Systematic Review/Meta-analysis

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Knowledge and practice regarding cancer screening in Nepal: a systematic review and meta-analysis

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Background: Cancer screening utilization can aid in the early diagnosis and treatment of cancer. However, the current scenario of the knowledge and practice regarding cancer screening remains unclear as the authors do not have sufficient studies. Hence, the authors conducted this systematic review and meta-analysis to assess the situation of cancer screening utilization and knowledge.
Methods: A systematic literature review was conducted to identify all studies on knowledge and practice regarding cancer screening in the Nepalese population. Data extraction and analysis were done with SPSS and CMA-3.
Results: The authors identified a total of 5238 studies after database searching, and 19 studies were included in a narrative synthesis. Lack of awareness and knowledge was the major barrier in cervical, breast, and testicular cancer screening. In cervical cancer screening, the most common reason for screening was the advice of health personnel in 85% of respondents, and the barrier was lack of awareness in 49.33% of participants.
Conclusion: The knowledge and practice of cancer screening is lacking in Nepal, as shown by our review. More educational and awareness programs, easy access to screening services, and elimination of sociocultural barriers are necessary to increase the utilization of screening services.

Keywords: cancer, cervical, knowledge, practice, screening

Background

Cancer screening is an integral component to reducing morbidity and mortality from cancer[1]. We do not have national cancer registries in the country. Only national screening guidelines implemented in the country was the national guideline for Cervical Cancer Screening and Prevention (CCSP) launched in 2010 and revised in 2017[2]. The goal was to screen for cervical cancer in 50% of women aged 30–60, which was later changed to 70%, screening utilization was reported to be just 5.4% as published by Nepal STEPS Survey 2019[3]. The cervical and breast cancer screening programme implementation guideline 2077 added breast cancer screening guidelines to screen young adolescent females and women free of cost[4]. The policy emphasizes clinical breast examination, teaching about self-breast examination, and facilitation on the specialist review. However, clear policy on screening frequency is lacking. Lack of awareness, ignorance, sociocultural barriers, perceived economic burden are all responsible for underutilization of the screening services[5–10]. We conducted this systematic review and meta-analysis to see the current situation of knowledge and practice of cancer screening.

HIGHLIGHTS

- Cancer screening is effective at reducing morbidity and mortality associated with cancer.
- US Preventive Services Task Force (USPSTF) has Level A recommendation for cervical and colorectal cancer screening, level B recommendation for lung and breast cancer screening, and D for testicular cancer screening.
- For Low–middle-income countries, several barriers like lack of knowledge, financial problems, lack of support from family members, and limited access to services pose a problem in screening utilization.
- Education and awareness, support from family and friends, and easy access to health care can facilitate screening utilization.

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Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement, Supplemental Digital Content 1, http://links.lww.com/MS9/A316[11]. The study protocol was registered in PROSPERO prior to the conduct of the review.

Selection of studies

Inclusion criteria

We included studies published in the English-language reporting empirical data obtained in Nepal. Studies were included if there was data on knowledge or practice for participants for cervical, testicular, lung or breast cancer.

Exclusion criteria

We excluded articles that could not be classified as empirical literature (e.g. commentaries, discussion papers, journalistic interviews, policy reports), reviews, studies on other topics on cancer not related to screening (e.g. mortality), and studies on mixed populations (e.g. South-Asians) unless separate results for people with cancer screening in Nepal could be isolated. Studies reporting on adults younger than 18 years were excluded.

Search strategy

The study followed the "Cochrane Guidelines for Systematic Reviews of Health Promotion and Public Health Interventions" in designing the search strategy. PubMed, Embase, and Scopus were searched for English-language articles published. The search terms and keywords related to cancer screening. The supplemental appendix contains the detailed search strategy. (Supplementary file 1, Supplemental Digital Content 2, http://links.lww.com/MS9/A317).

Study selection

Study selection was performed by (1) independent screening of titles and abstracts (A.A., S.G., B.K.), and (2) Independent screening of full texts of all hits judged suitable in the first step (A.A., S.G., B.K.). Discrepant ratings were discussed and agreed upon in consensus meetings (A.A., S.A., S.G., B.K.).

Data extraction, synthesis and analysis

A data extraction form including author, year, study title, type of cancer, type of screening method, type of journal, screening rate was prepared and the included articles were extracted by A.A., S.G., B.K. and R.Y. and checked by S.A. and S.S. Given the large heterogeneity of the included studies, a narrative synthesis of the data was performed. The heterogeneity of the studies was calculated using the I2 statistics and represented using forest plots with CMA-3 for meta-analysis and SPSS 22 for descriptive analysis. The quality of the studies was assessed using the JBI critical appraisal tool for descriptive cross-sectional studies (Supplementary file 2, Supplemental Digital Content 3, http://links.lww.com/MS9/A318)[12].

Results

Study selection

A total of 5238 studies were identified, and 2096 duplicates were removed. Title and abstracts of 3142 studies were screened, and 3042 studies were excluded. Full texts of 100 studies were assessed, and 81 studies were excluded for definite reasons. A total of 19 studies were included in this systematic review (Fig. 1).

Study characteristics

All 19 studies were cross-sectional studies[5–10,13–25]. Most studies were published in international journals ($n=14$)[5–9,13,15,17,18,20–24] while only five studies were published in national journals[10,14,16,19,25] 13 studies were community-based[5,7,10,13–15,17–21,23,24], while six studies were hospital-based[6,8,9,16,22,25] The summary of included studies is shown in Table 1.

Cancer screening

Most studies ($n=14$) were related to cervical cancer[5,8–10,13,14,16,17,19,20,22–25]. Only three studies were related to breast cancer screening[6,15,21]. One study was dedicated to testicular cancer[7]. A single study was related to knowledge and attitude toward cancer screening in general[18].

Study settings and location

Most of the studies ($n=5$) were performed in the Kathmandu district[6,14–16,25] followed by three studies each in the Chitwan district[7,8,22] and Kaski district[18,21,24]. Three studies included patients from more than one district[5,13,23]. The location of the studies, excluding three studies done in multiple districts, is shown in Figure 2.

Cervical cancer screening

Reported parameters

Seven studies reported if patients had heard of cervical cancer screening in general[13,14,17,20,23–25]. Knowledge regarding the correct age of screening was tested in five studies[8,9,14,22,24]. Data on participants who had undergone screening at least once was available in 13 studies[5,8–10,13,16,17,19,20,22–25]. The reported parameters of cervical cancer screening studies are shown in Figure 3.

Heard of cervical cancer screening in general

Seven studies reported if patients had heard of cervical cancer screening in general[13,14,17,20,23–25]. Pooling of the data showed that out of 2766 respondents, 59.61% had never heard of cervical cancer screening (Fig. 4).

Knowledge on starting age of cervical cancer screening

Knowledge regarding the correct screening age was tested in five studies[8,9,14,22,24]. Pooling of the data showed that among 1069 respondents, only 21.14% knew the correct starting age of cervical cancer screening. The proportion of the participants who knew the starting age of screening is presented in Figure 5.

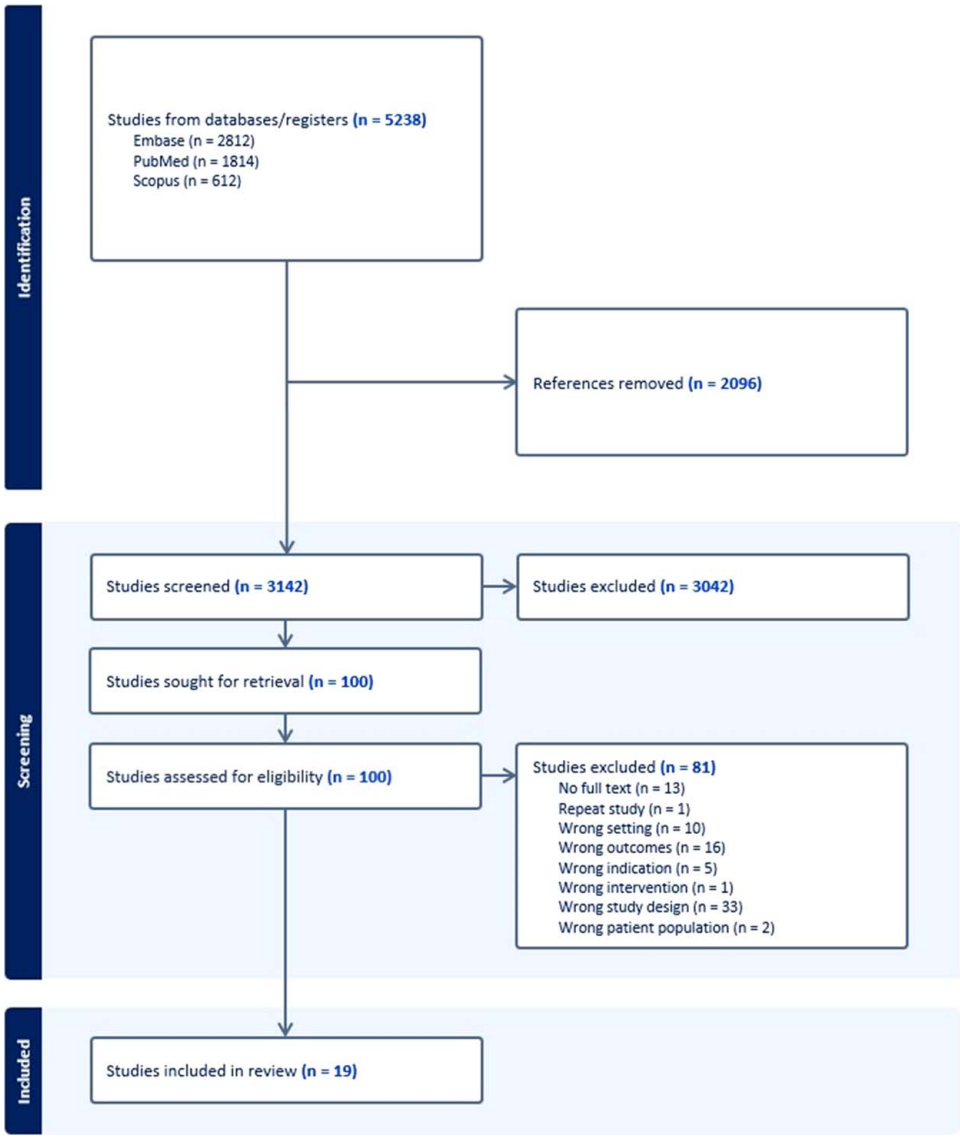

Figure 1. PRISMA flow diagram.

Knowledge of the correct cervical cancer screening interval

Six studies had data on the proportion of participants who knew the correct interval of screening[8–10,14,22,24]. Pooling of the data showed that only 5.36% of 1341 respondents knew the correct interval of screening methods. In all the studies, participants who did not know the correct screening interval were significantly higher than those who knew the correct one. In all studies, the percentage of participants who correctly knew the accurate screening interval was less than 10%; the highest percentage was 9.8% in a study by Thapa *et al.*[9] The number and proportion of participants with knowledge of the correct interval of cervical cancer screening are presented in Figure 6.

Screening practice

Cervical cancer screening utilization

Data on participants who had undergone screening at least once was available in 13 studies[5,8–10,13,16,17,19,20,22–25]. Among 13 studies, five were hospital-based[8,9,16,22,25], and eight were community-based[5,10,13,17,19,20,23,24]. The proportion of patients who had never been screened for cervical cancer was significantly higher than those who had been screened at least once in their lifetime. Pooling of the data from 13 studies shows that 74.58% of 4246 participants had never been screened for cervical cancer in their lifetime (Fig. 7). Two studies with the highest percentage of participants screened at least once were Pandey RA (47.58%) and Shrestha AD (44.88%)[17,24]. The forest plot of at least one screening utilization in hospital settings showed the utilization rate to be 19.7%, while the utilization rate in community settings was 27.3%. Due to the heterogeneity of the included studies, random effects model was used for both forest plots. The forest plot of the hospital and community settings are shown in Figures 8 and 9, respectively.

Use of cervical cancer screening at regular intervals

Only two studies had data regarding the regular use of screening at correct intervals[22,24]. In a study by Ranabhat and colleagues,

Table 1

Summary of included studies

References	Cancer screening	Study population	District	Sample size	Mean age ± SD	Screening utilization (at least once)
Baral *et al.*[14]	Cervical cancer	Community-based	Kathmandu	170	31.49 ± 8.70	—
Bhandari *et al.*[15]	Breast cancer	Community-based	Kathmandu	500	48.2 ± 5.2	—
Bhatt *et al.*[6]	Breast cancer	Hospital-based	Kathmandu	100	37	—
Dhakal *et al.*[7]	Testicular Cancer	Community-based	Chitwan	402	23.51	46/402
Ghimire *et al.*[16]	Cervical Cancer	Hospital-based	Kathmandu	220	34.38 ± 9.4	85/220
Heera *et al.*[10]	Cervical Cancer	Community-based	Morang	280	40.2 ± 9.16	84/280
Koirala *et al.*[18]	All cancer type	Community-based	Kaski	180	42	21/180
Maharjan *et al.*[13]	Cervical cancer	Community-based	Jumla & Rupandehi	510	Mountainous 30.60 ± 9.92 Terai 31.03 ± 10.76	91/510
Nepal *et al.*[19]	Cervical cancer	Community-based	Bhaktapur	360	40	116/360
Pandey *et al.*[17]	Cervical cancer	Community-based	Kavrepalanchok	180	42.64 ± 9.21	69/145
Poudel *et al.*[20]	Cervical cancer	Community-based	Lalitpur	506	Students 15.0 ± 1.0 Mothers 40.4 ± 5.5	38/253
Ramtel *et al.*[5]	Cervical Cancer	Community-based	Dolakha, Sindhupalchok, Bhaktapur	400	45	42/400
Ranabhat *et al.*[22]	Cervical cancer	Hospital-based	Chitwan	607	35.3 ± 10.2	98/607
Ranjit *et al.*[23]	Cervical cancer	Community-based	15 districts	816	38.12 ± 12.20	39/106
Sathian *et al.*[21]	Breast cancer	Community-based	Kaski	1420	41.5	—
Shrestha *et al.*[24]	Cervical cancer	Community-based	Kaski	729	45.9 ± 7.7	316/704
Shrestha *et al.*[8]	Cervical cancer	Hospital-based	Chitwan	96	38.83 ± 6.57	18/96
Thapa[25]	Cervical cancer	Hospital-based	Kathmandu	205	30.1 ± 9.2	34/205
Thapa *et al.*[9]	Cervical cancer	Hospital-based	Jumla	360	30.13 ± 10.4	49/360

among 98 patients, no one used screening regularly, whereas in a study by Shrestha, 10.12% of respondents were using screening at regular and correct intervals.

Reason for cervical cancer screening initiative

Three studies reported on the reason for taking a screening initiative[5,17,19] Pooling of the data showed that 85% of 227 participants had undergone screening under the advice of health personnel. 12% took the initiative by themselves for screening, while family and friends were responsible in 3% of cases. The pie chart is presented in Figure 10.

Barriers to cervical cancer screening

Five studies had data on the barrier to the use of cervical cancer screening[5,8–10,25]. Multiple responses were allowed by the questionnaires used in the studies. Pooling of the data showed

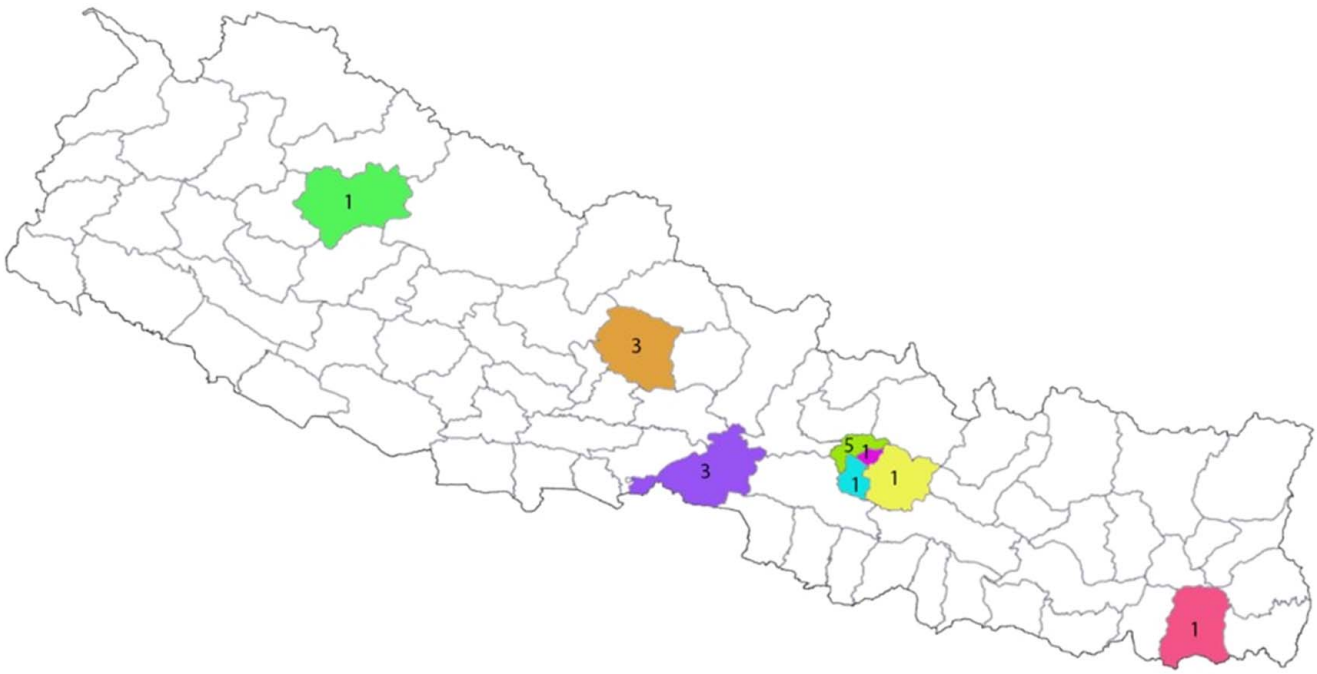

Figure 2. District map of Nepal and the number of studies done in those districts. Studies done in more than 1 district not included in the above diagram.

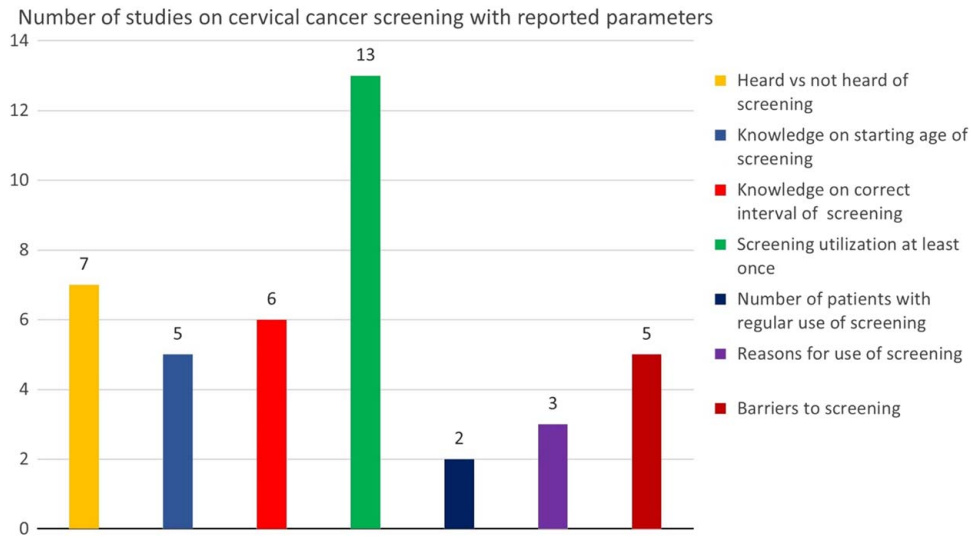

Figure 3. Number of cervical cancer screening studies reporting the parameters.

that the most cited reason was a lack of awareness or knowledge regarding screening by 593 patients. Similarly, the lack of facilities in the vicinity (464) and economic burden (411) were other common barriers pointed out by the patients. Sociocultural factors like embarrassment, a male doctor as the examiner, and disapproval from husband and family were common. The number of most commonly cited barriers is shown in Figure 11.

Breast cancer screening

All three studies on the knowledge and practice of breast cancer screening were published in international journals[6,15,21]. One study had participants from hospital visits[6] while the other two were community-based[15,21]. The total number of participants was 2020. Two studies asked participants if they had heard of breast cancer screening methods like mammograms (MMG), clinical breast examination (CBE), and breast self-examination (BSE)[6,21]. The table depicting the knowledge and practice of breast cancer screening is shown in Table 2. The utilization rate could be low due to poor awareness of warning signs, except for women in nursing professions[21] Higher education showed an increase in awareness level and utilization rate of screening[21].

Testicular cancer screening

Only one study was found to be regarding KAP on testicular cancer, which used testicular self-examination as a screening test[7]. Only 11.4% of 402 patients had ever undergone testicular screening, and only 4.2% did regular screening at the correct interval. One hundred fifty-four patients knew the starting age of

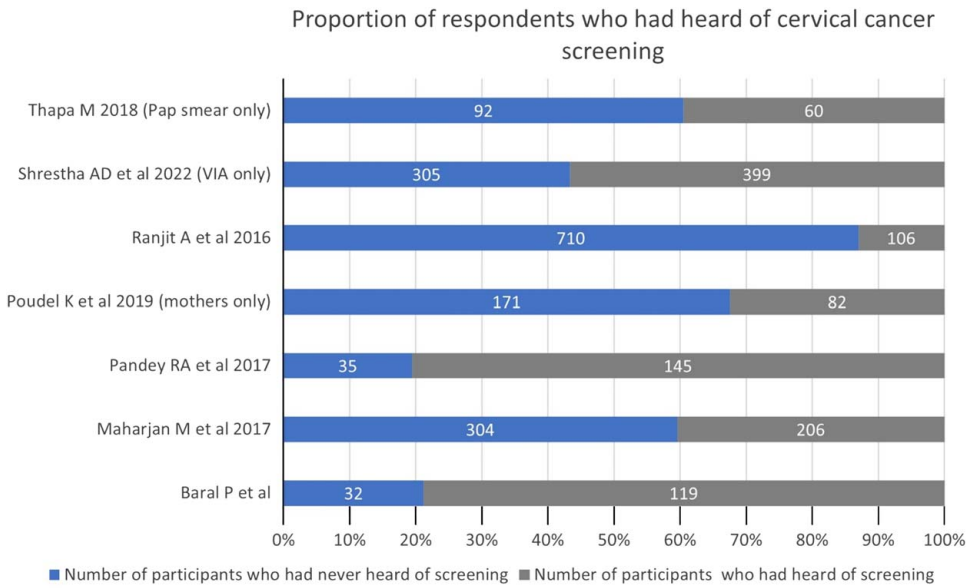

Figure 4. Proportion of participants who had heard of cervical cancer screening.

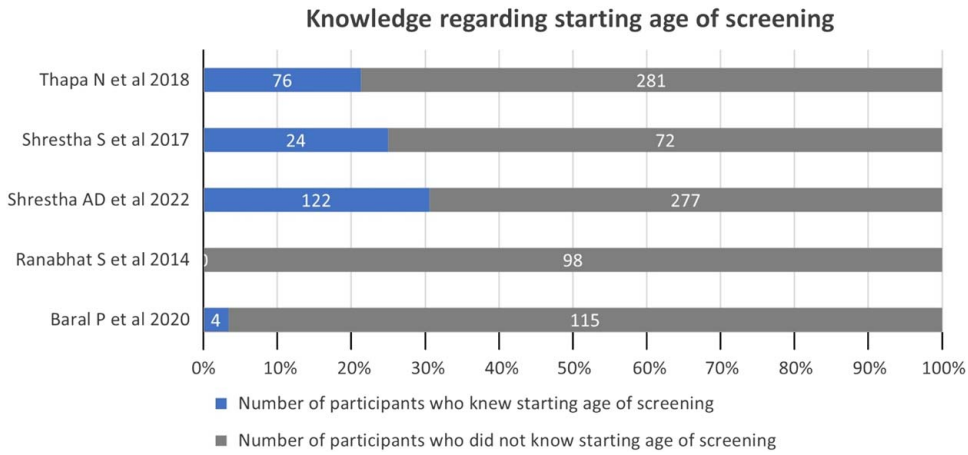

Figure 5. Knowledge regarding starting age of cervical cancer screening among participants.

screening. No knowledge regarding screening (58.4%) and lack of symptoms to prompt self-examination (29.5%) were the primary reasons given by those who had never undergone testicular self-examination.

Cancer screening in general

Koirala *et al.*[18] studied cancer screening trends in general Of 180 participants, only 21 had ever been screened for cancer. Eighteen had been screened for cervical cancer, six for breast cancer, and one each for prostate and throat cancer, while two were unsure of the cancer for which they were screened. The study showed cancer literacy as a significant predictor of screening behaviour.

Discussion

This is the first systematic review to describe the overall picture of the knowledge and practice regarding cancer screening in the Nepalese population and to analyze the barriers to the use of screening.

Cancer screening is an effective tool to identify cancer in earlier stages that can prevent morbidity and mortality[1]. Although there are several studies on cervical cancer screening, there were sparse studies on screening for breast and testicular cancer and no studies for lung cancer. More screening studies on breast and lung cancer should be done to get a more accurate picture of the screening rate, and to improve on its utilization.

We found more studies focused on cervical cancer screening, one of the cancers for which screening has been found to be very effective for reducing both incidence and mortality[26]. Screening for cervical cancer at least once by age 35 significantly lowers the lifetime risk of cancer[27]. However, a massive 74.5% of the participants in our review had never undergone a single cervical cancer screening. This is in stark contrast to our national target set in 2017, which aims to screen 70% of women aged 30–60 years[2]. WHO also has aimed to eliminate cervical cancer as a global health problem in the 21st century by screening 70% of women at least twice in a lifetime at ages 35 and 45 years and treating 90% of precancerous lesions[28]. The actual scenario of the screening utilization may be lower than the reported rate in our review as most studies only asked about screening utilization to respondents who had heard about screening. Hence, the real utilization can be expected to be lower than the utilization rate reported in our study of 19.7% and 27.3% in hospital and community settings, respectively.

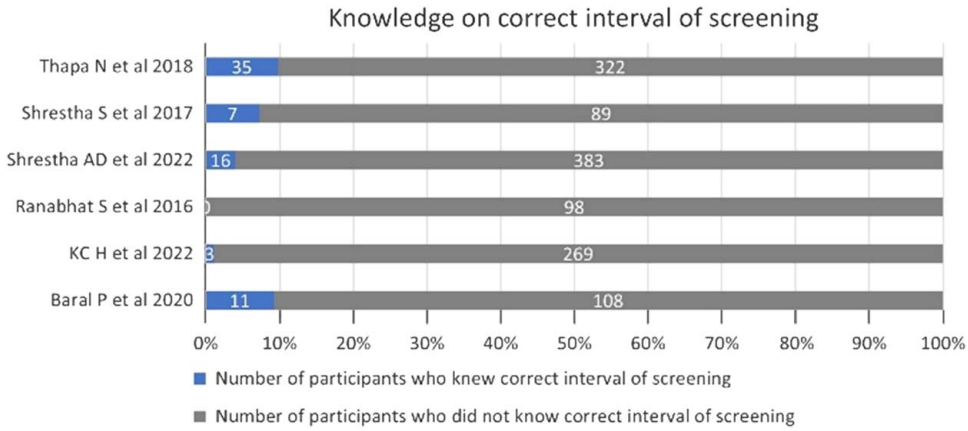

Figure 6. Knowledge of the correct interval of cervical cancer screening.

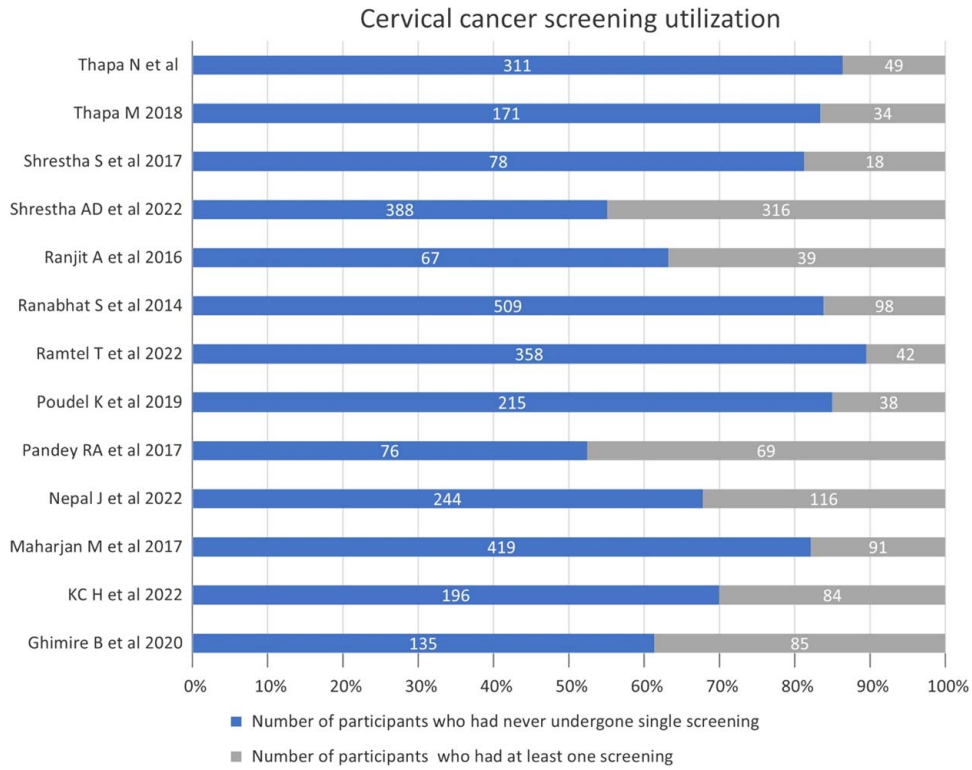

Figure 7. Participants who had never undergone screening vs. screening at least once.

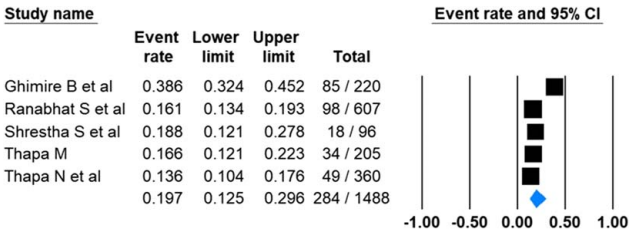

Figure 8. Forest plot of cervical cancer screening utilization in hospital settings.

Even though mammogram is the screening test with higher sensitivity compared to BSE and CBE, lack of accessibility to health services, unsatisfactory adherence, burden of costs, and lack of follow-up in a country like ours should encourage the use of BSE and CBE[29,30]. In addition, mammograms alone might not detect 10–30% of breast cancers due to several reasons like dense parenchyma, incorrect interpretations, subtype tumours, and smaller-sized tumours[31].

Lack of awareness and knowledge was the primary barrier to screening utilization in cervical, breast, and testicular cancer screening[5–7]. Many people also do not feel the need to screen for cancer as they have no symptoms[6,7,9]. This is similar to studies in other countries like India, Malaysia, and Bangladesh[32–34]. In addition, sociocultural barriers like unwillingness to comply with the test because of the male doctor, feeling embarrassed, and disapproval from husband and family contribute to the lack of

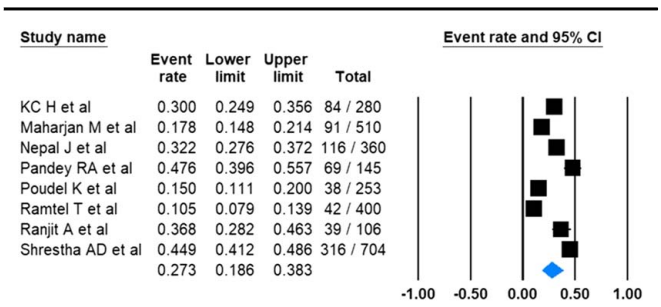

Figure 9. Forest plot of cervical cancer screening utilization in community settings.

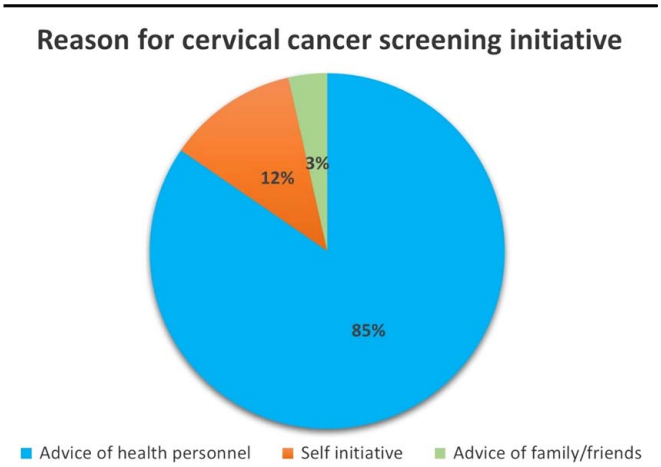

Figure 10. Reason for cervical cancer screening initiative.

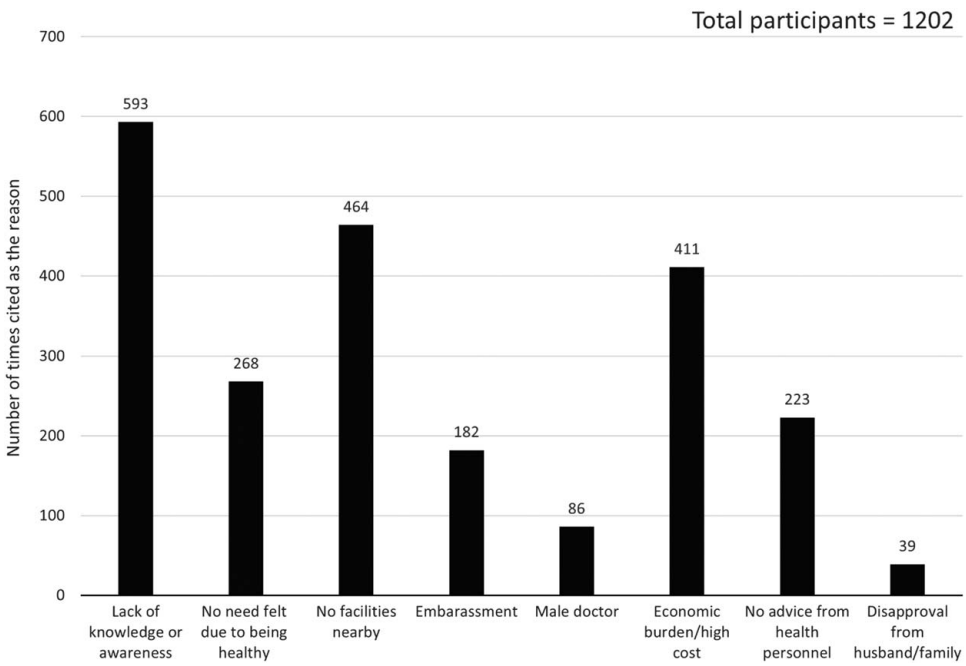

Figure 11. Barriers to the use of cervical cancer screening. The *y*-axis indicates the number of times the reason was cited. Respondents were allowed to choose multiple answers.

Table 2

Breast cancer screening knowledge and practice

References	Never heard of screening	Heard of screening	Undergone screening	Never undergone screening	Screening at regular intervals
Bhandari *et al.*[15]	—	—	MMG: 52/500CBE: 100/500BSE: 207/500	MMG: 448/500CBE: 400/500BSE: 293/500	MMG: 17/500 CBE: 36/500 BSE: 72/500
Bhatt *et al.*[6]	MMG: 56/100CBE: 68/100	MMG: 44/100CBE: 32/100	—	—	—
Sathian *et al.*[21]	MMG: 1137/1420 BSE: 1076/1420	MMG: 283/1420BSE: 344/1420	—	—	—

cervical cancer screening utilization[8–10]. Direct and indirect cost associated with the screening also hampers utilization[35].

The importance of awareness programs and education in screening utilization cannot be overstated[36,37]. Also, studies have found support from family and husbands to facilitate cervical cancer screening, especially in low and middle-income countries[38]. A study to see the role of female community health volunteers in increasing cervical cancer screening coverage in Nepal showed positive results[39]. Self-sampling as an alternative to collection by clinicians for HPV screening has been used in many countries, particularly in low-resource settings, to scale up the screening coverage[40]. HPV-based screening with self-sampling is cost-effective and will help overcome human constraints and socio-cultural barriers like embarrassment and fear faced by LMICs like ours[41]. Cost-effective studies need to be done to implement the most cost-effective screening methods.

Strengths and limitations

Our study is the first to review the studies on knowledge and practice regarding screening for different cancers in the Nepalese population. We have summarized the knowledge on different aspects of screening, the utilization rate, and barriers. However, our study has some limitations. Our study is limited to a few databases, viz—PubMed, Embase, and Scopus. Also, we searched for studies published in the English language only. So, we may not have identified studies published in non-indexed journals and studies published in languages other than English. Also, there was significant heterogeneity among studies.

Conclusion

Our systematic review will be highly relevant to the medical community in Nepal to improve cancer screening utilization. We observed the Nepalese population to be lacking in adequate knowledge and practice on screening for cancer. Primary facilitators and barriers to the use of screening were identified, along with the utilization rate of screening. Our review demonstrated the need to increase awareness programs, develop infrastructure and facilities to ease access to screening services, mobilize a workforce like female community health volunteers, and eliminate stigma and sociocultural barriers. National cancer registries, linking to cancer screening programs are necessary.

Ethical approval and consent to participate

Not applicable.

Consent to publication

Not applicable.

Source of funding

Not applicable.

Author contribution

A.A., B.K.: led screening of studies, data extraction and analysis, contributed in writing the case information and discussion. S.A., S.S. and S.G.: contributed to the process of original draft preparation and introduction. Conceptualization, methodology and discussion along with screening of studies. R.K. Y.: screening of studies. P.B.: contributed in review and editing of the final manuscript. All the authors approved of the final version of the manuscript and agreed to be accountable for all aspects of the work ensuring questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflicts of interest disclosure

None of the authors has any conflict of interest to disclose. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Research registration unique identifying number (UIN)

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Data availability statement

All data generated or analyzed during this study are included in this published article and its supplementary information files.

Provenance and peer review

Not commissioned, externally peer-reviewed.

References

[1] Habbema D, De Kok IMCM, Brown ML. Cervical cancer screening in the United States and the Netherlands: a tale of two countries. Milbank Q 2012;90:5–37.

[2] 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.

[3] Noncommunicable Disease Risk Factors: STEPS Survey Nepal 2019. 2019. Accessed 25 July 2023. https://www.who.int/docs/default-source/nepal-documents/ncds/ncd-steps-survey-2019-compressed.pdf

[4] Cervical and Breast Cancer Screening Program Implementation Guideline 2077. 2020. Accessed 28 October 2023. https://publichealthupdate.com/cervical-and-breast-cancer-screening-program-implementation-guideline-2077/?fbclid=IwAR25UXdi_WQyZyyeYP0DoY5UAc7d9j-dzm2RNsCq7lRBq9UFnJZReUVddeQ

[5] Ramtel T, Noh KM, Rampal KG, *et al*. Factors associated with utilization of visual inspection with acetic acid in Nepal. Int J Publ Health Sci 2022;11:1525–36.

[6] Bhatt VR, Wetz RV, Shrestha R, *et al*. Breast cancer knowledge, attitudes and practices among Nepalese women. Eur J Cancer Care (Engl) 2011;20:810–7.

[7] Dhakal R, Paudel S, Paudel D. Knowledge, Attitude, and Practice regarding Testicular Cancer and Testicular Self-Examination among Male Students Pursuing Bachelor's Degree in Bharatpur Metropolitan City, Chitwan, Nepal. Biomed Res Int 2021;2021:1–9.

[8] Shrestha S, Dhakal P. Knowledge, attitude and practice regarding cervical cancer screening among women attending a teaching. Hospital, Bharatpur, Chitwan 2017;11:18–23.

[9] Thapa N, Maharjan M, Petrini MA, *et al*. Knowledge, attitude, practice and barriers of cervical cancer screening among women living in mid-western rural, Nepal. J Gynecol Oncol 2018;29:e57.

[10] Heera KC, Gurung Alina, Katuwal Medina, *et al*. Surya Bahadur Parajuli, Knowledge, Practice and Barriers on Cervical Cancer Screening among Married Women. J Nepal Health Res Counc 2022;20:755–60.

[11] Liberati A, Altman DG, Tetzlaff J, *et al*. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. Ann Intern Med 151 2009;151:W–65.

[12] Joanna Briggs Institute, Critical Appraisal Tools, Asssessed 25 July 2023. https://jbi.global/critical-appraisal-tools

[13] Maharjan M, Thapa N, Panthi D, *et al*. Health beliefs and practices regarding cervical cancer screening among women in Nepal: a descriptive cross-sectional study. Nurs Health Sci 2020;22:1084–93.

[14] Baral P, Pokharel J, Gachhadar R. Awareness and attitude regarding cervical cancer screening among reproductive age women. J Nepal Health Res Counc 2020;18:529–34.

[15] Bhandari D, Shibanuma A, Kiriya J, *et al*. Factors associated with breast cancer screening intention in Kathmandu Valley, Nepal. PLoS One 2021;16:e0245856.

[16] Ghimire B, Pathak P. Determinants of uptake of cervical cancer screening among women attending tertiary level hospital. J Nepal Health Res Counc 2021;18:649–54.

[17] Acharya Pandey R, Karmacharya E. Cervical cancer screening behavior and associated factors among women of Ugrachandi Nala, Kavre, Nepal. Eur J Med Res 2017;22:32.

[18] Koirala R, Gurung N, Dhakal S, *et al*. Role of cancer literacy in cancer screening behaviour among adults of kaski district, nepal. PLoS One 2021;16:e0254565.

[19] Nepal J, Poudyal AK, Duwal S, *et al*. Utilization of cervical cancer screening and associated factors among women in Bhaktapur, Nepal. Kathmandu Univ Med J (KUMJ) 2022;20:330–6.

[20] Poudel K, Sumi N. Analyzing awareness on risk factors, barriers and prevention of cervical cancer among pairs of nepali high school students and their mothers. Int J Environ Res Public Health 2019;16:4382.

[21] Sathian B, Nagaraja SB, Banerjee I, *et al*. Awareness of breast cancer warning signs and screening methods among female residents of pokhara valley, Nepal. Asian Pacific J Cancer Prev 2014;15:4723–6.

[22] Ranabhat S, Tiwari M, Dhungana G, *et al*. Association of knowledge, attitude and demographic variables with cervical pap smear practice in Nepal. Asian Pacific J Cancer Prev 2014;15:8905–10.

[23] Ranjit A, Gupta S, Shrestha R, *et al*. Awareness and prevalence of cervical cancer screening among women in Nepal. Int J Gynecol Obstetr 2016;134:37–40.

[24] Shrestha AD, Gyawali B, Shrestha A, *et al*. Knowledge, attitude, preventive practices and utilization of cervical cancer screening among women in Nepal: a community-based cross-sectional study. Eur J Cancer Prev 2022;31:73–81.
[25] Thapa M. Cervical Cancer Awareness and Practice of Pap Smear Test Among Women with Gynecological problems. 2018. JNMA J Nepal Med Assoc. 2018;56:654–7
[26] Lin S, Gao K, Gu S, *et al*. Worldwide trends in cervical cancer incidence and mortality, with predictions for the next 15 years. Cancer 2021;127:4030–9.
[27] Goldie SJ, Gaffikin L, Goldhaber-Fiebert JD, *et al*. Cost-effectiveness of cervical-cancer screening in five developing countries. N Engl J Med 2005;353:2158–68.
[28] WHO, Global strategy towards the elimination of cervical cancer as a public health problem. 2019. Accessed 24 July 2023. https://www.who.int/docs/defaultsource/documents/cervical-cancer-elimination-draft-strategy.pdf
[29] Ward E, Jemal A, Cokkinides V, *et al*. Cancer disparities by race/ethnicity and socioeconomic status. CA Cancer J Clin 2004;54:78–93.
[30] da Costa Vieira RA, Biller G, Uemura G, *et al*. Breast cancer screening in developing countries. Clinics 2017;72:244–53.
[31] Majid AS, de Paredes ES, Doherty RD, *et al*. Missed breast carcinoma: pitfalls and pearls. Radiographics 2003;23:881–95.
[32] Islam RM, Bell RJ, Billah B, *et al*. 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;20:1386–92.
[33] Domingo EJ, Noviani R, Noor MRM, *et al*. Epidemiology and prevention of cervical cancer in Indonesia, Malaysia, the Philippines, Thailand and Vietnam. Vaccine 2008;26:M71–9.
[34] Mahalakshmi S, Suresh S. Barriers to cancer screening uptake in women: a qualitative study from Tamil Nadu, India. Asian Pac J Cancer Prev 2020;21:1081–7.
[35] Ministry of Health and Population. Annual Report - Department of Health Services 2073/74 (2016/17). 2017. Accessed 24 July 2023. https://dohs.gov.np/wp-content/uploads/2018/04/Annual_Report_ 2073-74.pdf
[36] Gana GJ, Oche MO, Ango JT, *et al*. 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;8:211–9.
[37] Abiodun OA, Olu-Abiodun OO, Sotunsa JO, *et al*. 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;14:1–9.
[38] Mouttapa M, Park Tanjasiri S, Wu Weiss J, *et al*. Associations between women's perception of their husbands'/partners' social support and pap screening in Pacific Islander communities. Asia Pacific Journal of Public Health 2016;28:61–71.
[39] Shrestha AD, Neupane D, Ghimire S, *et al*. Community-based intervention for cervical cancer screening uptake in a semi-urban area of Pokhara Metropolitan, Nepal (COBIN-C): study protocol for a cluster-randomized controlled trial. Trials 2021;22:1–9.
[40] Serrano B, Ibáñez R, Robles C, *et al*. Worldwide use of HPV self-sampling for cervical cancer screening. Prev Med (Baltim) 2022;154:106900.
[41] Arbyn M, Smith SB, Temin S, *et al*. Detecting cervical precancer and reaching underscreened women by using HPV testing on self samples: updated meta-analyses. Bmj 2018;363:k4823.