of the disease. Even  
102 though many researchers were conducted on KAP towards prevention of COVID-19, there is  
103 limited evidence on KAP of healthcare facility visitors. Therefore, assessing knowledge, attitude,  
104 and practice are important measures for identifying gaps and taking of intervention accordingly.  
105 (4). Therefore, the study was designed to assess knowledge, attitude, and practice of adult  
106 visitors towards COVID-19 Prevention in South Gondar Zone Hospitals, Northwest Ethiopia.

## 107 **Methods and materials**

### 108 **Study design, period, and setting**

109 A health facility-based cross-sectional study design was applied among hospital visitors in South  
110 Gondar Zone Hospitals, Northwest Ethiopia during August 1 to 30, 2020. South Gondar zone is  
111 one of the 13 administrative zones in the Amhara regional state of Ethiopia. Debre Tabor is its  
112 capital town which is located at 597 km and 105 km from Addis Ababa and Bahir Dar,  
113 respectively. According to the population projection of 2014, the total population of the study  
114 area was 2,364,603 of which 1,196,318 were males while 1,168,285 were females (population  
115 projection 2014).

116  
117 In South Gondar, there are one general hospital found in Debre Tabor Town and seven district  
118 government hospitals found in Addis Zemen, Mekane Eyesus, Andabet, Ebnat, Lay Gayint, Tach  
119 Gayint, and Smada towns. In addition, there are 98 government health centers, and 76 private  
120 clinics in South Gondar Zone (23). According to the reports of hospitals in South Gondar Zone,  
121 the average monthly visitors during COVID-19 were 13,440.

### 122 123 **Source and study population**

124 All hospital visitors whose age 18 years and above in South Gondar Zone Hospitals were the  
125 source population, whereas the study populations were those randomly selected study  
126 participants from the two randomly selected hospitals (Debre Tabor and Mekane Eyesus). Those  
127 study participants whose age below 18 years were excluded.

## 128 **Sample size estimation and sampling methods**

129 The sample size was determined using the single population proportion formula by taking the  
130 following assumptions.

$$131 \quad n = \frac{(z_{\alpha/2})^2 * p(1 - p)}{d^2}$$

132  $Z_{\alpha/2}$  is the standard normal variable value at  $(1-\alpha)\%$  confidence level ( $\alpha$  is 0.05 with 95% CI,  $Z_{\alpha/2}$   
133 = 1.96), an estimate of the proportion of knowledge attitude and practice, was considered as 50%  
134 as there was no similar studies conducted and 5% margin of error was considered. The sample  
135 size became 384 and after considering of 10% non-response rates, the adequate sample final  
136 sample size becomes 422.

137 After selecting the two hospitals randomly out of the 8 hospitals, we proportionally allocated  
138 sample size based on total estimated visitors of hospitals in the last three months. Then, 303  
139 sample size was allocated for Debre Tabor general hospitals and 117 for Mekane Eyesus  
140 hospitals. Then hospitals visitors flow data during the previous 3 months in emergency ward,  
141 surgical ward, medical ward, gynecology/obstetrics ward and pediatrics ward considered for  
142 sample size allocation for each hospitals departments. Finally, randomly selection of visitors for  
143 each ward was selected until the allocated sample size achieved.

## 144 **Outcome variable measurement**

145 The outcome variable was good or poor knowledge, positive or negative attitude and good or  
146 poor practice towards COVID-19.

147 **Good or poor knowledge:** Knowledge was measured by using 15 questions consisting of signs  
148 and symptoms, risk groups and prognosis, method of transmission, and /preventive methods.  
149 Each question was consisted of as ‘Yes’, ‘No’, and ‘I do not know’ options. Respondents who  
150 answered correctly were given 1 point while others were given 0 points. The total knowledge  
151 score ranges from 0-15 and a cut-off level of  $\geq 12$  (80% and above) was considered as good  
152 knowledge while  $<12$  (80%) was considered as poor knowledge towards COVID-19 prevention  
153 (24).

154 **Positive or negative attitude:** Attitude was measured by using 11 items and the response was  
155 categorized based on 3 scale measurements with agree (3 points), neutral (2 points), and disagree  
156 (1 point). The score of attitude varied from 11 to 33, with an overall score of  $\geq 27$  (81.8%) was  
157 considered as a positive attitude, whereas a score of less than 27 (81.8%) was considered as  
158 negative attitude towards COVID-19 prevention (27).

159 **Good or poor practice:** The practice was measured using 10 items and those who respond as  
160 yes were given 1 point while no was marked as 0. The total prevention practice score ranges  
161 from 0-10 and a score with a cut-off  $\geq 8$  (80%) was considered as good practice while  $<8$  was  
162 taken as a poor practice (25,26).

## 163 **Data collection and quality assurance**

164 Data were collected using a pre-tested structured questionnaire which was adapted from  
165 published articles in reputable journals and from WHO COVID-19 guidelines (28–33). The  
166 questionnaire consists of five sections including; part I: socio-demographic characteristics of the  
167 participants; part II; Pre-existing medical condition and sources of information towards COVID-  
168 19; part III: knowledge of the participants; part IV: Attitude of the participants; and part V:

169 Prevention practice of COVID-19. The tool was prepared in the English version and translated to  
170 Amharic version (local language), and re-translated back to English to ensure consistency. The  
171 tool was pre-tested using 5% of the final sample size in Andabet district hospital visitors to  
172 establish the validity of the questionnaire. Based on the pre-test, appropriate amendments such as  
173 order arrangement of questions, editing of unclear questions, and avoiding irrelevant questions  
174 were done accordingly.

175  
176 The data was collected using interviewer administered method using four BSc nurse  
177 professionals and supervised by two Public Health experts. Two days of training was given for  
178 data collectors and supervisors on the overall aim of the study, contents of the tool and ethical  
179 issues. Supervision was carried out on daily basis, and appropriate corrections of the collected  
180 data were done accordingly. Furthermore, double data entry was done to control data entry errors  
181 and data cleaning was carried before statistical analysis. The reliability coefficient of Cronbach's  
182 alpha was 0.76 which is an acceptable range.

### 183 **Statistical analysis**

184 Data was entered into EpiData version 4.6 and exported to the Statistical Package of the Social  
185 Science (SPSS) version 25.0 for data cleaning analysis. Descriptive statistic such as frequencies  
186 and percentages were calculated for categorical variables and mean with standard deviations for  
187 continuous variables to examine the overall distribution.

188 Associations between independent variables and knowledge, attitudes and practices towards  
189 COVID-19 were determined using a binary logistic regression model at 95% CI (Confidence  
190 interval). We used three different logistic regression models: The first model (Model 1)  
191 identified factors associated with good knowledge about COVID-19, the second model (Model

192 II) identified factors associated with favorable attitudes and the third model (Model III)  
193 identified factors associated factors with good preventive practices towards COVID-19. For each  
194 model, bivariable analysis with (COR [crude odds ratio]) and multivariable analysis (AOR  
195 [adjusted odds ratio]) was used.

196 From the bivariable analysis, variables with a  $p$ -value  $<0.25$  were retained into the multivariable  
197 logistic regression analysis. From the multivariable analysis of each model, variables with a  
198 significance level of  $p$ -value  $<0.05$  were taken as factors independently associated with  
199 knowledge, attitude and practices towards COVID-19. The presence of multicollinearity among  
200 independent variables was checked using standard error at the cutoff value of 2 and we found  
201 that a maximum standard error of 0.97, which indicated no multi-collinearity. Model fitness was  
202 checked using the Hosmer-Lemeshow test for Model I, Model II and Model III and found a  $p$ -  
203 value of 0.650, 0.871 and 0.913, respectively and indicated that all models were fit.

204

## 205 **Ethics approval and consent to participate**

206 The study was approved by the ethical review committee of Debre Tabor University. Permission  
207 to conduct the study was obtained from the respective hospital managers of the study site. Before  
208 the data collection, the purpose of the study was explained and verbal consent was obtained from  
209 each participant. Individuals who were volunteer to participate in the study were also told as they  
210 have the right to withdraw from the study at any stage of the interview. The confidentiality of the  
211 study participants was ensured by avoiding possible identifiers. Data collectors wear a facemask  
212 and keep a physical distancing of two feet. Facemask was provided for the study participants  
213 who did not wear during the data collection.

## 214 **Result**

### 215 **Socio-demographic characteristics of hospital visitors**

216  
217 A total of 404 visitors participated in the study with a response rate of 95.7%. Nearly two-thirds  
218 242 (59.7%) of the study participants were females and about one-fifth 92 (22.8%) of the the  
219 hospital visitors were in the age range of 30-39 years. Furthermore, 66 (16.3%), 68(16.8%), and  
220 117(29.0%) of the respondents can't read and write, farmers, and live in rural areas respectively.  
221 Finally, 56 (13.9%) of the participants had either or more chronic medical illness history (Table  
222 1).

### 223 **Knowledge of hospital visitors towards COVID-19 prevention**

224  
225 More than two-thirds 280 (69.3%; 95%CI; 65.1-73.8%) of the visitors had a good knowledge,  
226 whereas 124 (30.7%; 95%CI: 27.2-34.9%) of them had poor knowledge about COVID-19.  
227 Almost all 388 (96.0%) of the participants heard about COVID-19 and more than three-fourths  
228 322 (79.7%) of the participants knew as COVID-19 is a viral disease and 339 (83.9%) of them  
229 knew the major sign and symptoms of COVID-19 cases. Furthermore, more than three-fourth  
230 320 (79.2%) of the participants knew that elders, those who had a chronic medical illness, and  
231 being obese are more likely to have severe cases of COVID-19. Similarly, 283 (70.0%) of the  
232 respondents knew that COVID-19 can be transmitted from one person to another even in the  
233 absence of COVID-19 (Table 2).

### 234 **Attitude of hospital visitors towards COVID-19 prevention**

235  
236 About two-thirds 62.6% (95%CI;57.2-67.6%) of the hospital visitors had a positive attitude  
237 towards COVID-19 prevention, whereas 37.4% (95%CI: 32.4-42.8%) had negative attitude



238 towards COVID-19 prevention. About half 203 (50.2%) of the participants agree that the black  
239 race is not protective against COVID-19. Similarly, less than half 180 (44.6%) of the participants  
240 agreed that Ethiopia is in a good position to contain the spread of the COVID-19. About two-  
241 thirds 274 (67.8%) of the participants believed COVID-19 do not cause stigma. More than half  
242 221(54.7%) of the respondents agree that they can get infected with COVID-19 if they contacted  
243 infected patients despite their good immunity. On the other hand, 55 (13.6%) of the respondents  
244 believed that COVID-19 has occurred as a result of our sin (Table 3).

### 245 **Preventive practice of visitors towards COVID-19 prevention** 246

247 Half of the respondents 199 (49.3%) practiced the recommended COVID-19 prevention  
248 methods. Majority 378 (93.6%) of the participants washed their hands with water and soap for at  
249 least 20 seconds. Furthermore, almost nine out of ten respondents avoid handshaking practice for  
250 prevention of COVID-19. But a relatively lower number of 338 (83.7%) participants used  
251 facemasks when they leave their home and 333 (82.4%) practiced respiratory hygiene while  
252 coughing and sneezing. Furthermore less than half 177(43.8%) participants applied keeping of  
253 the recommended physical distance for prevention of COVID-19. Staying at home was also  
254 another challenge and only less than one-third 121(30%) of the participants applied it (Table 4).

255

256

257

258 **Factors Associated with Knowledge, Attitude, and practice towards**  
259 **COVID-19 from multivariable analysis**

260  
261 A multi-variable analysis from the first model indicated that educational status and use of social  
262 media as a source of information were statistically significant with the knowledge of COVID-19.  
263 The finding revealed that those who can read and write were 2.78 times more likely to have good  
264 knowledge towards COVID-19 prevention methods than those who could not read and write.  
265 Similarly, participants who have college and above educational level were 6.15 (AOR = 6.15;  
266 95%CI: 2.18-17.40) times more likely to have good knowledge than those who could not read  
267 and write. Furthermore, participants who used social media as a source of information towards  
268 COVID-19 was 2.96 (AOR = 2.96; 95%CI: 1.46-6.01) times more likely to have good  
269 knowledge than those who did not use social media (Table 5).

270 A multi-variable analysis from the second model revealed that those who had primary education  
271 were 6.49 (AOR = 6.49; 95%CI: 1.52-27.78) times more likely to have a positive attitude than  
272 those who could not read and write while being college and above graduated were 6.91 (AOR =  
273 6.91; 95%CI: 2.58-14.5) times more likely to have a positive attitude than the corresponding  
274 reference group. Furthermore, visitors who had chronic medical illnesses were 5 times (AOR =  
275 5; 95%CI: 1.71-14.67) more likely to have a positive attitude than those who did not have a  
276 chronic illness. Furthermore, participants who took training on COVID-19 prevention were 3.9  
277 (AOR = 3.9; 95%CI: 1.96-7.70) times more likely to have a positive attitude than those who  
278 didn't take the training. Additionally, participants who used peer as a source of information  
279 towards COVID-19 prevention were 2.45 (AOR = 2.45; 1.06-5.63) times more likely to have a

280 positive attitude than those who didn't use peers as a source of information for COVID-19  
281 prevention (Table 6).

282 From multivariable analysis of model three, we found that being a student was 7.7 times (AOR  
283 = 7.7; 95%CI: 1.15-51.86) more likely to have a good practices than farmers. Furthermore,  
284 participants who had good knowledge were 4.49 (AOR = 4.49; 95%CI: 2.41-8.39) times more  
285 likely to have a good practice about COVID-19 prevention than those who poor knowledge  
286 (Table 7).

## 287 **Discussion**

288 The pandemic of COVID-19 is still the critical concern of the globe including our country  
289 Ethiopia. But up to date, there is no confirmed treatment for the pandemic. Therefore prevention  
290 is the single most important method of alleviating the spread of COVID-19 pandemic.

291 In this finding, about 81.67% of the knowledge questions were correctly replied to by the  
292 respondents. This finding was in line with the study conducted in Saudi Arabia (80.5%) (4) and  
293 in Nigeria (77.36) (35). The finding of this study was lower than the study conducted in China  
294 (90%) (36). This discrepancy may be due to variation in the study population's characteristics,  
295 government commitment, and health care system. On the contrary, this study result was higher  
296 than in the Egyptian population (71.26%) (37). This discrepancy might be due to the variation in  
297 socio-demographic characteristics of the population.

298 The finding of this study revealed that 69.3 % (CI; 65.1-73.8) of the participants had good  
299 knowledge towards COVID-19 prevention which was in line with the study conducted in India  
300 (70 %) (38). On the other hand, this study finding was lower than a multicenter study conducted  
301 among health care workers in Ethiopia with 88.2% (16) and Nigerian residents in an urban

302 setting (99.7%) (39). This deviation may be due to variations in socio-demographic  
303 characteristics of the study population and sources of information towards COVID-19.

304 This study also revealed that about 80% of participants knew that the elderly, those who had  
305 chronic medical illnesses, and obese are more likely to develop severe cases of COVID-19. This  
306 finding was slightly higher than the study conducted in Ethiopia (72.5%) (11). This variation  
307 may be due to the change in study period, socio-demographic characteristics of the study  
308 population, and coverage of awareness creation towards COVID-19 prevention. Even though  
309 children and young adults are vulnerable groups, only 83.4% of the participants knew that these  
310 groups need to take preventive measures towards COVID-19. Neglecting such types of the  
311 population may wide-spreading the transmission of the pandemic (11).

312 Regarding the attitudes, 62.6% (95% CI; 57.2-67.6) of respondents had a positive attitude  
313 towards COVID-19 prevention which was lower than the study conducted in Ethiopia (94.7%)  
314 (16), Nigeria 79.5% (39), and Pakistan (82.16%) (40). This discrepancy may be due to a change  
315 in the socio-demographic characteristics of the study population, government commitment  
316 towards COVID-19. On the other hand, less than half (44.6%) of the participants believed that  
317 the government of Ethiopia can control the spread of COVID-19 within a short time. This  
318 finding was lower than the study conducted in china 97.1% (24) and India at 87.2% (41). This  
319 deviation may be due to the variation in the quality of the health care system, socio-demographic  
320 characteristics of the study population, and government preparedness towards the control of  
321 COVID-19 pandemic. According to the WHO report, the government of Ethiopia scored 52%  
322 towards COVID-19 preparedness response (21) which supports the finding of this study.  
323 Furthermore, this study also indicated that almost two-thirds of the respondents believed that the  
324 pandemic of COVID-19 leads to the development of social stigma which was lower than a study

325 conducted in Ethiopia at 77% (16) and 83.8% (11). This deviation may be due to differences in  
326 socio-demographic characteristics of the study population and study period. On the contrary, this  
327 study finding was higher than the study conducted in the Peruvian population 59.1% (42). This  
328 variation may be due to a change in the socio-demographic characteristics of the study  
329 population, study period, awareness creation towards COVID-19, and the burden of the  
330 pandemic. The social stigma may be developed due to fear of its mortality and high  
331 communicability. The history of social stigma due to pandemic was not a new phenomenon  
332 (43,44).

333 Regarding the prevention practice of COVID-19, the overall practice score of the respondents  
334 was 73.2% which was higher than the study conducted in Ethiopia (26). The finding of this study  
335 revealed that only half of the respondents 49.3% had a positive preventive practice of COVID-  
336 19. The finding of this study was lower than other studies conducted in Ethiopia (16,26) and  
337 China (45). This variation may be due to the change in the study setting, socio-demographic  
338 characteristics of the study population, and occupation of the study participant (being a health  
339 professional vs. general population), and the commitment of the government towards the  
340 prevention of COVID-19. Furthermore, most of the participants 93.6% washed their hands with  
341 water and soap for at least 20 seconds which was in line with a study conducted in Nigeria  
342 96.4% (39). On the contrary, this finding was lower than a study conducted in Nigeria 87.9 %  
343 (35). This deviation may be to a change in access and utilization of handwashing facilities in  
344 health care facilities.

345 Furthermore, 83.7% of the participants used face masks for prevention of COVID-19 which were  
346 consistent with the study conducted in Nigeria 84.4% (35), and 82.3% (39). This finding also  
347 revealed that less than half (43.8%) of the respondents applied the recommended physical

348 distance of 2 meter when they go to public crowded areas. This finding was lower than the study  
349 conducted in Nigeria 83% (35) and 92.7%, (39). This variation may be due to a change in the  
350 socio-demographic characteristic of the study population, the burden of the disease, awareness of  
351 the community towards the COVID-19 pandemic, and population way of life.

352 The finding also revealed that more than two-thirds 70% of the respondents avoid going to  
353 crowded places after the emergence of COVID-19 which was higher than the finding in Nigeria  
354 58.9% (35). in addition to this, 82.4% of the respondents practiced respiratory hygiene which  
355 was lower than the finding in India (97.7%) (46). The variation might be due to a change in a  
356 study setting, heterogeneity of population perception of the community, knowledge towards  
357 COVID-19, and burden of confirmed COVID-19 cases. Above all, the most common problem  
358 which was not applied by the participants was staying at home and only less than one-third  
359 (30%) after the occurrence of COVID-19. The possible justification for this might be due to the  
360 uncontrolled of the pandemic for a long period of time, poor preparedness of the community  
361 towards the pandemic, and subsistence way of life of the community.

## 362 **Conclusion**

363 We conclude that the status of knowledge, attitude and practice towards COVID-19 prevention  
364 was not satisfactory. Factors significantly associated with good knowledge about COVID-19  
365 were educational status who can read and write and college and above and use of social media.  
366 Factors significantly associated with positive attitude towards COVID-19 include presence of  
367 chronic illnesses, training on COVID-19, and peer/family as a source of information. Being a  
368 student and participants who had a good knowledge on COVID-19 were factors significantly  
369 associated with good practice towards COVID-19. Hence, intervention strategies that could

370 improve the knowledge, attitude and practice status towards COVID-19 preventions are urgently  
371 needed to control the transmission of COVID-19. Health education about COVID-19 infection  
372 prevention and control methods and advocacy about COVID-19 recommended prevention using  
373 various media channels are highly recommended. Therefore, hospital administrators should work  
374 in collaboration with other concerned stakeholders to enhance knowledge, attitude, and practice  
375 of hospital visitors to wards COVID-19 prevention.

376

## 377 **Abbreviations**

378 COVID-19: Coronavirus disease 2019; AOR: Adjusted Odds Ratio; CI: Confidence Interval;  
379 COR: Crude Odds Ratio; PPE: Personal Protective Equipment; SARAS\_COV-1: Severe Acute  
380 Respiratory Syndrome- Corona Virus-1; SARS-COV-2: Severe Acute Respiratory Syndrome-  
381 Corona Virus-2

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529 **Table 1: Socio-demographic characteristics of adult visitors in hospitals of South Gondar**  
530 **zone Northwestern Ethiopia, August 1 to 30, 2020**

<b>Variable</b>	<b>Category</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Sex	Male	163	40.3
	Female	241	59.7
Age(years)	<20	24	5.9
	20-29	92	22.8
	30-39	111	27.5
	40-49	94	23.3
	50-59	48	11.9
	≥60	35	8.7
Religion	Muslim	30	7.4
	Orthodox	331	81.9
	Protestant	43	10.6
Marital status	Single	83	20.5
	Married	295	73.1
	Divorced	26	6.5
Educational status	Cannot read and write	66	16.3
	Read and write	95	23.5
	Primary (1-8) grade	36	8.9
	Secondary (9-12) grade	29	7.2
	College and above	178	44.1
Occupation	Farmer	68	16.8
	Student	45	11.1
	Unemployed	55	13.6
	Government employer	129	31.9
	Private business worker	107	26.5
Resident	Urban	287	71.0
	Rural	117	29.0
Monthly income(ETB)	≤499	127	31.4
	500-2000	101	25
	≥2001	176	43.6
History of chronic medical illness	Yes	56	13.9
	No	348	86.1
Training on COVID 19	Yes	137	33.9
	No	267	64.1
Use social media	Yes	252	62.4
	No	152	37.6
Peer as a source of information of COVID19	Yes	345	85.4
	No	59	14.6
Use TV/radio as a source of information	Yes	321	79.5
	No	83	20.5
Use religious institution as source of information	Yes	130	32.2
	No	274	67.8

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532 **Table 2: Knowledge of hospital visitors towards COVID-19 prevention in hospitals of**  
 533 **South Gondar zone, Northwestern Ethiopia, August 1 to 30, 2020**

Item	Yes		No		I do not know	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Did you hear about COVID-19?	388	96.0	16	4.0		
COVID-19 is a viral disease.	322	79.7	40	9.9	42	10.4
The major sign and symptoms of COVID-19 are dry cough, fever, and shortness of breathing.	339	83.9	33	8.2	32	7.9
Runny nose and sneezing are less common symptoms of COVID-19.	275	68.1	88	21.8	41	10.1
Elder, those who have a chronic medical illness and obese are more likely to sever the case of COVID- 19.	320	79.2	57	14.1	27	6.7
Currently, there is no effective cure for COVID-19.	331	81.9	50	12.4	23	5.7
COVID-19 virus can spread via respiratory droplets.	375	92.8	29	7.2		
Eating and contacting wild animals would result COVID-19 infection	308	76.2	53	13.1	43	10.6
Persons with COVID 19 virus can transmit the virus to others when a fever is not present	283	70.0	71	17.6	50	12.4
Proper washing hand with soap and water is one method of preventing COVID-19.	375	92.8	18	4.5	11	2.7
Wearing general masks can prevent one from acquiring	354	87.6	35	8.7	15	3.7



infection by the COVID 19 virus						
Children and young adults must take measures to prevent the infection by Covid 19 virus	337	83.4	45	11.1	22	5.4
To prevent the infection by COVID 19 virus individuals should avoid going to crowded places such as bus parks and avoid public transportation	352	87.1	50	12.4	2	.5
People who have contact with someone infected with COVID 19 virus should be immediately isolated in a proper place in general the observation period is 14 days	273	67.6	95	23.5	36	8.9
Isolation and treatment of people who are infected with the COVID 19 virus are effective ways to reduce the spread of the virus	295	73.0	80	19.8	29	7.2

534 Mean± standard deviation = **12.25±2.45; Minimum = 2 and maximum = 15**

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**Table 3:-Attitude of adult visitors towards COVID-19 prevention in hospitals of South Gondar zone, Northwest Ethiopia, August 1 to 30, 2020**

Questions	Agree	Neutral	Disagree
Black races are not protected from COVID 19 disease.	203(50.2%)	146(36.1%)	55(13.6%)
Wearing a well-fitting face mask are effective in preventing COVID 19 virus	268(66.3%)	81(20.0%)	55(13.6%)
Hand wash can prevent you from COVID 19 virus	321 79.5	77 19.1	6 1.5
Ethiopia is in a good position to contain COVID 19 virus	180 44.6	144 35.6	80 19.8
COVID 19 is not stigma and I should not hide my infection	274 67.8	90 22.3	40 9.9
If I get infected with COVID 19, I will go to the hospital as advised.	221 54.7	141 34.9	42 10.4
I can get infected with COVID 19 if I contacted an infected patient despite my good immunity.	230 56.9	100 24.8	74 18.3
COVID 19 is fatal	215 53.2	105 26.0	84 20.8
During the outbreak of COVID 19 eating well cooked and safely handled meat is safe.	249 61.6	96 23.8	59 14.6
COVID 19 patients should share their recent travel history with a health care provider.	256 63.4	85 21.0	63 15.6
Do you think that the cause of Covid-19 is not spiritual/ is it happened because of our sin?	262 64.9	87 21.5	55 13.6

548 \* Mean ±standard deviation = **27.11±4.08**; Minimum = **17**; Maximum = **33**

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554 **Table 4:-Preventive practice of adult visitors towards COVID-19 prevention in hospitals of**  
 555 **South Gondar zone, Northwest Ethiopia, August 1 to 30, 2020**

Questions	Yes		No	
	Frequency		Frequency	
	n	%	N	%
Do you avoid handshaking to prevent covid 19?	363	89.9	41	10.1
Have you washed your hands often with soap and water for at least 20 seconds especially after you have been in a public place or after blowing your nose, coughing, or sneezing?	378	93.6	26	6.4
If soap and water are not readily available, are you applying a hand sanitizer that contains at least 60% alcohol?	309	76.5	95	23.5
Do you wear face masks repeatedly when you leave your home?	338	83.7	66	16.3
Do you coughing and sneezing into the elbow or within clothing?	333	82.4	71	17.6
In recent days have you avoid going to any crowded place?	281	69.6	123	30.4
Do you avoid eating raw animal products to prevent the COVID 19 virus?	336	83.2	68	16.8
Do you avoid touching your mouth nose and eyes with unwashed hands?	323	80.0	81	20.0
Do you keep your self 2m away from the others when you got to the public area?	177	43.8	227	56.2
Do you stay at your home after the emergent of covid 19?	121	30.0	283	70.0
Mean $\pm$ standard deviation	<b>7.32<math>\pm</math>1.60</b>			
Minimum	<b>1.00</b>			
Maximum	<b>10</b>			

557 **Table 5:-Associated factors of knowledge towards COVID-19 prevention among adult**  
 558 **visitors in hospitals of South Gondar zone, Northwest Ethiopia, August 1 to 30, 2020**

Variable	Knowledge status		COR(95% CI)	AOR(95% CI)	P-value
	Good	Poor			
Age					
<20	12	12	1	1	
20-29	70	22	3.18(1.25-8.09)	1.98(0.54-7.29)	0.31
30-39	82	29	2.83(1.14-6.99)	1.08(0.30-3.87)	0.091
40-49	58	39	1.61(0.65-3.97)	1.06(0.31-3.68)	0.92
50-59	33	15	2.20(0.80-6.02)	1.21(0.30-4.82)	0.79
≥60	25	10	2.50(0.84-7.40)	0.69(0.16-2.95)	0.61
Marital status					
Single	61	22	1	1	
Married	205	90	0.82(0.48-1.42)	0.88(0.42-1.82)	0.72
Divorced	14	12	0.42(0.17-1.05)	0.92(0.29-2.98)	0.89
<b>Education</b>					
cannot read and write	25	41	1	1	
Read and write	54	41	2.16(1.14-4.12)	<b>2.78(1.18-6.56)*</b>	<b>0.02*</b>
Primary	26	10	4.26(1.76-10.31)	2.42(0.56-10.44)	0.24
Secondary	21	8	4.31(1.66-11.18)	1.54(0.25-9.56)	0.65
College and above	154	24	10.52(10.52-5.45)	<b>6.15(2.18-17.40)*</b>	<b>0.001*</b>
Occupation					
Farmer	23	45	1	1	
Student	33	12	5.38(2.35-12.34)	1.64(0.28-9.72)	0.59
Currently unemployed	38	17	4.37(2.04-9.36)	1.50(0.49-4.58)	0.48
Gov't worker	111	18	12.07(5.95-24.48)	0.83(0.16-4.19)	0.82
Private business	75	32	4.59(2.39-8.80)	0.91(0.25-3.30)	0.89
Resident					

Urban	216	71	2.52(1.60-3.96)	1.43(0.75-2.71)	0.281
Rural	64	53	1	1	
Monthly income					
<499	73	54	1	1	
500-2000	67	34	1.46(0.85-2.51)	1.272(0.52-3.09)	0.600
>2000	140	36	2.88(1.73-4.78)	1.29(0.46-3.60)	0.630
Training					
Yes	113	24	2.82(1.70-4.67)	1.74(0.89-3.42)	0.110
No	167	100	1	1	
Use social media					
Yes	204	48	4.25(2.72-6.65)	<b>2.96(1.46-6.01)*</b>	<b>0.003*</b>
No	76	76	1	1	
Peer					
Yes	252	93	3.00(1.71-5.27)	1.09(0.48-2.51)	0.840
No	28	31	1	1	
TV/radio					
Yes	243	78	3.87(2.34-6.40)	1.07(0.43-2.65)	0.88
No	37	46	1	1	
Religious institution					
Yes	98	32	1.55(0.97-2.48)	0.93(0.50-1.73)	0.83
No	182	92	1	1	

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567 **Table 6:-Associated factors of attitude towards COVID-19 prevention among adult visitors**  
 568 **in hospitals of South Gondar zone, Northwest Ethiopia, in August 1 to 30, 2020**

Variable	Attitude		COR (95% CI)	AOR(95%CI )	P-value
	Positive	Negative			
Age					
<20	12	12	1	1	
20-29	57	35	1.63(0.66-4.02)	0.42(0.12-1.46)	0.17
30-39	66	45	1.47(0.61-3.56)	0.51(0.14-1.82)	0.30
40-49	57	37	1.54(0.63-3.79)	0.94(0.28-3.21)	0.93
50-59	32	16	2.00(0.74-5.44)	1.10(0.28-4.27)	0.89
≥60	29	6	4.83(1.47-15.87)	1.65(0.33-8.42)	0.55
Religion					
Muslim	25	5	3.27(1.05-10.20)	2.18(0.50-9.58)	0.30
Orthodox	202	129	1.02(0.53-1.96)	1.49(0.64-3.48)	0.36
Protestant	26	17	1	1	
<b>Education</b>					
cannot read and write	22	44	1	1	
Read and write	47	48	1.96(1.02-3.76)	2.39(0.99-5.79)	.053
Primary	27	9	6.00(2.41-14.93)	<b>6.49(1.52-27.78)*</b>	<b>0.012*</b>
secondary	21	8	5.25(2.01-13.74)	2.32(0.39-13.74)	.35
College and above	136	42	6.48(3.49-12.01)	<b>6.91(2.58-14.50)*</b>	<b>0.0001*</b>
Occupation					
Farmer	22	46	1	1	
Student	36	9	8.36(3.44-20.36)	1.87(0.33-10.72)	0.48
Currently unemployed	33	22	3.14(1.50-6.58)	0.54(0.18-1.68)	0.29
Gov't worker	105	24	9.15(4.66-17.96)	0.61(0.12-3.05)	0.55
Private business	57	50	2.38(1.26-4.50)	0.29(0.07-1.12)	0.07
Resident					
Urban	193	94	1.95(1.26-3.02)	1.23(0.66-2.23)	0.51
Rural	60	57	1	1	
Monthly income					
<499	72	55	1	1	
500-2000	61	40	1.17(0.69-1.98)	0.89(0.33-2.38)	0.82
>2000	120	56	1.64(1.02-2.63)	0.57(0.19-1.70)	0.31
History of chronic illness					
Yes	48	8	4.19(1.92-9.12)	<b>5.00(1.71-14.67)*</b>	<b>0.003*</b>
No	205	143	1	1	
Training					
Yes	113	24	4.27(2.59-7.05)	<b>3.9(1.96-7.70)*</b>	<b>0.0001*</b>

No	140	127	1	1	
Use social media					
Yes	179	73	2.59(1.70-3.93)	1.20(0.59-2.44)	0.63
No	74	78	1	1	
Peer					
Yes	231	114	3.41(1.92-60.5)	<b>2.45(1.06-5.63)*</b>	<b>0.04*</b>
No	22	37	1	1	
Tv/radio					
Yes	221	100	3.52(2.13-5.81)	2.091(0.85-5.16)	0.11
No	32	51	1	1	
Religious institution					
Yes	100	30	2.64(1.64-4.23)	1.725(0.93-3.21)	0.09
No	153	121	1	1	

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579 **Associated factors of COVID-19 preventive practice**

580 **Table 7: Associated factors of preventive practice towards COVID-19 prevention among**  
581 **adult visitors in hospitals of South Gondar zone, Northwest Ethiopia, in August 1 to 30,**  
582 **2020**

Variable	Practice status		COR (95% CI)	AOR (95% CI)	P-value
	Good	Poor			
<b>Age</b>					
<20	9	15	1	1	
20-29	48	44	1.82(0.72-4.57)	0.87(0.24-3.38)	0.84
30-39	49	62	1.32(0.53-3.26)	0.43(0.12-1.67)	0.22
40-49	41	53	1.29(0.51-3.24)	0.75(0.20-2.56)	0.67
50-59	27	21	2.14(0.79-5.85)	0.99(0.23-4.24)	0.98
≥60	25	10	4.17(1.38-12.58)	1.31(0.28-6.11)	0.73
<b>Education</b>					
cannot read and write	17	49	1	1	
Read and write	25	70	1.03(0.50-2.11)	0.93(0.36-2.43)	0.88
Primary	16	20	2.31(0.98-5.44)	0.39(0.08-1.80)	0.23
Secondary	17	12	4.08(1.62-10.27)	0.82(0.16-4.19)	0.82
College and above	124	54	6.62(3.50-12.52)	1.90(0.67-5.17)	0.21
<b>Occupation</b>					
Farmer	6	62	1	1	
Student	24	21	11.81(4.25-32.83)	<b>7.70(1.15-15.86)*</b>	<b>0.04*</b>
Currently unemployed	20	35	5.91(2.17-16.08)	2.35(0.58-9.57)	0.23
Gov't worker	93	36	26.70(10.62-67.12)	2.49(0.42-14.61)	0.31
Private business	56	51	11.35(4.52-28.47)	2.15(0.45-10.2)	0.34
<b>Resident</b>					
Urban	166	121	3.49(2.19-5.56)	1.54(0.79-3.00)	0.21
Rural	33	84	1	1	
<b>Monthly income</b>					
<499	39	88	1	1	
500-2000	50	51	2.21(1.29-3.81)	2.05(0.71-5.93)	0.19
>2000	110	66	3.76(2.32-6.12)	1.99(0.62-6.39)	0.25
<b>Training</b>					
Yes	86	51	2.30(1.51-3.51)	0.88(0.47-1.64)	0.68
No	113	154	1	1	
<b>Use social media</b>					
Yes	160	92	5.04(3.23-7.87)	1.54(0.76-3.10)	0.23
No	39	113	1	1	
<b>Peer</b>					
Yes	184	161	3.35(1.80-6.25)	0.78(0.31-1.97)	0.61
No	15	44	1	1	
<b>Tv/radio</b>					
Yes	185	136	6.70(3.62-12.41)	1.45(0.53-3.96)	0.46
No	14	69	1	1	
<b>Knowledge</b>					



Poor knowledge	22	102	1	1	
Good knowledge	177	103	7.97(4.73-13.41)	<b>4.49(2.41-8.39)*</b>	<b>0.0001*</b>
<b>attitude</b>					
Negative attitude	44	107	1	1	
Positive attitude	155	98	3.85(2.50-5.93)	1.04(0.58-1.86)	0.068

583 1, reference category

584

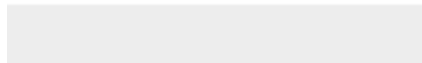
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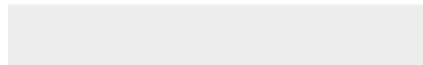




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**Supporting Information**

SI II Amharic Version of the Questionnaire.docx





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SI III. Data set.xlsx

1 **Knowledge, Attitude, and Practices towards COVID-19 and**  
2 **associated factors among adult hospital Visitors in South**  
3 **Gondar Zone Hospitals, Northwest Ethiopia**

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15 #Those authors contributed equally to this work

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21

## 22 **Abstract**

### 23 **Background**

24

25 Coronavirus disease 2019 is currently the critical health problem of the globe, including  
26 Ethiopia. Visitors of healthcare facilities are the high-risk groups due to the presence of  
27 suspected and confirmed cases of coronavirus 2019 in healthcare setting. Increasing the  
28 knowledge, attitude and practices towards COVID-19 prevention among hospitals visitors are  
29 very important to prevent transmissions of the pandemic despite lack of evidence remains a  
30 challenge in Ethiopia. Therefore, this study was designed to investigate the status of knowledge,  
31 attitude, and practice towards COVID-19 and associated factors among hospital visitors in South  
32 Gondar Zone Hospitals, Northwest Ethiopia.

### 33 **Methods**

34

35 A facility-based cross-sectional study design was employed ~~during~~<sup>from</sup> August 1 to 30, 2020 from  
36 randomly selected 404 hospital visitors in South Gondar Zone Hospitals, **northwest** Ethiopia.  
37 Data **was** collected using interviewer administered questionnaire. **The outcome of this study**  
38 **was good or poor knowledge, positive or negative attitude and good or poor practice towards**  
39 **COVID-19. A binary logistic regression model with 95% CI (Confidence interval) was used for**  
40 **data analysis. Bivariable analysis with (COR [crude odds ratio]) and multivariable analysis**  
41 **(AOR [adjusted odds ratio]) was used during data analysis. From the bivariable analysis,**  
42 **variables with a  $p$ -value  $<0.25$  were retained into the multivariable logistic regression analysis.**  
43 From the multivariable logistic regression analysis, variables with a significance level of  $p$ -value

44 <0.05 were taken as factors independently associated with knowledge, attitude and practices  
45 towards COVID-19.

## 46 **Main findings**

47 About 69.3% of the respondents had good knowledge, 62.6% had positive attitude, and 49.3%  
48 had good practice towards the prevention of COVID-19. We found that factors significantly  
49 associated with good knowledge about COVID-19 were educational status who can read and  
50 write (AOR=2.78; 95%CI: 1.18, 6.56) and college and above (AOR=6.15; 95%CI: 2.18-17.40),  
51 and use of social media (AOR=2.96; 95%CI: 1.46, 6.01). Furthermore, factors significantly  
52 associated with positive attitude towards COVID-19 includes presence of chronic illnesses  
53 (AOR=5.00; 95%CI; 1.71-14.67), training on COVID-19 (AOR=3.91; 95%CI: 1.96-7.70), and  
54 peer/family as a source of information (AOR=2.45; 95%CI: 1.06-5.63). Being a student  
55 (AOR=7.70; 95%CI: 1.15-15.86) and participants who had a good knowledge on COVID-19  
56 (AOR=4.49; 95%CI: 2.41-8.39) were factors significantly associated with good practice towards  
57 COVID-19.

## 58 **Conclusion**

59  
60 We conclude that the status of knowledge, attitude and practice towards COVID-19 prevention  
61 was not **satisfactory**. Factors significantly associated with good knowledge were educational  
62 status who can read and write and college and above and use of social media. Factors  
63 significantly associated with positive attitude include presence of chronic illnesses, training on  
64 COVID-19, and peer/family as a source of information. Being a student and participants who had  
65 a good knowledge were factors significantly associated with good practice towards COVID-19.  
66 Hence, intervention strategies such as health education and infection prevention and control that

67 could improve the knowledge, attitude and practice status towards COVID-19 preventions are  
68 urgently needed to control the transmission of COVID-19.

69 **Keywords: Knowledge, attitude, practice, associated factors, COVID-19, Ethiopia**

## 70 **Introduction**

71 Corona virus 2019 (COVID-19) is a rapidly emerging pandemic respiratory disease caused by a  
72 novel Coronavirus of Severe Acute Respiratory Syndrome (SARS/COV-2). The disease was  
73 reported initially in Wuhan city, Hubei Province, China at the end of December 2019 (1–3).  
74 Later on, World Health Organization (WHO) announces the disease as a public health  
75 emergency of international concern at the end of January 2020 and then declared as a global  
76 pandemic on March 11 (4–6). Two days later, the government of Ethiopia reported the first  
77 confirmed case of COVID-19 (7,8).

78 COVID-19 transmits mainly through droplets, airborne transmission, and contact between  
79 humans (6,9–11). The major sign and symptoms of COVID-19 cases are fever, dry cough,  
80 fatigue, myalgia, shortness of breath, and dyspnoea (4–6). The Severe cases of the disease may  
81 lead to the developments of cardiac injury, respiratory failure, acute respiratory distress  
82 syndrome, and death. Elders and patients with chronic medical illnesses like hypertension,  
83 cardiac disease, lung disease, cancer, or diabetes have been identified as potential risk factors for  
84 disease severity and mortality (6,11).

85 According to the Worldometer report, as of October 6, 2020, 9:54 am, COVID-19 spreads to  
86 more than 214 countries across the world. Worldwide, a total of 35,707,844 confirmed cases  
87 were reported. Of them, 26,907,997 were recovered and 1,049,700 were died of the pandemic



88 (12). In case of Ethiopia, 79,437 confirmed cases of COVID-19 were reported. Of this, 1,230 and  
89 34,016 were died and recovered, respectively (13).

90

91 Due to the absence of cure (6,11) prevention is recommended as the only strategy to prevent  
92 the spread of COVID-19. Different COVID-19 prevention measures are implemented such as  
93 respiratory hygiene, hand washing, social distancing, use of Personal Protective Equipment  
94 (PPE), and environmental disinfection (6,15–18). WHO designed different guidelines and online  
95 training sessions to increase the awareness of the community towards the prevention of the  
96 pandemic (19).But still, there is a deficiency of information mainly for vulnerable groups (6,18).

97 The government of Ethiopia has also implemented different prevention measures. Later on, the  
98 country declares and enforces a state of emergency for about six months since March 2020 But  
99 most populations of Ethiopia perceived that as the disease was eliminated since the termination  
100 of a state of emergency. Therefore, prevention measures towards COVID-19 are becoming  
101 neglected from time to time. Healthcare facilities are one the vulnerable area for transmission of  
102 COVID-19.As a result, visitors of healthcare facilities are one of the victim groups of population  
103 for COVID-19 due to close contact with suspected and confirmed cases of the disease. Even  
104 though many researchers were conducted on KAP towards prevention of COVID-19, there is  
105 limited evidence on KAP of healthcare facility visitors. Therefore, assessing knowledge, attitude,  
106 and practice are important measures for identifying gaps and taking of intervention accordingly.  
107 (4). Therefore, the study was designed to assess knowledge, attitude, and practice of adult  
108 visitors towards COVID-19 Prevention in South Gondar Zone Hospitals, Northwest Ethiopia.

## 109 **Methods and materials**

### 110 **Study design, period, and setting**

111 A ~~health~~ facility-based cross-sectional study design was applied among hospital visitors in South  
112 Gondar Zone Hospitals, Northwest Ethiopia ~~during~~ August 1 to 30, 2020. South Gondar zone is  
113 one of the 13 administrative zones in the Amhara regional state of Ethiopia. Debre Tabor is its  
114 capital town which is located at 597 km and 105 km from Addis Ababa and Bahir Dar,  
115 respectively. According to the population projection of 2014, the total population of the study  
116 area was 2,364,603 of which 1,196,318 were males while 1,168,285 were females (population  
117 projection 2014).

118  
119 In South Gondar, there are one general hospital found in Debre Tabor Town and seven district  
120 government hospitals found in Addis Zemen, Mekane Eyesus, Andabet, Ebnat, Lay Gayint, Tach  
121 Gayint, and Smada towns. In addition, there are 98 government health centers, and 76 private  
122 clinics in South Gondar Zone (23). According to the reports of hospitals in South Gondar Zone,  
123 the average monthly visitors during COVID-19 were 13,440.

### 124 125 **Source and study population**

126 All hospital visitors whose age 18 years and above in South Gondar Zone Hospitals were the  
127 source population, whereas the study populations were those randomly selected study  
128 participants from the two randomly selected hospitals (Debre Tabor and Mekane Eyesus). Those  
129 study participants whose age below 18 years were excluded.

130 **Sample size estimation and sampling methods**

131 The sample size was determined using the single population proportion formula by taking the  
132 following assumptions.

133 
$$n = \frac{(z_{\alpha/2})^2 * p(1 - p)}{d^2}$$

134  $Z_{\alpha/2}$  is the standard normal variable value at (1- $\alpha$ )% confidence level ( $\alpha$  is 0.05 with 95% CI,  $Z_{\alpha/2}$   
135 = 1.96), an estimate of the proportion of knowledge attitude and practice, was considered as 50%  
136 as there was no similar studies conducted and 5% margin of error was considered. The sample  
137 size became 384 and after considering of 10% non-response rates, the adequate sample final  
138 sample size becomes 422.

139 After selecting the two hospitals randomly out of the 8 hospitals, we proportionally allocated  
140 sample size based on total estimated visitors of hospitals in the last three months. Then, 303  
141 sample size was allocated for Debre Tabor general hospitals and 117 for Mekane Eyesus  
142 hospitals. Then hospitals visitors flow data during the previous 3 months in emergency ward,  
143 surgical ward, medical ward, gynecology/obstetrics ward and pediatrics ward considered for  
144 sample size allocation for each hospitals departments. Finally, randomly selection of visitors for  
145 each ward was selected until the allocated sample size achieved.

146 **Outcome variable measurement**

147 The outcome variable was good or poor knowledge, positive or negative attitude and good or  
148 poor practice towards COVID-19.

149 **Good or poor knowledge:** Knowledge was measured by using 15 questions consisting of signs  
150 and symptoms, risk groups and prognosis, method of transmission, and /preventive methods.  
151 Each question was consisted of as ‘Yes’, ‘No’, and ‘I do not know’ options. Respondents who  
152 answered correctly were given 1 point while others were given 0 points. The total knowledge  
153 score ranges from 0-15 and a cut-off level of  $\geq 12$  (80% and above) was considered as good  
154 knowledge while  $<12$  (80%) was considered as poor knowledge towards COVID-19 prevention  
155 (24).

156 **Positive or negative attitude:** Attitude was measured by using 11 items and the response was  
157 categorized based on 3 scale measurements with agree (3 points), neutral (2 points), and disagree  
158 (1 point). The score of attitude varied from 11 to 33, with an overall score of  $\geq 27$  (81.8%) was  
159 considered as a positive attitude, whereas a score of less than 27 (81.8%) was considered as  
160 negative attitude towards COVID-19 prevention (27).

161 **Good or poor practice:** The practice was measured using 10 items and those who respond as  
162 yes were given 1 point while no was marked as 0. The total prevention practice score ranges  
163 from 0-10 and a score with a cut-off  $\geq 8$  (80%) was considered as good practice while  $<8$  was  
164 taken as a poor practice (25,26).

## 165 **Data collection and quality assurance**

166 Data were collected using a pre-tested structured questionnaire which was adapted from  
167 published articles in reputable journals and from WHO COVID-19 guidelines (28–33). The  
168 questionnaire consists of five sections including; part I: socio-demographic characteristics of the  
169 participants; part II; Pre-existing medical condition and sources of information towards COVID-  
170 19; part III: knowledge of the participants; part IV: Attitude of the participants; and part V:

171 Prevention practice of COVID-19. The tool was prepared in the English version and translated to  
172 Amharic version (local language), and re-translated back to English to ensure consistency. The  
173 tool was pre-tested using 5% of the final sample size in Andabet district hospital visitors to  
174 establish the validity of the questionnaire. Based on the pre-test, appropriate amendments such as  
175 order arrangement of questions, editing of unclear questions, and avoiding irrelevant questions  
176 were done accordingly.

177  
178 The data was collected using interviewer administered method using four BSc nurse  
179 professionals and supervised by two Public Health experts. Two days of training was given for  
180 data collectors and supervisors on the overall aim of the study, contents of the tool and ethical  
181 issues. Supervision was carried out on daily basis, and appropriate corrections of the collected  
182 data were done accordingly. Furthermore, data entry was re-checked for 10% of the sample size  
183 in order to control data entry errors of the entered data and data cleaning was carried before  
184 statistical analysis. The reliability coefficient of Cronbach's alpha was 0.76 which is an  
185 acceptable range.

## 186 **Statistical analysis**

187 Data was entered into EpiData version 4.6 and exported to the Statistical Package of the Social  
188 Science (SPSS) version 25.0 for data cleaning analysis. Descriptive statistic such as frequencies  
189 and percentages were calculated for categorical variables and mean with standard deviations for  
190 continuous variables to examine the overall distribution.

191 *Associations between independent variables and knowledge, attitudes and practices towards*  
192 *COVID-19 were determined using a ~~binary~~ logistic regression model at 95% CI (Confidence*  
193 *interval). We used three ~~different logistic regression~~ models: The first model (Model 1)*

194 identified factors associated with good knowledge about COVID-19, the second model (Model  
195 II) identified factors associated with favorable attitudes and the third model (Model III)  
196 identified factors associated factors with good preventive practices towards COVID-19. For each  
197 model, bivariable analysis with (COR [crude odds ratio]) and multivariable analysis (AOR  
198 [adjusted odds ratio]) was used.

199 From the bivariable analysis, variables with a  $p$ -value  $<0.25$  were retained into the multivariable  
200 logistic regression analysis. From the multivariable analysis of each model, variables with a  
201 significance level of  $p$ -value  $<0.05$  were taken as factors independently associated with  
202 knowledge, attitude and practices towards COVID-19. The presence of multicollinearity among  
203 independent variables was checked using standard error at the cutoff value of 2 and we found  
204 that a maximum standard error of 0.97, which indicated no multi-collinearity. Model fitness was  
205 checked using the Hosmer-Lemeshow test for **Model I, Model II and Model III** and found a  $p$ -  
206 value of 0.650, 0.871 and 0.913, respectively and indicated that all models were fit.

207

## 208 **Ethics approval and consent to participate**

209 The study was approved by the ethical review committee of Debre Tabor University. Permission  
210 to conduct the study was obtained from the respective hospital managers of the study site. Before  
211 the data collection, the purpose of the study was explained and verbal consent was obtained from  
212 each participant. Individuals who were volunteer to participate in the study were also told as they  
213 have the right to withdraw from the study at any stage of the interview. The confidentiality of the  
214 study participants was ensured by avoiding possible identifiers. Data collectors wear a facemask  
215 and keep a physical distancing of two feet. Facemask was provided for the study participants  
216 who did not wear during the data collection.

## 217 **Result**

### 218 **Socio-demographic characteristics of hospital visitors**

219  
220 A total of 404 visitors participated in the study with a response rate of 95.7%. Nearly two-thirds  
221 242 (59.7%) of the study participants were females and about one-fifth 92 (22.8%) of the the  
222 hospital visitors were in the age range of 30-39 years. Furthermore, 66 (16.3%), 68(16.8%), and  
223 117(29.0%) of the respondents can't read and write, farmers, and live in rural areas respectively.  
224 Finally, 56 (13.9%) of the participants had either or more chronic medical illness history (Table  
225 1).

### 226 **Knowledge of hospital visitors towards COVID-19 prevention**

227  
228 More than two-thirds 280 (69.3%; 95%CI; 65.1-73.8%) of the visitors had a good knowledge,  
229 whereas 124 (30.7%; 95%CI: 27.2-34.9%) of them had poor knowledge about COVID-19.  
230 Almost all 388 (96.0%) of the participants heard about COVID-19 and more than three-fourths  
231 322 (79.7%) of the participants knew as COVID-19 is a viral disease and 339 (83.9%) of them  
232 knew the major sign and symptoms of COVID-19 cases. Furthermore, more than three-fourth  
233 320 (79.2%) of the participants knew that elders, those who had a chronic medical illness, and  
234 being obese are more likely to have severe cases of COVID-19. Similarly, 283 (70.0%) of the  
235 respondents knew that COVID-19 can be transmitted from one person to another even in the  
236 absence of COVID-19 (Table 2).

### 237 **Attitude of hospital visitors towards COVID-19 prevention**

238  
239 About two-thirds 62.6% (95%CI;57.2-67.6%) of the hospital visitors had a positive attitude  
240 towards COVID-19 prevention, whereas 37.4% (95%CI: 32.4-42.8%) had negative attitude

241 towards COVID-19 prevention. About half 203 (50.2%) of the participants agree that the black  
242 race is not protective against COVID-19. Similarly, less than half 180 (44.6%) of the participants  
243 agreed that Ethiopia is in a good position to contain the spread of the COVID-19. About two-  
244 thirds 274 (67.8%) of the participants believed COVID-19 do not cause stigma. More than half  
245 221(54.7%) of the respondents agree that they can get infected with COVID-19 if they contacted  
246 infected patients despite their good immunity. On the other hand, 55 (13.6%) of the respondents  
247 believed that COVID-19 has occurred as a result of our sin (Table 3).

### 248 **Preventive practice of visitors towards COVID-19 prevention**

249

250 Half of the respondents 199 (49.3%) practiced the recommended COVID-19 prevention  
251 methods. Majority 378 (93.6%) of the participants washed their hands with water and soap for at  
252 least 20 seconds. Furthermore, almost nine out of ten respondents avoid handshaking practice for  
253 prevention of COVID-19. But a relatively lower number of 338 (83.7%) participants used  
254 facemasks when they leave their home and 333 (82.4%) practiced respiratory hygiene while  
255 coughing and sneezing. Furthermore less than half 177(43.8%) participants applied keeping of  
256 the recommended physical distance for prevention of COVID-19. Staying at home was also  
257 another challenge and only less than one-third 121(30%) of the participants applied it (Table 4).

258

259

260



## 261 **Factors Associated with Knowledge, Attitude, and practice towards** 262 **COVID-19 from multivariable analysis**

263 A multi-variable analysis from the first model indicated that educational status and use of social  
264 media as a source of information were statistically significant with the knowledge of COVID-19.  
265 The finding revealed that those who can read and write were 2.78 times more likely to have good  
266 knowledge towards COVID-19 prevention methods than those who could not read and write.  
267 Similarly, participants who have college and above educational level were 6.15 (AOR = 6.15;  
268 95%CI: 2.18-17.40) times more likely to have good knowledge than those who could not read  
269 and write. Furthermore, participants who used social media as a source of information towards  
270 COVID-19 was 2.96 (AOR = 2.96; 95%CI: 1.46-6.01) times more likely to have good  
271 knowledge than those who did not use social media (Table 5).  
272

273 A multi-variable analysis from the second model revealed that those who had primary education  
274 were 6.49 (AOR = 6.49; 95%CI: 1.52-27.78) times more likely to have a positive attitude than  
275 those who could not read and write while being college and above graduated were 6.91 (AOR =  
276 6.91; 95%CI: 2.58-14.5) times more likely to have a positive attitude than the corresponding  
277 reference group. Furthermore, visitors who had chronic medical illnesses were 5 times (AOR =  
278 5; 95%CI: 1.71-14.67) more likely to have a positive attitude than those who did not have a  
279 chronic illness. Furthermore, participants who took training on COVID-19 prevention were 3.9  
280 (AOR = 3.9; 95%CI: 1.96-7.70) times more likely to have a positive attitude than those who  
281 didn't take the training. Additionally, participants who used peer as a source of information  
282 towards COVID-19 prevention were 2.45 (AOR = 2.45; 1.06-5.63) times more likely to have a

283 positive attitude than those who didn't use peers as a source of information for COVID-19  
284 prevention (Table 6).

285 From multivariable analysis of model three, we found that being a student was 7.7 times (AOR  
286 = 7.7; 95%CI: 1.15-51.86) more likely to have a good practices than farmers. Furthermore,  
287 participants who had good knowledge were 4.49 (AOR = 4.49; 95%CI: 2.41-8.39) times more  
288 likely to have a good practice about COVID-19 prevention than those who poor knowledge  
289 (Table 7).

## 290 **Discussion**

291 The pandemic of COVID-19 is still the critical concern of the globe including our country  
292 Ethiopia. But up to date, there is no confirmed treatment for the pandemic. Therefore prevention  
293 is the single most important method of alleviating the spread of COVID-19 pandemic.

294 **In this finding, about 81.67% of the knowledge questions were correctly replied to by the**  
295 **respondents.** This finding was in line with the study conducted in Saudi Arabia (80.5%) (4) and  
296 in Nigeria (77.36) (35). The finding of this study was lower than the study conducted in China  
297 (90%) (36). This discrepancy may be due to variation in the study population's characteristics,  
298 government commitment, and health care system. On the contrary, this study result was higher  
299 than in the Egyptian population (71.26%) (37). This discrepancy might be due to the variation in  
300 socio-demographic characteristics of the population.

301 The finding of this study revealed that 69.3 % (CI; 65.1-73.8) of the participants had good  
302 knowledge towards COVID-19 prevention which was in line with the study conducted in India  
303 (70 %) (38). On the other hand, this study finding was lower than a multicenter study conducted  
304 among health care workers in Ethiopia with 88.2% (16) and Nigerian residents in an urban

305 setting (99.7%) (39). This deviation may be due to variations in socio-demographic  
306 characteristics of the study population and sources of information towards COVID-19.

307 This study also revealed that about 80% of participants knew that the elderly, those who had  
308 chronic medical illnesses, and obese are more likely to develop severe cases of COVID-19. This  
309 finding was slightly higher than the study conducted in Ethiopia (72.5%) (11). This variation  
310 may be due to the change in study period, socio-demographic characteristics of the study  
311 population, and coverage of awareness creation towards COVID-19 prevention. Even though  
312 children and young adults are vulnerable groups, only 83.4% of the participants knew that these  
313 groups need to take preventive measures towards COVID-19. Neglecting such types of the  
314 population may wide-spreading the transmission of the pandemic (11).

315 Regarding the attitudes, 62.6% (95% CI; 57.2-67.6) of respondents had a positive attitude  
316 towards COVID-19 prevention which was lower than the study conducted in Ethiopia (94.7%)  
317 (16), Nigeria 79.5% (39), and Pakistan (82.16%) (40). This discrepancy may be due to a change  
318 in the socio-demographic characteristics of the study population, government commitment  
319 towards COVID-19. On the other hand, less than half (44.6%) of the participants believed that  
320 the government of Ethiopia can control the spread of COVID-19 within a short time. This  
321 finding was lower than the study conducted in china 97.1% (24) and India at 87.2% (41). This  
322 deviation may be due to the variation in the quality of the health care system, socio-demographic  
323 characteristics of the study population, and government preparedness towards the control of  
324 COVID-19 pandemic. According to the WHO report, the government of Ethiopia scored 52%  
325 towards COVID-19 preparedness response (21) which supports the finding of this study.  
326 Furthermore, this study also indicated that almost two-thirds of the respondents believed that the  
327 pandemic of COVID-19 leads to the development of social stigma which was lower than a study

328 conducted in Ethiopia at 77% (16) and 83.8% (11). This deviation may be due to differences in  
329 socio-demographic characteristics of the study population and study period. On the contrary, this  
330 study finding was higher than the study conducted in the Peruvian population 59.1% (42). This  
331 variation may be due to a change in the socio-demographic characteristics of the study  
332 population, study period, awareness creation towards COVID-19, and the burden of the  
333 pandemic. The social stigma may be developed due to fear of its mortality and high  
334 communicability. The history of social stigma due to pandemic was not a new phenomenon  
335 (43,44).

336 Regarding the prevention practice of COVID-19, the overall practice score of the respondents  
337 was 73.2% which was higher than the study conducted in Ethiopia (26). The finding of this study  
338 revealed that only half of the respondents 49.3% had a positive preventive practice of COVID-  
339 19. The finding of this study was lower than other studies conducted in Ethiopia (16,26) and  
340 China (45). This variation may be due to the change in the study setting, socio-demographic  
341 characteristics of the study population, and occupation of the study participant (being a health  
342 professional vs. general population), and the commitment of the government towards the  
343 prevention of COVID-19. Furthermore, most of the participants 93.6% washed their hands with  
344 water and soap for at least 20 seconds which was in line with a study conducted in Nigeria  
345 96.4% (39). On the contrary, this finding was lower than a study conducted in Nigeria 87.9 %  
346 (35). This deviation may be to a change in access and utilization of handwashing facilities in  
347 health care facilities.

348 Furthermore, 83.7% of the participants used face masks for prevention of COVID-19 which were  
349 consistent with the study conducted in Nigeria 84.4% (35), and 82.3% (39). This finding also  
350 revealed that less than half (43.8%) of the respondents applied the recommended physical

351 distance of 2 meter when they go to public crowded areas. This finding was lower than the study  
352 conducted in Nigeria 83% (35) and 92.7%, (39). This variation may be due to a change in the  
353 socio-demographic characteristic of the study population, the burden of the disease, awareness of  
354 the community towards the COVID-19 pandemic, and population way of life.

355 The finding also revealed that more than two-thirds 70% of the respondents avoid going to  
356 crowded places after the emergence of COVID-19 which was higher than the finding in Nigeria  
357 58.9% (35). in addition to this, 82.4% of the respondents practiced respiratory hygiene which  
358 was lower than the finding in India (97.7%) (46). The variation might be due to a change in a  
359 study setting, heterogeneity of population perception of the community, knowledge towards  
360 COVID-19, and burden of confirmed COVID-19 cases. Above all, the most common problem  
361 which was not applied by the participants was staying at home and only less than one-third  
362 (30%) after the occurrence of COVID-19. The possible justification for this might be due to the  
363 uncontrolled of the pandemic for a long period of time, poor preparedness of the community  
364 towards the pandemic, and subsistence way of life of the community.

## 365 **Conclusion**

366 We conclude that the status of knowledge, attitude and practice towards COVID-19 prevention  
367 was not satisfactory. Factors significantly associated with good knowledge about COVID-19  
368 were educational status who can read and write and college and above and use of social media.  
369 Factors significantly associated with positive attitude towards COVID-19 include presence of  
370 chronic illnesses, training on COVID-19, and peer/family as a source of information. Being a  
371 student and participants who had a good knowledge on COVID-19 were factors significantly  
372 associated with good practice towards COVID-19. Hence, intervention strategies that could

373 improve the knowledge, attitude and practice status towards COVID-19 preventions are urgently  
374 needed to control the transmission of COVID-19. Health education about COVID-19 infection  
375 prevention and control methods and advocacy about COVID-19 recommended prevention using  
376 various media channels are highly recommended. Therefore, hospital administrators should work  
377 in collaboration with other concerned stakeholders to enhance knowledge, attitude, and practice  
378 of hospital visitors to wards COVID-19 prevention.

379

## 380 **Abbreviations**

381 COVID-19: Coronavirus disease 2019; AOR: Adjusted Odds Ratio; CI: Confidence Interval;  
382 COR: Crude Odds Ratio; PPE: Personal Protective Equipment; SARAS\_COV-1: Severe Acute  
383 Respiratory Syndrome- Corona Virus-1; SARS-COV-2: Severe Acute Respiratory Syndrome-  
384 Corona Virus-2

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532 **Table 1: Socio-demographic characteristics of adult visitors in hospitals of South Gondar**  
533 **zone Northwestern Ethiopia, August 1 to 30, 2020**

<b>Variable</b>	<b>Category</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
Sex	Male	163	40.3
	Female	241	59.7
Age(years)	<20	24	5.9
	20-29	92	22.8
	30-39	111	27.5
	40-49	94	23.3
	50-59	48	11.9
	≥60	35	8.7
Religion	Muslim	30	7.4
	Orthodox	331	81.9
	Protestant	43	10.6
Marital status	Single	83	20.5
	Married	295	73.1
	Divorced	26	6.5
Educational status	Cannot read and write	66	16.3
	Read and write	95	23.5
	Primary (1-8) grade	36	8.9
	Secondary (9-12)grade	29	7.2
	College and above	178	44.1
Occupation	Farmer	68	16.8
	Student	45	11.1
	Unemployed	55	13.6
	Government employer	129	31.9
	Private business worker	107	26.5
Resident	Urban	287	71.0
	Rural	117	29.0
Monthly income(ETB)	≤499	127	31.4
	500-2000	101	25
	≥2001	176	43.6
History of chronic medical illness	Yes	56	13.9
	No	348	86.1
Training on COVID 19	Yes	137	33.9
	No	267	64.1
Use social media	Yes	252	62.4
	No	152	37.6
Peer as a source of information of COVID19	Yes	345	85.4
	No	59	14.6
Use TV/radio as a source of information	Yes	321	79.5
	No	83	20.5
Use religious institution as source of information	Yes	130	32.2
	No	274	67.8

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535 **Table 2: Knowledge of hospital visitors towards COVID-19 prevention in hospitals of**  
536 **South Gondar zone, Northwestern Ethiopia, August 1 to 30, 2020**

Item	Yes		No		I do not know	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Did you hear about COVID-19?	388	96.0	16	4.0		
COVID-19 is a viral disease.	322	79.7	40	9.9	42	10.4
The major sign and symptoms of COVID-19 are dry cough, fever, and shortness of breathing.	339	83.9	33	8.2	32	7.9
Runny nose and sneezing are less common symptoms of COVID-19.	275	68.1	88	21.8	41	10.1
Elder, those who have a chronic medical illness and obese are more likely to sever the case of COVID- 19.	320	79.2	57	14.1	27	6.7
Currently, there is no effective cure for COVID-19.	331	81.9	50	12.4	23	5.7
COVID-19 virus can spread via respiratory droplets.	375	92.8	29	7.2		
Eating and contacting wild animals would result COVID-19 infection	308	76.2	53	13.1	43	10.6
Persons with COVID 19 virus can transmit the virus to others when a fever is not present	283	70.0	71	17.6	50	12.4
Proper washing hand with soap and water is one method of preventing COVID-19.	375	92.8	18	4.5	11	2.7
Wearing general masks can prevent one from acquiring	354	87.6	35	8.7	15	3.7

infection by the COVID 19 virus						
Children and young adults must take measures to prevent the infection by Covid 19 virus	337	83.4	45	11.1	22	5.4
To prevent the infection by COVID 19 virus individuals should avoid going to crowded places such as bus parks and avoid public transportation	352	87.1	50	12.4	2	.5
People who have contact with someone infected with COVID 19 virus should be immediately isolated in a proper place in general the observation period is 14 days	273	67.6	95	23.5	36	8.9
Isolation and treatment of people who are infected with the COVID 19 virus are effective ways to reduce the spread of the virus	295	73.0	80	19.8	29	7.2

537 Mean± standard deviation = **12.25±2.45; Minimum = 2 and maximum = 15**

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**Table 3:-Attitude of adult visitors towards COVID-19 prevention in hospitals of South Gondar zone, Northwest Ethiopia, August 1 to 30, 2020**

Questions	Agree	Neutral	Disagree
Black races are not protected from COVID 19 disease.	203(50.2%)	146(36.1%)	55(13.6%)
Wearing a well-fitting face mask are effective in preventing COVID 19 virus	268(66.3%)	81(20.0%)	55(13.6%)
Hand wash can prevent you from COVID 19 virus	321 79.5	77 19.1	6 1.5
Ethiopia is in a good position to contain COVID 19 virus	180 44.6	144 35.6	80 19.8
COVID 19 is not stigma and I should not hide my infection	274 67.8	90 22.3	40 9.9
If I get infected with COVID 19, I will go to the hospital as advised.	221 54.7	141 34.9	42 10.4
I can get infected with COVID 19 if I contacted an infected patient despite my good immunity.	230 56.9	100 24.8	74 18.3
COVID 19 is fatal	215 53.2	105 26.0	84 20.8
During the outbreak of COVID 19 eating well cooked and safely handled meat is safe.	249 61.6	96 23.8	59 14.6
COVID 19 patients should share their recent travel history with a health care provider.	256 63.4	85 21.0	63 15.6
Do you think that the cause of Covid-19 is not spiritual/ is it happened because of our sin?	262 64.9	87 21.5	55 13.6

551 \* Mean ±standard deviation = **27.11±4.08**; Minimum = **17**; Maximum = **33**

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557 **Table 4:-Preventive practice of adult visitors towards COVID-19 prevention in hospitals of**  
 558 **South Gondar zone, Northwest Ethiopia, August 1 to 30, 2020**

Questions	Yes		No	
	Frequency		Frequency	
	n	%	N	%
Do you avoid handshaking to prevent covid 19?	363	89.9	41	10.1
Have you washed your hands often with soap and water for at least 20 seconds especially after you have been in a public place or after blowing your nose, coughing, or sneezing?	378	93.6	26	6.4
If soap and water are not readily available, are you applying a hand sanitizer that contains at least 60% alcohol?	309	76.5	95	23.5
Do you wear face masks repeatedly when you leave your home?	338	83.7	66	16.3
Do you coughing and sneezing into the elbow or within clothing?	333	82.4	71	17.6
In recent days have you avoid going to any crowded place?	281	69.6	123	30.4
Do you avoid eating raw animal products to prevent the COVID 19 virus?	336	83.2	68	16.8
Do you avoid touching your mouth nose and eyes with unwashed hands?	323	80.0	81	20.0
Do you keep your self 2m away from the others when you got to the public area?	177	43.8	227	56.2
Do you stay at your home after the emergent of covid 19?	121	30.0	283	70.0
Mean $\pm$ standard deviation	<b>7.32<math>\pm</math>1.60</b>			
Minimum	<b>1.00</b>			
Maximum	<b>10</b>			

560 **Table 5:-Associated factors of knowledge towards COVID-19 prevention among adult**  
 561 **visitors in hospitals of South Gondar zone, Northwest Ethiopia, August 1 to 30, 2020**

Variable	Knowledge status		COR(95% CI)	AOR(95% CI)	P-value
	Good	Poor			
Age					
<20	12	12	1	1	
20-29	70	22	3.18(1.25-8.09)	1.98(0.54-7.29)	0.31
30-39	82	29	2.83(1.14-6.99)	1.08(0.30-3.87)	0.091
40-49	58	39	1.61(0.65-3.97)	1.06(0.31-3.68)	0.92
50-59	33	15	2.20(0.80-6.02)	1.21(0.30-4.82)	0.79
≥60	25	10	2.50(0.84-7.40)	0.69(0.16-2.95)	0.61
Marital status					
Single	61	22	1	1	
Married	205	90	0.82(0.48-1.42)	0.88(0.42-1.82)	0.72
Divorced	14	12	0.42(0.17-1.05)	0.92(0.29-2.98)	0.89
<b>Education</b>					
cannot read and write	25	41	1	1	
Read and write	54	41	2.16(1.14-4.12)	<b>2.78(1.18-6.56)*</b>	<b>0.02*</b>
Primary	26	10	4.26(1.76-10.31)	2.42(0.56-10.44)	0.24
Secondary	21	8	4.31(1.66-11.18)	1.54(0.25-9.56)	0.65
College and above	154	24	10.52(10.52-5.45)	<b>6.15(2.18-17.40)*</b>	<b>0.001*</b>
Occupation					
Farmer	23	45	1	1	
Student	33	12	5.38(2.35-12.34)	1.64(0.28-9.72)	0.59
Currently unemployed	38	17	4.37(2.04-9.36)	1.50(0.49-4.58)	0.48
Gov't worker	111	18	12.07(5.95-24.48)	0.83(0.16-4.19)	0.82
Private business	75	32	4.59(2.39-8.80)	0.91(0.25-3.30)	0.89
Resident					

Urban	216	71	2.52(1.60-3.96)	1.43(0.75-2.71)	0.281
Rural	64	53	1	1	
Monthly income					
<499	73	54	1	1	
500-2000	67	34	1.46(0.85-2.51)	1.272(0.52-3.09)	0.600
>2000	140	36	2.88(1.73-4.78)	1.29(0.46-3.60)	0.630
Training					
Yes	113	24	2.82(1.70-4.67)	1.74(0.89-3.42)	0.110
No	167	100	1	1	
Use social media					
Yes	204	48	4.25(2.72-6.65)	<b>2.96(1.46-6.01)*</b>	<b>0.003*</b>
No	76	76	1	1	
Peer					
Yes	252	93	3.00(1.71-5.27)	1.09(0.48-2.51)	0.840
No	28	31	1	1	
TV/radio					
Yes	243	78	3.87(2.34-6.40)	1.07(0.43-2.65)	0.88
No	37	46	1	1	
Religious institution					
Yes	98	32	1.55(0.97-2.48)	0.93(0.50-1.73)	0.83
No	182	92	1	1	

562 1, reference category

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570 **Table 6:-Associated factors of attitude towards COVID-19 prevention among adult visitors**  
 571 **in hospitals of South Gondar zone, Northwest Ethiopia, in August 1 to 30, 2020**

Variable	Attitude		COR (95% CI)	AOR(95%CI )	P-value
	Positive	Negative			
Age					
<20	12	12	1	1	
20-29	57	35	1.63(0.66-4.02)	0.42(0.12-1.46)	0.17
30-39	66	45	1.47(0.61-3.56)	0.51(0.14-1.82)	0.30
40-49	57	37	1.54(0.63-3.79)	0.94(0.28-3.21)	0.93
50-59	32	16	2.00(0.74-5.44)	1.10(0.28-4.27)	0.89
≥60	29	6	4.83(1.47-15.87)	1.65(0.33-8.42)	0.55
Religion					
Muslim	25	5	3.27(1.05-10.20)	2.18(0.50-9.58)	0.30
Orthodox	202	129	1.02(0.53-1.96)	1.49(0.64-3.48)	0.36
Protestant	26	17	1	1	
<b>Education</b>					
cannot read and write	22	44	1	1	
Read and write	47	48	1.96(1.02-3.76)	2.39(0.99-5.79)	.053
Primary	27	9	6.00(2.41-14.93)	<b>6.49(1.52-27.78)*</b>	<b>0.012*</b>
secondary	21	8	5.25(2.01-13.74)	2.32(0.39-13.74)	.35
College and above	136	42	6.48(3.49-12.01)	<b>6.91(2.58-14.50)*</b>	<b>0.0001*</b>
Occupation					
Farmer	22	46	1	1	
Student	36	9	8.36(3.44-20.36)	1.87(0.33-10.72)	0.48
Currently unemployed	33	22	3.14(1.50-6.58)	0.54(0.18-1.68)	0.29
Gov't worker	105	24	9.15(4.66-17.96)	0.61(0.12-3.05)	0.55
Private business	57	50	2.38(1.26-4.50)	0.29(0.07-1.12)	0.07
Resident					
Urban	193	94	1.95(1.26-3.02)	1.23(0.66-2.23)	0.51
Rural	60	57	1	1	
Monthly income					
<499	72	55	1	1	
500-2000	61	40	1.17(0.69-1.98)	0.89(0.33-2.38)	0.82
>2000	120	56	1.64(1.02-2.63)	0.57(0.19-1.70)	0.31
History of chronic illness					
Yes	48	8	4.19(1.92-9.12)	<b>5.00(1.71-14.67)*</b>	<b>0.003*</b>
No	205	143	1	1	
Training					
Yes	113	24	4.27(2.59-7.05)	<b>3.9(1.96-7.70)*</b>	<b>0.0001*</b>

No	140	127	1	1	
Use social media					
Yes	179	73	2.59(1.70-3.93)	1.20(0.59-2.44)	0.63
No	74	78	1	1	
Peer					
Yes	231	114	3.41(1.92-60.5)	<b>2.45(1.06-5.63)*</b>	<b>0.04*</b>
No	22	37	1	1	
Tv/radio					
Yes	221	100	3.52(2.13-5.81)	2.091(0.85-5.16)	0.11
No	32	51	1	1	
Religious institution					
Yes	100	30	2.64(1.64-4.23)	1.725(0.93-3.21)	0.09
No	153	121	1	1	

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582 **Associated factors of COVID-19 preventive practice**

583 **Table 7: Associated factors of preventive practice towards COVID-19 prevention among**  
584 **adult visitors in hospitals of South Gondar zone, Northwest Ethiopia, in August 1 to 30,**  
585 **2020**

Variable	Practice status		COR (95% CI)	AOR (95% CI)	P-value
	Good	Poor			
<b>Age</b>					
<20	9	15	1	1	
20-29	48	44	1.82(0.72-4.57)	0.87(0.24-3.38)	0.84
30-39	49	62	1.32(0.53-3.26)	0.43(0.12-1.67)	0.22
40-49	41	53	1.29(0.51-3.24)	0.75(0.20-2.56)	0.67
50-59	27	21	2.14(0.79-5.85)	0.99(0.23-4.24)	0.98
≥60	25	10	4.17(1.38-12.58)	1.31(0.28-6.11)	0.73
<b>Education</b>					
cannot read and write	17	49	1	1	
Read and write	25	70	1.03(0.50-2.11)	0.93(0.36-2.43)	0.88
Primary	16	20	2.31(0.98-5.44)	0.39(0.08-1.80)	0.23
Secondary	17	12	4.08(1.62-10.27)	0.82(0.16-4.19)	0.82
College and above	124	54	6.62(3.50-12.52)	1.90(0.67-5.17)	0.21
<b>Occupation</b>					
Farmer	6	62	1	1	
Student	24	21	11.81(4.25-32.83)	<b>7.70(1.15-15.86)*</b>	<b>0.04*</b>
Currently unemployed	20	35	5.91(2.17-16.08)	2.35(0.58-9.57)	0.23
Gov't worker	93	36	26.70(10.62-67.12)	2.49(0.42-14.61)	0.31
Private business	56	51	11.35(4.52-28.47)	2.15(0.45-10.2)	0.34
<b>Resident</b>					
Urban	166	121	3.49(2.19-5.56)	1.54(0.79-3.00)	0.21
Rural	33	84	1	1	
<b>Monthly income</b>					
<499	39	88	1	1	
500-2000	50	51	2.21(1.29-3.81)	2.05(0.71-5.93)	0.19
>2000	110	66	3.76(2.32-6.12)	1.99(0.62-6.39)	0.25
<b>Training</b>					
Yes	86	51	2.30(1.51-3.51)	0.88(0.47-1.64)	0.68
No	113	154	1	1	
<b>Use social media</b>					
Yes	160	92	5.04(3.23-7.87)	1.54(0.76-3.10)	0.23
No	39	113	1	1	
<b>Peer</b>					
Yes	184	161	3.35(1.80-6.25)	0.78(0.31-1.97)	0.61
No	15	44	1	1	
<b>Tv/radio</b>					
Yes	185	136	6.70(3.62-12.41)	1.45(0.53-3.96)	0.46
No	14	69	1	1	
<b>Knowledge</b>					

Poor knowledge	22	102	1	1	
Good knowledge	177	103	7.97(4.73-13.41)	<b>4.49(2.41-8.39)*</b>	<b>0.0001*</b>
<b>attitude</b>					
Negative attitude	44	107	1	1	
Positive attitude	155	98	3.85(2.50-5.93)	1.04(0.58-1.86)	0.068

586 1, reference category

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Date: March 12 2021

**Manuscript ID: PONE-D-20-36453R1**

**Preventive Practice and Associated Factors towards COVID-19 among Medical Visitors in Hospitals of South Gondar Zone, Northwest Ethiopia**

Corresponding authors: Gete Berihun (MSc)

Dear Dr, Francesco Di Gennaro (PhD)

Academic Editor

PLOS ONE

Thank you for your letter dated January 27, 2021 with a decision of **major revision** needed. We were pleased to know that our manuscript was considered potentially acceptable for publication in PLoS ONE, subject to adequate revision as requested by the reviewers, academic editors and the journals. Based on the instructions provided in your letter, we uploaded the file of the rebuttal letter; the marked up copy of the revised manuscript highlighting the changes made in the original submitted version and the clean copy of the revised manuscript.

We have revised the manuscript by modifying the abstract, introduction, methods, results, discussion and other sections, based on the comments made by the reviewers and using the journal guidelines. Therefore, we have marked in red color all the changes made during the revision process. Appended to this letter is our point-by-point response (rebuttal letter) to the comments made by the reviewers.

We have agreed with almost all the comments and questions raised by the reviewers and academic editors. We also provided justification for those comments and questions for disagreeing. We would like to take this opportunity to express our thanks to the reviewers for their valuable comments and to thank you for allowing us to resubmit a revision of the manuscript.

I hope that the revised manuscript is accepted for publication in PLoS ONE.

Sincerely yours,

Gete Berihun (Wollo University)

# **Response to the Journal Requirements Questions**

## **Response to editor**

**Question #1** Please ensure that your manuscript meets PLOS ONE's style requirements, including those for file naming.

**Response:** Thank you for this remark. We re-formatted the revised manuscript using the PLoS ONE format guidelines. The whole content of the manuscript, including the abstract, introduction, methods, discussion and reference are formatted using the guidelines (**Please see the revised version for each section**).

Question #2. Data availability

**Response. We have attached the data on the supplementary information**

Question #3. Please amend either the title on the online submission form (via Edit Submission) or the title in the manuscript so that they are identical.

**Response: Thank you for your comment. We made the title identical on the online submission and the title in the manuscript.**

Question #4. Please amend either the abstract on the online submission form (via Edit Submission) or the abstract in the manuscript so that they are identical.

**Response: Thank you for your comment and we did it accordingly.**

Question #5. Your ethics statement should only appear in the Methods section of your manuscript. If your ethics statement is written in any section besides the Methods, please move it to the Methods section and delete it from any other section. Please ensure that your ethics statement is included in your manuscript, as the ethics statement entered into the online submission form will not be published alongside your manuscript.

**Response: Thank you. We did it.**

Question #6. We note that you have included a table to which you do not refer in the text of your manuscript. Please ensure that you refer to Table 2 in your text; if accepted, production will need this reference to link the reader to the Table.

**Response: We have accepted the comments and hence the text written in Table 1 is changed in to Table 2.**

## **Response to reviewer 1**

Question #1. What is the difference between patient and visitors in your study?

**Response: Sorry for the confusion about the two terms. We understand that we used the two terms interchangeably and now we updated the manuscript by hospital visitors. the patient is all persons who came to health care facilities for medical treatment. But visitors are any persons who came to the health care facilities for different purposes including seeking of medical treatment. Therefore, to avoid confusion we used visitors since the study was done on visitors, not only to patients (see the revised version).**

Question #2. The document has not page number please incorporate

**Response: Based on your comment, we gave the page number accordingly. Thank you.**

Question # 3. Some sentences are incomplete which need intensive editing.

**Response: We tried to assess errors like incomplete sentence, grammatical and language error from title up to discussion of the manuscript. As a result, the amendment was done accordingly in the revised version of the manuscript.**

Questions #4. In the abstract section please add space between ‘of’ and ‘south’ as ‘To assess COVID-19 preventive practice and associated factors among visitors in 30 hospitals of South Gondar Zone, Northwest Ethiopia.

**Response: Thank you for your comment. We made a correction in the revised manuscript.**

Question #5. In abstract section, “The questionnaire was pre-tested in 5% of the final sample size to establish the validity of the data collection instrument. The data were collected using face-to-face interviews by considering physical distancing and wearing of face masks. The data was entered in Epi-data version 3.1 and exported to Statistical Package for Social Science (SPSS) Version 25 for analysis.” It is better delete and replace by tool of outcome variable measurement.

**Response: Based on your comment we removed less important points from the abstract and amendment was done accordingly (see the revised new version of the manuscript).**

Question #6. In abstract section, Bi-variate Crude Odd Ratio (COR) with 95% confidence intervals (CI) and p-values of less than 0.25 were applied to select candidate variables for multi-variable analysis. Then, multi-variable Adjusted Odd Ratio (AOR) using binary logistic regression analysis at a p-value of less than 0.05 at 95% CI was shall be rephrased.

**Response: Thank you for this key comment, we revised accordingly and please see the data analysis in page 9 and 10.**

Question #7. In the abstract section, (AOR=2.96; 95% CI: 1.46, 6.01) were significantly associated with knowledge of COVID-1.’ This is incomplete and does not give sense. It is better rewrite it again.

**Response: We have accepted your comment hence this sentence rewritten as ...were associated significantly with visitors’ knowledge towards the prevention of COVID-19 (Please see the revised version of the abstract).**

Question #8. In abstract section, the conclusion did not in line the finding. Please conclude according to the finding.

**Response: We have accepted your comment. The conclusion was amended based on the finding of the study (see the revised version of the manuscript).**

Question #9. In Methods and Materials section, the patient flow data were estimated by reviewing the patients' logbook in the last three months and the average number of the patient for a month was calculated to determine the interval. Then, we used a systematic random sampling

technique to select study participants of the study'. This paragraph is not clear. How to reach to apply systematic random sampling technique? What is the sampling frame? Is your study population are patients or patients attendance or any visitor of the hospital?

**Response: We found that our way of writing was confusing. Sorry for the mistakes. After selecting the two hospitals randomly out of the 8 hospitals, we proportionally allocated sample size based on total estimated visitors of hospitals in the last three months. Then, 303 sample size was allocated for Debre Tabor general hospitals and 117 for Mekane Eyesus hospitals. Then hospitals visitors flow data during the previous 3 months in emergency ward, surgical ward, medical ward, gynecology/obstetrics ward and pediatrics ward considered for sample size allocation for each hospitals departments. Finally, randomly selection of visitors for each ward was selected until the allocated sample size was achieved (See the revised version in page 7.**

Question #10. Under outcome and explanatory variables: please delete sensitive words like poor knowledge, attitude, and practice. It shall be replaced with 'favorable/unfavorable'

**Response: We accepted your reflections, however, most studies used good/poor knowledge, positive and negative attitude and good/poor practice. We used these terms accordingly throughout the paper.**

Question #11. Delete subtopic of 'operational definition.' This is already state in the outcome variables. Please avoid bolding words like 'good knowledge, poor knowledge, positive attitude, and Practice

**Response: Thank you for your comment; we deleted subtopic of operational definition**

Question#12. A pre-test was conducted using 5% (21) of the final sample size in the Andabet district to establish the validity of the questionnaire and amendment was made accordingly.’  
What type of amendment you made? Can you explain that amendment?

**Response: The pre-test is aimed for amendment of measuring tool. Therefore, some of the amendments were arrangement, editing of unclear questions, and avoiding irrelevant questions.**

Question 13. Under Statistical analysis: what is the different between bi- variate and multi-variable? What do you mean ‘multi-variable’?

**Response: Bivariate analysis refers one independent variable with outcome variables. However, multivariable means that more than one independent variables with the outcome variable. From the adjusted analysis, all variables that has a p-value less than 0.25 were included into the adjusted multivariable analysis to control confounders. In our study, in the case of this study we used bivariable and multivariable analysis. Furthermore, the word bivariate analysis was changed to bivariable analysis throughout the manuscript.**

Question#14. Result section, use one of result presentation. Almost all tables are explained in the text. Please follow rule of text and table presentation together.

**Response: Based on your comments we reduced more than half of the explanation. As a result, only pertinent finding of the study was explained (Please see all result section).**

Question #15. In result section, similarly, 283 (70%) of the respondents knew that COVID-19 can be transmitted from one person to another even in the absence of COVID-19 (Table 1).’  
Table 1 presents socio-demographic characteristics of the participants but not knowledge of participants. Please cite the table appropriately.

**Response: We made a correction accordingly (See the revised version of the manuscript).**

Question #16. The finding of the study revealed seven out of ten 280 (69.3%) respondents had good knowledge towards COVID-19 while 253 (62.6%) had a positive attitude towards COVID-19. The finding of the study showed the pillar of prevention practice was much lower and only

half 199(49.3%) of the participants had a score of good prevention practice of COVID-19 (Figure 1).’ This paragraph is not clear.

**Response: This idea is rewritten as’...280 (69.3% of study participants had favorable knowledge towards COVID-19 prevention. ‘... almost half of the study participants 119 (49.3%) are practiced the recommended COVID-19 prevention methods.’**

Question #17. In result section, the finding revealed that those who can read and write were 2.78 times more likely to have good knowledge than those who can’t read and write is not clear and should be re-write.

**Response: We have rewritten as “The finding revealed that those who can read and write were 2.78 times more likely to have good knowledge towards COVID-19 prevention methods than those who can’t read and write”.**

Question #18. In discussion section, this discrepancy 274 might be due to Spatio-temporal variation.’ This is not a justifiable reason to the knowledge people towards novel coronal virus discrepancy of between Ethiopia and Egyptian population. Please search another justification of this discrepancy.

**Response: Based on comment we tried to elaborate better justification for variation in this study with the finding of other researches conducted in different parts of the world.**

Question #19. In discussion section, this deviation may be due to the change in the study population (health care professionals vs. general population) and residents of the study population. This makes confuse reader please rephrase again

**Response: This idea is rewritten as” the deviation may be due to the difference in the study subjects. In the present study, the study subjects were visitors of Hospitals while the study conducted in Egypt were only health care professionals.**

**Response to reviewer 2**

Question #1. The outcome variable and the title is not congruent. If your outcome variables are knowledge, attitude and practice towards COVID -19 prevention, your title should be modified to KAP of visitors towards COVID-19 prevention. Otherwise, if your title is focused only practice and associated factor, you have to include knowledge and attitude as part of associated factor, rather than the outcome variable.

**Response: Based on the comment, we tried to make the title in line with its outcome variable. Therefore the title is modified in to KAP of visitors towards COVID-19 prevention while the outcome variables of the study are Knowledge, attitude, and practice towards COVID-19 prevention**

### **Response to reviewer 3**

Question #1. Result and discussion part 1. Please use software modeling for clear elaboration the topic of CVID 19 Examples OLS Model, add other better software

**Response: We have already used logistic regression analysis using crude odds ratio (COR) and adjusted odds ratio (AOR) for determining the associated factors with the outcome variables.** Associations between independent variables and knowledge, attitudes and practices towards COVID-19 were determined using a binary logistic regression model at 95% CI (Confidence interval). We used three different logistic regression models: The first model (Model 1) identified factors associated with good knowledge about COVID-19, the second model (Model II) identified factors associated with favorable attitudes and the third model (Model III) identified factors associated factors with good preventive practices towards COVID-19. For each model, bivariable analysis with (COR [crude odds ratio]) and multivariable analysis (AOR [adjusted odds ratio]) was used.

From the bivariable analysis, variables with a  $p$ -value  $<0.25$  were retained into the multivariable logistic regression analysis. From the multivariable analysis of each model, variables with a



significance level of  $p$ -value  $<0.05$  were taken as factors independently associated with knowledge, attitude and practices towards COVID-19. The presence of multicollinearity among independent variables was checked using standard error at the cutoff value of 2 and we found that a maximum standard error of 0.97, which indicated no multi-collinearity. Model fitness was checked using the Hosmer-Lemeshow test for Model I, Model II and Model III and found a  $p$ -value of 0.650, 0.871 and 0.913, respectively and indicated that all models were fit.

**We hope that the data analysis we used above is very sufficient to our study, which we could able to explain the result and discussion as we did it.**

Question #2. Adding Images as possible

**Response: We have 7 Tables and including more Figure is repeating of the result of the Table in another forms.**

Question #3. Edit grammatical error and other

**Response: This comment was also raised by other reviewers. We tried to revise of grammar, language, and punctuation errors starting from the title of the manuscript up to discussion (see the revised version of the manuscript). We appreciate your comment.**

**Response to reviewer 4**

Question #1. What does medical visitor mean? is that for only visiting the medical ward? if not, it is better to say among visitors.

**Response: The study subjects all visitors of the health care facilities. So that, the title is modified to Knowledge, Attitude, and Practices towards COVID-19 and associated factors among hospital Visitors in South Gondar Zone Hospitals, Northwest Ethiopia**

\Question #2. In the background section, please also include information on preventive practices of COVID-19.

**Response: The title of the revised is modified to Knowledge, Attitude, and Practices towards COVID-19 and associated factors among hospital Visitors in South Gondar Zone Hospitals, Northwest Ethiopia. Therefore the emphasis is given not only for prevention measures but also for knowledge and attitude towards prevention of COVID-19. But in the revised manuscript, we elaborate detail COVID-19 prevention measures.**

Question #3. Replace the word "face-to-face administered" by "interviewer administered"

**Response: The phrase “face-to-face administered” is replaced by “interviewer administered”. (See the revised version of the manuscript).**

Question #4. Please include the confidence intervals for these percentages with 95% CI.

**Response: Knowledge, attitude, and practice of respondents are presented in the result and discussion section of the revised manuscript. According to this study, 69.3% (95%CI;65.1-73.8%) had a favorable knowledge, 62.6% (95%CI;57.2-67.6) had a favorable attitude, and 49.3%(95%CI;) had a favorable practice towards the prevention of COVID-19.**

Question #5. If you did the associations for knowledge, attitude and practice of visitors towards COVID- 19 prevention, please rewrite your title as knowledge, attitude and practice of hospital visitors towards COVID-19 prevention....

**Response: We have accepted your comment and the title was modified accordingly.**

Question #6. Bivariate analysis refers two paired data sets/with two outcome variables. But your study has single outcome so, better to use bivariable.

**Response: The word bivariate analysis was replaced by bivariable analysis throughout the revised version of the manuscript.**

Question #7. Where does your pretest conducted and what are the psychomotor properties of that pretest? Particularly state clearly in your methods section, than the abstract.

**Response: the pretest was conducted in other districts hospital visitors (andabet hospital) other than the study area. The psychomotor domains of the pretest are reliability and validity.**

Question #8. How the response rate becomes 95.7%, if you use interviewer administered questionnaire?

**Response: As we know the response rate of interviewer administered questionnaire is higher than self-administered once. But in the case of our study, the study subjects were visitors of health care facilities who came for different activities including medical treatments. The non-response rate of the study participants means that those study participants who are unable to provide data due to shortage of time, unwillingness to be part of the study and etc.**

Question #9. Most paragraphs emphasized what COVID -19 entails and may be considered as too lengthy. Introduction should follow a structured and sequential order while capturing relevant information to be included in this section. What are the current issues about COVID -19 prevention? Some of these points were included in one of your paragraphs. What are the quantifiable effect/issue around the points identified on COVID- 19 prevention? Based on the earlier identified issues about COVID-19 prevention, what are the points to be addressed in your study? What is the rationale for the study? and lastly what is the aim of the study?

**Response: We thank you for this key comment. Based on your comment we tried to shorten the introduction part. Furthermore we point out the current issues of COVID-19 prevention measures, earlier identified COVID-19 prevention measures, points to be addressed, rational of the study and finally aims of the study are explained in the revised version of the manuscript (See the updated manuscript).**

Question #10. If you exclude individuals whose age is <18 years , it is better to modify your title as ... among adult visitors... otherwise, why you exclude these groups?

**Response: Based on your comment we modified the title as to only adult visitors.**

Question #11. You stated the total population of South Gondar Zone. However, it is better to state the average number of monthly visitors to hospitals within the zone because you are aiming to study visitors...

**Response: we tried to modify this point method section particularly in study design, setting, and period of the revised version of the manuscript.**

Question #12. If these are your outcome variables, your title should be revised as KAP (knowledge, attitude, and practice of visitors towards COVID-19 prevention...) otherwise use practice as your outcome variable and use knowledge, attitude, socio-demographic.... as your independent variables. Doing research without knowing the variables is meaningless.

**Response: The title of the manuscript are modified in to KAP of adult visitors towards prevention of COVID- 19 to make in line with the outcome variable of favorable/unfavorable knowledge, attitude, and practice towards prevention of COVID-19.**

Question #13. Sampling procedure is not clear

**Response:** Sorry for the confusion. We rewrite the sampling procedure in a more clear manner.

After selecting the two hospitals randomly out of the 8 hospitals, we proportionally allocated sample size based on total estimated visitors of hospitals in the last three months. Then, 303 sample size was allocated for Debre Tabor general hospitals and 117 for Mekane Yesus hospitals. Then hospitals visitors flow data during the previous 3 months in emergency ward, surgical ward, medical ward, gynecology/obstetrics ward and pediatrics ward considered for sample size allocation for each hospitals departments. Finally, randomly selection of visitors for each ward was selected until the allocated sample size achieved.

Question #14. Attitude measurement is not clear. What does 26.4 (80%) score mean? is that the mean or median score of the overall attitude score?

**Response: The attitude of the participants was measured using 11 items based three measurement scales with agree (3 points), neutral (2 points), and disagree (1 point). As a result the score varied from 11 to 33. Therefore, respondents with a mean score of  $\geq 27$  (80%) were considered as having a favorable attitude towards the prevention of COVID-19.**

Question #15. Conducting of pre-test and keeping of the recommended physical distances should be considered as parts of ethical consideration rather than data collection.

**Response: Based on the comment we moved the statement of keeping recommended physical distance during data collection to ethical consideration from method section (Please see the ethical consideration section).**

Question #16. Is it feasible to conduct double data entry?

**Response:** We have written in a different term what we did, which is wrong. Thank you for your commitment in bringing such errors for correction. We mean that and what we did was data entry was re-checked for 10% of the sample size in order to control data entry errors of the entered data and data cleaning was carried before statistical analysis. Thank you so much.

Question#17. The overall knowledge of the respondents should also be stated in figures, percentages using 95% CI based on the operational definitions stated in the methods section.

**Response: Based on the operational definition, the knowledge of the respondents' was presented using figures and percentages with 95%CI. Therefore, about 280 (69.3%) (CI; 65.1-73.8) of the participants had a good knowledge towards prevention of COVID-19.**

Question #18. Your sample size is 422. However, you collect from 404 participants alone. Why? None response rate is rare in interviewer administered/ face to face questionnaire. Why this discrepancy arises?

**Response: The response rate of the study was 95.7%. The response rate of interviewer administered questionnaire is higher than self-administered one. But in the case of our study, the study subjects were visitors of health care facilities who came for different activities including medical treatments. The non-response rate of the study participants means that those study participants who are unable to provide data due to shortage of time, unwillingness to be part of the study and etc. Since the study subjects were all visitors of the healthcare facilities who came for different activities including medical treatment. Therefore they withdraw from the interview for different personal reasons which made the non-response rate higher than the expected one. Of course the 95.% response rate is good for such type of study.**

Question #19. The heading of Status of Knowledge, attitude, and preventive practice of COVID-19. It is better to avoid this title and write in their own parts as I comments above.

**Response: Based on your comment we omitted this subheading and the contents were written in their own parts accordingly.**

Question #20. Predictor is used for more advanced studies like cohort study. In this cross-sectional study, it is better to say associated factors.

**Response: Yes, this is excellent idea too. The word predictor is replaced by associated factors throughout the revised version of the manuscript.**

Question #21. Discuss only your pertinent findings like knowledge, attitude, and practice rather than discussing on sources of information towards COVID-19.

**Response: Thank you very much for your comment. We tried to discuss only the pertinent finding of knowledge, attitude, and practices towards prevention of COVID-19. As a result, other less important points like sources of information are removed in the revised version of the manuscript.**

Question #22. Why your justification becomes similar throughout your discussion? Please give reasonable justifications for each

**Response: We tried to write specific justification for each variation in the finding of this study with other study finding**

Question #23. Conclude based on your objective. Please also include the major factors affecting practice in the conclusion section. Finally, your recommendations should be based on your results. Does it mean, there is no problem on knowledge and attitude? Please rewrite it

**Response: In the original version of the manuscript our emphasis was only on prevention practice of COVID-19 rather than knowledge and attitude of visitors towards COVID-19 prevention measures. But now the title is modified in to knowledge, attitude, and practice. Therefore the conclusion is amended according to finding of the study. (See the revised version of the manuscript.**

Question #24. Avoid variables which contain a confidence interval of 1 in binary logistic regression.

**Response: All variables in logistic analysis which contains a confidence interval of 1 are excluded**

: Question #25. Check the figure digits

**Response: We have accepted the comment and all figure digits are presented with two digit value**

I hope that the revised manuscript is accepted for publication in PLoS ONE.

Sincerely yours,

Gete Berihun

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