

Knowledge and Utilization of Cervical Cancer Screening Service among Women in Ethiopia: A Systemic Review and Meta Analysis

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Abstract

Background: The purpose of this meta-analysis was to assess the association between knowledge and utilization of cervical cancer screening services among women in Ethiopia. Previous tests of the association of knowledge and utilization of cervical cancer screening services have yielded inconsistent results. Using data from 12 studies, from different regions of Ethiopia we performed a meta-analysis with a specific focus on women's utilization of cervical cancer screening service.

Methods: Electronic databases were searched from 2014 to 2019 on reference manager software reporting knowledge and utilization of cervical cancer screening service. Data extraction and assessment were guided by PRISMA checklist. Observational studies and studies with Newcastle-Ottawa Scale score of 5 or greater were included in the review. The pooled adjusted Odds Ratios (OR) and 95% confidence intervals were obtained using random effect model. We applied the random-effects analytic model and calculated a pooled odds ratio.

Results: A total of 12 observational studies involving 4704 participants, 1235 of which had utilization of cervical cancer screening service were eligible for inclusion in this meta-analysis. The summary OR for utilization of cervical cancer screening services comparing Women who know cervical cancer screening service versus Women who did not know cervical cancer screening service was 1.16 (95%CI 0.28 to 4.77), $P=0.813$, $I^2=96.23\%$. There was significant heterogeneity for all studies ($Q=291.78$; $P=0.000$; $I^2=96.23\%$). 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 in the utilization of cervical cancer screening services. The proportion of utilization of cervical cancer screening service among women aged >20 years was 18.22% in 6 of the 12 studies. The overall proportion of utilization of cervical cancer screening was 24.21% and 28.08% among having knowledge of cervical cancer screening service and not having knowledge cervical cancer screening service respectively.

Conclusion: Our findings suggest that knowledge of cervical cancer screening service is not directly related to the likelihood that they practice cervical cancer screening. The relationship between age and utilization of cervical cancer screening should be explored further.

Keywords: Cervical cancer; Newcastle-Ottawa scale; Meta-analysis; Papanicolaou

Introduction

Cervical cancer screening is a key to detect pre-cervical cancer earlier, but it is almost not utilized in all developing countries and most cases were diagnosed at the late stage of cervical cancer [1]. It causes hundreds of thousands of death among women annually worldwide. When a woman is screened for cervical cancer at least once in her life between the ages of 30 and 40, the risk of getting cervical cancer can be decreased by 25-36%. Despite this advantage, the coverage of cervical cancer screening is limited in low and middle-income countries including Ethiopia [2].

Lack of knowledge and poor attitude towards the disease and risk factors can affect screening practice and the development of preventive behavior for cervical cancer [3].

Compliance with screening has previously been suggested to be associated with women's knowledge [4]. Ample knowledge is important to spot the premalignant lesions and the understanding should be spread among common people to increase the awareness towards screening and preventing the disease conditions as soon as possible [5].

To prevent this disease, cervical cancer screening programs are introduced worldwide and the introduction of the Papanicolaou (Pap) test led to a significant reduction in mortality and morbidity in developed countries [6].

Across the three intervention periods, the media publicity appeared

to generate an additional 6.7% increase screening in areas with a high proportion of women of non-English-speaking-background compared with changes in screening with a low proportion of women of non-English-speaking background [7].

89 women were interviewed at Baragwanath Hospital. Only 4 of these had heard of or had had a cervical smear. This indicates that education about cervical carcinoma and cervical smears needs to be more extensive [8].

The age-adjusted incidence of cervical cancer in Ethiopia is 26.4 per 100,000 women, which is second only to breast cancer. Roughly 4,732 women die of cervical cancer each year, the highest cancer-related mortality rate (10.9 per 100,000) among Ethiopian women [9].

In Ethiopia, the coverage of cervical cancer screening is only 1%. Among all women, 42.7% had heard of cervical cancer screening and 144 (27.7%) women had adequate knowledge of cervical cancer screen-

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ing. In total, a quarter (25%) of eligible women had an experience of cervical cancer screening [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 more likely to have good knowledge than those who were young [11].

Methods

Data

Electronic databases were searched from 2014 to 2019.on reference manager software and quality assessments of the included studies were performed using the nine-star Newcastle Ottawa Scale

A meta-analysis was applied to investigate the effect of knowledge about cervical cancer screening on the utilization of cervical cancer screening services.

Primary concepts of 'cervical cancer screening', 'knowledge about cervical cancer screening service ', 'pap smear ', 'utilization', and 'Ethiopia ' were expanded to generate additional keywords for the search. Using the following search strategies; 'Cervical+cancer+screening+utilization+Ethiopia;- 'Cervical+papsmear+screening+utilization+Ethiopia;- 'Cervical+knowledge about cervical cancer screening service+utilization+Ethiopia;- 'Knowledge about cervical cancer screening service+Ethiopia;- 'cervical+utilization+Ethiopia.

Inclusion and exclusion criteria

Studies were included in the review if (1) the study was an observational study (cross-sectional study, case-control study, or cohort study), (2) the outcome of interest was utilization of cervical cancer screening services (3) the study reported the percentage of practice of cervical

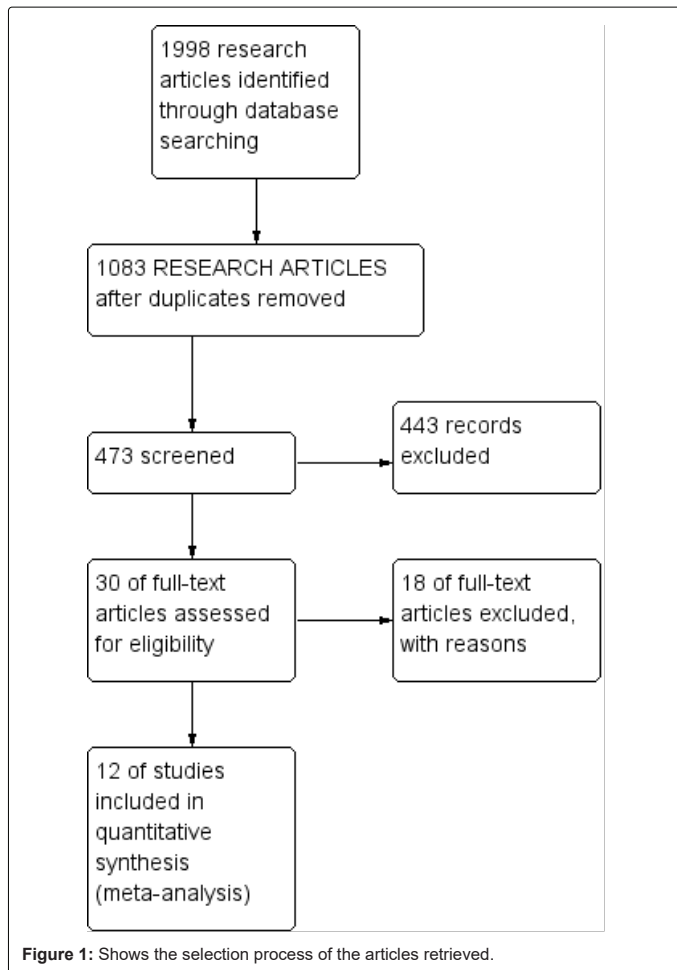
cancer screening services, according to 'Knowledge about cervical cancer screening service and (4) Newcastle-Ottawa Scale (NOS) or adapted Newcastle-Ottawa Scale (NOS) score of 5 or greater indicated moderate- to high-quality studies. Studies that were published in languages other than English, included participants with Utilization of cervical cancer screening services not dichotomized as good and poor practice, investigated and studies conducted not in Ethiopia were also excluded to avoid the combination of studies that were not comparable.

Data extraction and quality assessment

Two investigators independently conducted the study selection and quality assessment. The following information was extracted from each eligible study: first author's name, study design, source of study population, sample size, proportion of women who have knowledge about cervical cancer screening service and women who did not have knowledge about cervical cancer screening service and definition of Utilization of cervical cancer screening services. All studies reported multivariable-adjusted effect estimates based on of Utilization of cervical cancer screening services. Therefore, a result that was fully adjusted for potential confounding variables was selected. Quality assessment was conducted using the nine-star Newcastle Ottawa Scale (NOS); see Table 1. We considered studies with NOS score of 5 or greater. Figure 1 shows the selection process of the articles retrieved. The initial database search returned 1998 published English-language studies after removing unrelated titles. The abstracts were read and studies that did not meet the inclusion criteria were excluded. After removing duplicates, this resulted in 1083 studies investigating cervical cancer screening. After the full article examination, 12 studies met the inclusion criteria. The rest were excluded for reasons being, studies not in Ethiopia and studies not examining knowledge about cervical cancer screening service and utilization of cervical cancer screening service.

Author /year	Sample size	Title/study design	Knowledge	Utilization of Cx ca Screening	
				Good	Poor
Berhanu T 2019	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 D2017	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	0.9661	0.9661	0.9661
Gebre M2014	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
Gebre M2014 Gereme WB 2018	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 2017	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 C 2015	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 2018	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 K2016	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 2019	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 2016	281	Utilization of Cervical Cancer Screening and Associated Factors among Female Health Workers in Governmental Health Institution of Arba Minch Town and Zuria District, GamoGofa Zone, Arba Minch, Ethiopia, 2016 /facility based cross sectional study	Yes No	21 6	164 90
Solomon K 2019	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 2018	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

Table 1: Description of original studies included (n=12), 2019.



Measures

In this meta-analysis, the utilization of cervical cancer screening was assessed by self-reported action towards screening for premalignant cervical lesions those ever screened for cervical cancer were considered as having a good practice of cervical cancer screening and otherwise considered as having poor practice.

The knowledge of cervical cancer screening was assessed by their response to whether they heard about cervical cancer screening or not if they heard about cervical cancer screening they are considered as having good knowledge about cervical cancer screening and otherwise considered as having poor knowledge about cervical cancer screening.

Analysis

By design, this study is secondary data analysis. Using Review Manager Version 5.3 software [12], we determined pooled odds ratios and associated 95% confidence intervals to describe the relationship between utilization of cervical cancer screening and knowledge of cervical cancer screening. We calculated pooled odds ratios across the studies using the Mantel-Haenszel (MH) statistic (the DerSimonian-Laird method or random effect model). Using the I2 statistic $[100 \times (\text{chi-square} - \text{degree of freedom}) / \text{chi square}]$ [13], we assessed the nature and extent of heterogeneity across the surveys.

We applied the random effects analytic model to account for inter survey variation and to provide a more conservative effect than a fixed

model would have provided. The I2 statistics were used to assess the variability among the included studies and above 50% was considered as significant.

Results

Study characteristics

A total of 12 observational studies involving 4704 participants, 1235 of which had utilization of cervical cancer screening service were eligible for inclusion in this meta-analysis Table 1 provides information on the research methods, year, and the focus of the included studies. The 12 studies were published between 2014 to 2019 and they comprised of the population from a different region in Ethiopia. Two studies were conducted in the Tigray region, another three in the Amhara region, the two studies from the Oromia region and four studies from the Southern region and one study from Addis Ababa city in Table 1 Description of original studies included (n=12), 2019. 47.16% (2218), women reported knowing cervical cancer screening service, 26.25% (1235) were utilized for cervical cancer screening service. Among those who utilize cervical cancer screening service, 757 (16.09 %) and 478 (10.16%) were in the age of <20 years and age of >20 years, respectively. In all studies, the proportion of utilization of cervical cancer screening services among women 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 utilization of cervical cancer screening service with knowing cervical cancer screening service relative to not knowing cervical cancer screening service. There was significant heterogeneity for all studies ($Q=291.78$; $P=0.000$; $I^2=96.23\%$).

However, the meta-analysis demonstrates a statistically significant difference between the two age categories; the age of <20 years and the age of >20 years. A subgroup analysis demonstrated 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: 1.75–15.32 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 utilization of cervical cancer screening service. 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 observed (Egger's test: $P=0.693$, Begg's test: $P=0.131$).

The subgroup analysis compares the effect of knowledge about cervical cancer screening service, good knowledge about cervical cancer screening service and poor knowledge about cervical cancer screening service on the outcome of utilization of cervical cancer screening service. The subgroup analysis was conducted to investigate whether age modifies the effect of knowledge about cervical cancer screening services on the utilization of cervical cancer screening services.

The results of the subgroup analysis suggest that there is a statistically significant subgroup effect ($P<0.00001$), meaning that age significantly modifies the effect of good knowledge about cervical cancer screening service in comparison to poor knowledge about cervical cancer screening service. Good knowledge about cervical cancer screening service is favored over poor knowledge about cervical cancer screening service for age > 20 years, while poor knowledge about cervical cancer screening service is favored over good knowledge about cervical cancer screening service for age <20 years; therefore, the subgroup effect is qualitative. There is a relatively smaller amount of heterogeneity

ity between results from the studies within the age<20 years (78%).

However, a visual inspection of the forest plot confirms that heterogeneity is lower within the subgroups than across all studies, and so the subgroup analysis explains heterogeneity in the overall analysis subgroup effect is qualitative.

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

A sufficient number of studies (6) and participants (2080 and 2623) were included 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%). Therefore, the validity of the knowledge effect estimate for each subgroup is uncertain, as individual study results are inconsistent. 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 of cervical cancer screening and cervical cancer screening utilization.

Several studies conducted in Ethiopia by different scholar also failed to show any association between knowledge of cervical cancer screening and practice of cervical cancer screening [6,14]. Similarly, study which is done in Botswana [15]. showed that knowledge of cervical cancer and its prevention has no association with cervical cancer screening utilization. Furthermore, this finding goes in line with the concept stated on books of health education and behavioral science which emphasizing that knowledge does not always translate into behavior change [16].

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

This result was incomparable with the results of studies conducted in different parts of Ethiopia which reported that knowledge about cervical cancer and its screening was related to the utilization of cervical cancer screening [17-19]. Similarly, studies conducted in Uganda [20], Tanzania [21], Hong Kong [22], Malaysia [23], 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 [16,17]. This variation 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 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 (Figure 2). Forest plot for the Association of the utilization of cervical cancer screening service with knowing cervical cancer screening service relative to not knowing cervical

vical cancer screening service table.

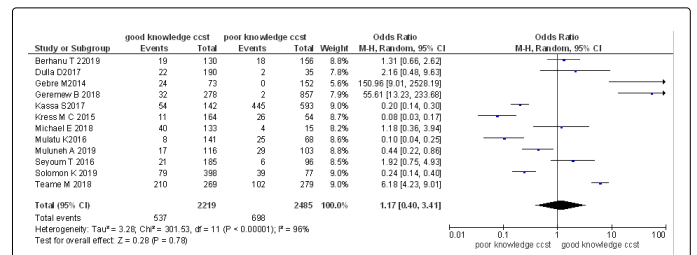


Figure 2: Forest plot for the Association of the utilization of cervical cancer screening service with knowing cervical cancer screening service relative to not knowing cervical cancer screening service table.

(Figure 3) The subgroup analysis compares the effect of knowledge about cervical cancer screening service on the outcome of the utilization of cervical cancer screening service.

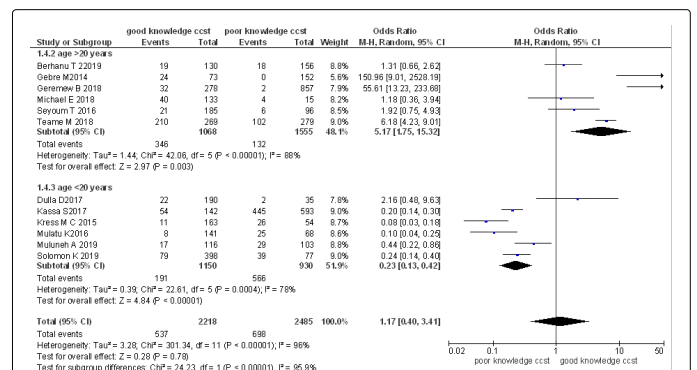


Figure 3: The subgroup analysis compares the effect of knowledge about cervical cancer screening service on the outcome of the utilization of cervical cancer screening service.

Conclusion

Our findings suggest that knowledge of cervical cancer screening service is not directly related to the likelihood that they practice cervical cancer screening and age significantly modifies the effect of good knowledge about cervical cancer screening service in comparison to poor knowledge about cervical cancer screening service.

Knowledge about cervical cancer screening service has considerable advantages in age>20 years However, this advantage is not seen in age<20 years. It would be beneficial for more studies to be conducted in these areas to confirm the subgroup effect.

Data Availability

All data are included in the paper.

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

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.

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