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THE PREVALENCE OF CERVICAL CANCER SCREENING IN LOW AND MIDDLE-INCOME COUNTRIES: A LITERATURE REVIEW

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ABSTRACT

Objectives: to determine the prevalence of cervical cancer screening in low and middle-income countries.

Method: This literature review was conducted in accordance with the Cochrane Collaboration guidance for literature reviews and reported following the PRISMA statement. We conducted searches of electronic bibliographic databases including Pubmed, Embase, MEDLINE, Cochrane Systematic Reviews and Cochrane CENTRAL.

Results: Our searches of the listed electronic databases generated 7,845 records. 23 studies met the inclusion criteria. The total sample size of female participants was 213,199. The definition of screening definitions were relatively similar among studies. Screening rates varied between studies (from 4% to 43%). The Pap smear test was the most common screening modality, next was Visual Inspection Acetic Acid (VIA). The overall prevalence of cervical cancer screening was still remarkably low 21.85% (95%CI: 20.56 - 22.32, I2 = 40%, p <0.001).

Conclusions: Despite global efforts to make screening approaches affordable and accessible, most women in low- and middle-income countries are not screened for cervical cancer.

Keywords: cervical cancer screening, literature review.

1. INTRODUCTION

According to World Health Organization (WHO), cervical cancer is the fourth most common cancer in women. In 2018, an estimated 570,000 women were diagnosed with cervical cancer worldwide and about 311,000 women died from the disease. [1] Cervical cancer is the second most common type of cancer in women in the South East Asia region and the major cause of cancer deaths among women of low- and middle income countries (LMICs). [2] In Vietnam, cervical cancer is the most common cancer among women, and about 4,132 new cases and 2,223 deaths occurred annually. [3] The study on multinational in Asia which included Vietnam, showed that as estimated, cervical cancer is the main cause of female cancer mortality Ho Chi Minh City and the second main cause in Hanoi. [4] Screening can reduce both the mortality and incidence of cervical cancer. Cervical cancer as a preventable disease in women, according to World Health Organization. [5], [6] Vietnam Ministry of Health (MOH) recommended routine Human papillomavirus (HPV) vaccination from age 9 to 26 years. Following the guidelines of WHO, MOH recommended that women should begin screening at age 21 until 65 years with appropriate tests. [7]

Beside, there are ongoing efforts to increase HPV vaccinations for primary cervical cancer prevention, early detection of precancerous cervical lesions through screening remains a critical health care service intervention for reducing cervical cancer incidence and mortality particularly in low-resource settings where HPV vaccination coverage is poor. Nonetheless, there are not enough comprehensive syntheses of these evidences to support for developing guidelines or recommendations. Therefore, we established this study titled "The prevalence of cervical cancer screening in low and middle-income countries: a literature review"

2. METHODOLOGY

2.1. Study design

This study was a literature review. The protocol has been developing in accordance with the Preferred

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Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA) 2015 statement [8]. This literature review was conducted in accordance with the Cochrane Collaboration guidance for literature reviews and reported following the PRISMA statement [9].

2.2. Eligibility criteria

Study inclusion and exclusion criteria were based on the following domains: Participants, Study timeframe, Outcomes, Type of study, Locations, Language.

2.2.1. Participants

Studies conducted among women eligible for participation in a cervical cancer screening program, including women with no prior screening for cervical cancer and women due or overdue for screening visits in various settings without previous medical diseases or screening requirements.

2.2.2. Study timeframe

This review considered all observational study designs published from 2010 to 2024.

2.2.3. Outcomes

We include studies that measured the proportion of women who completed cervical cancer screening during the trial.

2.2.4. Type of study

All population-based observational study designs (cross-sectional studies, case-control, and cohort studies) conducted in diverse settings like hospitals or communities. We conducted searches of electronic bibliographic databases including Pubmed, Embase, MEDLINE, Cochrane Systematic Reviews and Cochrane CENTRAL.

Table 1. Search terms

Concept	Keywords
Participant	women, woman, mother, mothers, lower middle income
Review	Knowledge, perspective, aware, attitude, barriers, factors
Outcome	cervical, cervical cancer, cervix, vaginal cytology, pap, smears, pap smears, papanicolaou test, screening, cytological, incidence, rate,

2.3. Data extraction and synthesis

The narrative summary for the included studies comprised of a description of the sample characteristics, outcome measures, study type and main findings. Two authors independently extracted data from final selected studies. The results of two reviewer's data extraction were compared and checked for consistency, and any discrepancies were resolved through discussion. Meta-analysis was performed using STATA 14.0 and presented using forest plot with z test to experience the significance of the results with the level of significance $\alpha = 0.05$. We used the funnel plots to check for the existence of reporting bias (e.g., publication bias, language bias, inclusion of small studies with poor methodological quality and heterogeneity) in each synthesized subgroup by effect periods. The asymmetry of the funnel plot was tested using Egger's test. If the test shows $p<0.05$, changes are there was reporting bias presented in the subgroup of studies.

3. RESULTS

3.1. General description of studies

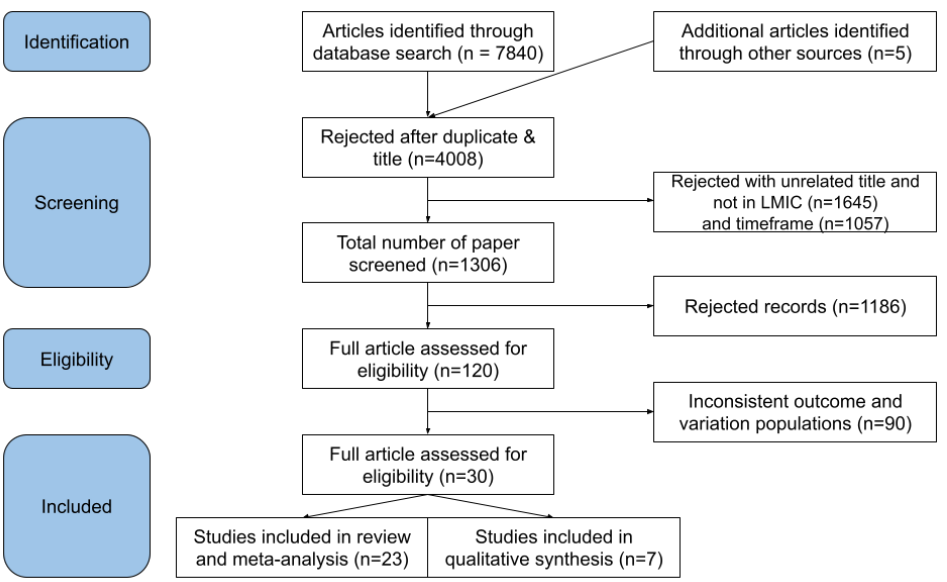


Figure 1. PRISMA flowchart of searching and screening process

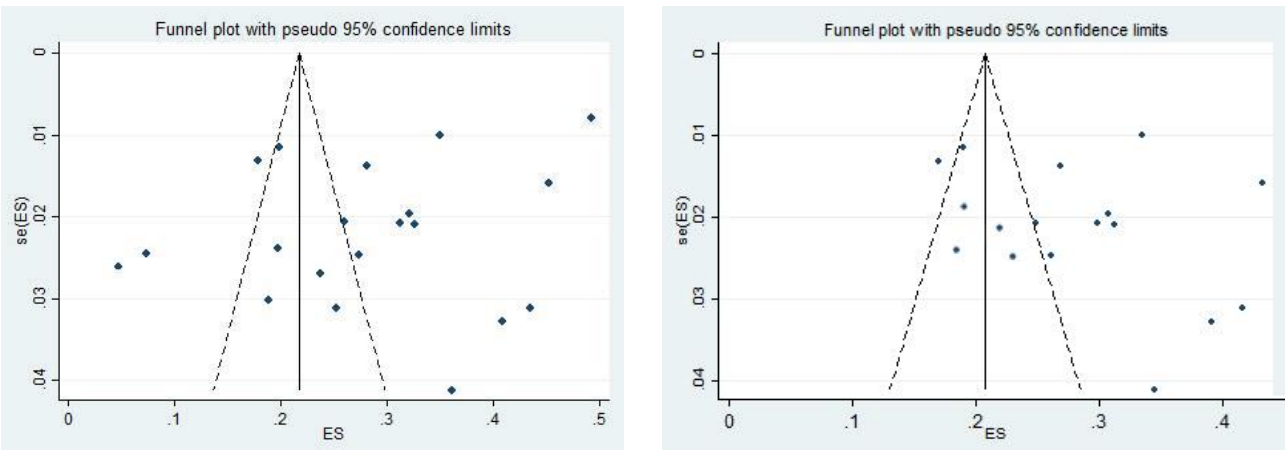
Our searches of the listed electronic databases (Figure 1) generated 7,845 records (including 5 records identified from earlier reviews and bibliographies of relevant studies), of which 3,837 were duplicated. After that, 1,645 records were unrelated/not in LMIC (n=1645)/ were not in the timeframe of our study 2010-2021 (n=1057). Therefore, 1,306 abstracts were screened. 1,186 records were inaccessible and 120 full-text papers were assessed for eligibility. After screening carefully, 90 records were excluded that were inconsistent outcome and variation populations (HIV patients, sex workers,…) 23 studies met the inclusion criteria.

Table 2. Descriptive summary of primary studies included in the review and meta-analysis of cervical cancer screening uptake in low-income and middle-income countries

No	First author	Published year	Study design	Sample size	Participants age	Study population	Definition of cervical cancer screening	Cervical screening uptake prevalence
1	Joshua et al. [10]	2021	Cross-sectional, retrospective study	13616	15 - 49 (27.9 ± 9.4)	Cameroon woman 15 – 49 year old	Ever been screened	4
2	Ermias et al. [11]	2020	Cross-sectional study	838	25 - 49 (36.19 ± 6.38)	Women aged 25 and above	Ever test in the past 3 years	17.8
3	Yalelet et al. [12]	2020	Cross-sectional study	595	30 - 39 (37.4 ± 4.1)	Ethiopia women 30 – 39 year old	Ever been screened	4
4	Suzanne et al. [13]	2020	Cross-sectional study	500	21 - 65 (38.64 ± 9.39)	Jordanian women 21 – 65 year old	Ever been screened	31.2
5	Rosethe et al. [14]	2019	Cross-sectional study	978	18 - 49	Nigerian women 18 – 49 year old	Ever been screened	45.2
6	Arwa et al. [15]	2019	Cross-sectional study	450	18 - 57 (32.9 ± 8.3)	Saudi women 18 – 57 year old	Ever been screened	26
7	Layu et al. [16]	2019	Cross-sectional study	253	25 - 65	Cameroon women 25 – 65 year old	Ever been screened	43.48
8	Mariana et al. [17]	2018	Cross-sectional study	1888	15–64	Mozambique woman 15–64 year old	Ever been screened	3
9	Cecilia et al. [18]	2018	Cross-sectional study	326	18 - 69	African women 18 – 69 year old	Ever test in the past 3 years	27.2
10	Sumadi et al. [19]	2018	Cross-sectional study	1058	52.9	Indonesian women	Ever been screened	28.07
11	Bou-Orm et al. [20]	2017	Cross-sectional, multi stage cluster random sampling study	2255	18 - 65 (38)	Lebanese women 18 – 65 year old	Ever been screened	35
12	Dubale et al. [21]	2017	Cross-sectional study	367	28.2 ± 6.4	Female health care workers	Ever been screened	11.4
13	Yitagesu et al. [22]	2017	Cross-sectional study	583	18 - 49 (28 ± 6.83)	Ethiopian women 18 – 49 year old	Ever been screened	9.9
14	Indian MoH and Family Welfare [23]	2017	Cross-sectional study	National survey		Indian women	Ever been screened	22.3

No	First author	Published year	Study design	Sample size	Participants age	Study population	Definition of cervical cancer screening	Cervical screening uptake prevalence
15	Hinsermu et al. [24]	2016	Cross-sectional study	1186	≥21 (31.1 ± 9.3)	Ethiopian women	Ever been screened	19.8
16	Zeleke et al. [25]	2016	Cross-sectional study	643	40 ± 12	Ethiopian women	Ever been screened	5.9
17	Kelias et al. [26]	2016	Retrospective cohort study	186041	18-60	Malawi women 18-60 year old	Ever been screened	26.5
18	Evelyn et al. [27]	2015	Cross-sectional study	225	18 - 79 (37.8 ± 16.7)	Jamaican women 18 – 79 year old	Screened after follow-up	40.7
19	Baohua et al. [28]	2015	Cross-sectional study	National survey		Chinese women	Ever been screened	21
20	Aminisani et al. [29]	2014	Cross-sectional study	561	≥40 (43.6 ± 5.17)	Iranian women aged 40 and up	Screening at least once	32
21	Kibicho et al. [30]	2014	Cross-sectional study	136	26 - 33	Kenya women 26 – 33 year old	Ever been screened	36
22	Wright et al. [31]	2014	Cross-sectional study	197	18 - 60 (41.1 ± 15.4)	Nigerian women 18 – 60 year old	Ever been screened	5.1
23	Arulogun et al. [32]	2012	Cross-sectional study	503	38.0 ± 8.6	Female Nigerian nurses	Ever been screened	32.6

Table 3 showed that the total sample size of female participants is 213,199 (except for 2 National surveys in India and China). The mean age of participating in the study was young (average 20-40 years old). The definition of screening definitions were relatively similar among studies. Screening rates varied between studies (from 4% to 43%). The Pap smear test was the most common screening modality, next was Visual Inspection Acetic Acid (VIA).



I II

Figure 2. Funnel plot before adjustment (I) and after adjustment (II) for publication bias

To assess the heterogeneity of the study, the Cochrane Q test, and I2 with its corresponding p-value were used. To assess the existence of publication bias, funnel plot and Egger regression asymmetry tests were employed. Moreover, with the evidence of heterogeneity, the random effect model analysis was computed. Firstly, among 23 studies, 3 National survey studies [23], [26], [28] in China, India and Malawi were not considered in the prevalence estimation. Additionally, three studies [10], [12], [17] in Cameroon (4%), Mozambique (3%) and Dire Dawa, eastern Ethiopia (4%) were excluded from prevalence estimation after checking the funnel plot and the significance of Egger's regression test. After adjustment, Egger's regression p-value was 0.097, indicating a reduced publication bias.

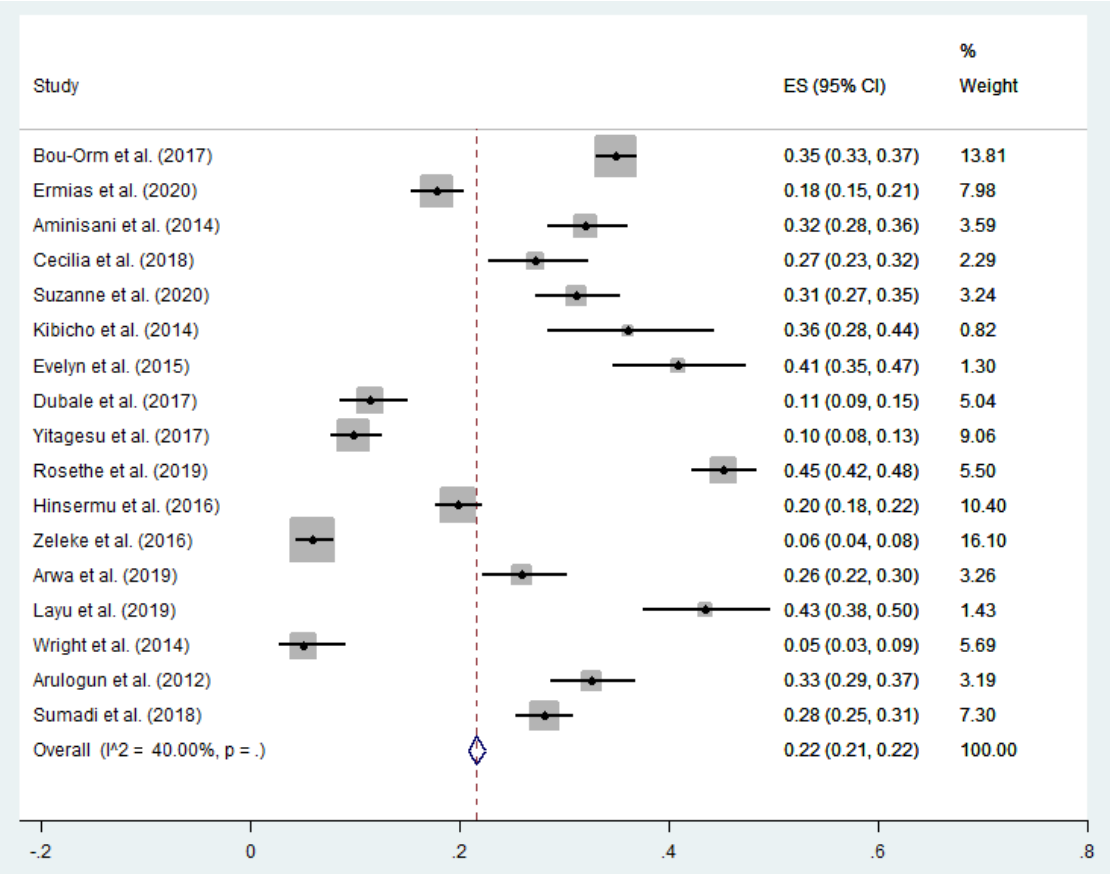


Figure 3. Forest plot displaying the pooled prevalence of cervical cancer screening uptake in LMIC

In our review, 17 studies [11], [13], [14], [15], [16], [18], [19], [20], [21], [22], [24], [25], [27], [29], [30], [31], [32]were included in the final meta-analysis. The pooled prevalence of cervical cancer screening uptake in LMIC was 21.85% (95%CI: 20.56 - 22.32, I2 = 40%, p <0.001) using a random effect model.

4. DISCUSSION

Early treatment and routine cervical cancer screening can prevent up to 80% of cervical cancers, if cervical abnormalities are identified at stages when they can be easily treated. To identify precancerous lesions, WHO recommends screening for all women aged 30 to − 49 years, which are usually asymptomatic [5]. HPV vaccination is vital to prevent cervical cancer but does not replace the necessity of cervical cancer screening and early treatment in women [33]. Among the studies in the review, the study of Mariana et al. in Mozambique has the lowest screening rate (3%) [17], following by the study of Joshua et al. in Cameroon with 4% [10]. Both of the studies were national surveys, which were conducted in large populations. In contrast, the study conducted in Nigeria (2017) [14], Jamaica (2013) [27], has the highest CCS rate, which are 45.2% and 40.7%, respectively. Those studies were conducted in community sites, and study sample sizes were 225 and 978 respectively, much lower than previous national surveys. This explains why there was such a big difference between studies.

The pooled prevalence of cervical cancer screening was lower than the study findings in developed countries such as Canada 58% [34], Spain 50.6% [35]. The possible reason for this variation could be due to differences in sociodemographic and economic status of the study respondents as well as the countries' health policy variations like institutional framework to promote screening, which could have largely succeeded in implementing successful programs regarding cervical cancer screening. Another possible reason for this may be due to uneven distribution of screening services centers. For example; there is universal access to health care in Canada, including the availability of primary care and specialist physicians, which differs from other health care models.

The finding of this systematic review was higher than the study conducted in Ghana (2.4%) [36]. The possible reason for the low coverage of cervical cancer screening services in Ghana might be there was still no national policy or program regarding cervical cancer screening and that could be contributing to the low screening of cervical cancer in Ghana. The other possible reason could be the ignorance about the disease and its screening practices as well as perceptions and attitudes based on cultural and religious beliefs.

The pooled prevalence of cervical cancer screening in our review was higher compared with the pooled uptake of cervical cancer screening rate in the systematic review study in Sub-Saharan Africa countries [37]. In the review, 9 studies were selected for this review, which included a total of 36,374 women. The uptake of cervical cancer screening in Sub-Saharan Africa was 12.87% (95% CI: 10.20, 15.54). The study also showed that predictors of cervical screening uptake include knowledge about cervical cancer, educational level, age, HIV status, contraceptive use, perceived susceptibility and awareness about screening locations.

Cervical cancer is a growing crisis in low- and middle-income countries where the burden of disease is shifting toward chronic, non-communicable diseases. Low coverage for cervical cancer screening becomes a roadblock to disease detection and treatment. For women in low- and middle-income countries, little progress has been seen. Where resources are limited, WHO recommends very low-cost visual inspection with acetic acid (vinegar) and cryotherapy to treat precancerous lesions. HPV DNA testing can also be used to detect the presence of high-risk types of HPV; these tests are becoming increasingly affordable for low- and middle-income countries [38]. WHO recommends that screening be offered at least once in a lifetime to every woman aged 30–49 years, who will benefit the most from this screening. Despite global efforts to make screening approaches affordable and accessible, most women in low- and middle-income countries are not screened for cervical cancer [39].

5. CONCLUSION

The overall prevalence of cervical cancer screening was still remarkably low 21.85% (95%CI: 20.56 - 22.32, I2 = 40%, p <0.001). Despite global efforts to make screening approaches affordable and accessible, most women in low- and middle-income countries are not screened for cervical cancer.

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