

Review Article

A global perspective on cervical cancer screening: a literature review

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ABSTRACT

Cervical cancer is a significant health issue for women globally, with over 600,000 new cases and 342,000 deaths in 2020. Effective cervical screening programs, including primary screening methods such as Pap tests, human papillomaviruses (HPV) deoxyribonucleic acid (DNA) testing, and liquid-based cytology, can prevent and detect early cancer cases, improving morbidity and mortality rates. However, screening uptake varies widely across countries, with high-income countries have achieved over 70% uptake but low- and middle-income countries lagging due to a lack of recommendations and centralised screening systems. Even in high-income countries in the Middle East, uptake remains low, requiring further investigation. This review explores barriers to screening programme delivery and highlights centralised and multi-level interventions that have proven effective worldwide. Future research should focus on culturally sensitive approaches, healthcare infrastructure strengthening, and community education and outreach programs to address uptake disparities and barriers.

Keywords: Cervical cancer, Screening methods, HPV testing, Uptake barriers, Intervention strategies, Low- and middle-income countries

THE IMPORTANCE OF CERVICAL CANCER SCREENING PROGRAMS

Cervical cancer is the fourth most common cancer in women worldwide after breast, colorectal and lung cancers, respectively. In 2020, the disease burden was estimated at 604 000 new cases and 342 000 deaths.¹

Cervical cancer screening programs have a significant impact on the lives of women worldwide. Screening for pre-cancerous lesions and human papillomaviruses (HPV) infection is an effective and reliable preventive intervention. Detecting early cancer cases allows for successful curative interventions.² There are direct links between successful cervical screening programmes and the prevention of cervical cancer among women, as well as improving morbidity and mortality. After decades of effective program implementation, reports from different high-income nations have demonstrated this evidence.

According to Cancer Research U.K., 99.8% of cervical cancers are preventable, which validates the reliability of the cervical screening programme.³ In England, around 800 women die of cervical cancer each year. A study in the U.K. suggests that an additional 1,827 more women would die of the disease without screening, but if all women aged between 25 and 64 were screened regularly, up to 347 more lives could be saved. The results advocate that screening all eligible groups reduces the number of deaths from the disease by 73%.⁴

Vaccarella et al reviewed the cervical screening program uptake in the Scandinavian countries over 50 years from 1961 to 2010. Their study found that screening programmes and treatment of screen-detected cervical lesions might have prevented over 60 000 cases of invasive cervical cancer in the Nordic countries, half of the cases that would have been expected in the lack of screening.⁵

While different primary screening methods are implemented across nations, evidence for their efficacy seems robust. The most common methods include the Pap test, HPV DNA testing and liquid-based cytology.

The International Agency for Research on Cancer (IARC) recently published a special report on the impact of different methods for cervical cancer screening. The report re-evaluated and compared the effectiveness of various cervical screening methods in reducing the incidence of cervical cancer and associated mortality. The report supports the use of all recognised screening methods. HPV DNA testing screening is superior in the early detection of cancers with liquid-based cytology close to it.⁶

GEOGRAPHICAL AND SOCIO-ECONOMIC VARIATIONS IN CERVICAL CANCER SCREENING UPTAKE

Estimated coverage in lifetime worldwide is currently at 36%. In a study published in the *Lancet* in 2022, 84% (95% CI 73–96) of women aged 30–49 years living in high-income countries and 48% (40–57) residing in upper-middle-income countries had been screened ever in the lifetime, compared with 9% (8–10) of women in this age group in lower-middle-income countries and 11% (10–13%) in low-income countries. 90% of mortality associated with cervical cancer occurs in women living in low- and middle-income countries.⁷ The uptake of cervical cancer screening is lowest where it is most needed.

Reports from the developed countries of the West suggest that more than 70% uptake is achievable. In the U.K., that percentage has remained above 70% in the last two decades.⁸ A similar rate of women uptake cervical screening in the U.S.A., according to a detailed data analysis from 1987-2019.⁹ The last five-year cervical screening uptake in Scandinavian countries was between 70% and 84%.¹⁰ In Australia, the cervical screening uptake has hovered around 60% of the target population from records between 1996 and 2017.¹¹

Many systematic reviews of the uptake in countries with low-middle income confirm the lower uptake. The uptake of cervical cancer screening in Sub-Saharan Africa was 12.87%, according to a systematic review by Yimer et al in 2021.¹² In India, the uptake was around 22% in a study published in 2020.¹³ The findings are expected and in line with the recent report by Sung et al.¹

Bruni et al reports that low and low-middle-income countries lack key recommendations and centralised systems for cervical cancer screening. (61%) of 31 low-income countries and 23 (44%) of 52 lower-middle-income countries still do not have official recommendations for cervical cancer screening.⁷

In high-income countries of the Middle East, the uptake continues to be low. According to a study published in 2019, in Saudia Arabia, the percentage of women aged 25-

49 years who had a Pap smear test was 7.6%. It was 10.6% in Oman, 17.7% in Kuwait and 28.0% in the U.A.E.¹⁴ The low uptake needs a deeper understanding of why the economic burden is less likely to be responsible.

THE NEED FOR CHANGE: ACHIEVING GLOBAL ELIMINATION OF CERVICAL CANCER

Cervical cancer screening uptake is a significant area for improvement in many parts of the world.

In recognition of that, the World Health Organisation (WHO) launched a global initiative to eradicate cervical cancer in 2020 under the Global Health Assembly, calling for "now" to eliminate cervical cancer as a worldwide public health problem. Under this goal of elimination, every country must achieve an incidence rate of below four per 100 thousand. The key targets to achieve this are highlighted - vaccination: 90% of girls are fully vaccinated with the HPV vaccine by the age of 15; screening: 70% of women screened using a high-performance test by the age of 35 and again by the age of 45; and treatment: 90% of women with pre-cancer treatment and 90% with invasive cancer managed.

Each country should meet the 90-70-90 targets by 2030 to get on the path to eliminating cervical cancer within the next century.¹⁵

BARRIERS TO THE EFFECTIVE DELIVERY OF THE CERVICAL SCREENING PROGRAMME

Different systematic reviews looked at barriers to cervical cancer screening in lower to middle-income countries. Emotions of embarrassment and fear of the screening procedure were the most reported barriers. Other personal barriers included a lack of knowledge regarding the condition, perceived susceptibility and severity and potential treatment. Sociocultural and religious barriers were also reported in some countries alongside limited resources and difficult accessibility.¹⁶

Similar themes emerge with patients of different ethnic backgrounds and low uptake in high-income economies. According to a qualitative study in the U.K., the cultural barriers in some ethnic groups can result in reduced uptake of cervical screening. The fear and shame of intimate examination and a diagnosis with perceived links to promiscuity led women not to attend when invited for screening. The same study highlighted a painful smear in the past off-putting and a reason for women not to attend again.¹⁷

A qualitative study done on uninsured women in the United States revealed factors like cost, fear of finding cancer, anxiety, embarrassment, the anticipation of pain, male physician, lack of knowledge, language barriers, other health problems, transportation, forgetting to schedule an appointment, and lack of time in descending order, being barriers to not attending cervical smears.¹⁸

A systematic review of the cervical screening uptake of female Healthcare professionals in Nigeria showed low uptake despite having good knowledge. Barriers included cost, but principal reasons included fear of positive results and lack of time to arrange appointments.¹⁹

While higher education and income levels were associated with higher uptake in different studies, a recommendation from a friend or healthcare professional was the most reported facilitator.²⁰

The uptake of cervical cancer screening can vary depending on several factors, such as access to screening services, awareness of the importance of screening, and individual beliefs and attitudes about the test. Universal emotional reasons include embarrassment, fear of the test and the results or poor previous experiences.

The low coverage of cervical cancer screening in low- and middle-income countries can be attributed to various factors, including lack of awareness, poor access to screening services, inadequate infrastructure and resources, cultural and social beliefs, and fear of stigmatization. In many countries, women face significant challenges in accessing healthcare, including screening services, due to financial and logistical barriers. Additionally, cultural and social beliefs may lead to low screening uptake, with some women feeling uncomfortable with the idea of a pelvic exam or considering it unnecessary.²¹ Addressing these barriers and increasing awareness and education about the importance of cervical cancer screening can be crucial in improving coverage and reducing the burden of cervical cancer in these countries.^{16,19}

The IARC report summarised the determinants of participation in the screening programme as socioeconomic status, ethnic groups, health insurance status, education level and lack of access to services owing to lack of power, authority, or control.⁷ Overall, different barriers to cervical cancer screening highlight the need for culturally sensitive and tailored interventions to improve uptake rates and reduce disparities in screening outcomes.

CERVICAL CANCER PREVENTION: UNLOCKING BETTER SCREENING UPTAKE THROUGH HISTORICAL AND CURRENT EVIDENCE

Centralised and multi-level interventions improved cervical cancer uptake around the world. In the U.K., the cervical screening programme was initially introduced in 1964. Due to a lack of knowledge of the clinicians and populations, it was very haphazard and resulted in a remarkably high incidence of cervical cancer diagnosis and related mortality and morbidity.²² It was only after the introduction of the centrally operated National Health System Cervical screening service in 1988 it resulted in a dramatic rise in the uptake and delivery of a meaningful screening service for its target population.²³

The centralised computer database was used to capture the target population and to send recall letters to women to go to their family physicians to book cervical smears. Primary healthcare practitioners were given financial incentives to achieve 80% coverage from 1990. The outcome was an increase in coverage from approximately 40% in the 1980s to more than 80% between 1991 and 1999.^{24,25} The centralised system, recall intervention, and incentivising clinical practice doubled cervical cancer screening uptake in the U.K.

A recent guideline by N.H.S. England on the Gov.UK website proposes to send multiple invites and text messages to non-responders to the national invitation. They also comment on "data cleansing" so those patients can be deducted from the non-responder list, which is wrongly included because of a system error.

In addition to the organised and systematic recall, N.H.S. England advises health centres to use videos and leaflets in waiting-for areas to enhance patient education. All necessary steps should be taken to include women from all cultural backgrounds, and all efforts should be made to improve their access to their values and beliefs.²⁶

The focus on educational interventions in the low-income environment is of more importance. A review by Lott et al of studies looking into improving cervical screening uptake in Sub-Saharan Africa found that certain specific interventions are more effective in increasing the uptake than others.

Education programmes that involved social ties and were delivered by people from within the community worked better than an institutionalised style of impersonal education. Text messages on mobile also brought a notable change in improving clinic attendance for cervical screening. They also discussed the need to work on educating families, including male family members, as a possible way forward, especially in communities with conservative social values.²⁷

While all screening modalities are effective, traditional methods like cytology and visual inspection have significant limitations in relation to patients' engagement. Alternative ways of collecting the screening samples, like self-sampling and community pop-up clinics, were also particularly useful. The self-testing kits address a significant emotional barrier of fear and embarrassment.

A large literature review done in 2017 highlighted two extensive studies that assessed the use of HPV self-testing kits as a method for improving cervical cancer screening uptake in France and Mexico. Both interventions showed statistically significant increases in attendance. Other studies in this review found that a simple G.P. letter with a pre-set appointment was the most effective. A detailed letter on cancer risk had a similar impact.²⁸

In summary, the success of the National Health System Cervical screening service in the U.K. highlights the

impact of centralization, recall intervention, and incentivizing clinical practice on improving screening uptake. N.H.S. England proposes a recall system using multiple invites and text messages, along with patient education through videos and leaflets, which can further increase screening uptake. In low-income settings, community-based education programs delivered by locals and text messages have proven effective in increasing attendance. Alternative screening methods, such as self-sampling and community pop-up clinics, show promise in improving screening uptake. While traditional screening methods remain effective, addressing emotional barriers through self-testing kits and providing clear information on cancer risk through detailed letters can also increase attendance. Therefore, combining centralization, recall intervention, patient education, and alternative screening methods can improve cervical cancer screening uptake, ultimately reducing the global burden of cervical cancer.

CONCLUSION

Various factors, including awareness, beliefs, and access to screening services, influence cervical cancer screening uptake. Emotional barriers are universal obstacles, such as embarrassment, fear, and past negative experiences. Women in many countries face significant challenges in accessing healthcare, including screening services, due to a lack of awareness, poor access, cultural and social beliefs, and financial and logistical barriers. Addressing these barriers and increasing awareness can help improve screening coverage and reduce the burden of cervical cancer.

Centralised efforts to improve screening uptake should focus on improving access to services by offering free screening tests and increasing availability in underserved areas. Recall systems can also help increase uptake. With proactively provided information by healthcare providers and community organizations, community and public health campaigns can help increase awareness. Addressing emotional barriers and offering self-testing kits can also improve uptake.

Although cervical cancer screening programs have reduced incidence and mortality rates, uptake disparities persist. It is crucial to address these disparities and barriers to achieve the WHO's goal of eradicating cervical cancer. Future research should focus on culturally sensitive approaches, healthcare infrastructure strengthening, and community education and outreach programs. Investigating new screening technologies, such as self-sampling, can also help improve coverage and uptake. Finally, exploring the impact of policies and funding on screening program uptake is crucial to achieving universal screening.

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REFERENCES

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin.* 2021;71(3):209-49.
2. Supporting the prevention, detection and treatment of cervical cancer. Available at: <https://www.who.int/europe/activities/supporting-the-prevention-detection-and-treatment-of-cervical-cancer>. Accessed on 16 February 2023.
3. Cervical cancer statistics. Cancer Research UK. Available at: <https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/cervical-cancer>. Accessed on 16 February 2023.
4. Landy R, Pesola F, Castañón A, Sasieni P. Impact of cervical screening on cervical cancer mortality: estimation using stage-specific results from a nested case-control study. *Br J Cancer.* 2016;115(9):1140-6.
5. Vaccarella S, Franceschi S, Engholm G, Lönnberg S, Khan S, Bray F. 50 years of screening in the Nordic countries: quantifying the effects on cervical cancer incidence. *Br J Cancer.* 2014;111(5):965-9.
6. Bouvard V, Wentzensen N, Mackie A, Berkhof J, Brotherton J, Giorgi-Rossi P, et al. The IARC Perspective on Cervical Cancer Screening. *N Engl J Med.* 2021;385(20):1908-18.
7. Bruni L, Serrano B, Roura E, Alemany L, Cowan M, Herrero R, et al. Cervical cancer screening programmes and age-specific coverage estimates for 202 countries and territories worldwide: a review and synthetic analysis. *The Lancet. Global Health.* 2022;10(8):e1115-27.
8. Cancer screening. The Nuffield Trust. Available at: <https://www.nuffieldtrust.org.uk/resource/breast-and-cervical-cancer-screening>. Accessed on 16 February 2023.
9. Koliopoulos G, Nyaga VN, Santesso N, Bryant A, Martin-Hirsch PP, Mustafa RA, et al. Cytology versus HPV testing for cervical cancer screening in the general population. *Cochrane Database Syst Rev.* 2017;8(8):CD008587.
10. Partanen VM, Heinävaara S, Waldström M, Elfström KM, Tropé A, Ágústsson ÁI, et al. Adherence to international recommendations in the governance and organisation of Nordic cervical cancer screening programmes. *Acta Oncol.* 2020;59(11):1308-15.
11. Cervical screening rates. National Cancer Control Indicators. Available at: <https://ncci.canceraustralia.gov.au/screening/cervical-screening-rates/cervical-screening-rates>. Accessed on 16 February 2023.
12. Yimer NB, Mohammed MA, Solomon K, Tadese M, Grutzmacher S, Meikena HK, et al. Cervical cancer screening uptake in Sub-Saharan Africa: a systematic review and meta-analysis. *Public Health.* 2021;195:105-11.

13. Monica, Mishra R. An epidemiological study of cervical and breast screening in India: district-level analysis. *BMC Womens Health*. 2020;20(1):225.
14. So VHT, Channon AA, Ali MM, Merdad L, Al Sabahi S, Al Suwaidi H, et al. Uptake of breast and cervical cancer screening in four Gulf Cooperation Council countries. *Eur J Cancer Prev*. 2019;28(5):451-6.
15. Cervical Cancer Elimination Initiative. Available at: <https://www.who.int/initiatives/cervical-cancer-elimination-initiative#cms>. Accessed on 16 February 2023.
16. Black E, Hyslop F, Richmond R. Barriers and facilitators to uptake of cervical cancer screening among women in Uganda: a systematic review. *BMC Womens Health*. 2019;19(1):108.
17. Marlow LA, Waller J, Wardle J. Barriers to cervical cancer screening among ethnic minority women: a qualitative study. *J Fam Plann Reprod Health Care*. 2015;41(4):248-54.
18. Akinlotan M, Bolin JN, Helduser J, Ojinnaka C, Lichorad A, McClellan D. Cervical Cancer Screening Barriers and Risk Factor Knowledge Among Uninsured Women. *J Community Health*. 2017;42(4):770-8.
19. Okolie EA, Barker D, Nnyanzi LA, Anjorin S, Aluga D, Nwadike BI. Factors influencing cervical cancer screening practice among female health workers in Nigeria: A systematic review. *Cancer Rep (Hoboken)*. 2022;5(5):e1514.
20. Zhang M, Sit JWH, Chan DNS, Akingbade O, Chan CWH. Educational Interventions to Promote Cervical Cancer Screening among Rural Populations: A Systematic Review. *Int J Environ Res Public Health*. 2022;19(11):6874.
21. Shrestha AD, Neupane D, Vedsted P, Kallestrup P. Cervical Cancer Prevalence, Incidence and Mortality in Low and Middle Income Countries: A Systematic Review. *Asian Pac J Cancer Prev*. 2018;19(2):319-24.
22. NHS Cervical Screening Programme Achievable standards, Benchmarks for reporting, and Criteria for evaluating cervical cytopathology third edition including revised performance indicators. 2013. Available at: www.cancerscreening.nhs.uk. Accessed on 16 February 2023.
23. Herbert A. Is cervical screening working? A cytopathologist's view from the United Kingdom. *Human Pathol*. 1997;28(2):120-6.
24. Quinn M, Babb P, Jones J, Allen E. Effect of screening on incidence of and mortality from cancer of cervix in England: evaluation based on routinely collected statistics. *BMJ*. 1999;318(7188):904-8.
25. Landy R, Pesola F, Castañón A, Sasieni P. Impact of cervical screening on cervical cancer mortality: estimation using stage-specific results from a nested case-control study. *Br J Cancer*. 2016;115(9):1140-6.
26. Cervical screening: ideas for improving access and uptake - GOV.UK. Available at: <https://www.gov.uk/guidance/cervical-screening-ideas-for-improving-access-and-uptake>. Accessed on 16 February 2023.
27. Lott BE, Trejo MJ, Baum C, McClelland DJ, Adsul P, Madhivanan P, et al. Interventions to increase uptake of cervical screening in sub-Saharan Africa: a scoping review using the integrated behavioral model. *BMC Public Health*. 2020;20(1):654.
28. Rees I, Jones D, Chen H, Macleod U. Interventions to improve the uptake of cervical cancer screening among lower socioeconomic groups: A systematic review. *Prev Med*. 2018;111:323-35.

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