World Cancer Research Journal WCRJ 2021; 8: e1844

KNOWLEDGE AND UTILIZATION OF SCREENING FOR CERVICAL CANCER AMONG FEMALE IN ETHIOPIA: A SYSTEMIC REVIEW AND META-ANALYSIS

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Abstract – *Objective:* *The aim of this systemic review and meta-analysis was to verify that whether knowledge about screening for cervical cancer related with usage of screening for cervical cancer among female in Ethiopia.*

Previous studies on knowledge about screening for cervical cancer and usage of screening for cervical cancer indicated different findings. We include 12 studies in different regions of Ethiopia. We have done this study focusing on female's usage of screening for cervical cancer

Materials and Methods: *Electronic databases were searched from 2014 to 2019.on reference manager software reporting knowledge and usage of screening for cervical cancer. Data extraction and assessment were guided by PRISMA checklist. Observational studies and studies with Newcastle-Ottawa Scale score > 50% were included in the review. The combined adjusted Odds ratios (OR)) and 95% confidence intervals were calculated using random effect model.*

Results: *Twelve observational studies involving 4704 participants, 1235 of which had usage of screening for cervical cancer, were included. The combined effect size (OR) for usage of screening for cervical cancer comparing female who know about screening for cervical cancer versus female who did not know about screening for cervical cancer was 1.16 (95%CI 0.28 to 4.77),* p*=0.813, I^2=96.23%). There was significant = heterogeneity (Q=291.78; p=0.000; I^2=9 6.23%%. No publication bias was observed (Egger's test:* p*=0.693, Begg's test:* p*=0.131).*

47.16% (2218) women who know cervical cancer screening service 11.41% (537) engaged to use screening for cervical cancer.

The proportion of utilization of screening for cervical cancer among female aged >20 years was 18.22% in 6 of the 12 studies. The overall proportion of screening usage for cervical cancer was 24.21% and 28.08% for those having knowledge of screening for cervical cancer and not having knowledge screening for cervical cancer respectively.

Conclusions: *Knowledge of screening for cervical cancer is not associated with usage of screening for cervical cancer. The association between age and usage of screening for cervical cancer should be explored further.*

KEYWORDS: *Knowledge of screening for cervical cancer, Screening for cervical cancer, Meta-analysis, Usage of screening for cervical cancer, Systematic reviews.*

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INTRODUCTION

Screening for Cervical cancer has a role to identify pre-cervical cancer early and usage screening for cervical cancer is lower in all developing countries and most females were diagnosed at the late stage of disease[1]. Cervical cancer causes many death among female yearly worldwide. If women is screened for cervical cancer once between 30 and 40 years, probability of disease can be decreased by 25-36%. Even though Screening for Cervical cancer has advantage, the usage of screening for cervical cancer is low in developing countries including Ethiopia[2].

Low level of awareness and fewer attitudes about cervical cancer can influence usage of screening for cervical cancer[3].

Usage of screening for cervical cancer is associated with women's knowledge[4]. Knowledge is important to spot the premalignant lesions and the level of awareness should be disseminated among all population to increase understanding of screening and prevent cervical cancer[5].

Screening programs for cervical cancer was implemented worldwide to prevent cervical cancer and Papanicolaou (Pap) test led to decrease in death and illness in developed countries[6].

A previous study[7] indicated that, when the media coverage was more intense, a larger increase in screening rates was evident in postcode areas with high percentages of women of non-English-speaking background.

22% of women had knowledge of screening for cervical cancer or had had usage of screening for cervical cancer[8].

The incidence of cervical cancer in Ethiopia is 26.4 per 100,000 women[9].

In Ethiopia, the coverage of screening usage for cervical cancer is 1%. From all women, 42.7% had heard of screening for cervical cancer and 144 (27.7%) women had good knowledge of screening for cervical cancer. A quarter (25%) of target women had previous usage of screening for cervical cancer[10].

Almost half 210(49.6%) of them had good overall knowledge about cervical cancer, only 9 (2.1%) of them were ever screened. This study identified that those women whose ages were 50 or more were 21 times higher knowledge than those who were young[11].

MATERIALS AND METHODS

Data

Electronic databases were searched from 2014 to 2019.on reference manager software the reason for choosing time period between 2014 and 2019 is authors need updated evidence and many studies in Ethiopia were conducted after 2014.

Quality assessments of included studies were done using the nine-star Newcastle Ottawa Scale (Table 1) as well as we follow PRISMA (PRISMA 2009 Checklist).

A meta-analysis was applied to determine the effect of knowledge about screening for cervical cancer on usage of screening for cervical cancer

Primary concepts of screening 'cervical cancer', 'knowledge about screening of cervical cancer', 'pap smear', 'usage', and 'Ethiopia' were used as search strategy . Using the following search strategies; 'Cervical+ cancer+ screening+ utilization+ Ethiopia;- 'Cervical+ pap smear + screening+ utilization+ Ethiopia;- 'Cervical+ knowledge about cervical cancer screening service + utilization+ Ethiopia;- 'Knowledge about screening for cervical cancer + Ethiopia;- 'cervical + utilization+ Ethiopia.

Identification

Eligibility

Eligibility criteria are (1) observational study ((2) the outcome of interest was usage of screening for cervical cancer (3) report the percentage of practice of screening for cervical cancer according to Knowledge about screening for cervical cancer and (4) Newcastle-Ottawa Scale (NOS) >50%.

Published in languages other than English, included participants with usage of screening for cervical cancer not dichotomized as good and poor practice and studies conducted not in Ethiopia were also excluded.

Data extraction and quality assessment

Two reviewers independently done selection as well as quality assessment of studies and the extracted data from included studies: are author's name, study design, study population, sample size, proportion of women who have knowledge about screening for cervical cancer and women who did not have knowledge about screening for cervical cancer and definition of Utilization of screening for cervical cancer.

The included studies done multivariable-analysis on use of screening for cervical cancer (Table 2) Therefore, a finding controlled for confounding factors was included.

Quality of studies was evaluated by nine-star Newcastle Ottawa Scale (NOS) (Table 3).

Figure 1 shows the selection process of the studies retrieved. 1998 research articles identified through data base searching, 1083 research article after duplicates removes 473 screened and 443 re-

TABLE 1. Newcastle-Ottawa Scale adapted for cross-sectional studies.

Selection: (Maximum 4 stars)
1. Representativeness of the sample:
   a) Truly representative of the average in the target population. * (all subjects or random sampling)
   b) Somewhat representative of the average in the target population. * (non-random sampling)
   c) No description of the sampling strategy.
2. Selected group of users
   a) Due to relevant selection of individuals to exclude factors that will bias results (such as certain diseases or drugs that have an negative/positive effect on bones) *
   b) No relevant/systematic selection
3. Sample size:
   a) Justified and satisfactory (power calculation included). *
   b) Not justified.

Comparability: (Maximum 2 stars)
1. The subjects in different outcome groups are comparable, based on the study design or analysis. Confounding factors are controlled.
   a) The study controls for the most important factor (select one). *
   b) The study control for any additional factor. *

Outcome: (Maximum 3 stars)
1. Ascertainment of the method:
   a) Validated measurement method (interassay CV included). **
   b) Non-validated measurement method, but the method is available or described.*
   c) No description of the measurement tool.
2. Statistical test:
   a) The statistical test used to analyze the data is clearly described and appropriate, and the measurement of the association is presented (including SD/SE and the probability level [*p*-value]). *
   b) The statistical test is not appropriate, not described or incomplete.

cords excluded, 30 full text article assessed for eligibility and 18 full text article excluded for reasons being, studies not in Ethiopia and studies not examining knowledge about screening for cervical cancer service and utilization of screening for cervical cancer and finally 12 studies included in meta-analysis.

Measures

The utilization of screening for cervical cancer was assessed by self-reported action of screening for cervical cancer those ever screened for cervical cancer were categorized as use screening for cervical cancer and otherwise considered as not use screening for cervical cancer

The knowledge about screening for cervical cancer were evaluated by tasking whether they heard about cervical cancer screening or not if they heard about cervical cancer screening they are categorized as knowledgeable about screening for cervical cancer and otherwise categorized as non-knowledgeable about screening for cervical cancer.

Statistical Analysis

Study design is systemic review and meta-analysis. Review Manager Version 5.3 software is used to do the meta-analysis[12]. We estimated the pooled ORs with 95% CIs to examine the relationship between knowledge about screening for cervical cancer and utilization of screening for cervical cancer among female in Ethiopia. We assessed heterogeneity using the I^2 statistic[13]. Random effects model were used with the assumptions of variation for inter survey. *p-value* <0.05 was considered statistically significant.

RESULTS

Study Characteristics

Twelve 12 studies, 4704 females, 1235 females used screening for cervical cancer were included. Table 2 shows description of original studies included (n=12).

The publication year of studies ranged from 2014 to 2019 and constitutes populations from five regions of Ethiopia. Two studies from the Tigray region, another three from Amhara region, the two studies from the Oromia region and four studies from Southern region and one study from Addis Ababa city.

47.16% (2218), women reported knowing cervical cancer screening service, 26.25% (1235) were utilized screening for cervical cancer From women who have usage of screening for cervical cancer, 757 (16.09%) and 478 (10.16%) were in the

TABLE 2. Description of original studies included (n=12), 2019.

Author/ year	Sample size	Tittle/study	Know-ledge design	Utilization screening of Cx ca	
				Good	Poor
Berhanu T et al[14]	286	Knowledge of Cervical Cancer and Its Screening Practice among Health Extension Workers in Addis Ababa, Ethiopia/across sectional, interview based survey	Yes No	19 18	111 138
Dulla D et al[15]	225	Knowledge about cervical cancer screening and its practice among female health care workers in southern ethiopia: a cross-sectional study/Institution-based cross sectional study	Yes No	22 2	168 33
Gebre M et al[16]	225	Factors Affecting the Practices of Cervical Cancer Screening among Female Nurses at Public Health Institutions in Mekelle Town, Northern Ethiopia, 2014: A Cross-Sectional Study	Yes No	24 0	49 152
Geremew B et al[17]	1135	Comprehensive knowledge on cervical cancer, attitude towards its screening and associated factors among women aged 30–49 years in Finote Selam town, northwest Ethiopia/A community based cross-sectional study	Yes No	32 2	246 855
Kassa S et al[18]	735	Knowledge, attitude and practice towards cervical cancer among women in Finote Selam city administration, West Gojjam Zone, Amhara Region, North West Ethiopia, 2017/a community-based cross-sectional study design	Yes No	54 445	88 148
Kress M et al[9]	218	Knowledge, attitudes, and practices regarding cervical cancer and screening among ethiopian health care workers/ self-administered, anonymous, multiplechoice surveys	Yes No	11 26	153 28
Michael E et al[19]	148	Cervical cancer screening utilization and its associated factors among women aged 30 years and above in Woliso town, South West Showa Zone, Oromia region, Ethiopia/ Community based Cross sectional study	Yes No	40 4	90 11
Mulatu K et al[5]	209	Assessment of Knowledge, Attitude and atice on Cervical Cancer Screening among Female Students of Mizan Tepi University, Ethiopia, 2016/Descriptive cross sectional study design	Yes No	8 25	133 43
Muluneh A et al[20]	219	Predictors of cervical cancer screening service utilization among commercial sex workers in Northwest Ethiopia: a casecontrol Study	Yes No	17 29	99 74
Seyoum T et al[1]	281	Utilization of Cervical Cancer Screening and Associated Factors among Female Health Workers in Governmental Health Institution of Arba Minch Town and Zuria District, Gamo Gofa Zone, Arba Minch, Ethiopia, 2016 /facility based cross sectional study	Yes No	21 6	164 90
Solomon K et al[21]	475	Predictors of cervical cancer screening practice among HIV positive women attending adult anti-retroviral treatment clinics in Bishoftu town, Ethiopia: the application of a health belief model/ acility based cross-sectional study	Yes No	79 39	319 38
Teame M et al[22]	548	Factors affecting utilization of cervical cancer screening services among women attending public hospitals in Tigray region, Ethiopia, 2018; Case control study/Hospital based unmatched case control study	Yes No	210 102	59 177

age of <20 years and age of >20 years, respectively. In all studies, the proportion of usage of screening for cervical cancer among female was 1235 (26.25%).

The odds ratios for all studies 1.16 (95%CI 0.28 to 4.77), $p = 0.813$, $I^2 = 96.23\%$%). revealed no statistically significant association of usage of screening for cervical cancer with knowing about screening for cervical cancer relative to not knowing about screening for cervical cancer. There was significant= heterogeneity for all studies ($Q = 291.78$; $p = 0.000$; $I^2 = 96.23\%$%) (Figure 2).

This study shows a statistically significant difference between the two age categories; the age of <20 years and the age of >20 years.

A subgroup analysis showed that the odds ratio for the age of >20 years was higher than that for the age of <20 years (OR = 5.17; 95% CI: 1.75-

TABLE 3. Characteristics of the included studies (n=6) according to Newcastle-Ottawa Quality Assessment Scale, 2020.

Study	*Selection*	*Comparability*	*Outcome*	*NOS scale*
Berhanu T et al[14]	***	**	***	8
Dulla D et al[15]	***	**	**	7
Gebre M et al[16]	***	**	*	6
Geremew B et al[7]	***	**	***	8
Kassa S et al[18]	***	**	**	7
Kress M C et al[9]	***	**	***	8
Michael E et al[19]	***	**	*	6
Mulatu K et al[5]	***	**	*	6
Muluneh A et al[20]	***	**	**	7
Seyoum T et al[1]	***	**	**	7
Solomon K et al[21]	***	**	***	8
Teame M et al[22]	***	**	***	8

15.32 and OR = 0.23; 95% CI: 0.13-0.42) respectively. In other words, knowledge about cervical cancer screening service discrepancy was stronger for the age of >20 years than for the age of <20 years, with age of >20 years much more likely to the usage of screening for cervical cancer. The funnel plot for the subgroups of age > 20 years and age < 20 years indicate that all of the relevant trials that have been conducted were identified. No publication bias was identified (Egger's test: $p = 0.693$, Begg's test: $p = 0.131$) (Figure 4).

The subgroup analysis compares the effect of knowledge about screening for cervical cancer s, good knowledge about screening for cervical cancer versus poor knowledge about screening for cervical cancer on the outcome usage of screening for cervical cancer. The subgroup analysis was done to verify whether age modifies the association of knowledge about screening for cervical cancer and usage of screening for cervical cancer.

The subgroup analysis indicated a statistically significant subgroup effect ($p < 0.00001$) and age modifies the effect of knowledgeable about screening for cervical cancer in comparison to non-knowledgeable about screening for cervical cancer.

knowledgeable about screening for cervical cancer is favored over non-knowledgeable about screening for cervical cancer for age > 20 years, while non-knowledgeable about screening for cervical cancer is favored over knowledgeable about screening for cervical cancer for age < 20 years; therefore, there is qualitative subgroup effect.

There is lower heterogeneity within the age < 20 years subgroup that is 78% relative to age >20 years subgroup (88%).

Forest plot indicated that heterogeneity reduced in subgroups than across all studies, and subgroup analysis explains heterogeneity in the overall analysis.

Considering the covariate distribution, 6 studies included in the age > 20 years subgroup, and 6 studies contribute data to the age < 20 years subgroup.

The number of studies must be six and above in each subgroup in our subgroup there are six studies in each subgroup and number of participants in each subgroup must be greater than 1700 in our

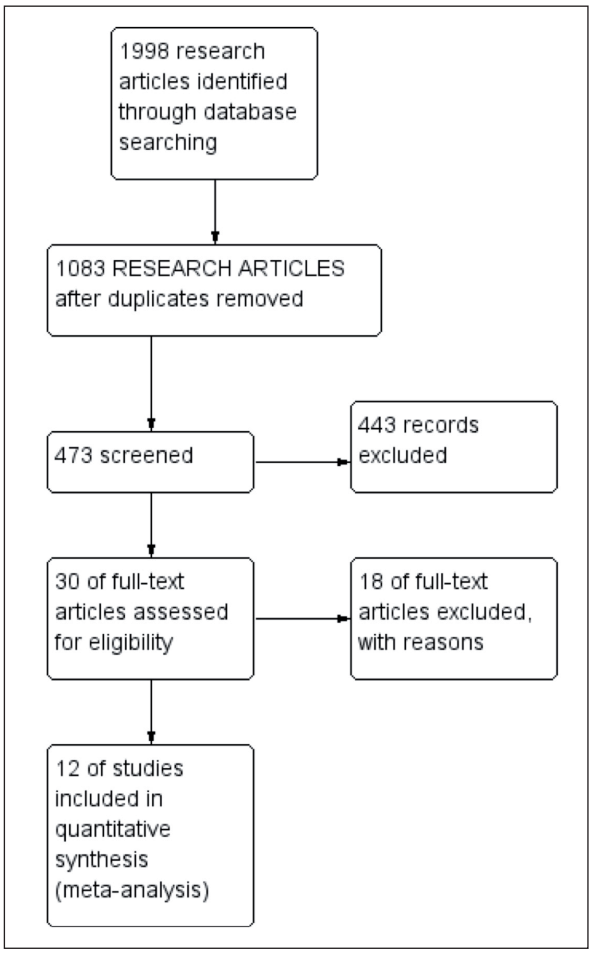

Fig. 1. Study flow diagram.

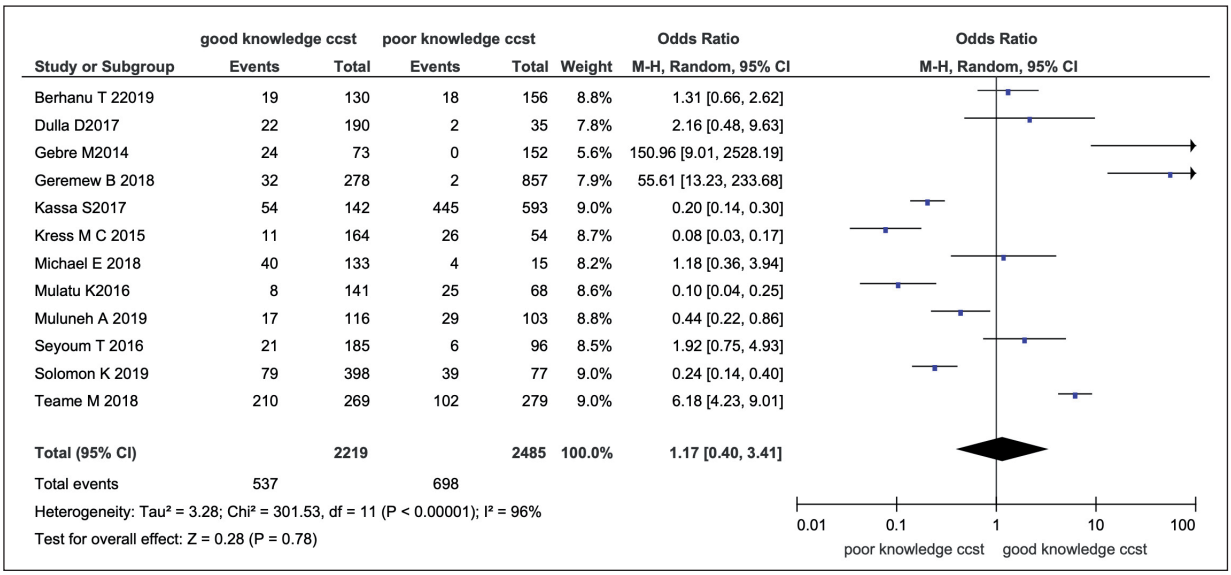

Fig. 2. Forest plot for the association of screening utilization for cervical cancer and knowledge about screening for cervical cancer.

subgroup there are 2080 and 2623 participants in each subgroup, so the covariate distribution is not concerning for this subgroup analysis.

However, there is substantial unexplained heterogeneity between the studies within each of these subgroups (age > 20 years: I2 = 88% age < 20 years: I2 = 78%) (Figure 3) therefore, the validity of effect estimate for usage of screening for cervical cancer in each subgroup is uncertain, as each study findings are heterogeneous. The importance of this subgroup analysis is high.

DISCUSSION

We conducted this review intending to obtain an overall effect of knowledge on cervical cancer screening and current gaps in research and knowledge. According to this study, the pooled odds ratios across the studies using the Mantel-Haenszel (MH) statistic was 1.17 (95% CI 0.40, to 3.41) which indicated that no significant association between knowledge about screening for cervical cancer and usage of screening for cervical cancer

Several studies conducted in Ethiopia by different scholar also failed to show any association between knowledge of screening for cervical cancer and practice of screening for cervical cancer[6,21]. Similarly, study which is done in Botswana[22] showed that knowledge of cervical cancer and its prevention has no association with usage of screening for cervical cancer Furthermore, results goes with the concept stated on books of health education and behavioral science which emphasizing that knowledge does not always translate into behavior change[23].

This might be due to factors like accessibility, acceptability, affordability, quality of screening and treatment services.

This result was incomparable with previous studies in Ethiopia which reported that knowledge about cervical cancer and its screening was related to the utilization of screening for cervical cancer[24-27]. Similarly, studies conducted in Uganda[28], Tanzania[29], Hong Kong[30], Malaysia[31], and Myanmar elucidate that knowing cervical cancer screening was associated with participation in cervical cancer screenings. Yet, the association between knowledge and behavior change is not always clear[24,25]; this difference might be due to the difference in the study population, sampling, study design and theoretical framework.

Mostly, meta-analysis heavily depends on published studies which are more likely to report significant results; studies having non-significant association would be would be systematically avoided. However, in this analysis, the problem of publication bias would be less significant as the focus of the analysis is a contemporary issue of scientific argument by which reporting any direction of association would be practically interesting to researchers and publishers.

CONCLUSIONS

Knowledge of screening for cervical cancer is not associated with usage of screening for cervical cancer.

Age significantly modifies the effect of good knowledge about screening for cervical cancer in comparison to poor knowledge about screening for cervical cancer.

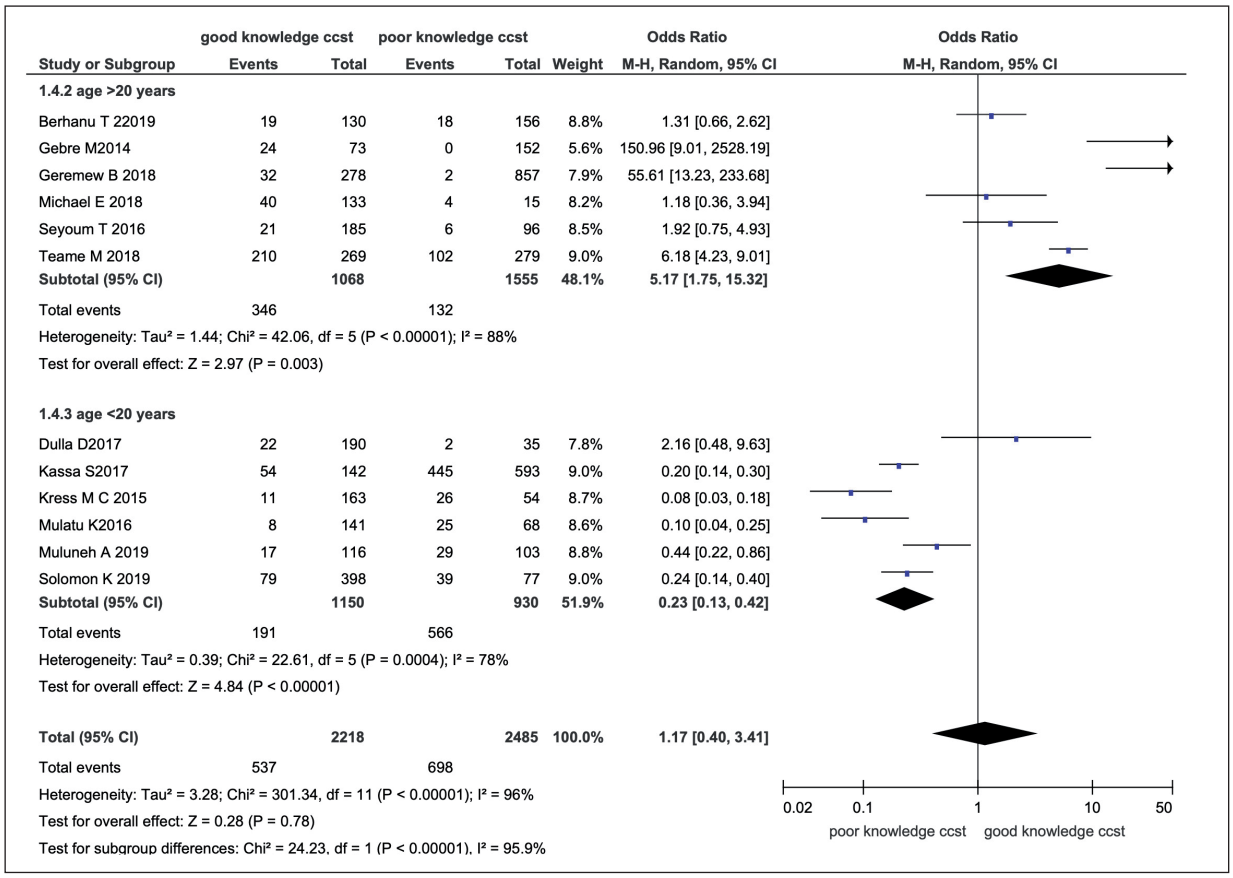

Fig. 3. The subgroup analysis compares the effect of knowledge about screening for cervical cancer on utilization of screening for cervical cancer.

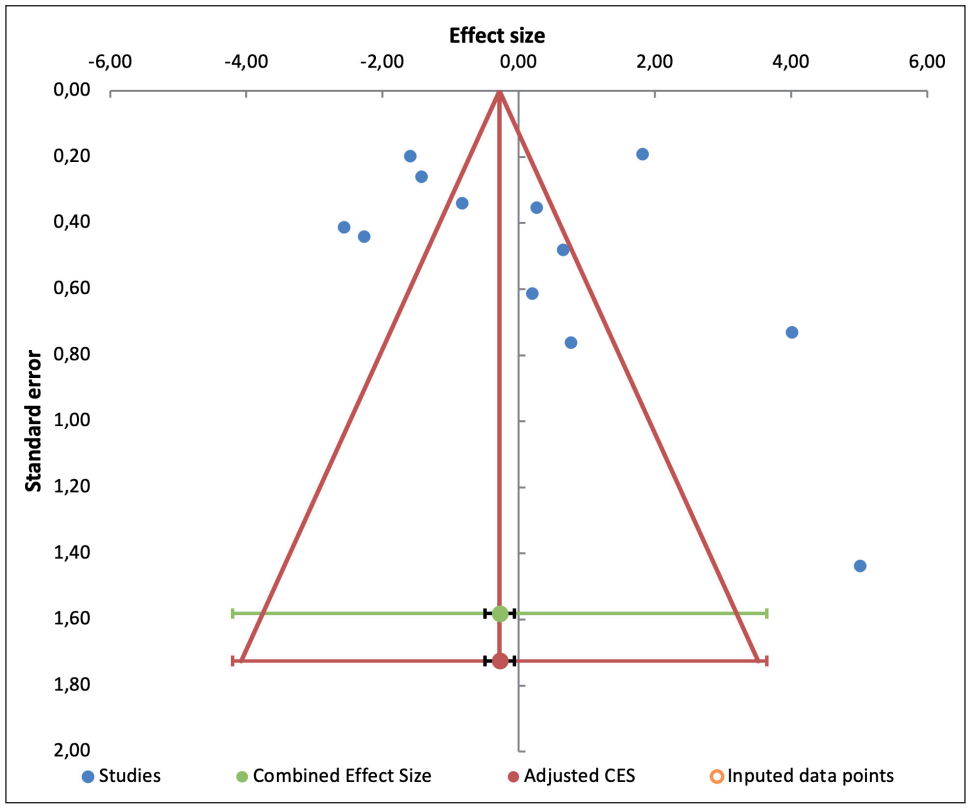

Fig. 4. The funnel plot for the subgroups of age > 20 years and age < 20 years.

Knowledge about screening for cervical cancer has considerable advantages in age > 20 years however, this advantage is not seen in age < 20 years.

The association between age and usage of screening for cervical cancer should be explored further.

Data Availability:
All data are included in the paper.

Authors' Contributions:
- Kaleab Tesfaye Tegegne was responsible for conceptualization, project administration, software, supervision, and development of the original drafting of the manuscript.
- Kaleab Tesfaye Tegegne, Eleni Tesfaye Tegegne, Abiyu Ayalew Assefa, and Mekibib Kassa Tessema were participated in quality assessment of articles, methodology, validation, and screening of research papers
- All authors contributed with data analysis, critically revised the paper, and agreed to be accountable for their contribution.

Acknowledgments:
We would like to thank all the primary authors of the included articles.

Competing of interest:
The authors have declared that there is no competing interest.

Funding:
Not any funding received for this work.

Conflict of interest:
The authors declare that they have no conflicts of interest.

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4 -5
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	NA
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	6
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	6
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	6
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	6
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	7
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	8
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	n/a
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	9
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	9

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	n/a
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	n/a
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Page 10
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	10
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	n/a
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	13
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	13
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	n/a
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	n/a
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	16
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	n/a
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	20
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A