

Review Article

Knowledge, attitude and practice towards Coronavirus disease 2019 prevention in Ethiopia: Systematic review and meta-analysis

Dinka Fikadu Gamtesa*, Habteyes Hailu Tola, Gadissa Gutema, Biniyam Dagne, Bira Bejiga Bedassa

Ethiopian Public Health Institute, Tuberculosis/HIV Research Directorate, Addis Ababa, Ethiopia.

ARTICLE INFO

ABSTRACT

Received 11.07.2021
Revised 05.08.2021
Accepted 21.10.2021
Published 15.12.2021

Key words:

Corona virus disease-19;
Knowledge;
Attitude;
Practice

Introduction: Level of knowledge, Attitude and Practice (KAP) of the community towards corona virus disease 2019 (COVID-19) is important to prevent and control the disease. In Ethiopia there are some studies that assess the KAP's of different segments of the community and reported different results. However, there is limited review evidence that pooled the proportion of KAP of the community towards COVID-19 prevention and control of the disease in Ethiopia. The aim of this systematic review and meta-analysis was to summarize and pool the proportion of KAP towards COVID-19 prevention and control in general community.

Methods: A systematic review and meta-analysis study was conducted to estimate the pooled proportion of Knowledge, Attitude and Practice towards COVID-19 prevention and control in general community. Electronic databases such as PubMed, Google Scholar and Science Direct were searched for studies reported in English language without restricting publication year. The search strategy was used by combining the keywords: "Knowledge", "Attitude", "Practice", "COVID-19", and "Ethiopia" both in Medical Subject Heading (MeSH) and free text terms. Data was analyzed using STATA version 14. Random effects model meta-analysis was employed to estimate pooled proportion of KAP's towards COVID-19 in general community

Results: Data on 12391 participants which retrieved from 26 studies included into this review. The study was pooled to estimate the pooled proportion of knowledge, attitude and practice towards COVID-19 prevention and control in the community. Our meta-analysis revealed that the pooled proportion of good knowledge was 62% (95% CI: 54%-71%), while favorable attitude 64 % (95% CI: 58%-71%) and prevention practice 44% (95% CI: 32%-56%).

Conclusion: Our review indicated that the knowledge, attitude and practice towards COVID-19 prevention and control in general community were considerably insufficient. There are several different factors that affects the level of practice towards COVID-19 prevention. Therefore, collaborative efforts should be made by the government, partners and the media to improve the knowledge, attitude and practice of the general community towards COVID-19 preventive practices.

*.Corresponding Author: ejeta430@gmail.com



Introduction

Coronavirus disease 2019 (COVID-19) is a respiratory disease that can spread from person to person. A novel coronavirus called Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) is the cause of COVID-19 and the outbreak first recognized in China in December 2019.¹ Ethiopia reported its first COVID-19 confirmed case on 13 March, 2020.² World health organization declared that Corona virus disease 2019 as pandemic on March, 2020.³ Coronavirus disease 2019 is the new public health crisis of respiratory illness.⁴ Assessing community level knowledge, attitude and practice towards COVID-19 is important to prevent and control the transmission.⁵ Study in Nepalese showed that 60.0-98.7% responded correct answer for knowledge, while 77.9-96.4% had good attitude and 78.2-95.0 % good practice.⁶ Also study from Bangladesh indicated 48.3% of participants had accurate knowledge, 62.3% positive attitudes, and 55.1% frequent practices of COVID-19 prevention recommendations.⁷ Being older, higher education, employment, higher monthly family income, and having more frequent prevention practices were factors associated with positive attitude.⁷ Moreover, female sex, older age, higher education, higher family income, urban residence, and having more positive attitudes were factors associated with good prevention practice.⁷ Study from china indicated 90% of the participants had correct answer for knowledge, and 97.1% scored good attitude, while 98.0% practice wore masks when going out.⁸ Moreover, a study in India among medical students revealed that the majority of the participants (86.7%) had correct knowledge about the main symptoms of

COVID-19, and most of them showed good practice on the prevention of COVID-19.⁹ Report from Philippines also indicated 94.0% of respondents had heard about COVID-19, and 89.5% knew as coughing and sneezing are transmission route of COVID-19.¹⁰ Other study in china among health workers showed 89% knowledgeable of COVID-19, more than 85% feared self-infection, and 89.7% followed correct practices of COVID-19 prevention.¹¹ Evidence from Nigeria reported (99.5%) had good knowledge of COVID-19, (79.5%) positive attitudes, 92.7% practicing social distancing/self-isolation, 96.4% frequent hand washing and 82.3% using face mask.¹² Also report from Malaysia showed (83.4%) avoiding crowds, (87.8%) practicing proper hand hygiene and (51.2%) wearing face masks.¹³ A study in Uganda revealed that 69% had sufficient knowledge, 21% positive attitude, and 74% good practices toward COVID-19.¹⁴ Age >40 years were negatively associated with knowledge and news media were positively associated. Age 40 years or more and holding a diploma educational status were positively associated with COVID-19 prevention practice.¹⁴ Study among front line healthcare workers in Nepal revealed that there were 76% adequate knowledge, 54.7% positive attitude and 78.9% appropriate practice. Male sex, nurse and doctor, using websites as source of information and infection prevention control training were significantly associated with adequate knowledge. Moreover, factors significantly associated with appropriate practice were master's degree or above and online course related to COVID-19.¹⁵ There were studies reported from Ethiopia on KAP's of different segments of the community, which reports different proportion

of KAP's of the community.¹⁶⁻⁴¹ But, no review and meta analysis study that summarize and pool the available evidence of knowledge, attitude and practice of the general community in Ethiopia. Therefore, current review and meta analysis was aimed to estimate the pooled proportions of knowledge, attitude and practice of the general community. Also the present study intends to summarize the reasons why the community not practice COVID-19 prevention recommendations in order to help Ministry of Health and similar organizations, and planners in COVID-19 controlling and prevention in Ethiopia.

Methods

Searching strategy

A systematic review and meta-analysis

study was conducted to estimate the pooled proportion of knowledge, attitude and practice of the community towards COVID-19 following PRISMA (Preferred Reporting Items for Systematic Review and Meta-analysis) (Figure 1 and PRISMA checklist). We systematically search electronic databases such as PubMed, Google Scholar, Science Direct and free search for studies reported in English language without restricting publication year. The search was conducted from October 1-15/2020. The bibliographies of included articles were also screened for the relevant studies. The search strategy was used by combining the keywords: “Knowledge”, “Attitude”, “Practice”, “COVID-19”, and “Ethiopia” both in Medical Subject Heading (MeSH) and free text terms.

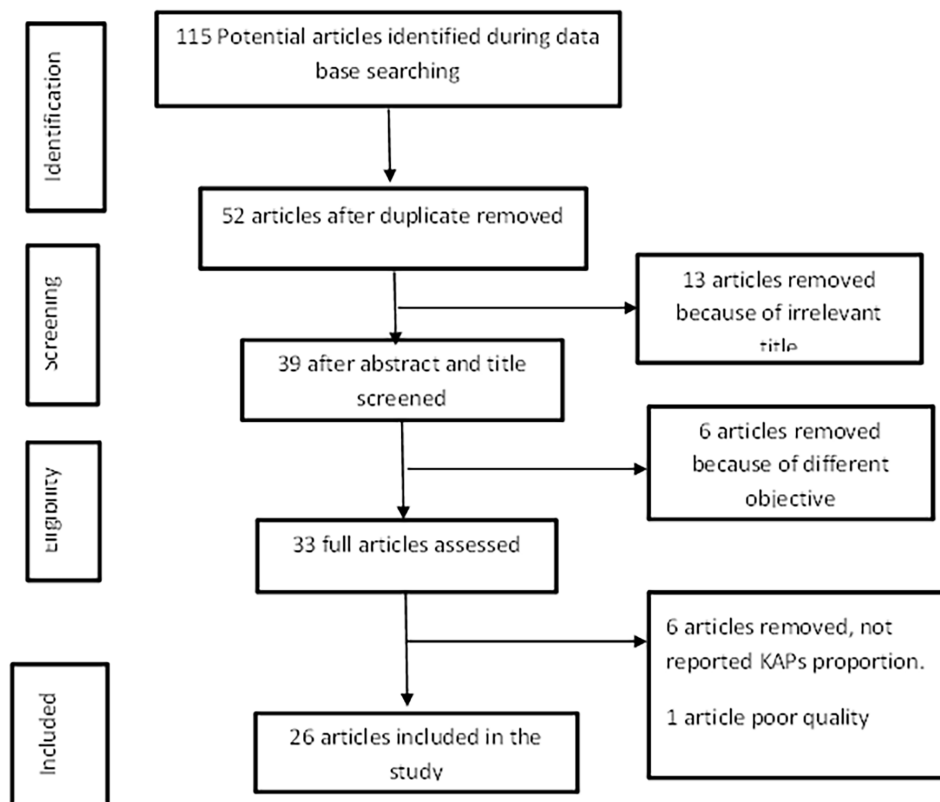


Figure 1. Study selection follow diagram

Inclusion and Exclusion criteria

Cross-sectional study design and reported proportion of knowledge, attitude and practice towards COVID-19 prevention and control among different community segments in Ethiopia were included without restricting publication year. In addition, studies conducted both at the community and institutional levels were included. Any studies that not reported proportion of knowledge, attitude and practice of the community on COVID-19, studies who have poor quality and duplicated were excluded (Figure 1).

Two authors (DFG, HHT) independently conducted search and screened the studies based on each study title and abstract at the first step. In the next step both authors were selected full text studies based on eligibility criteria. In the case of disagreements, the two authors were resolved the disagreement by the decision of the third author (GG).

Study quality assessment

The quality of the included studies were assessed by the modified version of Newcastle-Ottawa quality assessment scale (NOS).⁴² The scale assesses three key points (domains) of a given study: participant selection, comparability of the groups and outcome measurement. Star was assigned for each point of the scale to categorize the studies into good, fair and poor quality based on the NOS.⁴² A good quality study was obtained 3 or 4 stars in participant selection, 1 or 2 stars in comparability of groups, and 2 or 3 stars in outcome assessment. Similarly, a fair quality study was scored 2 stars in participant selection, 1 or 2 stars in comparability of the groups, and 2 or 3 stars in outcome assessment. However,

a poor quality study was scored 0 or 1 star in participant selection, 0 stars in comparability of the groups and 0 or 1 star in outcome assessment. In case of disparity between the two authors (DFG and HHT) on the quality of the study, the disparity was resolved by the decision of the third author (GG).

Study selection

In the first step the articles were identified based on the objectives of the study, and screened by the titles and the abstracts. The articles that not satisfied the inclusion criteria were excluded at the second stage. After this step, the eligible articles were further screened by reading the full texts; and those not met the inclusion criteria were excluded. Finally, the eligible full text articles that fulfilled the inclusion criteria were included in the review.

Data extraction

Data was extracted on Microsoft excel spreadsheet from the included studies. The primary outcome of this study was KAP of the community towards COVID-19 that were measured by interviewer guided questionnaire. Information was extracted on the characteristics of participants such as mean age, and sex. Data was also extracted on studies' characteristics: name of first author, publication year, study setting, study design and sample size. In addition, proportion of Knowledge, attitude and practice was extracted from each included studies.

Statistical analysis

Data was analyzed by STATA version 14 (StataCorp, College Station, TX, USA).

Random effects model meta-analysis was used to estimate the pooled proportion of KAP towards COVID-19 prevention and control. The heterogeneity among effect sizes of included studies were evaluated using the Q test results with significance difference at $p < 0.1$ and the I^2 statistic value $> 75\%$.⁴³ In addition, the effects of sample size and mean age on the heterogeneity in the proportion of KAP towards COVID-19 was assessed by moment based meta-regression models. We also qualitatively summarized the factors that affect knowledge, attitude and practice towards COVID-19 prevention and control in a general community.

Result

Characteristics of study included in the review and meta-analysis.

Table 1 shows characteristics of included studies in the review and meta-analysis. Out of 115 articles identified during electronic database search 26 articles fulfill the inclusion criteria and included in the review (Figure 1). Ten of the study was done in Amhara region,^{16,17,28,35-41} four study in Addis Ababa,¹⁸⁻²¹ four in southern nation and nationality region of Ethiopia,²²⁻²⁵ three in Tigray region,^{26,27,29} two in Oromia region,^{30,31} two at national level,^{32,33} and one comparison with other countries.³⁴ We have pooled a total of 12391 participants of different community segments to estimate the pooled proportion of knowledge, attitude and practice to-wards COVID-19 prevention and control in a general community. Twenty two of the studies report mean age of the participants. The lowest mean age was 28.47²⁵ and the highest was 56.5.¹⁷ The smallest sample size was 46.³⁹ and largest was 1170.²⁴ All studies was published

in 2020. Three studies not reported sex of the participants.^{17,20,34} Quality categories of the included studies; two under good, 24 were grouped under fair category.

Knowledge of the community to wards COVID-19

The overall pooled proportion of good knowledge of the community towards COVID-19 prevention and control in Ethiopia was 62% (95% CI: 54%-71%) (Figure 2). We used the random effects model because the chi-square result of based Q test and I^2 statistics (variation in effect sizes attributable to heterogeneity) showed high heterogeneity between the studies ($Q = 3079.72$ ($df = 23$), $p < 0.001$ and $I^2 = 99.25\%$).

Attitude of the community to wards COVID-19

The overall pooled proportion of favorable attitude towards COVID-19 prevention and control in the community in Ethiopia was 64 % (95% CI: 58%-71%) (Figure 3). There was significant heterogeneity between the true effect sizes of attitude of included primary studies ($Q = 415.85$ ($df = 13$), $p < 0.001$ and $I^2 = 96.87\%$)

Prevention practice of the community to wards COVID-19

The overall pooled proportion of COVID-19 prevention practice in the community in Ethiopia was 44% (95% CI: 32%-56%) (Figure 4). There was significant heterogeneity between the true effect sizes

Table 1. Characteristics of studies included in the review and meta-analysis

First author, publication year	Study setting	Study design	Study tools and Sample size
Asemahagn et al, 2020 ¹⁶	Health Facility based	cross sectional study	Structured questionnaire and 398 health workers
Akalu et al, 2020 ¹⁷	Health Facility based	cross sectional study	Structured questionnaire & 404 chronic diseases patients
Mechessa et al, 2020 ²³	Community Based	cross sectional study	Structured questionnaire and 393 sampled population
Kebede et al, 2020 ³⁰	Health Facility based	cross sectional study	Tools adapted from WHO resources and similar studies and 247 Hospital visitors
Tadesse et al, 2020 ²⁹	Health Facility based	cross sectional study	Structured questionnaire and 415 Health workers
Kassa et al, 2020 ²⁸	Community Based	cross sectional study	Questions adapted from WHO COVID-guideline and a similar study and 828 selected population
kassie et al, 2020 ³⁶	Health Facility based	cross sectional study	Structured questionnaire and 408 health workers
Nigussie et al, 2020 ²⁵	Community Based	cross sectional study	Questionnaire and 528 selected population
Tesfaye et al, 2020 ¹⁸	Health Facility based	cross sectional study	Questionnaire and 295 pharmacies
Adhena et al, 2020 ²⁶	Community Based	cross sectional study	Questionnaire and 419 selected population
Asmelash et al, 2020 ³⁷	Community Based	cross sectional study	Questions adapted from WHO COVID-guideline and a similar study and 410 religious clerics and traditional healers
Birihane et al, 2020 ³⁸	Health Facility based	cross sectional study	Questions adapted from WHO COVID-guideline and a similar study and 183 Health workers
Girma et al, 2020 ³²	Health Facility based	web-based online survey	Electronically administered questionnaire and 273 health workers
Haftom et al, 2020 ²⁷	Community Based	cross sectional study	Questionnaire adapted from similar study and 331 adults quarantined for COVID-19
Tadessa et al, 2020 ²⁰	Health Facility based	cross sectional study	Questionnaire adapted from similar study and 628 government employee
Tadesse et al, 2020 ¹⁹	Health Facility based	cross sectional study	Questionnaire adapted from similar study and 408 health workers
Taye et al, 2020 ³¹	Health Facility based	cross sectional study	Questionnaire adapted from similar study and 423 Hypertension and Diabetes Mellitus
Yimenu et al, 2020 ³⁹	Health Facility based	cross sectional study	Structured questionnaire adapted from previous literature and 46 pharmacist
Tamire et al, 2020 ²¹	Health Facility based	cross sectional study	Standardized well-structured questionnaire and 526 health workers
Abate and Mokenin, 2020 ⁴⁰	Health Facility based	cross sectional study	Adapted from WHO and similar study and 387 hospital visitors
Andarge et al, 2020 ²²	Health Facility based	cross sectional study	Standardized questionnaire and 806 adults with chronic conditions
Lee et al, 2020 ³⁴	Health Facility based	cross sectional study	Questionnaire developed by public health experts and 175 population
Kassie et al, 2020 ³⁵	Health Facility based	cross sectional study	Questionnaire adapted from similar study and 630 health workers
Awake et al, 2020 ²⁴	Community Based	cross sectional study	Questionnaire and 1170 selected population
Geda et al, 2020 ³³	Community Based	cross sectional study	Survey questions and 1037 selected population
Kabito et al, 2020 ⁴¹	Community Based	cross sectional study	Structured questionnaire and 623 selected population

of prevention practice of included primary studies ($Q = 1920.96$ ($df = 14$), $p < 0.00$ and $I^2 = 99.27\%$).

Common COVID-19 recommended prevention practices in Ethiopia

The pooled proportion of frequent hand washing practices was 67% (95% CI: 54%-79%) (Table 2), wearing face mask was 48% (95% CI: 35%-62%) (Table 2), avoiding visiting crowded area was 42% (95% CI: 32%-51 %) (Table 2), applied social distance was 45% (95% CI: 32%-59%) (Table 2), avoid hand shaking was 61% (95% CI: 50%-72%)

(Table 2), and cover mouth with elbow during sneezing and coughing was 57 % (95% CI: 34%-79%) (Table 2).

Factors associated with good knowledge on COVID-19

Completed primary school and above, using internet, were positively associated and rural residence and no formal education was negatively associated with good knowledge regarding COVID-19 prevention (Table 3).

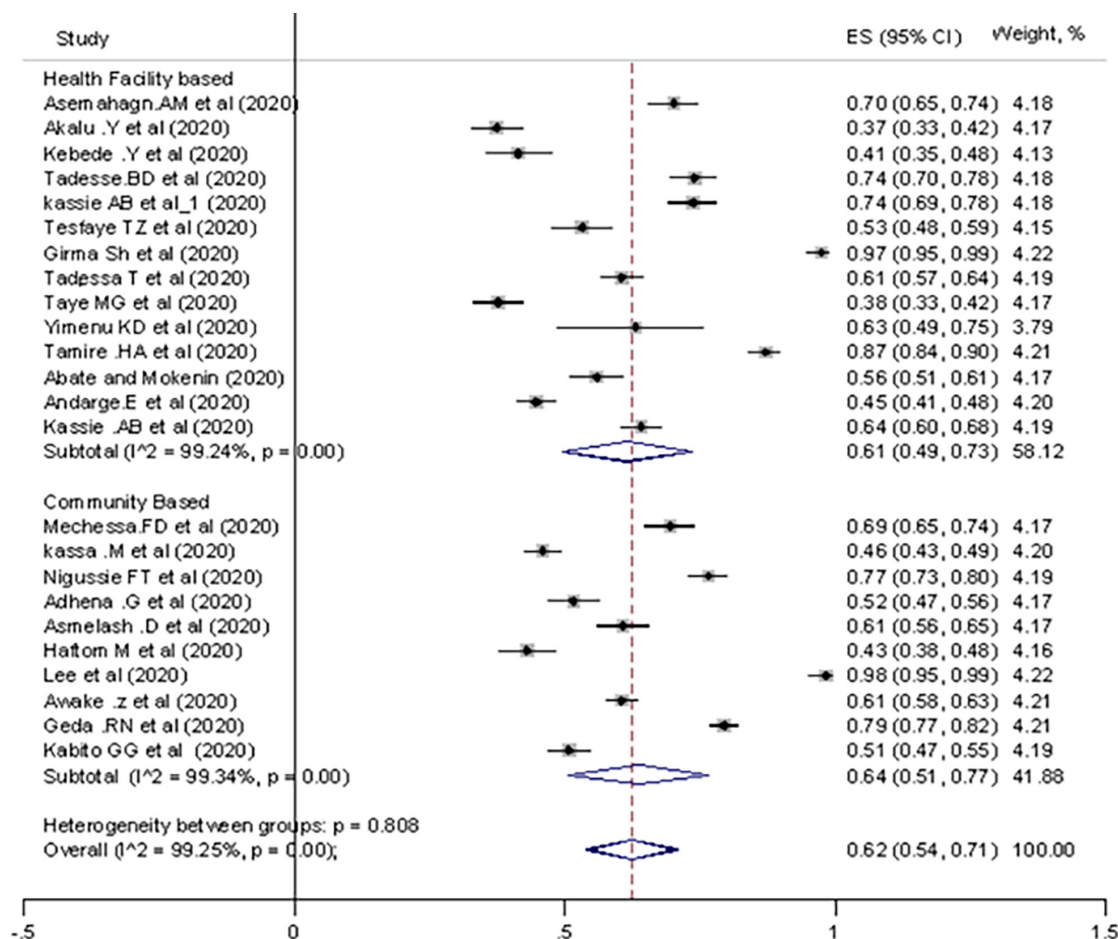


Figure 2. Pooled proportion of good knowledge of the community to wards COVID-19 prevention and control in Ethiopia (Pooled proportion estimated using random-effect model, *ES=effect size).

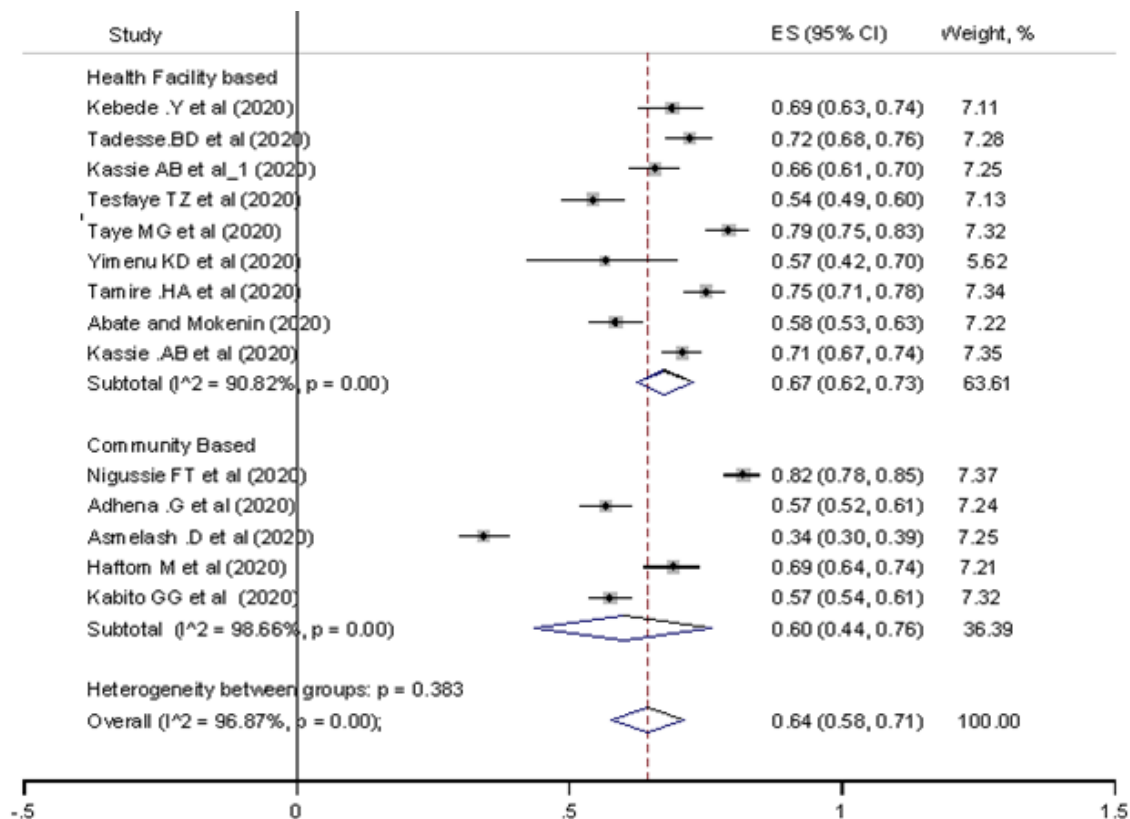


Figure 3. Pooled proportion of favorable attitude of the community to wards COVID-19 prevention and control in Ethiopia (Pooled proportion estimated using random-effect model, *ES=effect size).

Table 2. Common recommended COVID-19 prevention practice sub -group analysis based on study setting in Ethiopia

Types of prevention	Study setting	Number of study	Proportion of prevention practice	X ²	df	I ²	P-value
Wearing face mask	Health facility based	9	58% (44-71%)	719.52	8	98.89%	P<0.001
	Community based	5	32% (17-47%)	248.94	4	98.39%	P<0.001
Overall		14	48 % (35-62%)	1844.71	13	99.30%	P<0.001
Frequent hand washing	Health facility based	11	68% (56-80%)	1328.62	10	99.25%	P<0.001
	Community based	4	63% (23-102%)	1875.00	3	99.84%	P<0.001
Overall		15	67 % (54-79%)	3238.70	14	99.57%	P<0.001
Avoid visiting crowded area	Health facility based	6	46 % (35-58%)	189.72	5	97.36%	P<0.001
	Community based	5	36% (22-51%)	191.18	4	97.91%	P<0.001
Overall		11	42% (32-51%)	451.12	9	97.78%	P<0.001
Applied social distance	Health facility based	4	48% (28-67%)	159.88	3	98.12%	P<0.001
	Community based	2	39% (36-42%)	-	1	-	-
Overall		6	45% (32-59%)	222.94	5	97.76%	P<0.001
Cover mouth and nose with elbow during sneezing and coughing	Health facility based	6	62% (36-88%)	1712.48	5	99.71%	P<0.001
	Community based	2	45% (42-49%)	-	1	-	-
Overall		8	57% (34-79%)	2082.86	7	99.66%	P<0.001

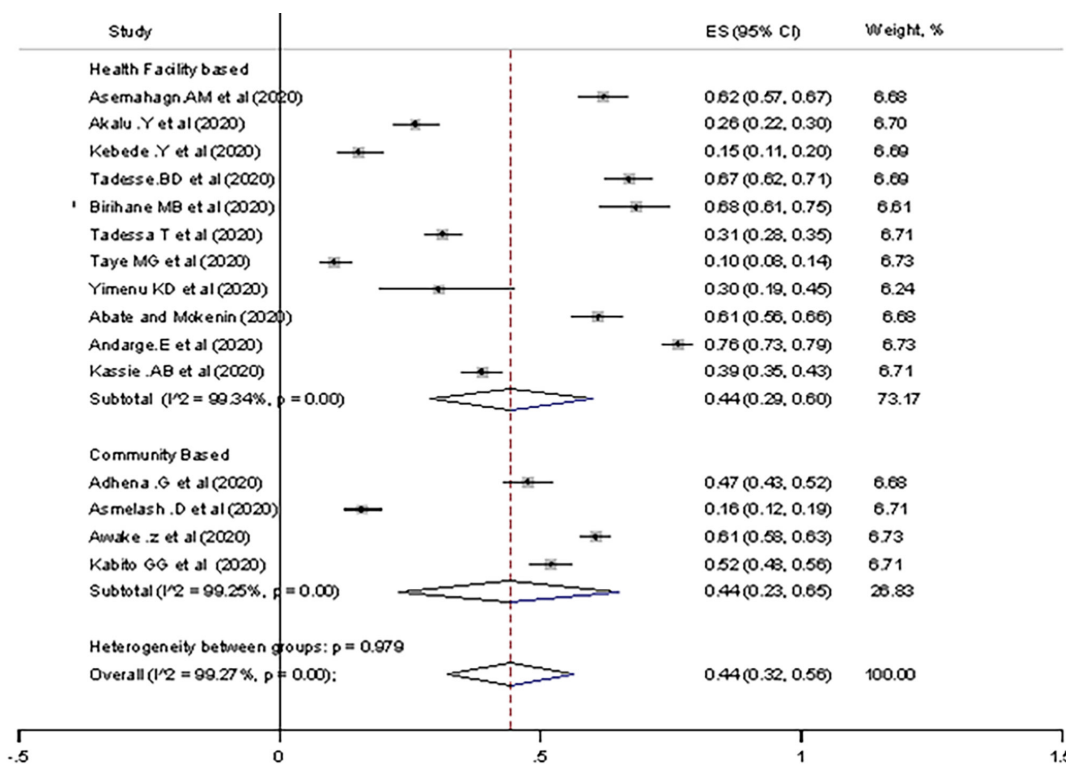


Figure 4. Pooled proportion of prevention practice of the community to wards COVID-19 prevention and control in Ethiopia (Pooled proportion estimated using random-effect model, *ES=effect size).

Table 3. Factors positively and negatively associated with knowledge of COVID-19 in the community of Ethiopia

Authors	Positively associated with good knowledge to wards COVID-19	Negatively associated with good knowledge to wards COVID-19
Kassie et al ³⁶	Having master’s degree	-
Nigussie et al ²⁵	Education levels of degree or higher	-
Asmelash et al ³⁷	Completed primary school and above	-
Akalu et al ¹⁷	-	Educational status of can’t read and write, rural residence
Mechessa et al ²³	-	lack of formal education
Kassa et al ²⁸	-	Living in rural area, unable to read and write
Adhena et al ²⁶	-	No formal educational
Awake et al ²⁴	Using internet	-
Asemahagn et al ¹⁶	using social media	-

Factors associated with COVID-19 prevention practice

Able to read and write, chronic illness, urban residence and knowledge about COVID-19

were positively associated with COVID-19 prevention practice, while rural residence, unemployment, and no formal education were negatively associated with COVID-19 prevention practice (Table 4).

Table 4. Factors positively and negatively associated with COVID-19 prevention practice in the community of Ethiopia

Authors	Positively associated with good COVID-19 prevention practice	Negatively associated with good COVID-19 prevention practice
Asemahagn et al ¹⁶	knowledge about COVID-19, having chronic illnesses	Rural residence
Kebede et al ³⁰	Knowledge status and self- efficacy	unemployment
Asmelash et al ³⁷	Able to read and write, completed secondary school and university/college, known underlying disease	-
Girma et al ³²	knowing the source of COVID-19 infection	-
Haftom et al ²⁷	Higher education level, Good knowledge	-
Andarge et al ²²	Higher level of education, being urban residence, having a good knowledge	-
Akalu et al ¹⁷	-	Cannot read and write, chronic disease of rural residence, income of <7252 Ethiopian birr & poor knowledge
Adhena et al ²⁶	-	Unemployment
Taye et al ³¹	-	No formal education, having poor knowledge about COVID-19
Abate and Mokenin ⁴⁰	-	Unemployed, rural residency, poor knowledge

Table 5. Meta regression analysis for mean age and sample size as reason of heterogeneity on proportion of good knowledge, Favorable attitude and prevention practice of the community to wards COVID-19 prevention and control

Good knowledge of the community to wards COVID-19 prevention and control in Ethiopia				
Predictive variable	Unadjusted model		Adjusted model	
	β(95%CI)	P -value	β(95%CI)	P -value
Mean age in years	-1.637 (-7.644 -4.370)	0.575	-2.13 (-4.793-0.423)	0.095
Sample size	0.584 (0.464 -0.705)	0.000	0.530 (0.364 - 0.697)	<0.0001
Favorable attitude of the community to wards COVID-19 prevention and control in Ethiopia				
Predictive variable	Unadjusted model		Adjusted model	
	β(95%CI)	P -value	β(95%CI)	P -value
Mean age in years	0.479 (-7.898 -8.858)	0.902	-0.714 (-3.364 -1.934)	0.562
Sample size	0.641 (0.384 - 0.899)	0.000	0.653 (0.462 - 0.846)	<0.0001
prevention practice of the community to wards COVID-19 prevention and control in Ethiopia				
Predictive variable	Unadjusted model		Adjusted model	
	β(95%CI)	P -value	β(95%CI)	P -value
Mean age in years	0.479 (-7.898 -8.858)	0.902	-0.714 (-3.364 -1.934)	0.562
Sample size	0.641 (0.384 - 0.899)	0.000	0.653 (0.462 - 0.846)	<0.0001

Meta regression analysis

Sample size and mean age was assessed for the effect of heterogeneity between each study using moment based meta regression model. The results showed that sample size significantly predicted the heterogeneity of included studies' effect sizes on knowledge, attitude and practice towards COVID-19 prevention and control in the community (Table 5).

Discussion

Assessing community knowledge, attitude and practice towards COVID-19 prevention and control is important to limit the transmission of the virus.⁵ In Ethiopia some studies done to assess the knowledge, attitude and practice towards COVID-19 prevention among different segment of the community and reported heterogeneous proportion of knowledge, attitude and practice. However there was no meta-analysis that pools the knowledge, attitude and practice of the community towards COVID-19 prevention and control at country level. We include a total of 26 articles and 12391 participants of different community members to pool the knowledge, attitude and practice of the community towards COVID-19 prevention and control in Ethiopia.

The result of our meta-analysis revealed that the pooled proportion of good knowledge was 62%, while favorable attitude 64 % and good prevention practice 44%. The current review study pooled estimate is less than the finding reported from china which indicated 90% on correct knowledge and 97.1% good attitude towards COVID-19 prevention.⁸ The present review pooled proportion of COVID-19 prevention practice was less than the previous

study reported from Bangladesh (55.1%).⁷ Studies reported from India⁹ and Nigeria¹² were reported higher good knowledge proportion on COVID-19 prevention. The similar study from Nigeria indicated higher proportion of positive attitude toward COVID-19,¹² this finding is higher than our results. A study reported from Uganda had shown 69% of the participants had sufficient knowledge, and 74% had good practices toward COVID-19¹⁴ which are higher than our pooled proportions.

In addition, our meta-analysis showed that pooled proportion of frequent hand washing practice was 67%(95% CI: 54% - 79%), wearing face mask 48 %(95% CI: 35% - 62%), avoiding visiting crowded area 42% (95% CI: 32% - 51%), applied social distance 45% (95% CI: 32% - 59%) and covering mouth and nose with elbow during sneezing and coughing 57% (95% CI: 34% - 79%). These results were lower than study reported from china which revealed 98.0% of the participant wore masks.⁸ Similarly, study reported from Philippines had shown that 89.9% of the participants responded that the most important COVID-19 prevention is hand washing with soap,¹⁰ which is much higher than our findings. Moreover, study reported from Malaysia¹³ indicated the proportion of avoiding crowd places (83.4%) and practicing proper hand hygiene (87.8%) which are higher than our estimated pooled proportion. The similar study reported from Malaysia is also indicated about 50% of the participants wearing face masks¹³ which was higher than our finding in which 48% of participants wear face masks.

Able to read and write, chronic illness, urban residence and having knowledge about COVID-19 were positively associated with COVID-19 prevention practice which is in line with the result reported from Uganda.¹⁴

Moreover, study reported from Nepal had shown having master degree or above was significantly associated with appropriate practice.¹⁵ Rural residence, unemployment, and no formal education were negatively associated with COVID-19 prevention practice. Completed primary school and above, using internet was positively associated and rural residence and no formal education was negatively associated with good knowledge towards COVID-19.

Conclusion

Our review indicated that the knowledge, attitude and practice towards COVID-19 prevention and control in the general community in Ethiopia were considerably insufficient. Several and different factors were negatively associated with knowledge, attitude and practice towards COVID-19 prevention and control practice in the community. Collaborative effort should be made by the government, stakeholders and media to enhance knowledge, attitude and practice towards COVID-19 prevention in the general community in Ethiopia.

Abbreviations

COVID-19: Corona Virus Disease 2019; KAP: Knowledge, Attitude and Practice; MeSH: Medical Subject Heading; NOS: Newcastle-Ottawa quality assessment scale; SARS-CoV-2: Severe Acute Respiratory Syndrome Corona Virus 2; PRISMA: Preferred Reporting Items for Systematic Review and Meta-analysis

Ethical clearance and consent to participate

Ethical clearance and consent to participate

was not applicable for the data. However, the protocol of this study was pre-registered on PROSPERO (International prospective register of systematic reviews) University of York, Centre for Reviews and Dissemination with registration number of CRD42020206252.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study were included in this published article as supporting data.

Funding

The authors received no specific funding for this work.

Competing interests

The authors have declared that no competing interest exists

Acknowledgements

The authors acknowledge the contribution of Ethiopian Public Health Institute for the provision of internet access.

Reference

1. ACHA Guidelines Preparing for COVID-19. 2020.
2. Available from: <https://www.afro.who.int/news/first-case-covid-19-confirmed-ethiopia>
3. Coronavirus disease 2019 (COVID-19)

Situation Report – 51. Vol. 2019. 2020.

4. Hafeez A, Ahmad S, Siddiqui SA, Ahmad M. A Review of COVID-19 (Coronavirus Disease-2019) Diagnosis, Treatments and Prevention. 2020;4(2):116–25.

5. RAPID RISK ASSESSMENT European Centre for Disease Prevention and Control. Outbreak of novel coronavirus disease 2019 (COVID-19): increased transmission globally – fifth update, 2 March 2020. ECDC: Stockholm; 2020. Stockholm; 2020.

6. Asraf H, Garima T, BSM et al. Knowledge, attitudes, and practices towards COVID-19 among Nepalese Residents: A quick online cross-sectional survey. Vol. 11, *Frontiers in Public Health*. 2020.

7. Ferdous MZ, Id SI, Sikder T, Syed A. Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online based cross-sectional study. *PLoS One* [Internet]. 2020;15(10):1–17. Available from: <http://dx.doi.org/10.1371/journal.pone.0239254>

8. Zhong B, Luo W, Li H, Zhang Q, Liu X, Li W, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci*. 2020;16.

9. Maheshwari S, Gupta PK, Sinha R, Rawat P. Knowledge, attitude, and practice towards coronavirus disease 2019 (COVID-19) among medical students: A cross-sectional study. *J Acute Dis*. 2020;9(May):100–4.

10. Lau LL, Hung N, Joy D, Ferma J, Dodd W, Ave JV. Knowledge, attitudes and practices of COVID-19 among income-poor households

in the Philippines: A cross-sectional study. *J Glob Health*. 2020;10(1).

11. Zhang M, Zhou M, Tang F, Wang Y, Nie H, Zhang L, et al. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *J Hosp Infect* [Internet]. 2020;105(2):183–7. Available from: <https://doi.org/10.1016/j.jhin.2020.04.012>

12. Christopher R, Margaret R, Dauda MAD, Saleh A, Ene P. Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. *J Community Health*. 2020;(0123456789).

13. Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLoS One* [Internet]. 2020;15(5):1–15. Available from: <http://dx.doi.org/10.1371/journal.pone.0233668>

14. Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, Uganda. *Front Public Heal*. 2020;8(April):1–9.

15. Tamang N, Rai P, Dhungana S, Sherchan B, Shah B, Pyakurel P, et al. COVID-19: a National Survey on perceived level of knowledge, attitude and practice among frontline healthcare workers in Nepal. *BMC Public Health*. 2020;20(1):1905.

16. Asemahagn MA. Factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in

Amhara region, Ethiopia: A cross-sectional survey. *Trop Med Health*. 2020;48(72).

17. Akalu Y, Ayelign B, Molla MD. Knowledge, attitude and practice towards covid-19 among chronic disease patients at addis zemen hospital, Northwest Ethiopia. *Infect Drug Resist*. 2020;13:1949–60.

18. Tesfaye ZT, Yismaw MB, Negash Z, Ayele AG. COVID-19-Related Knowledge, Attitude and Practice Among Hospital and Community Pharmacists in Addis Ababa, Ethiopia. *Integr Pharm Res Pract*. 2020;Volume 9:105–12.

19. Tadesse T, Tesfaye T, Alemu T, Haileselassie W. Healthcare worker's knowledge, attitude, and practice of proper face mask utilization, and associated factors in police health facilities of Addis Ababa, Ethiopia. *J Multidiscip Healthc*. 2020;13:1203–13.

20. Tadesse T, Alemu T, Amogne G, Endazenaw G, Mamo E. Predictors of coronavirus disease 2019 (Covid-19) prevention practices using health belief model among employees in Addis Ababa, Ethiopia, 2020. *Infect Drug Resist*. 2020;13:3751–61.

21. Tamire AH, Tamire AH, Legesse TK. Original Article Knowledge, Attitudes, and Practices Towards Coronavirus Disease -19 Among Health Professionals in Addis Ababa. *Ethiop Med J*. 2020;58(4):343–9.

22. Andarge E, Fikadu T, Temesgen R, Shegaze M, Feleke T, Haile F, et al. Intention and practice on personal preventive measures against the covid-19 pandemic among adults

with chronic conditions in southern ethiopia: A survey using the theory of planned behavior. *J Multidiscip Healthc*. 2020;13:1863–77.

23. Mechessa DF, Ejeta F, Abebe L, Henok A, Nigussie T, Kebede O, et al. Community 's Knowledge of COVID-19 and Its Associated Factors in Mizan-Aman Town,. *Int J Gen Med*. 2020;13(9):507–513.

24. Aweke Z, Jemal B, Mola S, Hussen R. Knowledge of COVID-19 and its prevention among residents of the Gedeo zone, South Ethiopia. Sources of information as a factor. *Curr Med Res Opin*. 2020;36(12):1955–60.

25. Nigussie TF. Knowledge , Attitude and PracticetowardsCOVID-19amongArbaMinch Town GSJ : Volume 8 , Issue 6 , June 2020, Online : ISSN 2320-9186 KNOWLEDGE , ATTITUDE AND PRACTICE TOWARDS COVID-19 AMONG ARBA. *Glob Sci Jourunals*. 2020;8(July):1283–307.

26. Adhena G, Hidru HD. Knowledge, attitude, and practice of high-risk age groups to coronavirus disease-19 prevention and control in korem district, tigray, Ethiopia: Cross-sectional study. *Infect Drug Resist*. 2020;13:3801–9.

27. Haftom M, Petrucka P, Gemechu K, Mamo H, Tsegay T, Amare E, et al. Knowledge, attitudes, and practices towards covid-19 pandemic among quarantined adults in Tigray region, Ethiopia. *Infect Drug Resist*. 2020;13:3727–37.

28. Kassa AM, Mekonen AM, Yesuf KA, Woday Tadesse A, Bogale GG. Knowledge level and factors influencing prevention of

- COVID-19 pandemic among residents of Dessie and Kombolcha City administrations, North-East Ethiopia: A population-based cross-sectional study. *BMJ Open*. 2020;10(11):1–9.
29. Tadesse DB, Gebrewahd GT, Demoz GT. Knowledge, attitude, practice and psychological response toward COVID-19 among nurses during the COVID-19 outbreak in northern Ethiopia, 2020. *New Microbes New Infect* [Internet]. 2020;38:100787. Available from: <https://doi.org/10.1016/j.nmni.2020.100787>
30. Kebede Y, Yitayih Y, Birhanu Z, Mekonen S, Ambelu A. Knowledge, perceptions and preventive practices towards COVID-19 early in the outbreak among Jimma university medical center visitors, Southwest Ethiopia. *PLoS One* [Internet]. 2020;15(5):1–15. Available from: <http://dx.doi.org/10.1371/journal.pone.0233744>
31. Taye GM, Bose L, Beressa TB, Tefera GM, Mosisa B, Dinsa H, et al. COVID-19 knowledge, attitudes, and prevention practices among people with hypertension and diabetes mellitus attending public health facilities in Ambo, Ethiopia. *Infect Drug Resist*. 2020;13:4203–14.
32. Girma S, Alenko A, Agenagnew L. Knowledge and precautionary behavioral practice toward covid-19 among health professionals working in public university hospitals in ethiopia: A web-based survey. *Risk Manag Healthc Policy*. 2020;13:1327–34.
33. Geda NR, Legesse B, Kebede SW, Fekadu B, Ababa A. Knowledge and Attitude Towards Covid-19 in. Report. 2020;
34. Lee H, Moon SJ, Ndombi GO, Kim KN, Berhe H, Nam EW. Covid-19 perception, knowledge, and preventive practice: comparison between south korea, ethiopia, and democratic republic of congo. *Afr J Reprod Health*. 2020;24(2 Special Edition COVID-19):66–77.
35. Kassie BA, Adane A, Abebe Kassahun E, Ayele AS, Kassahun Belew A. Poor COVID-19 Preventive Practice among Healthcare Workers in Northwest Ethiopia, 2020. *Adv Public Heal*. 2020;2020(March):1–7.
36. Kassie BA, Adane A, Tilahun YT, Kassahun EA, Ayele AS, Belew AK. Knowledge and attitude towards COVID-19 and associated factors among health care providers in Northwest Ethiopia. *PLoS One*. 2020;15(8 august):1–12.
37. Asmelash D, Fasil A, Tegegne Y, Akalu TY, Ferede HA, Aynalem GL. Knowledge, attitudes and practices toward prevention and early detection of COVID-19 and associated factors among religious clerics and traditional healers in Gondar town, northwest Ethiopia: A community-based study. *Risk Manag Healthc Policy*. 2020;13:2239–50.
38. Biriha BM, Bayih WA, Alemu AY, Belay DM. Perceived barriers and preventive measures of COVID-19 among healthcare providers in debretabor, north central Ethiopia, 2020. *Risk Manag Healthc Policy*. 2020;13:2699–706.
39. Yimenu DK, Demeke CA, Kasahun AE, Asrade S, Mekuria AB. COVID-19: What should health professionals know? Assessment of Knowledge, attitude, and

practice of community pharmacists in a developing country. *SAGE Open Med.* 2020;8:205031212097349.

40. Abate H, Mekonnen CK. Knowledge, attitude, and precautionary measures towards covid-19 among medical visitors at the university of gondar comprehensive specialized hospital northwest Ethiopia. *Infect Drug Resist.* 2020;13:4355–66.

41. Kabito GG, Alemayehu M, Mekonnen TH, Wami SD, Azanaw J, Adane T, et al. Community's perceived high risk of coronavirus infections during early phase of epidemics are significantly influenced by socio-demographic background, in Gondar City, Northwest Ethiopia: A cross-sectional -study. *PLoS One* [Internet]. 2020;15(11 November):1–12. Available from: <http://dx.doi.org/10.1371/journal.pone.0242654>

42. Modesti PA. PAModesti et al. Panethnic differences in blood pressure in europe: a systematic review and meta-analysis. S1 Text:NEWCASTLE - OTTAWA QUALITY ASSESSMENT SCALE (adapted for cross sectional studies). 1–2 p.

43. Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. 2003;557–60.