



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Cervical cancer screening utilization, and associated factors, in Nepal

a systematic review and meta-analysis

Citation for published version:

Shrestha, AD, Andersen, JG, Gyawali, B, Shrestha, A, Shrestha, S, Neupane, D, Ghimire, S, Campbell, C & Kallestrup, P 2022, 'Cervical cancer screening utilization, and associated factors, in Nepal: a systematic review and meta-analysis', *Public Health*, vol. 210, pp. 16-25. <https://doi.org/10.1016/j.puhe.2022.06.007>

Digital Object Identifier (DOI):

[10.1016/j.puhe.2022.06.007](https://doi.org/10.1016/j.puhe.2022.06.007)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Publisher's PDF, also known as Version of record

Published In:

Public Health

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.





Review Paper

Cervical cancer screening utilization, and associated factors, in Nepal: a systematic review and meta-analysis



A.D. Shrestha^{a, b, *}, J.G. Andersen^a, B. Gyawali^c, A. Shrestha^{d, e, f}, S. Shrestha^g,
D. Neupane^{b, h}, S. Ghimireⁱ, C. Campbell^j, P. Kallestrup^a

^a Center for Global Health, Department of Public Health, Aarhus University, Denmark

^b COBIN, Nepal Development Society, Bharatpur, Nepal

^c Global Health Section, Department of Public Health, University of Copenhagen, Denmark

^d Department of Public Health and Community Programs, Kathmandu University School of Medical Sciences, Dhulikhel, Nepal

^e Center for Methods in Implementation and Prevention Science, Yale School of Public Health, New Haven, CT, USA

^f Institute for Implementation Science, Kathmandu, Nepal

^g School of Public Health, University of Alabama, Birmingham, AL, USA

^h Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

ⁱ Nepal Cancer Care Foundation, Lalitpur, Nepal

^j Usher Institute, University of Edinburgh, EH8 9AG, United Kingdom

ARTICLE INFO

Article history:

Received 1 September 2021

Received in revised form

23 May 2022

Accepted 11 June 2022

Keywords:

Cervical cancer screening

Human papillomavirus

Barriers

Facilitators

Nepal

Implementation

Systematic literature review

ABSTRACT

Objective: To systematically appraise the existing published literature on cervical cancer screening utilization, and associated barriers and facilitators, in Nepal.

Study design: Systematic literature review and meta-analysis.

Methods: PubMed/MEDLINE, CINAHL, Scopus, Embase, and, Google Scholar were systematically searched using Preferred Reporting Items for Systematic Review and Meta-Analysis guideline. All quantitative and qualitative studies reporting cervical cancer screening (using the Pap smear test or visual inspection with acetic acid or human papillomavirus test) utilization, barriers, and facilitators for screening were identified. A meta-analysis was performed to estimate Nepal's pooled cervical cancer screening utilization proportion. **Results:** The search yielded 97 records, of which 17 studies were included. Fifteen studies were quantitative and two were qualitative. Of the 17 studies, six were hospital-based and six were community-based. The pooled cervical cancer screening utilization proportion (using Pap smear test) among Nepalese women was 17% from the studies in the hospital settings, and 16% in the community. Six studies reported barriers to cervical cancer screening, of which four reported embarrassments related to the gynecological examination and a low level of knowledge on cervical cancer. Three (of four) studies reported health personnel, and two studies reported screening services-related facilitators for cervical cancer screening.

Conclusion: Our review reported that cervical cancer screening utilization (16%) is more than four times lower than the national target (70%) in Nepal. Multiple barriers such as low levels of knowledge and embarrassment are associated with cervical cancer screening utilization. Health personnel's gender, counseling, and privacy of screening services were commonly reported facilitators. These findings could help to inform future research, and policy efforts to increase cervical cancer screening utilization in Nepal.

© 2022 The Author(s). Published by Elsevier Ltd on behalf of The Royal Society for Public Health. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Introduction

Cervical cancer is the fourth most common cancer in women. In 2020, the global estimated age-standardized incidence rate for cervical cancer was 13.3, and the age-standardized mortality rate

was 7.3 per 100,000 women.¹ In Nepal, a low-resource country situated in South Asia where the female population accounts for approximately 55%, the estimated age-standardized incidence, and mortality rates of cervical cancer were approximately 16.4 and 11.1 per 100,000 women, respectively, in 2020.¹ Almost all cervical cancer cases are associated with the carcinogenic human papillomavirus (HPV) infection.² Additional factors such as illiteracy, early age at marriage, limited access to health care, and not undergoing cervical cancer screening contribute to delayed diagnosis

* Corresponding author. Center for Global Health, Department of Public Health, Aarhus University, Denmark.

E-mail address: aamod.shrestha@gmail.com (A.D. Shrestha).

of cervical cancer.^{3,4} More than 80% of Nepalese people live in rural areas, and women in these areas are at particular risk of delayed diagnosis of cervical cancer.⁵ Furthermore, the country's geographical layout imposes serious constraints on the delivery of health services, particularly in the mountains due to sparse and scattered populations, tough terrain with no transport or difficult road conditions, and seasonal isolation, compared to the hills and the terai (plains) region.⁶ Although women remain asymptomatic for many years after acquiring HPV infection, the pathological changes can be detected by screening, and treatment of precancerous stages helps prevent progression into cancer.^{7–10} Hence, comprehensive cervical cancer screening, treatment, and prophylactic vaccine for HPV would play an important role in reducing the high incidence of cervical cancer among Nepalese women.^{7–11} Currently, there is no nationwide HPV vaccination campaign in Nepal. HPV vaccination was offered to 1096 girls of age 10–26 years attending 17 secondary schools as a pilot program in two districts of Nepal in 2008.¹² The national guideline for Cervical Cancer Screening and Prevention (CCSP) was introduced in Nepal with the goal of screening at least 50% of the target population (women aged 30–60 years) in 2010, which was updated to 70% in 2017.^{13–15} The guideline has also highlighted the importance of integrating cervical cancer screening programs, and prevention, in national health policy and reproductive health programs.^{14,15} There is no national screening programme in Nepal until now. However, the country has adapted the 'screen-and-treat' approach to cervical cancer prevention using the visual inspection with acetic acid (VIA) test and immediately treating precancerous lesions with cryotherapy in accordance with the World Health Organization (WHO) recommendations.^{10,13} In Nepal, VIA tests are available and free of charge at the government health institutions (hospitals or health posts) in 64 of 77 Nepalese districts for women aged 30–60 years.^{13,16} Pap smear test is recommended where technical and laboratory facilities are available for taking the Pap smear and providing the results.¹⁵

Despite the implementation of the national guideline, the cervical cancer screening coverage remained low: 2.4% as reported by the 2003 World Health Survey conducted among 4300 Nepalese women aged 18–69 years to only 5.4% of women aged 30–65 years ever screened in 2015 and 8.2% women of age 30–49 years in 2019.^{17–19}

Limited knowledge of cervical cancer and information regarding benefits of screening, myths, fear of test results, lack of accessibility, lack of privacy, as well as lack of support or permission from husband and family are major obstacles to screening participation.^{20–23} Therefore, the aim of this review was to collate and report the cervical cancer screening utilization percentage, and associated barriers and facilitators to cervical cancer screening, in Nepal. The findings will provide insights into the status of cervical cancer screening delivery and utilization and factors affecting cervical cancer screening participation, as well as inform recommendations for future interventions to increase utilization.

Methods

Protocol and registration

This review was conducted based on a registered protocol in the International Prospective Register of Systematic Reviews [(PROSPERO), ID - CRD42019144645], and a publication with an updated timeline to include studies published in the English language from 1 January 2000 to 31 December 2020.²⁴

Reporting

The systematic review followed the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines.²⁵

Inclusion and exclusion criteria

This study included articles if they fulfilled the following criteria: (i) studies reporting ever screened for cervical cancer using Pap smear test, or VIA or HPV test; (ii) studies reporting barriers and facilitators to cervical cancer screening; (iii) either quantitative and qualitative studies; (iv) studies conducted in Nepal; and (v) studies published in the English language between 1 January 2000 and 31 December 2020. Conference papers, editorials, short communications, studies lacking data on cervical cancer screening utilization, barriers and facilitators to screening, multicountry studies, reports, review articles, and study protocols were excluded.

Outcome measurement

Cervical cancer screening utilization was defined as the percentage of women who had ever been screened for cervical cancer. Furthermore, barriers and facilitators to cervical cancer screening were defined as factors that hinder or encourage women to attend cervical cancer screening.

Data sources and search strategy

We searched for all available articles within the electronic databases PubMed/MEDLINE, CINAHL, Scopus, and Embase. In addition, we searched for available articles using Google Scholar. The search terms were developed using the medical subject heading for cervical cancer and cervical cancer screening methods. We included search terms for treatment, or vaccination or HPV to search articles that may report cervical cancer screening utilization in Nepal. The search terms were modified according to the search criteria for each database. Articles were searched using the following search terms in the following combination:

Uterine cervical neoplasms OR Cervical-Cancer OR Cervical-Neoplasm OR Cervical-Neoplasms OR Cancer-of-Cervix OR Cervical-cancer-screening OR Visual-Inspection OR Papanicolaou-test OR Pap-Smear OR Colposcopy OR Human-papillomavirus DNA tests OR HPV-DNA-Test OR Cryotherapy OR Electrocoagulation OR Thermocoagulation OR Conization OR Papillomavirus-vaccines OR HPV OR Papillomaviridae OR Human-Papilloma-Virus AND Nepal.

Study selection and quality assessment

First, all identified studies were imported into the Covidence online application for search records management. Second, duplicates were removed. Third, two independent authors (ADS and JGA) screened and assessed the titles and abstracts of all studies, followed by a full-text review. Any disagreements between authors were resolved by discussion until consensus was reached. Fourth, the quality of studies was assessed using the Appraisal tool for Cross-Sectional Studies (AXIS) ([Supplement file – Table 1](#)).²⁶

Qualitative studies were subject to quality assessment using the Critical Appraisal Skills Programme (CASP) checklist (Supplement file – Table 2).²⁷

Data extraction and analysis

After quality assessment, data were extracted into a Microsoft Excel spreadsheet. The extracted data items included study type, study setting, first author, publication year, geographical regions — mountain, hill, and terai (plains), district, age group, sample size, and the number of women ever screened for cervical cancer (Table 1). We categorized the barriers and facilitators to cervical cancer screening according to the socio-ecological model proposed by McLeroy et al., which identifies two key concepts: multiple levels (behavior affects, and is affected by multiple levels of influence), and reciprocal causation (individual behavior shapes and is shaped by the social environment).²⁸ According to this model, patterned behavior is the outcome of interest, and behavior is viewed as being determined by intrapersonal, interpersonal,

institutional, community, and public policy factors.²⁸ We adapted the five levels of the model by McLeroy et al. into four levels (individual level, institutional level, community level, and policy level) by collapsing the intrapersonal, and interpersonal levels into individual-level factors based on the emerging themes in the included studies.^{28,29}

An inverse variance-weighted random-effects model for proportion was performed to estimate pooled screening utilization proportion using a Pap smear test with a 95% confidence interval (CI) for studies conducted either in hospital or community settings.³⁰ We considered meta-analyses containing at least five studies.

Results

Study selection

The search resulted in 97 publications from PubMed and MEDLINE, 26 publications from CINAHL, 28 from Scopus, 25 publications from Embase, 10 studies from reference lists, and 999

Table 1 Study characteristics.

Study type	Study setting	Study	Publication year	Ecological region	District	Rural/Urban	Age group (years)	Sample size	Cervical cancer screening	Quality score									
Quantitative	Health camp	Ranabhat, S. et al. ³²	2014	Terai	Udaypur	Rural	19–55+	90	7	13 [†]									
		Sherpa, A.T.L. et al. ³¹	2015	Terai	Chitwan	Rural	16–59	1033	405	16 [†]									
		FHD, UNFPA & CMDN ³³	2016	Mountain Hill	Taplejung & Dolpa Okhaldhunga, Kavrepalanchowk, Myagdi, Pyuthan, Dailekh & Baitadi	Rural and urban	15–49	4277	63	19 [†]									
	Hospital-based	Hospital-based	Shrestha, J. et al. ³⁶	2013	Hill	Kathmandu	Urban	18–59	105	11	11 [†]								
			Ranabhat, S. et al. ³⁸	2014	Terai	Chitwan	Urban	18–50+	607	98	14 [†]								
			Shrestha, S. et al. ³⁵	2017	Terai	Chitwan	Urban	30–60	96	18	15 [†]								
			Thapa, M. et al. ³⁴	2018	Hill	Kathmandu	Urban	20–40	205	34	12 [†]								
			Thapa, N. et al. ⁴	2018	Mountain	Jumla	Rural	20–60+	360	49	16 [†]								
			Shilpakar, O. et al. ³⁷	2020	Hill	Kathmandu	Urban	30–60	390	96	15 [†]								
			Community-based	Community-based	Shrestha, P. et al. ³⁹	2014	Terai	Sunsari	Urban	15–60	100	13	16 [†]						
	Ranjit, A. et al. ¹⁸	2016			Mountain Hill	Dolpa Baglung, Bhaktapur, Doti, Kaski, Kathmandu, Lalitpur & Panchthar	Rural and urban	21–65	829	39	20 [†]								
	Khadka, K. et al. ⁴¹	2017			Hill	Rukum	Rural	15–49	594	8	19 [†]								
												Pandey, R.A. et al. ³	Hill	Kavrepalanchowk	Rural	30–60	180	69	15 [†]
												Chhetri, M. et al. ⁴²	Hill	Syangja	Rural	20–60	207	27	14 [†]
	Maharjan, M. et al. ⁴⁰	2020	Mountain	Jumla	Rural and urban	20–65	510	91	16 [†]										
Qualitative	—	Darj, E. et al. ²⁰	2019	Hill	Rupandehi	Urban	25–60	72	—	10 [‡]									
		Andersen, J.G. et al. ²¹	2020	Hill	Kaski	Urban	30–60	48	—	10 [‡]									

Note: [†]Quality appraisal of studies — Appraisal tool for Cross-Sectional Studies (AXIS) for quantitative studies, [‡]Critical Appraisal Skills Programme (CASP) checklist for qualitative studies.

studies from Google Scholar. A total of 836 duplicates (Google Scholar = 800 and databases = 36) were removed from the records identified (1185) amounting to 349 records. After title and abstract review, 256 records were excluded for the following reasons: 75 articles were not from Nepal and 181 articles lacked information on cervical cancer. Thus, 93 articles remained for full-text review. After full-text review, 76 articles were excluded because they were either conference papers, editorials, short communications, multicountry studies, reports, review articles, or study protocols, or they presented no data on cervical cancer screening utilization and its associated factors. Thus, 17 articles were included in the review (Fig. 1).^{3,4,18,20,21,31–42}

Quality of included studies

Table 1 includes quality assessment scores. Quantitative cross-sectional studies (n = 15) were subjected to a quality assessment using the AXIS checklist with a score of 55% or above; seven studies scored above 80%.^{3,4,18,26,31–42} Qualitative studies (n = 2) were subject to quality assessment using the CASP checklist for qualitative studies with a score of 10 of 10 points.^{20,21,27}

Study characteristics

A summary of the findings from the 17 articles meeting the inclusion criteria is reported in Table 1.^{3,4,18,20,21,31–42} Fifteen quantitative studies and two qualitative studies representing the three geographical regions [mountain (n = 3 districts), hill (n = 16

districts), and terai (plains; n = 12 districts)] (Fig. 2), 31 (of 77) districts with 52.6% of the total female population in Nepal, and a total of 47 study sites in Nepal were included (Table 1).^{3,4,18,20,21,31–43}

There were six community-based studies,^{3,18,39–42} six hospital-based studies,^{4,34–38} and three health camp-based studies,^{31–33} conducted among women aged 15–65 years, 18–60+ years, and 19–59 years, respectively. All the included studies collected data through face-to-face interviews using a structured questionnaire.^{3,4,18,31–42}

Cervical cancer screening utilization

The pooled screening utilization proportion using the Pap smear test estimated from the studies conducted in the hospital settings was 17.0% (Fig. 3),^{4,34–38} and in the community settings it was 16.0% (Fig. 4).^{3,18,39,41,42}

We compared screening utilization in rural and urban areas among the community-based studies: cervical cancer screening utilization using the Pap smear test ranged from 3.3% (21–65 years) to 14.8% (20–65 years) in rural areas, and 7.3% (21–65 years) to 20.1% (20–65 years) in the urban areas (Table 1).^{18,40}

Cervical cancer screening method

The Pap smear test was reported to be the cervical cancer screening method in 15 studies;^{3,4,18,26,31–42} of these, three studies reported both VIA and Pap smear test as screening methods.^{33,40,42} None of the 17 included studies reported the use of liquid-based cytology or screening by HPV test (see Table 2).

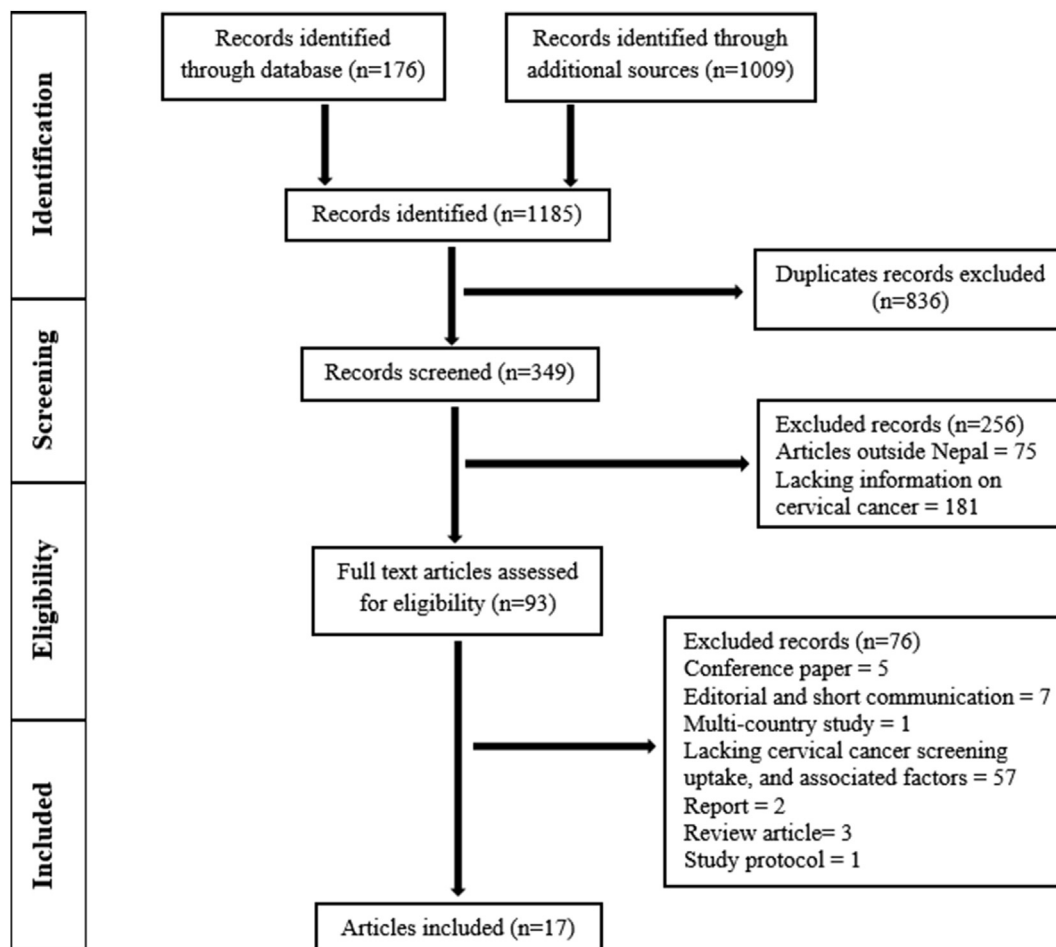


Fig. 1. Selection of papers for review.

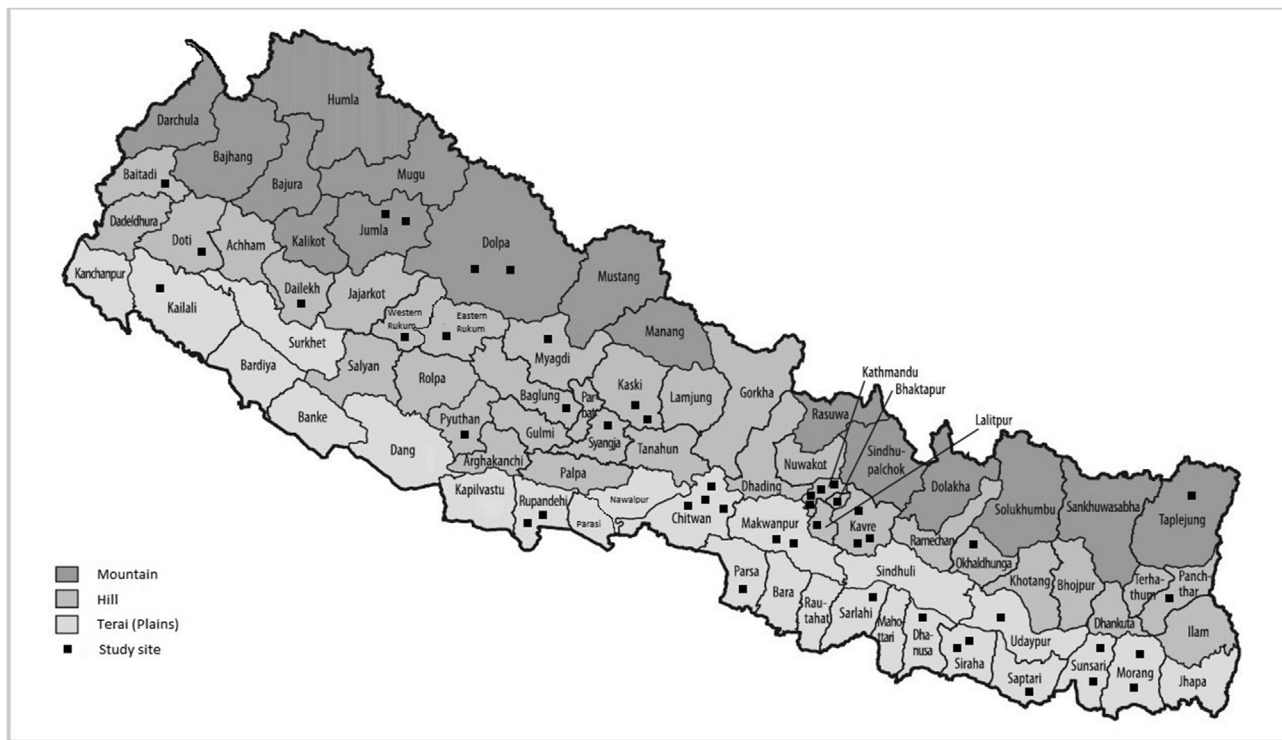


Fig. 2. Map showing 47 study sites from 31 (of 77) districts of Nepal.

Barriers to cervical cancer screening

Two qualitative studies and four quantitative studies reported barriers to cervical cancer screening, which were further categorized into (i) individual level, (ii) institutional level, (iii)

community level, and (iv) policy level as shown in Table 3.^{20,21,31,34,35,37}

Individual-level barriers were the most frequently reported barriers to cervical cancer screening. Four (of six) studies reported embarrassment related to gynecological examination, and low level

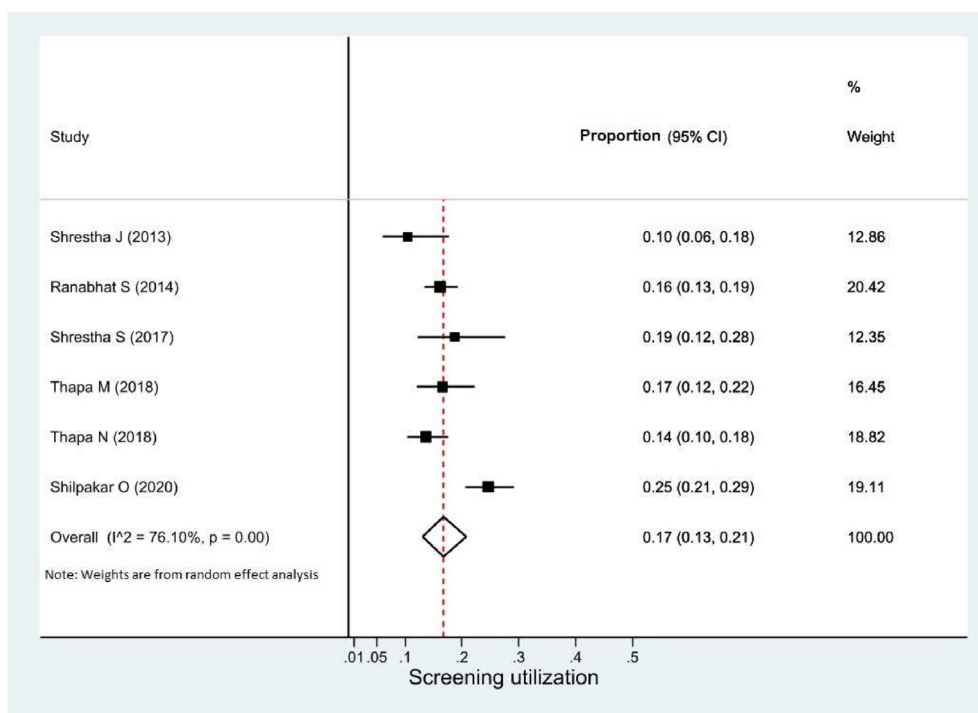


Fig. 3. Forest plot of cervical cancer screening utilization reported in hospital settings in Nepal.

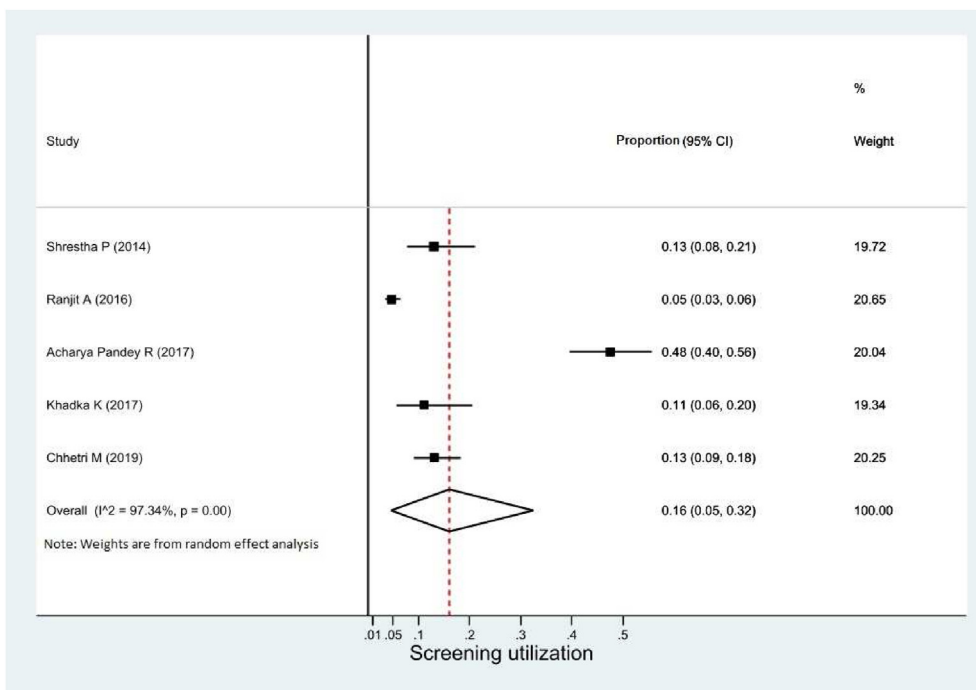


Fig. 4. Forest plot of cervical cancer screening utilization reported in community settings in Nepal.

Table 2

List of studies included in the review for analysis.

Study setting	Author	Title	Publication year
Hospital-based	Shrestha, J. et al. ³⁶	Knowledge, Attitude and Practice regarding Cervical Cancer Screening Amongst Women visiting Tertiary Centre in Kathmandu, Nepal	2013
	Ranabhat, S. et al. ³⁸	Association of Knowledge, Attitude and Demographic Variables with Cervical Pap Smear Practice in Nepal	2014
	Shrestha, S. et al. ³⁵	Knowledge, Attitude and Practice regarding Cervical Cancer Screening Among Women attending a Teaching Hospital, Bharatpur, Chitwan	2017
	Thapa, M. et al. ³⁴	Cervical cancer awareness and practice of pap smear test among women with gynecological problems	2018
	Thapa, N. et al. ⁴	Knowledge, attitude, practice and barriers of cervical cancer screening among women living in mid-western rural, Nepal	2018
	Shilpakar, O. et al. ³⁷	Knowledge, Attitude and Practice (KAP) of Women towards Cervical Cancer Screening at A Tertiary Care Institute in Kathmandu, Nepal	2020
Community-based	Shrestha, P. et al. ³⁹	Knowledge, Attitude, and Practice regarding Pap Smear Test among Women in Ward no. 14, Dharan	2014
	Ranjit, A. et al. ¹⁸	Awareness and prevalence of cervical cancer screening among women in Nepal	2016
	Khadka, K. et al. ⁴¹	Knowledge and Awareness about Cervical Cancer Screening and HPV Vaccine among Females Aged 15–49 Years in Rukum District of Nepal	2017
	Pandey, R.A. et al. ³	Cervical cancer screening behavior and associated factors among women of Ugrachandi Nala, Kavre, Nepal	2017
	Chhetri, M. et al. ⁴²	Awareness and Practice of Cervical Cancer and it's Screening Among Married Women of Syangja, Nepal	2019

of knowledge on cervical cancer screening as individual-level barriers.^{20,21,31,34,35,37}

Facilitators to cervical cancer screening

Two qualitative studies and two quantitative studies reported facilitators to cervical cancer screening, which were further categorized into individual, institutional, community, and policy levels.^{3,20,21,35} A detailed list of facilitating factors is presented in Table 4.

Three (of four) reported institutional level facilitators, in which health personnel–related (female health personnel and counseling), and two studies reported screening services (privacy of examination room, confidentiality, and trust) as facilitators for cervical cancer screening.^{3,35,21}

Discussion

This systematic review focuses on cervical cancer screening utilization as well as barriers and facilitators to cervical cancer screening among Nepalese women.^{3,4,18,20,21,31–42} Our review is likely to have captured all relevant studies published in the English language from 1 January 2000 to 31 December 2020. The pooled cervical cancer screening utilization estimate of the use of Pap smear test from the studies conducted in hospital settings among women aged 18–60+ years was 17.0%; 95% CI: 13%–21%^{4,34–38} and in community settings among women aged 15–65 years was 16.0%; 95% CI: 5.0%–32.0%.^{3,18,39,41,42} Our review reports that cervical cancer screening utilization estimates (16% and 17%) are far below the national target (70% of women aged 30–60 years) for cervical cancer screening utilization.¹⁵ Moreover, the low cervical cancer

Table 3
Barriers to cervical cancer screening.

Individual-level barriers	Institutional-level barriers	Community-level barriers	Policy-level barriers
<p>Embarrassment of gynecological examination</p> <p>Ashamed of having a gynecological examination³¹</p> <p>Embarrassment/due to shyness^{21,34,35}</p> <p>Fear of screening and results</p> <p>Fear of being diagnosed with cancer^{31,34}</p> <p>Fear of the examination or procedure^{21,34,35,37}</p> <p>Finances</p> <p>Financial barriers and poverty^{20,21}</p> <p>Knowledge on cervical cancer screening</p> <p>Low/limited level of knowledge and information^{20,21,34,35}</p> <p>Misconception about cervical cancer and screening behavior^{20,21}</p> <p>No symptoms/not experiencing the need for screening</p> <p>I'm not ill, so it is not necessary/feeling healthy^{34,35}</p> <p>Only seeking health care when having symptoms²¹</p> <p>No exact reason³⁴</p>	<p>Health personnel</p> <p>Not recommended by a health worker³⁵</p> <p>Service providers²⁰</p> <p>Male doctors/nurses²¹</p> <p>Lack of trust²¹</p> <p>Screening services</p> <p>Uncomfortable screening experiences²¹</p> <p>The examination room lacking privacy^{21,37}</p>	<p>Decision making</p> <p>Family dependency²¹</p> <p>Lack of permission and encouragement from husband²¹</p> <p>Husband disapproves of cervical cancer screening³⁵</p> <p>Husband lacks knowledge of risk factors and benefits²¹</p> <p>Socio-cultural aspects</p> <p>Socio-cultural barriers²⁰</p> <p>Patriarchal society²¹</p> <p>Fear of social exclusion and gossip²¹</p> <p>Fear of discrimination by husband and family²¹</p> <p>Fear of abuse and rejection²¹</p> <p>Community resources</p> <p>Geographical challenges²⁰</p> <p>Long distance to screening facility²¹</p>	<p>Inaccessibility</p> <p>No access to clinic for screening³⁵</p> <p>Costs for screening</p> <p>Considering screening expensive³⁴</p>

Table 4
Facilitators to cervical cancer screening.

Individual-level facilitators	Institutional-level facilitators	Community-level facilitators	Policy-level facilitators
<p>Personal behavior</p> <p>Personal initiative³</p> <p>Preventive measure³⁵</p>	<p>Health personnel</p> <p>Health personnel's advice³</p> <p>Health worker recommendations³⁵</p> <p>Counseling before the screening²¹</p> <p>Female doctors/nurses²¹</p> <p>Trained and skilled staff²¹</p> <p>Female Community Health Volunteers²¹</p> <p>Screening services</p> <p>Ensuring privacy in the examination room²¹</p> <p>Reassurance if normal screening result²¹</p> <p>Confidentiality and trust²¹</p> <p>Diagnostic purposes³⁵</p>	<p>Societal aspects</p> <p>Women encourage each other and go together²¹</p> <p>Societal norms²¹</p> <p>Support and motivation</p> <p>Family's advice³</p> <p>Husband's knowledge about cervical cancer²¹</p> <p>Family support²¹</p> <p>Motivation²⁰</p> <p>Social support²¹</p>	<p>Screening and awareness</p> <p>Arranged health camps³⁵</p> <p>Awareness program²⁰</p> <p>Empowerment of women to make health-related decisions²¹</p> <p>Public awareness campaigns to reduce stigma²¹</p> <p>Access to screening</p> <p>Short distance to screening facility²¹</p> <p>Costs for screening</p> <p>Screening being free of charge²¹</p>

screening utilization coverage identified in our review is especially concerning, given that it reports ever screened or screening at least once in a lifetime for cervical cancer among women. Screening women once in their lifetime by the age of 35 years has been shown to significantly lower the lifetime risk of cervical cancer.⁴⁴ However, screening once by age 35 years and again by 45 years is the WHO recommended global strategy to eliminate cervical cancer.⁴⁵

Cervical cancer screening utilization is reported lower in the rural areas compared to urban areas of Nepal:^{18,40} this may reflect access to health services. However, studies conducted in hospital settings, study sites with ongoing awareness programs, and studies with small sample sizes may have resulted in higher estimates of cervical cancer screening utilization. In addition, one study included in our review reported high cervical cancer screening utilization, which may be the result of ongoing cervical cancer awareness programs run by non-governmental organizations.³ Educational interventions on cervical cancer screening to increase knowledge and empower women by mobilizing community health workers, and use of information communication technology could help increase screening utilization among women in Nepal.^{46–48}

Nepalese women face many barriers to accessing cervical cancer screening. The socio-ecological model proposes that the social environment affects individual behavior and that behavior

both shapes and is shaped by multiple levels of influence.^{28,29} Among the four-level factors from the socio-ecological model of McLeroy et al., and similar to findings reported by Daley et al.,^{28,29} our review found individual-level barriers to be the major barriers reported in the included studies.^{20,21,31,34,35,37} Similar to our review findings, studies have reported that the level of knowledge and awareness of cervical cancer among women is associated with screening utilization.^{46,47} Various studies have emphasized the influence of women's knowledge as an important determinant in the perception of the importance of cervical cancer screening and procedure.^{22,31,49,50}

Studies report that the level of awareness of cervical cancer and available screening services among Nepalese women are either lacking or very low.^{18,20,21,38} These factors are associated with different misconceptions, fears, and lack of concern that characterize women in this region in relation to risk factors, perceived risk, perceived severity; moreover, screening cost for cervical cancer also plays an important role.^{20,21,31,34,35} Pap smear test costs in the range of USD 3–10 in the private institutions, which is exclusive of the unexpected cost, and may not be affordable for all the women in Nepal²⁰ where the median household income was estimated to be US\$ 256 in 2015.⁵¹ Although cervical cancer screening test (VIA) is free of charges at the government health institutions (hospitals and health posts), the associated indirect cost may

hinder the service utilization.^{13,16} Cost estimation for the direct and indirect costs associated with cervical cancer screening is essential to implement a cost-effective screening programme. Furthermore, studies reported that many women still think that cervical cancer screening is not necessary because they do not have any symptoms.^{34,35}

Low level of awareness, low perception of susceptibility and risk as well as misconceptions about the need for screening were the main factors identified in similar studies conducted in India, Bangladesh, Malaysia, and the Philippines.^{52–55} Our review reports similar findings that a low level of awareness of cervical cancer screening is the major barrier to screening utilization.^{20,21,31,34,35} Therefore, health education and empowerment are key factors to strengthen women's awareness and align perceived susceptibilities, seriousness, benefits, and barriers with reality, and facts, which will lead to increased cervical cancer screening participation.^{31,50} However, there is an urgent need for an organized cervical cancer screening program to educate women, provide an individual invitation and follow-up for screening at regular intervals (every 5 years), and treat precancerous or invasive cancer.

Men's support is a facilitating factor for increasing cervical cancer screening utilization among women in low- and middle-income countries, which is an important barrier.^{21,56–59,47–50} Advice from health personnel is one of the major facilitators reported.^{3,35} Previous studies have reported that mobilizing female community health volunteers may be an effective way to increase cervical cancer screening utilization.^{46,47}

Most of the studies included in our review reported on the use of the Pap smear test as the cervical cancer screening method. Using a different screening strategy for cervical cancer such as HPV self-sampling should be further explored as a method for screening women in rural areas with limited access to health services, and to overcome barriers such as privacy and embarrassment.^{60,61} Furthermore, future research should investigate cultural barriers and facilitators, and the associated cost of HPV self-sampling.^{62,63}

Strengths and limitations

This review summarized studies on cervical cancer screening (using Pap smear and VIA) utilization, barriers, and facilitators of cervical cancer screening in Nepal. Our study is limited to PubMed/MEDLINE, CINAHL, and Scopus databases with additional searches in Google Scholar; thus, it may not have identified all studies in this field, particularly those published in non-indexed local journals, non-English language publications, and platforms not covered by the databases searched in this review. We included studies from both rural and urban settings, and with either hospital- or community-based samples. The methodological quality of many of the included studies was poor in relation to sample size, and sampling techniques, which may have introduced bias. Overall, a high degree of heterogeneity was observed in the included studies.

Conclusions

Our review reports that cervical cancer screening utilization (16%) is more than four times less than the national recommended target for screening 70% of eligible women aged 30–60 years in Nepal. Furthermore, limited knowledge of cervical cancer screening and embarrassment related to the screening procedure were the most frequently reported individual-level barriers. The review highlighted facilitators (female health personnel and counseling, and privacy for screening services) for cervical cancer screening, which may inform future interventions.

Author statements

Acknowledgements

We thank Aarhus University Library for assisting with database searches.

Ethics approval

This article is based on published data, and hence ethical approval was not required.

Funding

This study is part of research work toward a PhD degree at Aarhus University, Denmark (<https://phd.health.au.dk/>), and is funded by a university scholarship awarded to ADS. The funding organizations do not have any role in the study design, the data collection, analysis, interpretation, or the reporting of the results.

Competing interests

All authors declared that they have no competing interests.

Authorship contributions

ADS made substantial contributions to the conception and design of the manuscript and wrote the first draft, incorporated coauthors' suggestions, and prepared the final version for submission. ADS and JGA conducted the systematic review search. BG, AS, SS, DN, SG, and CC were involved in the drafting of the article and revising it critically for important intellectual content. JGA, BG, AS, SS, DN, SG, CC, and PK contributed to all the drafts and approved the final version for submission.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2022.06.007>.

References

1. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, et al. *Global Cancer Observatory: Cancer Today*. Lyon, France: International Agency for Research on Cancer; 2020 (cited 2021 Aug 13). Available from: <https://gco.iarc.fr/today>.
2. ACCP. *Cervical Cancer Prevention Fact sheet*. Alliance for Cervical Cancer Prevention; 2009 (cited 2021 Aug 13). Available from: https://screening.iarc.fr/doc/RH_fs_risk_factors.pdf.
3. Pandey RA, Karmacharya E. Cervical cancer screening behavior and associated factors among women of Ugrachandi Nala, Kavre, Nepal. *Eur J Med Res* 2017;**22**(1):32.
4. Thapa N, Maharjan M, Petrini MA, Shah R, Shah S, Maharjan N, et al. Knowledge, attitude, practice and barriers of cervical cancer screening among women living in mid-western rural, Nepal. *J Gynecol Oncol* 2018;**29**(4):e57.
5. Gyenwali D, Pariyar J, Onta SR. Factors associated with late diagnosis of cervical cancer in Nepal. *Asian Pac J Cancer Prev* 2013;**14**(7):4373–7.
6. Hodge A, Byrne A, Morgan A, Jimenez-Soto E. Utilisation of health services and geography: deconstructing regional differences in barriers to facility-based delivery in Nepal. *Matern Child Health J* 2015;**19**(3):566–77.
7. Denny L, Kuhn L, De Souza M, Pollack A, Dupree W, Wright T. Screen-and-treat approaches for cervical cancer prevention in low-resource settings: a randomized controlled trial. *JAMA* 2005;**294**(17):2173–81.
8. Gaffikin L, Blumenthal PD, Emerson M, Limpaphayom K. Safety, acceptability, and feasibility of a single-visit approach to cervical-cancer prevention in rural Thailand: a demonstration project. *Lancet* 2003;**361**(9360):814–20.
9. Sankaranarayanan R, Esmy PO, Rajkumar R, Muwonge R, Swaminathan R, Shanthakumari S, et al. Effect of visual screening on cervical cancer incidence and mortality in Tamil Nadu, India: a cluster-randomised trial. *Lancet* 2007;**370**:398–406.
10. World Health Organization. *WHO guidelines for screening and treatment of precancerous lesions for cervical cancer prevention*. 2013 (cited 2021 Aug 13).

- Available from: https://apps.who.int/iris/bitstream/handle/10665/94830/9789241548694_eng.pdf.
11. Brisson M, Kim J, Canfell K, Drolet M, Gingras G, Burger EA, et al. Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries. *Lancet* 2020;**395**(10224):575–90.
 12. Singh Y, Shah A, Singh M, Verma S, Shrestha BM, Vaidya P, et al. Human papilloma virus vaccination in Nepal: an initial experience in Nepal. *Asian Pac J Cancer Prev* 2010;**11**(3):615–7.
 13. Family Health Division. National guidelines for cervical cancer screening and prevention in Nepal. In: Department of Health Services, Ministry of Health and Population, editor. Kathmandu: Family Health Division; 2010.
 14. Family Health Division. Cervical Cancer Screening and Prevention (CCSP) in Nepal. A reference manual 2015. In: Department of Health Services, Ministry of Health and Population, editor. Kathmandu: Family Health Division; 2015.
 15. Family Health Services. Cervical cancer screening and prevention in Nepal implementation plan 2016–2020. In: Department of Health Services, Ministry of Health and Population, editor. Teku, Kathmandu: Family Health Services; 2017.
 16. Ministry of Health and Population. *Annual Report - Department of Health Services 2073/74 (2016/17)*. Kathmandu, Nepal. 2017 (cited 2021 Aug 13). Available from: https://dohs.gov.np/wp-content/uploads/2018/04/Annual_Report_2073-74.pdf.
 17. World Health Organization. *World health survey results - report of Nepal*. 2003 (cited 2021 Aug 13). Available from: <http://www.who.int/healthinfo/survey/whsnpl-nepal.pdf>.
 18. Ranjit A, Gupta S, Shrestha R, Kushner AL, Nwomeh BC, Groen RS. Awareness and prevalence of cervical cancer screening among women in Nepal. *Int J Gynaecol Obstet* 2016;**134**(1):37–40.
 19. Dhimal M, Bista B, Bhattarai S, Dixit LP, Hyder MKA, Agrawal N, et al. *Report of non communicable disease risk factors: STEPS survey Nepal 2019*. Kathmandu: Nepal Health Research Council; 2020 (cited 2021 Aug 13). Available from: https://www.who.int/docs/default-source/nepal-documents/ncds/ncd-steps-survey-2019-compressed.pdf?sfvrsn=807bc4c6_2.
 20. Darj E, Chalise P, Shakya S. Barriers and facilitators to cervical cancer screening in Nepal: a qualitative study. *Sex Reprod Healthc* 2019;**20**:20–6.
 21. Andersen JG, Shrestha AD, Gyawali B, Neupane D, Kallestrup P. Barriers and facilitators to cervical cancer screening uptake among women in Nepal - a qualitative study. *Women Health* 2020;**60**(9):963–74.
 22. Sapkota K. Knowledge, attitude and perceived barriers to cervical cancer screening among rural women in western Nepal. In: *APHA 139th annual meeting and exposition Oct 29 - Nov 2, 2011*; 2011. Washington DC. (cited 2021 Aug 13). Available from: <https://apha.confex.com/apha/139am/webprogram/Paper249942.html>.
 23. Sherpa ATL. *Time for an organized cervical cancer screening in Bharatpur, Nepal*. Master's thesis. University of Oslo, Faculty of Medicine, Department of General Practice and Community Medicine, Section for International Health; 2007 (cited 2021 Dec 23). Available from: <https://www.duo.uio.no/bitstream/handle/10852/30021/Ang-Thesis-Aug-28-2007.pdf?sequence=3&isAllowed=y>.
 24. Shrestha AD, Andersen JG, Neupane D, Ghimire S, Campbell C, Kallestrup P. Protocol for systematic literature review on implementation of cervical cancer screening and associated factors in Nepal from 2000 to 2018. *J Glob Health Rep* 2020;**4**:e2020023 (cited 2021 Aug 13). Available from: <https://www.jogh.org/article/12505-protocol-for-systematic-literature-review-on-implementation-of-cervical-cancer-screening-and-associated-factors-in-nepal-from-2000-to-2018>.
 25. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JPA, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ* 2009;**339**:b2700.
 26. Downes MJ, Brennan ML, Williams HC, Dean RS. Development of a critical appraisal tool to assess the quality of cross-sectional studies (AXIS). *BMJ Open* 2016;**6**(12):e011458.
 27. CASP UK. *CASP qualitative checklist [Internet]*. Oxford: CASP UK; 2018 (cited 2021 Aug 13). Available from: https://casp-uk.net/wp-content/uploads/2018/03/CASP-Qualitative-Checklist-2018_fillable_form.pdf.
 28. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. *Health Educ Q* 1988;**15**(4):351–77.
 29. Daley E, Alio A, Anstey EH, Chandler R, Dyer K, Helmy H. Examining barriers to cervical cancer screening and treatment in Florida through a socio-ecological lens. *J Community Health* 2011;**36**(1):121–31.
 30. Nyaga VN, Arbyn M, Aerts M. Metaprop: a Stata command to perform meta-analysis of binomial data. *Arch Public Health* 2014;**72**(1):39.
 31. Sherpa AT, Karki BS, Sundby J, Nygard M, Franceschii S, Clifford G. Population based study of cervical cancer screening in Bharatpur, Nepal. *J Manmohan Mem Inst Health Sci* 2015;**1**(4):3–8.
 32. Ranabhat S, Dhungana G, Neupane M, Shrestha R, Tiwari M. Pap smear coverage and effect of knowledge and attitude regarding cervical cancer on utilization of the test by women in Udayapur district of Nepal. *J Chitwan Med Coll* 2014;**4**(4):31–5.
 33. Family health division & United Nations Population Fund. *Study on selected reproductive health morbidities among women attending reproductive health camps in Nepal*. Kathmandu. 2017 (cited 2021 Aug 13). Available from: https://nepal.unfpa.org/sites/default/files/pub-pdf/RH%20Morbidity%20study_0.pdf.
 34. Thapa M. Cervical cancer awareness and practice of Pap smear test among women with gynecological problems. *J Nepal Med Assoc* 2018;**56**(211):657.
 35. Shrestha S, Dhakal P. Knowledge, attitude and practice regarding cervical cancer screening among women attending a teaching hospital, Bharatpur, Chitwan. *J Fam Reprod Health* 2017;**11**(1):18–23.
 36. Shrestha J, Saha R, Tripathi N. Knowledge, attitude and practice regarding cervical cancer screening amongst women visiting tertiary centre in Kathmandu, Nepal. *Nepal J Med Sci* 2013;**2**(2):85–90.
 37. Shilpakar O, Aacharya RP, Neupane RP, Karki B. Knowledge, attitude and practice (KAP) of women towards cervical cancer screening at a tertiary care institute in Kathmandu, Nepal. *Nepal Med J* 2020;**3**(1):13–8.
 38. Ranabhat S, Tiwari M, Dhungana G, Shrestha R. Association of knowledge, attitude and demographic variables with cervical Pap smear practice in Nepal. *Asian Pac J Cancer Prev* 2014;**15**(20):8905–10.
 39. Shrestha P. *Knowledge, attitude, and practice regarding Pap smear test among women in Ward no. 14, Dharan* [Masters thesis in Public Health]. The Arctic University of Norway; 2014 (cited 2021 Aug 13). Available from: <https://munin.uit.no/bitstream/handle/10037/7995/thesis.pdf?sequence=2>.
 40. Maharjan M, Thapa N, Panthi D, Maharjan N, Petrini MA, Jiong Y. Health beliefs and practices regarding cervical cancer screening among women in Nepal: a descriptive cross-sectional study. *Nurs Health Sci* 2020;**22**(4):1084–93.
 41. Khadka K, Shah SK, Sanal TS, Mathias J, Upadhyay A, Ghimire R, et al. Knowledge and awareness about cervical cancer screening and HPV vaccine among females aged 15–49 years in Rukum district of Nepal. *Am J Cancer Prev* 2017;**5**(1):10–6.
 42. Chhetri M, Dhakal R. Awareness and practice of cervical cancer and its screening among married women of Syangja, Nepal. *J Health Allied Sci* 2019;**9**(1).
 43. Central Bureau of Statistics. *National Population and Housing Census 2011 (National Report)*. 2012 (cited 2021 Dec 23). Available from: <https://cbs.gov.np/national-population-and-housing-census-2011-national-report/>.
 44. Goldie SJ, Gaffikin L, Goldhaber-Fiebert JD, Gordillo-Tobar A, Levin C, Mahé LC, et al. Cost-effectiveness of cervical-cancer screening in five developing countries. *N Engl J Med* 2005;**353**(20):2158–68. <https://doi.org/10.1056/NEJMsa044278>.
 45. *Global strategy to accelerate the elimination of cervical cancer as a public health problem*. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO. (cited 2021 Dec 23). Available from: <https://www.who.int/publications/i/item/9789240014107>.
 46. Abiodun OA, Olu-Abiodun OO, Sotunsa JO, Oluwole FA. Impact of health education intervention on knowledge and perception of cervical cancer and cervical screening uptake among adult women in rural communities in Nigeria. *BMC Public Health* 2014;**14**(814).
 47. Ebu NI, Amissah-Essel S, Asiedu C, Akaba S, Pereko KA. Impact of health education intervention on knowledge and perception of cervical cancer and screening for women in Ghana. *BMC Public Health* 2019;**19**:1505.
 48. Gana GJ, Oche MO, Ango JT, Raji MO, Okafogun NC. Effect of an educational program on awareness of cervical cancer and uptake of Pap smear among market women in Niger State, North Central Nigeria. *J Public Health Epidemiol* 2016;**8**(10):211–9.
 49. Bhandari TR, Kutty VR, Ravindran TKS. Women's autonomy and its correlates in Western Nepal: a demographic study. *PLoS One* 2016;**11**(1):e0147473.
 50. Olson B, Gribble B, Dias J, Curryer C, Vo K, Kowal P, et al. Cervical cancer screening programs and guidelines in low- and middle-income countries. *Int J Gynaecol Obstet* 2016;**134**(3):239–46.
 51. *Fifth household budget survey Nepal*. Kathmandu: Nepal Rastra Bank; 2016 (cited 2021 Dec 23). Available from: https://www.nrb.org.np/contents/uploads/2019/12/Study_Reports-Fifth_Household_Budget_Survey_2014-2015.pdf.
 52. Domingo EJ, Noviani R, Noor MRM, Ngelangel CA, Limpaphayom KK, Thuan TV, et al. Epidemiology and prevention of cervical cancer in Indonesia, Malaysia, the Philippines, Thailand and Vietnam. *Vaccine* 2008;**26**(Suppl 12):M71–9.
 53. Islam RM, Bell RJ, Billah B, Hossain MB, Davis SR. Lack of understanding of cervical cancer and screening is the leading barrier to screening uptake in women at midlife in Bangladesh: population-based cross-sectional survey. *Oncologist* 2015;**20**(12):1386–92.
 54. Mahalakshmi S, Sundaram S. Barriers to cancer screening uptake in women: a qualitative study from Tamil Nadu, India. *Asian Pac J Cancer Prev* 2020;**21**(4):1081–7.
 55. Wong LP, Wong YI, Low WY, Khoo EM, Shuib R. Knowledge and awareness of cervical cancer and screening among Malaysian women who have never had a Pap smear: a qualitative study. *Singapore Med J* 2009;**50**(1):49–53.
 56. Cunningham MS, Skrastins E, Fitzpatrick R, Jindal P, Onoko O, Yeates K, et al. Cervical cancer screening and HPV vaccine acceptability among rural and urban women in Kilimanjaro Region, Tanzania. *BMJ Open* 2015;**5**(3):e005828.
 57. Mouttapa M, Tanjasiri SP, Weiss JW, Sablan-Santos L, DeGuzman Lacsamana J, Quitugua L, et al. Associations between women's perception of their husbands'/partners' social support and Pap screening in Pacific Islander Communities. *Asia Pac J Public Health* 2016;**28**(1):61–71.

58. Ragan KR, Buchanan Lunsford N, Lee Smith J, Saraiya M, Aketch M. Perspectives of screening-eligible women and male partners on benefits of and barriers to treatment for precancerous lesions and cervical cancer in Kenya. *Oncologist* 2018;**23**(1):35–43.
59. Thiel de Bocanegra H, Trinh-Shevrin C, Herrera AP, Gany F. Mexican immigrant male knowledge and support toward breast and cervical cancer screening. *J Immigr Minor Health* 2009;**11**(4):326–33.
60. Johnson DC, Bhatta MP, Smith JS, Kempf MC, Broker TR, Vermund SH, et al. Assessment of high-risk human papillomavirus infections using clinician- and self-collected cervical sampling methods in rural women from far western Nepal. *PLoS One* 2014;**9**(6).
61. Kamath Mulki A, Withers M. Human Papilloma Virus self-sampling performance in low- and middle-income countries. *BMC Women's Health* 2021;**21**(1): 12.
62. Allen-Leigh B, Uribe-Zúñiga P, León-Maldonado L, Brown BJ, Lörincz A, Salmeron J, et al. Barriers to HPV self-sampling and cytology among low-income indigenous women in rural areas of a middle-income setting: a qualitative study. *BMC Cancer* 2017;**17**(1).
63. Malone C, Barnabas RV, Buist DSM, Tiro JA, Winer RL. Cost-effectiveness studies of HPV self-sampling: a systematic review. *Prev Med* 2020;**132**: 105953.