Barriers to uptake of cervical cancer screening services in low-and-middle-income countries

A SYSTEMATIC REVIEW

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This report is dedicated to those who have lost the battle to cervical cancer, and to those who continue to fight one of the most preventable and treatable forms of cancer.

RESEARCH REPORT
Barriers to uptake of cervical cancer screening services in low-and-middle-income countries: A Systematic Review

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FOREWORD

Cervical cancer threatens the lives and well being of women, their families, and communities around the world. Its burden is heaviest among women who face barriers to accessing resources necessary for health, including cervical cancer screening. In low- and middle-income countries, where health delivery infrastructure and financial resources are often limited, less than 5% of women are screened. With nine out of ten women suffering and dying from cervical cancer in LMICs, this is both a tragedy and an injustice. Addressing this injustice is even more pressing at a time when the COVID-19 pandemic has deepened pre-existing divides, vulnerabilities and inequities, and many struggle to secure their health.

The global strategy to accelerate the elimination of cervical cancer as a public health problem offers a historic chance to eliminate a cancer for the first time. The strategy envisions a future with universal access to sexual health and STI prevention services, HPV vaccines, effective screening and precancer treatment services, treatment of invasive cervical cancer, and palliative care. It is premised on the principle that all women and girls, regardless of where they live or their background will have timely access to quality cervical cancer prevention, care, and treatment so that they can enjoy good health across the life course. More than a year since the launch of the global strategy, great strides have been made in the effort to ensure that more women have access to screening and treatment. We have also seen innovations like self-sampling, which offers women the option of being screened for cervical cancer without a pelvic exam – an option shown to reduce barriers to care. These efforts are shaping a global movement that puts the perspectives and needs of women and girls at center stage – a movement that is gaining momentum.

Yet significant challenges in reducing incidence and mortality and paving the way toward the elimination of cervical cancer persist. Proven and cost-effective measures for eliminating cervical cancer have not been widely implemented in regions of the world where the disease burden is highest. Commitment and action are needed to scale up these efforts, using health service platforms that are sensitive to women's needs, and uphold their rights and dignity. This requires focused consideration of the social and structural circumstances that hinder women's access to health services.

This report is a significant contribution to the global effort to eliminate cervical cancer. It is a critical first step to better understand the barriers to access across LMICs where the burden of cervical cancer is greatest. It comprehensively maps out key barriers to preventative screening within evidence to date, and presents recommendations for research, policy and practice to address them. Such review is critical. Without a clear picture of which women are not getting screened and why, meaningful and inclusive interventions that benefit all women cannot occur. Importantly, the report answers the increasing call for more robust evidence on who is benefiting and who is being missed in relation to health interventions such as cervical cancer screening to better address health inequities.

The status quo is not acceptable. This report shows that barriers to screening are multi-level, interacting, and complex. Research that captures and discusses these complexities and looks to innovative equity-informed recommendations and actions must be supported and funded. One size fits all interventions are not enough. We must also work to strengthen our health information systems to allow for data collection and monitoring of cervical cancer programs across the continuum of prevention, care, and treatment services to make sure they are provided in an equitable, human-rights based, and sustainable manner. No women – regardless of their identity or where they live - should be left behind. Barriers including those related to age, gender, ethnicity, socioeconomic status, Indigenous status, migrant status, health status, sexual orientation, and disability must be addressed.

The power of the research presented here is that it is informed by women themselves. Women, their families, allies, and communities continue to fight for what is needed via research, grassroots initiatives, activism and advocacy. It is important that their input and leadership is prioritized and integrated in all elimination efforts, from service development to evaluation.

Real progress to elimination requires collaborative engagement to break down the barriers to women's health and well being. I invite all people to join the global movement to ensure all women can access the services and resources required for health with the goal of making cervical cancer a thing of history.

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ACRONYMS AND ABBREVIATIONS

CASP	Critical Appraisal Skill Program
FGDs	Focus Groups Discussions
HIC	High-Income Countries
HPV	Human Papillomaviruses
HSRC	Human Sciences Research Council
IARC	International Agency for Research on Cancer
IDIs	Indepth interviews
LMICs	Low- and middle-income countries
PCC	Population, Concept and Context
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
VIA	Visual inspection with acetic acid
VILI	Visual inspection with Lugol's iodine
WHO	World Health Organization

SUMMARY

This review aimed to identify barriers to uptake of cervical cancer screening services in low- and middle-income countries (LMICs). We conducted a comprehensive and sensitive search of relevant articles in major databases and also approached networks for grey literature. 92 articles were included comprising 79 articles based on primary studies or secondary data analysis. We also included 13 reviews comprising of systematic, scoping and other general reviews. The primary studies were undertaken in 28 countries, with 48 studies undertaken in Africa. We identified a wide range of barriers to cervical cancer screening uptake by women in LMICs that we categorised into i) individual/personal level barriers, ii) cultural/traditional and religious barriers, iii) societal or social barriers, iv) health system barriers at policy, organisational and facility level, and v) structural barriers. Although there were few studies from the Americas and Europe, overall, the barriers identified were similar across the LMICs represented in this review. Within the individual/personal level category of barriers lack of knowledge and awareness of cervical cancer screening services and cervical cancer in general was the most frequently reported barrier, and was reported across all countries and continents. Women were also afraid of the screening procedure and of a potential cancer diagnosis. Cultural/traditional or religious beliefs also limited uptake, with lack of partner support and/or permission a frequently reported barrier in this category. Stigma towards screening was also common and appeared to be linked to misconceptions about the cause of cervical cancer and association with sexually transmitted infections. Poorly functioning health systems also posed major barriers ranging from lack of and poor implementation of screening policies, poor promotion of screening services, limited capacity (lack of skilled staff, space and materials), to poor attitudes of healthcare workers. Travel and screening costs were the most frequent structural barriers to access and uptake.

The categories of barriers identified seem to arise from four key underlying reasons, i) lack of knowledge and myths and misconceptions about cervical cancer, ii) weaknesses within the health system arising from lack of policies and resources, iii) lack of universal health coverage and iv) gender norms that deprioritise the health needs of women.

Addressing these barriers will require action in four main areas. Firstly, there is need for implementation of clear cervical cancer policies and guidelines with prerequisite structures and resources. This should include adequate resources to support structured rather than opportunistic screening together with increased access to screening facilities and efficient people-centered referral systems. Secondly, there is need for widescale education, information dissemination, and advocacy about cervical cancer and screening. This should include special targeting of key stakeholders including men, and cultural and religious leaders. Thirdly, policies that promote gender equality, health equity, and the sexual and reproductive health and rights of women should be strengthened and expanded to improve access to health services as well as education and knowledge about cervical cancer. Finally, given the extensive characterisation of barriers future research should focus on interventions and implementation to assess, monitor, and refine interventions aimed at increasing screening uptake.

Background

Although cervical cancer is preventable and curable, it remains a major cause of morbidity and mortality. When it is diagnosed early and managed appropriately, it can be successfully treated, and even when it is diagnosed in its late stages, it can be controlled with appropriate treatment and palliative care. However, it still remains the fourth most common cancer diagnosed in women globally (IARC & WHO, 2018).

The burden is greatest in low- and middle-income countries (LMICs) with age-standardised incidence rates varying from 75 per 100,000 women in the highest-risk countries to fewer than 10 per 100,000 women in the lowest risk countries (WHOa, 2018). The proportion of women who die from cervical cancer is greater than 60% in many LMICs, which is more than twice the proportion of cervical cancer deaths in many high-income countries (HICs) (IARC, 2018; Bray, 2018). In 2018, an estimated 570 000 women were diagnosed with cervical cancer worldwide and about 311 000 women died from the disease, with approximately 90% of deaths occurring in LMICs (WHO, 2020).

The global burden of cervical cancer is projected to increase to nearly 700 000 cases and 400 000 deaths in 2030 (Arbyn *et al.*, 2020). Most of these increases are projected to be in women living in LMICs (WHO, 2020), which is in line with the global epidemiological picture. The remarkable geographical contrasts in the incidence of cervical cancer and mortality rates reflect differences in exposure to risk factors and inequalities in access to adequate screening and effective cancer treatment facilities, and thus indicate areas with the greatest need for interventions (Arbyn *et al.*, 2020).

Screening awareness and early detection through screening has had a major impact on the mortality rate associated with cervical cancer in HICs (Peto *et al.*, 2004; Scarinci *et al.*, 2010; Taylor *et al.*, 2008). Data from low-income countries have, however, shown that, there is a lower uptake of cervical screening programs (Guillaume *et al.*, 2020; Hoque *et al.*, 2008; Jeong *et al.*, 2011).

The treatment of precancerous lesions detected by microscopic inspection of cells scraped from the cervix has long been the mainstay of secondary prevention of cervical cancer (Arbyn *et al.*, 2020; IARC, 2005). The knowledge that almost all cervical cancer cases (99%) are linked to infection with high-risk human papillomaviruses (HPV) – an extremely common virus transmitted through sexual contact – has opened new pathways for primary and secondary prevention (Arbyn *et al.*, 2020). HPV vaccination is now a key primary preventive strategy. However, even in the advent of HPV vaccination, secondary prevention remains a key component of the cervical cancer elimination toolkit – especially where there is low HPV vaccination availability and low access and uptake of vaccination, as is common in many low-resource settings. Furthermore, some HICs with established preventive programmes have seen an upward trend in cervical cancer incidence, which is thought to be the result of increased exposure to HPV insufficiently compensated by cytological screening (Castanon & Sasieni, 2018; Dillner *et al.*, 2018; McDonald *et al.*, 2017).

Until relatively, recently cervical cancer screening programs in developing countries were not a priority, and in many countries, HPV vaccination is only a recent development. For example, in South Africa, a LMIC with one of the highest burdens of cervical cancer, HPV vaccination was introduced in 2014 (Delany-Moretlwe *et al*, 2018). As these preventive measures are prioritised, it is critical to characterise and understand the barrier to access and uptake in order to inform effective policies for successful scale-up of screening.

1.1   Rationale

In May 2018, the Director-General of the World Health Organization (WHO) announced a global call to action toward the elimination of cervical cancer. In August 2020, a draft global strategy towards eliminating cervical cancer as a public health problem was published (WHO, 2020). The strategy proposes a vision of a world where cervical cancer is eliminated as a public health problem with a threshold of 4 per 100 000 women per year. The following 90-70-90 targets should be met by 2030 – 90% of girls fully vaccinated with the HPV vaccine by the age of 15; 70% of women screened using a high-performance test by the age of 35, and again by the age of 45; 90% of women identified with the cervical cancer disease receive treatment (90% of pre-cancer female patients treated; 90% of female patients with invasive cancer managed).

Therefore the elimination of cervical cancer requires interventions across three pillars: HPV vaccination; screening and treatment of pre-cancerous lesions and invasive cancer treatment and palliative care. There is therefore a need to collate and synthesize data to advance efforts and interventions across the three pillars. Furthermore, with varying contexts in the LIMCs (for example by HIV prevalence), there is a need to include collation and synthesis of region-specific data to inform targeted interventions where this is required.

1.2   Aims and objectives

The overall aim of this systematic review was to synthesise the existing evidence about barriers to uptake of cervical cancer screening services in LMICs to inform research gaps and policy interventions to support the elimination of cervical cancer in these countries.

The objectives were to i) document barriers to the uptake of cervical cancer screening services in LMICs; ii) investigate the underlying reasons for poor uptake of cervical cancer screening services in LMICs; iii) identify and document similarities and differences in barriers and underlying reasons in different regions of LMICs; iv) identify research gaps in understanding the barriers to uptake of cervical cancer screening services; v) provide evidence for policy interventions to support the elimination of cervical cancer in LMICs.

Methods

This review focused on LMICs, as defined by the World Bank based on per capita gross national income in 2020 (World Bank, 2020). The work outline included identifying and defining the research question, searching for and selecting relevant studies, extracting the data, synthesising and summarising the data, and reporting the findings.

The review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The research question was defined as: 'What are the barriers to the uptake of cervical cancer screening services in LMICs?', and it was was framed using the Population, Concept and Context (PCC) element. The population was women (15 years and older) eligible for cervical cancer screening with two concepts of interest, i.e., exposure concept (barriers to uptake of cervical cancer screening as described by the authors) and an outcome concept (uptake of screening services for cervical cancer). The context was girls and women from any setting in LMICs.

2.1 Search strategy for identification of studies

Two authors developed a search strategy that had no language or date restrictions and performed a comprehensive literature search in PubMed on 22 February 2021, Scopus on 24 February 2021, and Web of Science on 26 February 2021. The search strategy was first developed in PubMed and afterward adapted for Scopus and Web of Science. A basic search in Google and Google Scholar was also conducted. The websites of the WHO and International Agency for Research on Cancer (IARC) were also searched for relevant articles. The reference list of all included studies were also checked for relevant articles. The search was initiated with keywords including "cervical cancer screening", "cervical cancer prevention", "cervical cancer screening barriers", "cervical cancer screening uptake". The search terms were refined by adapting search terms from relevant literature. The detailed search strategy for the three databases is available in the Annexure.

2.2 Inclusion and eligibility

All types of studies that addressed uptake of cervical cancer screening in LMICs published in English over a 10-year period (1 January 2010 – December 2020) were eligible. We included published full-text articles that describe barriers to access and uptake of cervical cancer screening services among girls and women aged 15 years and older conducted in LMICs (as defined by the World Bank based on per capita gross national income in 2020 (World Bank, 2020)). We also included project and academic reports, including Masters and Doctoral theses. We excluded editorials, commentaries, and abstracts where we could not access full-text articles.

2.3   Study selection

Eight authors working in pairs, independently screened the titles and abstracts of records identified in the search output for potentially eligible studies. We retrieved the full texts for studies that were considered potentially eligible. The authors independently assessed the full texts of the potentially eligible studies and deemed them as either included or excluded. Disagreements among the authors during the screening process were resolved through discussion and consensus.

2.4   Data extraction

The author pairs independently extracted data using a standardised data extraction form, which had been piloted to test for accuracy and consistency. Information was extracted on the country of study, study design, population, sample size, age of the participants, the aim of the study, type of screening, barriers to uptake of cervical cancer screening, reported findings, and recommendations.

The authors compared extracted data and resolved discrepancies through discussion and consensus. One author reviewed all the articles selected at this stage and made a final determination of the articles that were included in the review.

2.5   Assessment of study methodological quality

The quality of the included qualitative studies was assessed using the quality criteria in the qualitative checklist of the Critical Appraisal Skills Program (CASP, 2020) tool, and the following ten criteria were assessed: clear study objectives, appropriate methodology, appropriate study design, recruitment strategy, data collection, consideration of the relationship between researchers and participants, ethical issues, rigorous analysis, clear findings and value of the research. Each of the quality criteria was scored from 1 to 3 based on the researcher's subjective judgment. These scores were summed up and the overall quality of each study was ranked as low (1 – 10), medium (11 – 20), or high (21 – 30).

For the quantitative studies, nine quality criteria from the CASP modified tool were assessed: clear study objectives, appropriate methodology, representative sample and power, response rate and validation of the instrument, reliability of the results, appropriate tables and graphs, appropriate statistical methods, important variables considered, and value of the research. Each of the quality criteria was scored from 1 to 3 based on the researcher's subjective judgment. These scores were summed up and the overall quality of each study was ranked as low (1 – 9), medium (10 – 19), or high (20 – 30).

Results

3.1   Search results

The literature search yielded a total of 2 148 articles: 385 from PubMed, 1 280 from Scopus, 461 from Web of Science, 18 from Google scholar, and 4 other articles.

After removing 20 duplicates, the titles were screened against the eligibility criteria, and 1 882 irrelevant articles were excluded (see Figure 1). Full texts of the 246 remaining articles were further assessed for eligibility, and 92 met the inclusion criteria (see Figure 1).

A total of 79 articles were based on individual studies, and 13 were reviews that included systematic, scoping, and other general reviews.

Figure 1 Search strategy flow diagram
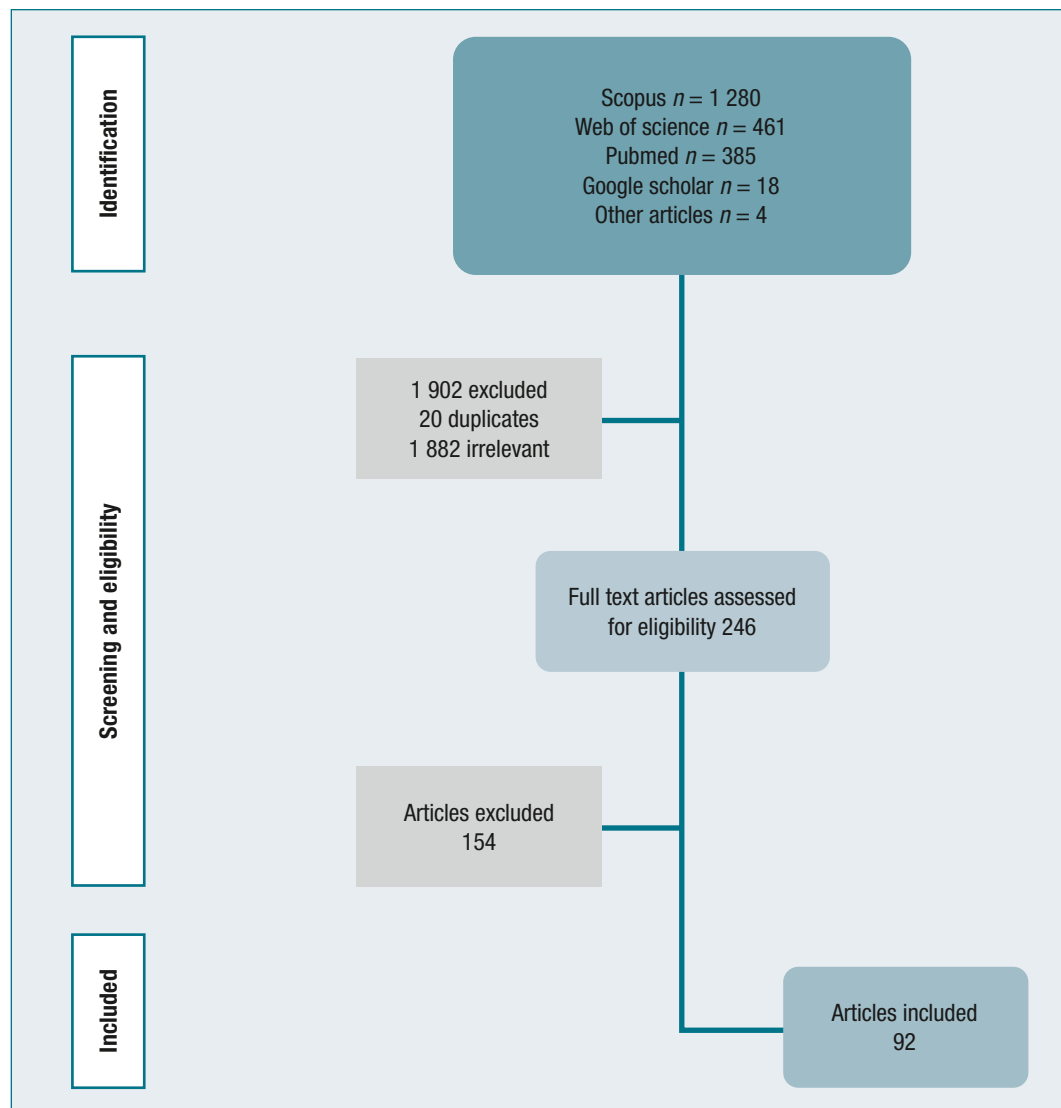
3.2 Characteristics of included studies

The characteristics of the individual studies included are shown in Table 1 and the characteristics of the reviews are shown in Table 2. Of the individual studies, 48 were quantitative studies, 26 were qualitative studies, and 5 used mixed methods. The quantitative studies were largely cross-sectional surveys, while the qualitative studies were based on focus group discussions, in-depth and semi-structured interviews (see Table 1). Six studies were based on secondary data analysis (Bishwajit & Kpoghomouya, 2017; Calys-Tagoe *et al.*, 2020; Gottschlich *et al.*, 2020; Kangmennaang *et al.*, 2018; Park & Park, 2010; Stewart *et al.*, 2020).

3.3 Country and setting

The individual studies were undertaken in 28 countries (see Figure 2), with 48 studies undertaken in Africa.

Figure 2 Map showing countries where reported studies were conducted
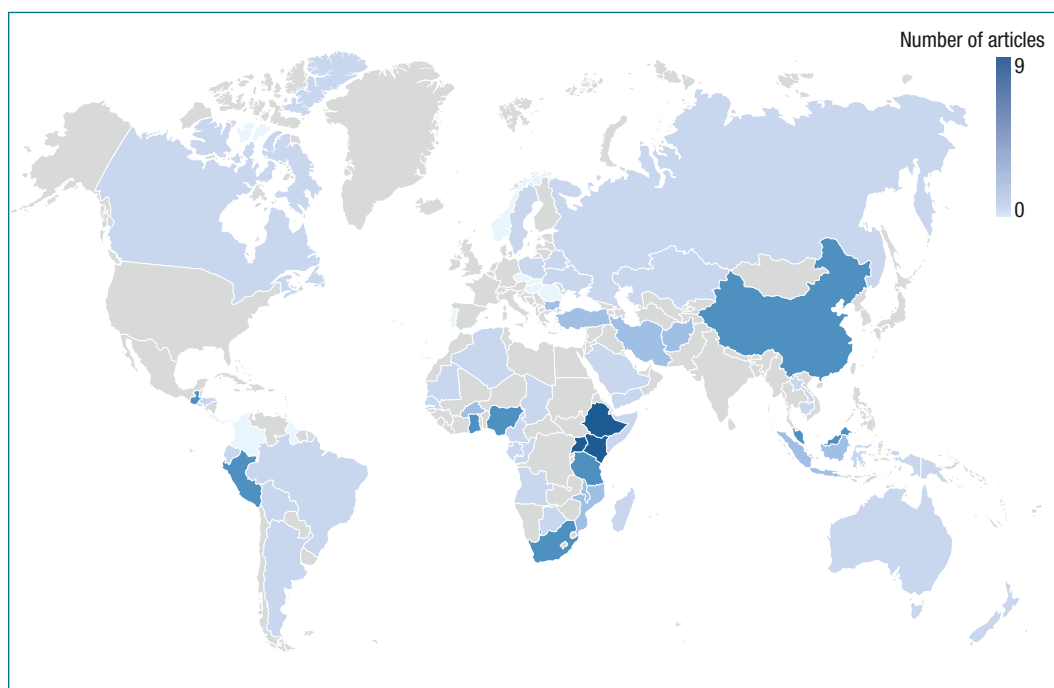
3.4   Participants

The individual studies included participants from rural and urban areas, HIV-infected and uninfected women, women in the general public, women who were students, women attending antenatal services, and healthcare workers.

Three studies included men, and in two studies the men were partners of the women participants (Lunsford *et al.*, 2017; Osth *et al.*, 2015; Spagnoletti *et al.*, 2019). Thirteen studies included healthcare workers exclusively or other participants who were not healthcare workers (Abdullah & Su, 2010; Chary & Rohloff, 2014; Filade *et al.*, 2017; Hweissa *et al.*, 2016; Lieber *et al*, 2019; Malambo & Erikson, 2017; Munthali *et al.*, 2015; Mwaka *et al.*, 2013; Paul *et al.*, 2013; Paz-Soldán, *et al.*, 2012; Stormo *et al.*, 2012; Townsend *et al.*, 2014; Valerianova *et al.*, 2015). Eight studies also included participants younger than 18 years old, including one study that included girls from the age of 10 years old, together with older women (Ampofo *et al*, 2020; Bishwajit & Kpoghomou, 2017; Ebu *et al.*, 2014; Kangmennaang *et al.*, 2018; Mupepi *et al.*, 2011; Nyamambi *et al.*, 2020; Rad *et al.*, 2010; Tiruneh *et al.*, 2017). Age details were not specified in 17 studies (see Table 1).

The sample sizes of the individual studies ranged from 15 participants (Learmonth *et al.*, 2015; Lieber *et al*, 2019; Mwaka *et al.*, 2013) to 15 317 participants in a study based on secondary data analysis (Gottschlich *et al.*, 2020).

3.5   Types of screening methods

A total of 35 studies were about pap smears exclusively, or about pap smears in combination with other screening methods; 20 studies were about visual inspection with acetic acid (VIA), or visual inspection with Lugol's iodine (VILI); 9 studies were on HPV, screening exclusively, or HPV screening in combination with other screening methods; while a total of 24 studies did not specify the type of screening method (see Table 1). Among the reviews, there were 9 on pap smears exclusively, or in combination with other screening methods, 1 was on VIA, and in 3, the type of screening was not specified (see Table 2).

Data synthesis

Given the nature of the review and that most of the studies included were qualitative or descriptive in design, a narrative synthesis was used to summarise the findings.

4.1   Categories of barriers identified

The barriers were grouped into five categories as defined below:
- **Individual/personal level barriers** – These were barriers operating at an individual level, such as individual/personal ideas, knowledge, attitudes, beliefs, perceptions, and feelings.
- **Social barriers** – These were community and societal barriers such as community expectations, community perspectives, and stigma.
- **Cultural/traditional/religious barriers** – These were cultural, traditional, and religious views, norms, and expectations such as family roles, beliefs, assumptions, and rules of conduct.
- **Structural** – These were macroscale systemic obstacles that collectively affected some women disproportionately, such as distance, cost, low socioeconomic status, and low levels of education.
- **Health system barriers** – These were factors in the health system that made it difficult for some individuals to access, use or benefit from care.

Given the complexities of how communities live and exist, it is important to note that these categories are not entirely distinct or mutually exclusive. Barriers in one category overlap and are influenced by those in other categories. The examples of the range of barriers in each category are shown in Figure 3.

Figure 3: Examples of barriers in the five identified categories

Individual/personal barriers	Social barriers	Cultural/traditional/religous barriers	Health system barriers	Structural barriers
• Lack of information about cervical cancer • Lack of knowledge and/or awareness of screening • Low risk perception • Lack of understanding of value and benefits of screening, misconceptions about screening/absence of symptoms believed to be indicative of good health • Fear of screening and anticipation of pain • Fear of results/disease/death • Competing priorities for time • Misconceptions about screening procedure • Embarrassed to be screened • Discomfort with undressing, being touched, and/or being screened by male or young healthcare workers	• Gender relations • Lack of family/partner/community support • Stigma related to misconceptions about cervical cancer • Associations with HIV and sexually transmitted infections and related stigma • Women's health regarded as private/taboo subject • Societal misconceptions about cervical cancer screening and cancer • Community influence	• Gender relations • Lack of, or requirement for spousal/partner permission or support • Traditional beliefs/reasons/norms • Religious beliefs/reasons/norms • Cultural beliefs/reasons/norms • Traditional/alternate medicine preferred • Cultural/traditional beliefs vs western medicine/western treatments/expectations	• Lack of screening policies, guidelines, and/or their implementation • Lack of staff and trained staff • Service unavailability in all facilities (or only offered in certain facilities and at particular times) • Poor attitudes and knowledge of healthcare workers • Unavailability of resources for screening, including equipment breakdown, lack of materials • Poor health system planning - inconvenient bookings, poor follow-up systems, lack of referral or referral to facilities far from clients' home • Long waiting times at facilities • Healthcare workers not offering the service • Exclusionary policies by age, marital status	• Unaffordable screening costs • Socio-economic factors • Service availability/accessibility (including transport challenges, crime, etc.) • Lack of information, awareness, advice • Remote services • Transport costs • Lack of female-focused healthcare • Financial constraints/low socio-econommic status • Lack of information about cervical cancer • Poor infrastructure (including infrastructure for people with disabilities) • Low levels of education

4.1.1 Individual/personal level barriers

Almost all studies in this review reported individual or personal level barriers to screening (44 from Africa, 16 from Asia, 5 from South America, 4 from North America, and 2 from Europe).

The most common individual-level barriers were lack of knowledge and information about cervical cancer and cervical cancer screening, and lack of knowledge and information about the value and the benefits of screening (Abdulkadir, 2013; Albuquerque *et al.*, 2014; Ebu *et al.*, 2014; Getachew *et al.*, 2019; Jia *et al.*, 2014; Kibicho, 2014; Kokuru, 2017; Learmonth *et al.*, 2015; Lunsford *et al.*, 2017; Lyons *et al.*, 2020; Munthali *et al.*, 2015; Mupepi *et al.*, 2011; Ndejjo *et al.*, 2016; Ngugi *et al.*, 2012; Nigussie *et al.*, 2019; Shiferaw *et al.*, 2018; Solomon *et al.*, 2019; Spagnoletti *et al.*, 2019; Williams *et al.*, 2019).

Studies also reported that women had misconceptions about screening and the screening process. Many women did not understand screening, i.e., health examination in the absence of symptoms or ill health. This may partly explain the finding that women also reported having no time to attend screening because of competing priorities for their time. Competing priorities for time to attend screening were reported by both urban and rural women, and by formally employed and unemployed women (Abdullah & Su, 2010; Aduda & Mkhize, 2014; Albuquerque *et al.*, 2014; Ampofo *et al.*, 2020; Atuhaire, 2013; Demirtas & Acikgoz, 2013; Gu *et al.*, 2018; Harries *et al.*,2020; Hweissa *et al.*, 2016; Lunsford *et al.*, 2017; Maree & Kampinda-Banda, 2018; Modibbo *et al*, 2016; Ndejjo *et al.*, 2016; Nigussie *et al.*, 2019; Oketch *et al.*, 2019; Paul *et al.*, 2013; Lyons *et al.*, 2020).

Another commonly reported individual-level barrier was fear, which encompassed a number of factors. A total of 17 studies in Africa and 6 in Asia reported that women feared the possibility of receiving a diagnosis of cancer from screening, and many believed that a cancer diagnosis was terminal. No studies in the other continents reported this finding. Other studies reported that women were afraid that the screening procedure might be too painful, and some women were concerned about possible harm, such as contracting cancer from screening and injury or damage to the uterus or cervix during and from the screening procedures (Albuquerque *et al.*, 2014; Ampofo *et al.*, 2020; Ashtarian *et al*, 2016; Baskaran *et al.*, 2013; Ebu *et al.*, 2014; Getachew *et al.*, 2019; Getahun *et al.*, 2020; Gu *et al.*, 2017; Gu *et al*, 2018; Hasahya *et al.*, 2016; Kibicho, 2014; Kokuru, 2017; Koneru *et al.*, 2017; Learmonth *et al.*, 2015; Megersa *et al.*, 2020; Munthali *et al.*, 2015; Mwaka *et al.*, 2013; Ngugi *et al.*, 2012; Nigussie *et al.*, 2019; Nyamambi *et al.*, 2020; Oketch *et al.*, 2019; Shiferaw *et al.*, 2018; Vhuromu *et al.*, 2018). In Nigeria, women were afraid of getting infected with other diseases from the screening equipment, or other sources within the facility (Filade *et al.*, 2017; Modibbo *et al*, 2016). In Ethiopia, women who were offered the opportunity for self-sampling for HPV were reported to have expressed fear of using the Evalyn brush (Megersa *et al.*, 2020), while in South Africa, women reported fear of having concurrent HIV testing conducted during the screening process (Harries *et al.*, 2019).

Studies also reported that women were embarrassed to be screened or to undergo pelvic examination. This was reported in a total of 26 studies (17 in Africa, 4 in Asia, and 2 in South America) (Abdullah *et al.*, 2011; Albuquerque *et al.*, 2014; Ampofo *et al.*, 2020; Ashtarian *et al.*,2016; Baskaran *et al.*, 2013; Demirtas & Acikgoz, 2013; Ebu *et al.*, 2014; Getachew *et al.*, 2019; Gu *et al.*, 2018; Hasahya *et al.*, 2016; Hyacinth *et al.*, 2012; Jia *et al.*, 2013; Keneem, 2018; Kibicho, 2014; Kokuru, 2017; Koneru *et al.*, 2017; Learmonth *et al.*, 2015; Lunsford *et al.*, 2017; Munthali *et al.*,2015; Nigussie *et al.*, 2019; Nugus *et al.*, 2018; Nyamambi *et al.*, 2020; Oketch *et al.*, 2019; Osth *et al.*, 2013; Reis *et al.*, 2012; Shiferaw *et al.*, 2018; Spagnoletti *et al.*, 2019; Vhuromu *et al.*, 2018; Williams *et al.*, 2019). Some studies mentioned that women felt exposed during screening, with some reporting that women were also not comfortable to be screened by male healthcare workers and preferred being screened by female healthcare workers. In South Africa and Malawi, women were also not willing or comfortable to be screened by young healthcare workers (Lieber *et al.*, 2019; Munthali *et al.*, 2015).

The reviews also highlighted a lack of knowledge about cervical cancer as the most frequently reported individual-level barrier (Batool *et al.*, 2017; Bosch *et al.*, 2020; Chidyaonga-Maseko *et al.*, 2015; Chinn *et al.*, 2020; Dykens *et al*, 2020; Guillaume *et al.*, 2020; Islam *et al.*, 2017; Lim & Ojo, 2017; Lott *et al.*, 2020; Majidi *et al.*, 2017; McFarland *et al.*, 2016; Pierz *et al.*, 2020; Rahman *et al.*, 2017), and this included a lack of knowledge about cancer, screening, and low perception of risk. The reviews also reported women were afraid of pain during screening, and that they were embarrassed or shy to be screened by male healthcare workers.

4.1.2 Cultural/traditional/religious and social barriers

Cultural, traditional, religious and social barriers were reported in a total of 26 studies. Eleven studies reported that women were not screened because of religious or traditional reasons (Abdulkadir, 2013; Ampofo *et al.*, 2020; Ebu *et al.*, 2014; Filade *et al.*, 2017; Gu *et al.*, 2011; Kangmennaang *et al.*, 2018; Lunsford *et al.*, 2017; Megersa *et al.*, 2020; Nyamambi *et al.*, 2020; Shiferaw *et al.*, 2018). Two studies reported on possible clashes between western and traditional views on health concerning screening for cervical cancer (Learmonth *et al.*, 2015; Nugus *et al.*, 2018). In Ecuador, Nugus *et al.*, found that competing interpretations of health between healthcare workers and the community was a barrier to screening, while in South Africa Learmonth *et al.*, found that there was mistrust of western medicine and a preference of use traditional medicine (Learmonth *et al.*, 2015; Nugus *et al.*, 2018). Within the cultural, traditional and religious category, studies also reported that many men disapproved of cervical screening and did not support their wives to undergo screening – with some men reported to refuse screening for their wives (Adewumi *et al.*, 2019; Al-Naggar & Isa, 2010; Baskaran *et al.*, 2013; Filade *et al.*, 2017; Hweissa *et al.*, 2016; Jia *et al.*, 2013; Keneem, 2018; Kibicho, 2014; Learmonth *et al.*, 2015; Lunsford *et al.*, 2017; Modibbo *et al*, 2016; Munthali *et al.*, 2015; Mwaka *et al.*, 2017; Nugus *et al.*, 2018; Shiferaw *et al.*, 2018; Solomon *et al.*, 2019; Spagnoletti *et al.*, 2019; Vhuromu *et al.*, 2018; Williams *et al.*, 2019). Women's health was also reported to be regarded as of low priority, and in addition, to women's sexual and reproductive health and related screening being seen as private and taboo (Chidyaonga-Maseko *et al.*, 2015; Stormo *et al.*, 2012).

Social barriers were also related to community disapproval or negative community perceptions about screening, lack of peer support and stigma associated with screening and cervical cancer, and mistrust of the health system (Adewumi *et al.*, 2019; Andersen *et al.*, 2020; Getahun *et al.*, 2020; Gu *et al.*, 2010; Hasahya *et al.*, 2016; Megersa *et al.*, 2020; Modibbo *et al.*, 2016; Momberg *et al.*, 2017; Paul *et al.*, 2013; Spagnoletti *et al.*, 2019; Stormo *et al*, 2012). Stigma was related to the view that cervical cancer is a terminal disease (Ampofo *et al.*, 2020; Oketch *et al.*, 2019). Stigma was also related to cervical cancer being seen as a sexually transmitted (Adewumi *et al.*, 2019; Lunsford *et al.*, 2017). In South Africa, women screened for cervical cancer were routinely were offered HIV testing, and here stigma was related to the association of cervical cancer screening with HIV infection, sexually transmitted infections, infidelity, hysterectomy, and loss of womanhood (Learmonth *et al.*, 2016; Momberg *et al.*, 2017).

Cultural, religious, traditional and social barriers were also highlighted in the reviews, and the barriers reported include lack of and requirement of spousal support, religious, cultural, and traditional beliefs prohibiting screening, stigmatisation of cancer and screening, as well as a misconception about cancer and screening as reported in individual studies (Batool *et al.*, 2017; Bosch *et al.*, 2020; Chidyaonga-Maseko *et al.*, 2015; Chinn *et al.*, 2020; Dykens *et al*, 2020; Guillaume *et al.*, 2020; Islam *et al.*, 2017; Lim & Ojo, 2017, Lott *et al.*, 2020; Majidi *et al.*, 2017; McFarland *et al.*, 2016; Mupepi *et al.*, 2011; Pierz,*et al.*, 2020).

4.1.3 Health systems barriers

Factors relating to the health system – which ranged from lack of capacity (availability of health facilities, lack of staff, lack of screening, lack of space, lack of equipment), poor and negative attitudes of healthcare workers, poor organisation services, and lack of the promotion of screening – were also identified as barriers to screening uptake. Lack of capacity to conduct screening included limited healthcare facilities in general, and especially in rural areas, limited numbers of healthcare facilities that offer screening services, limited staff including staff skilled to conduct screening, and shortage of equipment leading to women being referred for screening far from where they live resulting in lengthy diagnostic processes (Abdulkadir, 2013; Atuhaire, 2013; Filade *et al.*, 2017; Getachew *et al.*, 2019; Harries *et al.*, 2020; Hasahya *et al.*, 2016; Hyacinth *et al.*, 2012; Learmonth *et al.*, 2015; Lieber *et al.*, 2019; Malambo & Erikson, 2017; Maree & Kampinda-Banda, 2018; Munthali *et al.*, 2015; Mwaka *et al.*, 2017; Nigussie *et al.*, 2019; Nyamambi *et al.*, 2020; Paul *et al.*, 2017; Shiferaw *et al.*, 2018; Stormo *et al.*, 2012; Tiruneh *et al.*, 2017; Townsend *et al.*, 2014; Vhuromu *et al.*, 2018). Capacity barriers also included reports of poor technical skill of healthcare professionals assigned to undertake screening, limited supervision of this cadre of staff thus leaving staff uncertain about technique, and limited expert staff such as gynaecologists needed to manage difficult cases. (Chary & Rohloffa, 2014; Mwaka *et al.*, 2017).

In Kenya and Ethiopia, clinic operating times and unavailability of screening services on weekends, were also reported as barriers to screening uptake (Getahun *et al.*, 2020; Kibicho, 2014). In studies conducted in Uganda and South Africa, women reported that the lack of privacy in healthcare facilities was a barrier to screening (Keneem *et al.*, 2018; Learmonth *et al.*, 2015). In Malawi, Munthali *et al.* identified lack of space for screening services in facilities as another barrier (Munthali *et al.*, 2015). Limited capacity was further demonstrated by reports of limited consultation time as reported in Libya and China (Gu *et al.*, 2018; Hweissa *et al.*, 2016). In Nigeria and Uganda, there was also a lack of confidence in the health system (Modibbo *et al.*, 2016; Mwaka *et al*, 2013).

Eleven studies in Africa (*n*=7), Asia (*n*=3) and South America (*n*=1), found that poor attitudes of healthcare workers, which included discrimination against some women, discouraged screening (Abdulkadir, 2013; Aduda & Mkhize, 2018; Andersen *et al.*, 2020; Atuhaire 2013; Baskaran *et al.*, 2013; Ebu *et al.*, 2018; Harries *et al.*, 2020; Kibicho, 2014; Nugus *et al.*, 2018; Shiferaw *et al.*, 2018). Two studies also found that communication and language barriers between women and healthcare workers and left women with unanswered questions and limited screening (Ampofo *et al.*, 2020; Nugus *et al.*, 2018).

In 7 studies, women reported that long wait times in facilities were a barrier to screening. This was reported in studies conducted in South Africa (Harries *et al.*, 2020; Learmonth *et al.*, 2015), Uganda (Atuhaire 2013; Ndejjo *et al*, 2016), Kenya (Aduda & Mkhize, 2014) and in China (Gu *et al.*, 2018). This may also account for women reporting that they had competing priorities for their time when they considered attending screening services, as reported under individual-level barriers. In Uganda, long wait times were reported to interfere with women's daily responsibilities, and also result in additional costs being associated with screening (Paul *et al.*, 2013).

Several studies reported on policy and guideline implementation barriers. Studies in Uganda, Indonesia, Brazil, and China found that there was poor organisation of services, with limited information about screening services available. Therefore women did not know where to attend screening and how to make appointments for screening (Albuquerque *et al.*, 2014; Gu *et al.*, 2018; Hyacinth *et al.*, 2012; Spagnoletti *et al.*, 2019). In Bolivia, healthcare workers reported that the lack of dissemination of screening guidelines, lack of educational campaigns, and infrastructure for screening, limited screening (Stormo *et al.*, 2012), whereas in Oceania, screening guidelines were not implemented. In Bulgaria, lack of a screening policy hindered screening uptake (Townsend *et al.*, 2014; Valerianova *et al.*, 2015), and in Argentina and China, the screening policy excluded unmarried women from free screening (in China), thus limiting screening possibilities for some women because out of pocket screening costs were also identified as a barrier to uptake (Paolino & Arrossi, 2011; Gu *et al.*, 2018).

Healthcare workers also often failed to recommend or promote screening, or to offer screening or information about screening to women during consultations for other services and conditions (Abdullah & Su, 2010; Al-Naggar & Isa, 2010; Ashtarian *et al.*, 2016; Getachew *et al.*, 2018; Mitchell *et al.*, 2017; Ndejjo *et al.*, 2016), which may also lead to less screening in younger and unmarried who do not attend post-natal services. Being younger and unmarried were associated with a lower likelihood of being screened in Malaysia, Kenya, and China (Gan *et al.*, 2013; Gu *et al.*, 2018; Kangmennaang *et al.*, 2018).

The reviews also highlighted health system barriers (as reported in the individual studies), which included poor attitudes of healthcare workers, long wait times, and difficulties navigating the health system. In addition, several studies reported poor or weak cervical cancer policies, poor integration of screening into cancer plans, and unknowledgeable healthcare workers who did not promote or offer screening to patients (Batool *et al.*, 2017; Chidyaonga-Maseko *et al.*, 2015; Dykens *et al.*, 2020; Guillaume *et al.*, 2020; Islam *et al.*, 2017; McFarland *et al.*, 2016; Pierz *et al.*, 2020).

4.1.4   Structural barriers

Structural barriers were mainly related to distance to screening facilities, costs that were required or incurred when travelling to facilities, poor transport systems, and screening costs where screening was not provided free of charge in the absence of health insurance. In 17 studies (Africa *n*=12, Asia *n*=2, North America *n*=1, South America *n*=1, Oceania *n*=1), screening costs were a barrier (Ampofo *et al.*, 2020; Andersen *et al.*, 2020; Compaore *et al.*, 2015; Edu *et al.*, 2014; Filade *et al.*, 2017; Getachew *et al.*, 2019; Gottschlich *et al.*, 2020; Hweissa *et al.*, 2016; Kibicho, 2014; Kokuru, 2017; Learmonth *et al.*, 2015; Lunsford *et al.*, 2017; Paolino & Arrossi, 2011; Shiferaw *et al.*, 2018; Spagnoletti *et al.*, 2019; Tiruneh *et al.*, 2017; Townsend *et al.*, 2014), and in 10 studies (Africa *n*=8; Asia *n*=1, South America *n*=1), travel costs were reported as a barrier (Adewumi *et al.*, 2020; Aduda & Mkhize, 2014; Collins *et al.*,2019; Filade *et al.*, 2017; Getachew *et al.*, 2019; Hasahya *et al.*, 2016; Kokuru, 2017; Lunsford *et al.*, 2017; Ndejjo *et al.*, 2016; Oketch *et al.*, 2019; Shiferaw *et al.*, 2018; Tiruneh *et al.*, 2017).

Long waiting times were also associated with additional costs for food and beverages, and this was a barrier for some women (Paul *et al.*, 2013). Women in rural areas were disproportionately affected by distance and travel costs (Barret *et al.*, 2020; Harries *et al.*, 2020; Hasahya *et al.*, 2016; Mwaka, AD *et al.*, 2013; Lyons *et al.*, 2020). In South Africa, Uganda and Nigeria, additional barriers reported were crime that limited travel, poor road networks, and lack of and inconvenient transport schedules to facilities (Gu *et al.*, 2018; Harries *et al.*, 2020; Mwaka, AD *et al.*, 2013; Stewart *et al.*, 2020). Other structural issues also included low levels of education and low socio-economic status (Bishwajit & Kpoghomou, 2017; Ng'ang'a *et al.*, 2018; Tiruneh *et al.*, 2017).

The structural barriers reported in the reviews included difficulties in accessing services because of travel costs since services were far from where women lived, screening and other hidden costs, low levels of education, and low socio-economic status (Batool *et al.*, 2017; Bosch *et al.*, 2020; Chidyaonga- Maseko *et al.*, 2015; Chinn *et al.*, 2020; Dykens *et al.*, 2020; Guillaume *et al.*, 2020; Islam *et al.*, 2017; Lim & Ojo, 2017; Lott *et al.*, 2020; Majidi *et al.*, 2017; McFarland *et al.*, 2016; Pierz *et al.*, 2020; Rahman *et al.*, 2017).

4.2   Similarities and differences in barriers in different LMICs

When considering the differences and similarities in barriers that were identified in different regions of LMICs in this review, it is important to note that most of the individual studies included are from Africa and Asia, with only a few studies from other continents (see Table 1).

At the individual/personal level, lack of knowledge and/or awareness and information about cervical cancer and cervical cancer screening and its benefits, was a universal barrier with almost all studies across all continents reporting this barrier. This was reported throughout the period of this review, i.e., from articles published in 2010 to more recent articles published in 2020.

Fear of pain during the screening process was also reported in studies from all the continents except Europe, and many studies in Africa and Asia also reported fear of a positive screening result. Another frequently reported barrier in studies in Africa and Asia was embarrassment – which was reported as women being embarrassed to be screened, with some studies also mentioning that women were embarrassed to be screened by male healthcare workers, and that they felt embarrassed to be "exposed" (Ngugi *et al.*,2012; Oketch *et al.*, 2019; Spagnoletti *et al.*, 2019; Williams *et al.*, 2019).

Within the social category of barriers, stigma was reported in Africa, Asia and South America. In Africa and South America, stigmatisation was mainly concerning the association of cervical cancer with sexually transmitted infections and HIV (Adewumi *et al.*, 2019; Harries *et al.*, 2020; Kokuru, 2017; Learmonth *et al.*, 2015; Momberg *et al.*, 2017; Ngugi *et al.*, 2012; Stormo *et al.*, 2012). Social misconceptions about screening were also reported in all continents (see Table 1). Cultural/traditional and religious barriers were reported in Africa, Asia, and South America, whereas this was not an underlying cause of barriers in North America and Europe. In this category, partner or spousal support/approval was frequently reported. Lack of screening because of religious or cultural prohibition was largely reported in Africa and Asia.

Health system barriers were largely similar across the countries and continents. These ranged from lack of capacity (screening facilities, equipment, space and staff), poor attitudes of healthcare workers, and healthcare workers not recommending or offering screening to women. Studies that included healthcare workers in Europe, Oceania, and South America were more explicit about policy gaps that limited screening uptake (Paz-Soldán *et al.*, 2012; Stormo *et al.*, 2012; Townsend *et al.*,2014; Valerianova *et al.*, 2015).

The structural barriers of costs (screening costs and travel costs) and distance were reported almost universally in Africa, Asia and the Americas.

Table 1: Studies reporting barriers to cervical cancer screening in low- and middle-income countries (LMICs)

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Getahun, T., *et al.*, Ethiopia, 2020	Mixed methods Cross-sectional and IDIs	Rural and urban women and cervical cancer screening service providers	821 women 10 in-depth interviews with cervical cancer screening service providers	Median age: 39 years (range 30 – 49)	Not specified	Individual (fear of screening because of misconceptions about the screening regarding potential harms) Social (stigma) Health system (inconvenient health facility operating times)	High
Megersa, B.S., *et al.*, Ethiopia, 2020	Qualitative IDIs and FGDs	Women who had participated in a community-wide home-based HPV self-sampling, sample collectors, community healthcare workers, and their assistants	47 (25 in FGDs, 22 in IDIs).	Mean age: 36 years	HPV self-sampling	Individual (lack knowledge about cervical cancer and self-sampling, fear of self-sampling device, misconceptions about the harm caused by the device) Social (community disapproval) Cultural/traditional/religious (religious and cultural prohibition spouse disapproval)	High
Ampofo, A.G., *et al.*, Ghana, 2020	Quantitative Cross-sectional survey	Women of reproductive age	200	15 – 50	VIA, Pap smear	Individual (fear of positive test results, fear of pain, embarrassed to be screened, lack of knowledge about cause, competing priorities for time) Social (stigma associated with cervical cancer as a terminal disease) Cultural/traditional/religious (religious and cultural prohibition) Health system (knowledge of facilities offering screening, communication difficulties with healthcare workers) Structural (poor transport system to screening centres, screening costs)	High
Calys-Tagoe, B.N.L., *et al.*, Ghana, 2020	Quantitative Secondary data analysis	Women	2 711 (224 analysed for a pap smear)	Mainly ≥50 years	Pap smear	Individual (lack of concern with one's care) Cultural/traditional/religious (being married) Structural (father not educated)	Medium

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Stewart, K., *et al.*, Nigeria, 2020	Quantitative Secondary data analysis	Women who had who received cervical screening	621	Not specified	VIA/VILI, and Pap smear	Structural (poor road network coverage and fewer options for public transport)	High
Harries, J., *et al.*, South Africa, 2020	Qualitative semi-structured interviews	Women with potential breast cancer or cervical cancer symptoms in urban and rural areas	18	mean age 34.5 years (range 22 – 58)	Not specified	Individual (competing priorities for time) Social (crime hindering travel to facilities) Health system (limited information and counselling, long waiting times, staff shortage, poor health-care worker attitudes) Structural (distance – s creening sites are far in rural areas, lack of transport to screening facilities)	High
Nyamambi, E., *et al.*, Zimbabwe, 2020	Quantitative Cross-sectional	Sexually active women	156	15 – 50	VIA	Individual (screening conducted by male healthcare workers, embarrassed to be screened, pain during screening, don't know where to go for screening) Cultural/traditional/ religious (culture/ religious prohibition) Health system (lack of screening facilities/ services) Structural (distance – screening sites are far)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Getachew *et al.*, Ethiopia, 2019	Mixed methods Cross-sectional and FGDs	Women of reproductive age attending antenatal follow-up clinics, family planning and postnatal care services at the primary health centres	520	mean age 27.7 years (range (20 – 49)	Not specified	Individual (lack adequate information regarding cervical cancer, cervical screening services, and eligibility criteria for screening, lack of knowledge about benefits of screening, embarrassed to be screened, pain during screening) Health system (lack of screening facilities/ services, healthcare workers do not offer the service) Structural (screening costs)	High
Nigussie, T., *et al.*, Ethiopia, 2019	Quantitative Cross-sectional	Women from a rural community	737 women	mean age 36.6 years (range 30 – 49)	VIA	Individual (fear of positive screening results, don't know where to go for screening, embarrassed to be screened, fear of pain, competing priorities for time, lack of knowledge about benefits of screening, misconceptions about risk – too old to be screened) Health system (lack of health facilities)	High
Solomon, K., *et al.*, Ethiopia, 2019	Quantitative Cross-sectional	HIV positive women attending ARV clinics	475	18 +years	VIA	Individual (fear of positive screening results, lack of know-ledge about benefits of screening) Cultural/ traditional/ religious (partner attitude)	Medium

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Williams, M.S., *et al.*, Ghana, 2019	Quantitative Cross-sectional	Women convenient sample in public places	288	mean age 32.4 years (range 19 – 64)	Pap smear	Individual (fear of positive screening results, embarrassed to be screened, don't want to expose self, lack of knowledge about benefits of screening, misconceptions about risk – too old to be screened) Cultural/ traditional/ religious (husband refusal)	High
Adewumi, K., *et al.*, Kenya, 2019	Quantitative Cross-sectional	Women, community health volunteers	604	Not specified	Self-collected vaginal swabs for HPV	Social (low prioritisation of women's health, stigma associated with cervical cancer as a sexually transmitted infection) Cultural/traditional/ religious (gender power relations. negative partner attitude) Structural (travel costs)	High
Oketch, S. Y., *et al.*, Kenya, 2019	Qualitative IDIs	Women cervical cancer screening campaign with community-based HPV self-sampling	120	mean age 36.1 years	HPV self-sampling	Individual (fear of pain, embarrassed to be screened by male doctors, competing priorities for time) Social (stigma associated with cervical cancer as a terminal disease) Structural (travel costs to screening centres)	High
Lieber, M., *et al.*, South Africa, 2019	Mixed method IDIs, FGDs observations, chart reviews	Women patients and healthcare providers	12 patients and 3 healthcare providers focus group number not specified	Not specified	VIA	Individual (fear, not willing to be screened, not willing to be e screened by young healthcare workers) Health system (lack of staff, high staff turnover)	Medium

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Shiferaw, S., *et al.* Ethiopia, 2018	Mixed method Cross-sectional and qualitative IDIs	HIV-positive women attending health facilities	581	Mean age 35 years (range 21 – 65)	Not specified	Individual (lack of knowledge about cervical cancer, benefits of screening and screening procedure, fear of pain during screening, fear of positive screening results, embarrassed to be screened, misconceptions about risk, don't know where to go for screening) Cultural/traditional/religious (partner attitude, religious reasons) Health system (lack of health facilities, poor healthcare worker attitudes, poor care in healthcare facilities, lack of skilled healthcare workers) Structural (screening costs)	High
Kangmennaang, J., *et al.*, Kenya, 2018	Quantitative Cross-sectional survey Secondary analysis of survey data	Women of reproductive age	14 741	Mean age 30 years (range 15 – 49)	Not specified	Individual (younger age) Social (high levels of gendered norms regarding intimate partner violence) Cultural/traditional/religious (cultural, religious and religious beliefs) Structural (primary level of education, unemployment, distance to facilities lack of health insurance)	High
Ng'ang'a, A., *et al.*, Kenya, 2018	Quantitative A nested case-control study in a cross-sectional survey	Women	1 180	30 – 49	Not specified	Individual (younger age) Structural (living in a rural area, lower level of education, low socio-economic status)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Maree, J.E., & Kampinda-Banda, M., Malawi, 2018	Quantitative Cross-sectional	Women – convenient sample in a rural district	262	Mean age 36.1 years (range 30 – 45)	VIA	Individual (lack of knowledge about and reasons for screening, fear, not willing to be screened, competing priorities for time, not yet decided) Health system (lack of screening facilities/ services)	High
Keneem, M., et al., Uganda, 2018	Quantitative Cross-sectional	Women attending antenatal clinic	100	25 – 49	Not specified	Individual (lack of knowledge cervical cancer, and free screening services, embarrassed to be screened) Cultural/traditional/ religious (lack of spousal support) Health system (lack of privacy in facilities) Structural (access-facility is far)	Medium
Vhuromu, E.N., et al., South Africa, 2018	Quantitative Cross-sectional	Women attending health clinics	500	20 – 59	Pap smear	Individual (lack of knowledge about benefits of screening, fear of pain during screening, embarrassed to be screened, misconceptions about risk) Cultural/traditional/ religious (spousal refusal) Health system (lack of screening facilities)	Medium

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Kokuru, M.l., Ghana, 2017 Thesis degree of Master of Nursing Science	Quantitative Cross-sectional	Women attending reproductive health services	369	18 years+	Not specified	Individual (lack of knowledge about cervical cancer, benefits of screening and screening procedure, fear of pain during screening, fear of positive screening results, fear and ashamed/embarrassed to be screened, misconceptions about risk, don't know where to go for screening) Social (stigma – misconception about an association with promiscuity) Cultural/traditional/religious (spousal refusal) Structural (screening costs)	High
Bishwajit, G. & **Kpoghomou**, M., Kenya, 2017	Quantitative Cross-sectional secondary data analysis	Women	11 138	Mean age 29.6 range (15 – 49)	Not specified	Structural (low socio-economic status, lower level of education, living in a rural area)	High
Lunsford, N.B., *et al.*, Kenya, 2017	Qualitative FGDs	Women, married men with partners 25 – 49	100 10 focus groups (6 female-only and 4 male-only) with 10 participants in each group (*n*=100)	Women 25 – 49, men ≥18	Pap smear versus VIA/VILI	Individual (lack of knowledge about cervical cancer, benefits of screening and screening procedure, fear of positive screening results, fear and ashamed/embarrassed to be screened, competing priorities for time) Social (stigma – misconception about an association with promiscuity) Cultural/traditional/religious (religious or cultural beliefs, spousal disapproval) Health system (lack of capacity – lack of equipment) Structural (screening costs)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Tiruneh, F.N., et al., Kenya, 2017	Quantitative Cross-sectional	Married women	6 498	15 – 49	Pap smear, urine sampling	Social (low media exposure) Structural (low socio-economic status, unemployment, cost – no health insurance)	High
Filade, T.E., et al., Nigeria, 2017	Qualitative FGDs and IDIs	Pregnant women registered to attend antenatal care. Healthcare workers (obstetricians, midwives, and community health extension workers)	82 pregnant women 13 healthcare workers	Pregnant women Mean age 28.9 years	HPV DNA based tests	Individual (lack of awareness of cervical cancer, fear of positive screening results, fear of screening equipment and proce-dures, denialism, gender of healthcare worker) Cultural/traditional/religious (cultural beliefs, spouse's opinion) Health system (poor availability of screening facilities) Structural (high screen-ing costs, poor access in rural areas)	High
Momberg, M., et al., South Africa, 2017	Qualitative FGDs	Women who were first-time colposcopy clin-ic attendees	27	mean age 34 years (range 18 – 49)	Pap smear and colpos-copy	Individual (fear of concurrent HIV testing) Social (negative community opinions about screening – stigma because of association with HIV infection, lack of peer support)	High
Malambo, N. & Erikson S., Swaziland, 2017	Qualitative	Women and healthcare workers	27 20 women 7 healthcare workers	19 – 49	Not specified	Individual (fear of a cancer diagnosis) Health system (lack of capacity, lengthy diag-nostic process)	Medium
Mitchell, S.M., et al., Uganda, 2017	Quantitative Cross-sectional	HIV+ women attending a rou-tine care	87	30 – 69		Individual (lack of knowledge/education about cervical cancer and need for screening) Health system (Healthcare workers not offering or advising screening) Not specified (for barriers) study was on self collection of samples for HPV testing	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Koneru, A., *et al.* Tanzania, 2017	Quantitative Cross-sectional	HIV+ women	399	19 years+	VIA and colpos-copy	Individual (lack of knowledge that screening is free, embarrassed to be screened, perception that screening is painful) Health system (lack of information from health-care workers)	High
Modibbo, I.F., *et al.*, Nigeria, 2016	Qualitative FGDs	Muslim and Christian women purposively sampled	49	18 years+ Mean age 33 years	Not specified	Individual (lack of awareness of screening programmes, competing priorities for time, fear of positive screening results, fear of getting infected with other diseases from the screening equipment or other sources or procedures within the facility, denialism, gender of healthcare worker) Social (fear of status disclosure) Cultural/traditional/religious (requiring husband's permission before screening) Health system (discrimination, lack of confidence in the healthcare system)	High
Hweissa, NAb, *et al.* Libya, 2016	Qualitative IDIs	Healthcare workers from public and private sectors	16	Not specified	Pap smear	Individual (low levels of awareness, competing priorities for time, fear of positive screening results) Cultural/traditional/religious (lack of spousal support and/or approval husband) Health system (limited consultation time, gender of health-care worker) Structural (services only offered in some facilities, travel costs, and screening costs)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Adepoju, E.G., *et al.*, Nigeria, 2016	Quantitative Cross-sectional	Women resident in Osun state located in Southwest Nigeria	287	age 51.6 years (SD 14.3)	Pap smear, colpos-copy	Individual (low-risk perception)	Low
Ndejjo, R., *et al.*, Uganda, 2016	Quantitative Cross-sectional	Women from predominantly rural districts	900	25 – 49	Not specified	Individual (lack of knowledge about benefits of screening, misconceptions about risk, competing priorities for time, fear of positive screening results, lack of awareness of cervical cancer screening service) Social (misconceptions about the screening process – rumours) Health system (long waiting times at facilities, screening not recommended by healthcare workers) Structural (distance – screening sites are far, costs)	High
Hasahya, O.T., *et al.* Uganda, 2016	Qualitative FGDs	Women purposively recruited through their daughters who had received HPV vaccination.	36	25 – 49	Not specified	Individual (lack of knowledge about the cause of cervical cancer, misconceptions about the cause, fear of the screening process because of pain and risk of contracting cervical cancer from equipment, embarrassed to be screened, fear of male practitioners) Social (misconceptions about the screening process – rumours) Health system (few diagnostic and treatment facilities in the community, lack of staff, health workers quite often did not share results) Structural (distance- screening sites are far especially for rural women, travel costs)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Ghidei *et al.*, Ethiopia and Tanzania, 2015 Research report	Descriptive Cross-sectional	Women	23	19 – 45	VIA	Individual (fear, low-risk perception) Cultural/traditional/religious (cultural and religious beliefs, discourage by partner)	Low/small sample
Compaore, S.C., *et al.*, Burkina Faso, 2015	Quantitative Cross-sectional	Women	351	Not specified	VIA, VILI	Individual (lack of knowledge about cervical cancer, screening, and risk, fear of positive test results) Structural (long distance to screening sites, high cost)	Medium
Munthali, C.M., *et al.*, Malawi, 2015	Qualitative interviews	Healthcare workers District coordinators and cervical screening service providers	53	Not specified	VIA	Individual (embarrassed to be screened, belief that screening is painful, lack of knowledge about cervical cancer and the benefits of screening, misconceptions about the screening process) Cultural/traditional/religious (need for spouse support, unwillingness to be screened by young screener) Health system (Lack of equipment and supplies, male screeners in health facilities, staff shortage, intermittent service, lack of space for screening in facilities, limited supervision, and guidance of screeners) Structural (distance – screening sites are far)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Learmonth, D., *et al.*, South Africa, 2015	Qualitative FGDs	Women of low socio-economic status	15	25 – 51	Not specified	Individual (embarrassed to be screened, belief that screening is painful, lack of knowledge about benefits of screening, fear of positive test results) Social (stigma and negative association with other conditions) Cultural/traditional/religious (mistrust of western medicine and use of traditional medicine, Men's lack of acceptance of cervical screening) Health system (lack of health education, lack of staff, long waiting times, slow return of results, poor quality service, lack of privacy, poor healthcare worker attitudes, language barriers.) Structural (high cost, lack of health insurance)	High
Ebu, N.I., *et al.*, Ghana, 2014	Quantitative Cross-sectional	Women	392	10 – 74	Pap smear	Individual (lack of information about screening, embarrassed to be screened, belief that screening is painful, lack of knowledge about benefits of screening, misconceptions about risk and eligibility, fear of positive test results, pain in previous gynaecological examinations) Social (no information about cervical cancer in the community) Cultural/traditional/religious (partner refusal, against cultural values and religious beliefs)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
						Health system (lack of health education to promote screening, no information about screening sites, poor healthcare worker attitudes, difficulties in scheduling tests)	
						Structural (distance – screening sites are far, cannot afford cost and cost not covered by health insurance)	
Aduda, D.S.O. & Mkhize, N., Kenya, 2014	Qualitative FGDs	Women screened for syphilis and cervical cancer	Not specified	Not specified	Not specified	Individual (Lack of information about cervical cancer, competing priorities for time, fear of positive test results)	High
						Health system (poor healthcare worker attitudes, long waiting times)	
						Structural (cost of travel to screening facilities)	
Kibicho *et al.*, Kenya, 2014	Quantitative Cross-sectional	Women of reproductive age admitted to a gynaecology ward	138	Mean age 31.6 years (range 18 – 49)	Pap smear, colposcopy, VIA/VILI test	Individual (lack of information about cervical cancer screening procedures, lack of knowledge about eligibility and benefits of screening, embarrassed to be screened, belief that screening is painful, not knowing where to go for cervical cancer screening)	High
						Cultural/traditional/religious (partner refusal)	
						Health system (poor healthcare worker attitudes, lack of female screeners in health facilities, inconvenient clinic time, tests are costly)	
						Structural (services are offered at the big hospitals that are far and expensive)	

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Abdulkadir, I.R., Ethiopia, 2013 Thesis Master of Public Health, Health Education	Quantitative Cross-sectional	Female university students	392	Mean age 23.3 years (range 18 – 52)	Pap smear	Individual (misconception about eligibility and benefits of screening, belief that screening is painful, shyness to undergo screening) Cultural/traditional/religious (Cultural belief prevented screening) Health system (service unavailability – lack of health service facility in my area, poor healthcare worker attitudes) Structural (could not afford the cost)	High
Atuhaire, L., Uganda, 2013 Thesis for Masters degree	Qualitative Exploratory and descriptive	Women accessing maternal and child health services	25 (22 unscreened women)	18 – 64	All screening	Individual (lack of knowledge about screening and awareness of the importance of screening, low perceived risk discomfort with exposure during screening, fear of outcomes, competing priorities for time) Health system (poor healthcare worker attitudes, low motivation of healthcare workers, few healthcare workers, long waiting times	High
Mwaka, A.D., et al., Uganda, 2013	Qualitative	Healthcare workers	15	Not specified	Not specified	Individual (lack of awareness of cervical cancer and available services, discomfort with exposure during screening, fear of pain during pelvic examinations), Cultural/traditional/religious (lack of partner support) Health system (inadequate knowledge and skills about cervical cancer management by healthcare workers) Structural (long distances and lack of transport to cervical cancer screening and care centres)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Paul *et al.*, Peru, Uganda, Vietnam, 2013	Qualitative	Healthcare workers, village health team and screened and unscreened women	109	Not specified	VIA	Individual (embarrassed to be screened, fear of pain during the procedure, misconceptions about screening and treatment of cervical cancer, low perceived risk)	High
						Social (mistrust of the health system)	
						Health systems (inadequate supply of materials, limited staff, long wait times, services offered at inconvenient times)	
						Structural (costs associated with waiting)	
Ngugi *et al.*, Kenya, 2012	Qualitative IDIs	Women	50	Not specified	Not specified	Individual (lack of knowledge about screening, embarrassed to be screened and embarrassed to be screened by male healthcare workers, fear of pain during the procedure, competing priorities for time for other responsibilities misconceptions about screening and treatment of cervical cancer, low perceived risk)	High
						Social (stigma – association with sexually transmitted infections)	
						Cultural/traditional/religious (spousal disapproval)	
						Health systems (health workers not very supportive, poor attitude of healthcare workers, short consultation times))	
						Structural (screening costs, transport costs)	

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Hyacinth *et al.*, Nigeria, 2012	Quantitative Cross-sectional	Women working at a Federal non-healthcare establishment	388 (300 never screened)	18 – 65	Pap smear	Individual (lack of knowledge, never thought about it – do not consider it important, anxiety about the result, embarrassed to be screened) Health system (cannot locate testing facility)	High
Mupepi, S.C., *et al.* Zimbabwe, 2011	Quantitative Cross-sectional	Randomly selected, sexually active, rural women	Not specified	12 – 84	Pap smear	Individual (lack of knowledge about screening, fear of pain during the procedure, misconceptions about risk, competing priorities for time, lack of information and understanding of the benefits of screening) Social (association with promiscuity and sex workers) Cultural/traditional/religious (lack of spousal permission) Health system (health-care workers do not offer or encourage screening) Structural (screening costs, distance from health facility)	
Asia							
Andersen, J.G., *et al.*, Nepal, 2020	Qualitative FGDs and IDIs	Screened and non-screened women Female community health volunteers	48	30 – 60	Not specified	Individual (lack of awareness about screening options) Social (stigma and discrimination) Cultural/traditional (lack of spousal support) Health system (poor attitude of healthcare workers) Structural (access – remoteness)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Spagnoletti, B.R.M., *et al.*, Indonesia, 2019	Qualitative FGDs and semi-structured interviews	Married women and men	39 women and 15 men): Four FGDs were conducted (17 women and 15 men)	35 – 45 FGD women 28 – 40, men 35 – 45; semi-structured interview women 22, age 22 – 57 years	VIA and Pap smear	Individual (embarrassed to be screened by a male doctor, fear, discomfort with undergoing pelvic examination, fear of a positive result, lack of information and under-standing of the benefits of screening) Social (poor under-standing of risk in the community) Health system (no information about testing sites) Structural (not able to afford cost)	High
Gu *et al.*, China, 2018	Qualitative Semi-structured interviews	Screened and unscreened women who were perceived as having a high or low risk of cervical cancer in a prior quantitative research	27	25 – 50	Pap smear	Individual (fear of pain, and embarrassment at undergoing a pelvic examination, completing priorities for time) Health system (long waiting time at the clinic, poor organisation of the system, women did not know who to contact to request for such service, exclusionary policies – exclusion of unmarried women from free screening, poor attitudes of healthcare workers, limited information from health-care workers and limited consultation time) Structural (poor accessibility, inconvenient transport schedules making it difficult to navigate the healthcare services)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Ashtarian, H., *et al.*, Iran, 2016	Quantitative Cross-sectional	Women attending health centres	355	Mean age 34.08 years	Pap smear	Individual (lack of knowledge, embarrassed to be screened, fear of pain during screening, fear of the result, distrust of health-care workers) Health system (health workers not recommending screening)	
Osth *et al.*, Sri Lanka, 2015 Master Thesis in International Health	Quantitative Cross-sectional	Male and female undergraduate students	326 (224 females, 102 males)	18 – 30	Pap smear, cyto-logical screening	Individual (lack of knowledge, incorrect information – belief that they were too young to be screened, embarrassed to be screened)	High
Jia, Y., *et al.*, China, 2013	Quantitative Cross-sectional	Women (convenient sample)	5 929	25-65	Pap smear, VIA, colpos-copy	Individual (fear of cancer diagnosis and belief that it is incurable, fear of pain during screening, lack of understanding of the benefits of screen-ing, distrust of process, absence of symptoms, lack of knowledge) Cultural/traditional/religious (partner refusal)	High
Baskaran, P., *et al.*, Malaysia, 2013	Quantitative Cross-sectional	Women attend-ing outpatient care	369	Mean age 37.5 years (range 21 – 65)	Pap smear	Individual (embarrassed to be screened, uncertainty about pain during screening, misconceptions about risk, eligibility for screening and side effects of the screening procedure, worry about screening result, preference of female screeners, lack of information) Cultural/traditional/reli-gious (partner refusal) Health system (poor attitude of healthcare workers, lack of convenient clinic times, lack of clarity about screening centres)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Gan *et al.*, Malaysia, 2013	Quantitative Cross-sectional	Women in 1,000 households selected through multistage random sampling.	959	Mean age 45.2 years (range 20 – 64)	Pap smear	Individual (lack of knowledge about symptoms of cervical cancer, younger age, not having children) Social (lack of social support for screening)	High
Demirtas, B. & Acikgoz, I., Turkey, 2013	Quantitative Cross-sectional	Women who applied for health care at the gynaecology outpatient clinic	256	21 – 62	Pap smear	Individual (lack of knowledge about screening and reason for screening, embarrassment and hesitation, fear of screening, competing priorities for time, and low priority, young age)	High
Guvenc *et al.*, Turkey, 2013	Quasi-experimental	Women	294 included in telephonic	21+	Pap smear	Individual (embarrassed to be screened, competing priorities for time, fear of pain during the procedure, ignoring the need for screening)	
Reis *et al.*, Turkey, 2012	Qualitative	Women at gynaecology and obstetrics outpatient clinics	387	Not specified	Pap smear	Individual (lack of knowledge, unwillingness to be examined by a male doctor, fear and embarrassment about the procedure including equipment used, fear of pathological result)	Medium
Gu *et al.*, China, 2012	Quantitative Cross-sectional	Women	167	25 – 50	Not specified	Individual (lack of knowledge, not having children)	High
Abdullah *et al.*, Malaysia, 2011	Quantitative Cross-sectional	Female secondary school teachers	403	Not specified	Pap smear	Individual (embarrassed/shy to undergo screening, lack of time, competing priorities, younger age ≤35 years) Individual (lack of information) Health system (no feedback of screening results)	Medium

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Gu *et al.*, China, 2010	Quantitative Cross-sectional	Women	184	25 – 50	Not specified	Individual (lack of awareness about screening, lack of knowledge about the benefits of screening, competing priorities for time) Health system (not suggested by a doctor)	Medium
Abdullah & Su, Malaysia, 2010	Qualitative Semi-structured interviews	Policymakers, healthcare workers	11	37 – 57	Pap smear	Individual (not acceptable to women, competing priorities for time) Health system (low priority of cervical cancer screening, low funding, no commitment to implementation by healthcare workers)	
Al-Naggar, R.A. & Isa, Z.M., Malaysia, 2010	Quantitative Cross-sectional survey	Female Malaysian university students	287	18 years+	Pap smear	Individual (fear or worry about results) Cultural/traditional/ religious (no encourage-ment by partner) Health system (no encouragement or information from healthcare workers)	Medium
Park, S.J. & Park, W.l., Korea, 2010	Quantitative Secondary analysis	Women aged older than 21 years who had not had a hysterectomy and were eligible for pap smears	2 590	21 years+	Pap smear	Individual (older age, smoking) Structural (disability)	High
North America							
Gottschlich, A., *et al.*, Guatemala, 2020	Quantitative Secondary data analysis	Screened and unscreened women	15 317	25 – 49	Pap smear	Individual (fear, not wanting to go alone) Social (needing permission) Structural (cost of screening, accessibility distance)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Bien-Aimé *et al.*, Haiti, 2020 Thesis Degree of Master of Medical Sciences in Global Health Delivery	Quantitative Cross-sectional	Women in five urban areas	200	25 years+	Pap smear, Colposcopy, VIA, HPV test	Individual (fear of the screening process) Social (negative/ inaccurate feedback from peers)	Medium
Lyons, K.D., *et al.*, Honduras, 2020	Quantitative Cross-sectional	Rural women	473 (2013) 401 (2016)	Not specified	HPV PCR and Pap smear	Individual (lack aware-ness of the benefits of screening, fear of the screening process and health care system, competing priorities for time) Structural (poverty, accessibility – distance to screening centres)	Medium
Chary, A.N. & Rohloff, P.J., Guatemala, 2014	Qualitative Semi-structured interviews	NGO service provider staff	36	Not specified	VIA	Health system (staff turnover, training quality, lack of continued supervision, problems with referrals for further treatment)	
South America							
Barret, B.W., *et al.*, Peru, 2020	Quantitative Cross-sectional	Rural women	619	18 – 65	HPV testing, VIA or Pap smear	Structural (distance and time to travel to screening facilities)	Medium
Collins, J.H., *et al.*, Peru 2019	Quantitative Cross-sectional	Rural women	121 women	mean age 42 years (range 21 – 76)	Not specified	Individual (fear of the screening process, competing priorities, e.g., childcare) Structural (lack of access to services – transport costs)	High

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Nugus, P., *et al.*, Ecuador, 2018	Qualitative FGDs and semi-structured Interviews	Women who had participated in a government community-based cervical cancer screening program	28	24 – 69	Pap smear	Individual (fear, embarrassed to undergo a pelvic examination, competing priorities) Social (societal misinformation and misconceptions) Cultural/traditional/religious (competing interpretations of health between healthcare workers and community, spousal refusal) Health systems (discriminatory attitude of healthcare workers) Structural (language barriers)	High
Ferreira de Albuquerque *et al.*, Brazil, 2014	Quantitative Cross-sectional	Rural and urban women	493	Mean age 35.4 years (range 15 – 69)	Pap smear	Individual (lack of knowledge about the benefits of screening, embarrassed to undergo screening, fear of pain, competing priorities for time) Health system (inability to schedule tests) Structural (inability to miss work, accessibility – distance to health facility)	High
Stormo *et al.*, Bolivia, 2012	Qualitative descriptive survey	Healthcare workers	42 7 nurses and 35 physicians	Not specified	VIA, cryo-therapy	Individual (lack of knowledge about cervical cancer, and screening) Social (belief that cancer is not preventable, stigma related to cervical cancer for being a sexually transmitted illness) Cultural/traditional/religious (taboo about pap testing among women, low priority given to women's health) Health system (lack of dissemination of screening guidelines, lack of educational campaigns and infrastructure)	Medium

Author, Country, Year	Study design	Population	Sample size	Age (years)	Screening method	Barriers	Quality rating
Africa							
Paz-Soldán, V.A., *et al.*, Peru,2012	Qualitative Semi-structured interviews	Policymakers and healthcare workers (clinicians, laboratory technicians)	30	Not specified	Not specified	Health system (lack of capacity for screening, intermittent service, unnecessary delays, variation in procedures, varying levels of training of laboratory personnel) Structural (accessibility-cost-differences in women's ability to pay)	High
Paolino, M. & Arrossi, S.l., Argentina, 2011	Quantitative	Women attending hospital	200	18+	Pap smear	Individual (lack of knowledge) Health system (a policy that excludes unmarried women) Structural (cost, not having health insurance)	High
Oceania							
Townsend, J.S., *et al.*, US Affiliated Pacific Island Jurisdictions (USAPIJ), 2014	Quantitative cross-sectional	Healthcare workers	72	Not specified	HPV testing, Pap smear	Health system (lack of implementation of guidelines, cost, lack of equipment) Structural (cost of screening)	High
Europe							
Valerianova, Z., *et al.*, Bulgaria, 2015	Qualitative	Healthcare workers		23 – 65	Not specified	Individual (lack of knowledge regarding the effectiveness of screening programs, unwillingness of women) Health system (absence of a policy on screening, absence of organised mass screening, cost)	Medium
Rad, C., *et al.*, Romania, 2010	Quantitative Cross-sectional	Men, women	1 902	15 – 82	Pap smear	Individual (lack of knowledge, lack of knowledge about screening, and the benefits of screening, low level of education) Social (societal misconceptions – information from non-medical professionals)	Low

FGDs – focus group discussions; IDI – in-depth interviews; VIA – Visual inspection with acetic acid; VILI – Visual inspection with Lugol's iodine;
*HPV – **Human papillomavirus***

Table 2: Reviews reporting barriers to cervical cancer screening in low- and middle-income countries (LMICs)

Author, Country, Year	Population	Screening methods	Barriers
Bosch, X., *et al.*, LMIC, 2020	Young and old women, boys	None	Individual (lack of knowledge and awareness of cervical cancer screening)
Lott, B.E., *et al.*, Nigeria and South Africa, 2020	Women in urban and rural areas	Pap smear	Individual (lack of knowledge, fear of the screening procedure, low-risk perception)
			Social (stigma about cancer)
			Cultural/traditional/religious (modesty about being seen/examined by a male healthcare worker)
Chinn *et al.*, sub-Saharan Africa, 2020	Women	Pap smear/cytology, acetic acid screening	Individual (lack of awareness and knowledge about cervical cancer and screening, fear of the screening procedure, and a positive test result)
			Structural (financial constraints for screening or transport)
Dykens, A., *et al*, LMIC, 2020	Multiple	None	Individual (lack of knowledge and awareness about screening services, low priority of prevention; embarrassed to be in a clinic screened, misconceptions about screening – concerned about side effects, skepticism about device used during screening, lack of understanding about the value of screening, concern that results are not immediate)
			Social (association of screening with promiscuity, belied that cervical cancer is a curse)
			Cultural (permission required from husband, cultural barriers to diseases of the reproductive system)
			Health systems (lack of policies and guidelines poor systems, lack of training opportunities for healthcare workers to, high staff turnover, technical deficiencies, and poor supervision, healthcare workers not offering service, lack of supplies, lack of space in clinics, communication and language barriers, long wait times)
			Structural (cost of screening, lack of electricity)

Author, Country, Year	Population	Screening methods	Barriers
Guillaume *et al*., LMIC, 2020	HIV positive women	Multiple/not specified	Individual (lack of knowledge of cervical cancer screening, competing priorities for time)
			Social (stigma about cancer, myths about cancer)
			Health systems (lack of trained staff and resources, fragile and insufficient healthcare infrastructure, long waiting times, attitudes of healthcare workers)
			Structural (long distances to clinics, cost)
Pierz, A.L., *et al*., Sub-Saharan Africa, 2020	Women interviewed in hospitals and clinics	Pap smear, VIA	Individual (lack of knowledge of cervical cancer screening, competing priorities for time, embarrassed to be screened, fear of pain, fear of positive screening results, fear of infections during screening
			Social (lack of community support, lack of support from spouse and spousal approval, stigma in their community in utilising cervical and/or breast cancer screening services; religious or cultural beliefs)
			Health system (Limited or flawed screening and patient management policies, poor provider-patient interactions – poor attitudes of healthcare workers, a lack of trust in providers, insufficient education or advocacy from healthcare workers, poor healthcare infrastructure, poor allocation of resources, and political will, lack of equipment; inconvenient hours of operation for clinics, lack of privacy, long waiting times, limited health insurance coverage, unavailability of services in some locations, and lack of space in facilities for screening service, gaps in the training of healthcare workers)
			Structural (socioeconomic status and financial barriers – transportation to health facilities, screening costs, location of facilities far from clients)

Author, Country, Year	Population	Screening methods	Barriers
Rahman, R. *et al.*, African nations, 2019	Women	Pap smear, VIA	Individual (low patient awareness, lack of knowledge about personal risk, lack of understanding about cervical cancer risk and benefits of screening misconceptions about screening services, fears about screening process, fear about instrument cleanliness, competing priorities for time)
			Social (stigma due misunderstandings about screening and treatment)
			Cultural/traditional/religious (permission required from family, lack of social support)
			Health systems (staff shortages of trained staff), poor promotion of screening services, lack of supplies or infrastructure for screening
			Structural (geographic reach access challenges, travel costs, screening and treatment costs, hidden costs)
Batool *et al.*, Pakistan, 2017	Women	Pap smear	Individual (lack of knowledge about cervical cancer and importance of screening, lack of awareness of screening, shyness to be screened)
			Social (lack of family and community support)
			Cultural/traditional/religious (modesty – about seeing male healthcare workers)
			Health system (poor knowledge about guidelines and cervical cancer among healthcare workers)

Author, Country, Year	Population	Screening methods	Barriers
Islam, R.M., *et al.*, LMICs, 2017 SR	n/a	Not specified	Individual (lack of knowledge and awareness about screening, fear of the procedure, embarrassed/shy to be screened, employment outside the home)
			Social (misconceptions about the cause of cervical cancer)
			Cultural (cultural and religious beliefs about screening and modesty, partners attitude)
			Health systems (lack of screening programmes)
			Structural (low levels of education, travel costs, and distance to screening facilities, low levels of education)
Lim, J.N. & Ojo, A.A., Sub-Saharan Africa, 2017	Women	Multiple	Individual (fear of the procedure, lack of awareness of screening, embarrassment about seeking care, fear of possible violation of privacy
			Social (stigma)
			Cultural/religious (lack of spousal support)
			Health systems (difficulty in facility navigation, long waiting time, and poor healthcare worker attitudes)
			Structural (remoteness of screening services, travel costs, screening costs)
Majidi, A., *et al.*, Iran, 2017	Iranian women	Pap smear	Individual (misunderstanding about screening, embarrassed to be screened)

Author, Country, Year	Population	Screening methods	Barriers
Chidyaonga-Maseko, F., *et al.*, LMIC, 2015	Women	VIA	Individual (lack of awareness and knowledge about risk factors and prevention of cervical cancer, low recognition of risk among younger and unmarried women, high diffidence (shyness of the procedure))
			Social (stigma attached to discussing reproductive health issues)
			Cultural (cultural and religious belief, taboo about talking about reproductive health issues, women seen as subordinate and requiring family's permission)
			Health systems (lack of appropriate personnel, poor client-provider relationship)
			Structural (low socio-economic status, geographic inaccessibility, Screening cots)
McFarland, D.M., *et al.*, Sub-Saharan Africa, 2016 Cooper's guided integrative review methodology	Women and healthcare workers	Pap smear	Individual (lack of knowledge about cervical cancer, screening and its benefits and risk, fear of the screening process and positive test results, misconceptions about the screening process, embarrassed to be screened, competing priorities for time)
			Cultural/traditional (forbidden by cultural and religious beliefs, spousal refusal, and lack of support)
			Social (stigma, low priority of women's health)
			Health system (lack of health education, healthcare workers not recommending screening, poor attitude of healthcare workers, lengthy waiting times for screening appointment, exclusionary policies by age, no information about screening sites)
			Structural (distance – screening sites are far, high cost, levels of education or illiteracy)

VIA – Visual inspection with acetic acid

4.3 Underlying reasons for barriers to screening uptake

4.3.1 Limited knowledge, and myths and misconceptions about cervical cancer

The studies in this review indicate that limited information and education about cervical cancer and screening as a preventive strategy both within communities and the health system is a key underlying reason for poor uptake. Where information does exist, there are many misconceptions about screening, which suggests poor or ineffective messaging about cervical cancer and prevention, and this could lead to misconceptions about screening and stigmatisation of screening and cancer – as was found in this review. The review by Lott *et al.*, found that intensive, culturally appropriate health behaviour, model-based, and multi-dimensional educational interventions could be effective in increasing screening uptake (Lott *et al.*, 2020).

4.3.2 Lack of policies and resources in the health system

The review indicates deprioritisation of cervical cancer screening within the health system, with healthcare workers not discussing, recommending, or offering screening during consultations. Possible reasons for this could be lack of clear policies regarding screening and lack of resources for implementation – which includes staff (including skilled staff), materials and physical space within facilities.

4.3.3 Limited access – lack of universal health coverage

Access to screening was another key underlying factor, an indication of lack of universal health coverage in many LMICs. This review found that women must often travel to facilities far from where they live to access screening services. This indicates limited geographic availability of services – especially in rural areas – and this is exacerbated by a requirement for transport costs. Furthermore, women often had to pay out of pocket for screening, since many do not have health insurance. Innovative service delivery models could improve geographic access, and universal health coverage will alleviate financial barriers (Lott *et al.*, 2020).

4.3.4 Gender norms that deprioritise the health needs of women

Gender norms and the health needs of women, which is partly vested in cultural, traditional, and religious systems, were further underlying reasons for barriers to screening uptake. In many studies, women reported lack of partner approval, permission or support, and religious, cultural, traditional, or societal expectations, norms or prohibitions as barriers to uptake.

4.4 Research gaps

This review suggests a need for further research in the following areas:
- Development of messaging for accurate understanding and dispelling of myths about cervical cancer and cervical cancer screening as a preventive measure.
- Understanding the views and practices of healthcare workers regarding cervical screening to facilitate promotion and implementation of screening within facilities.
- Implementation research to inform optimal service delivery interventions and optimal allocation of limited resources to support screening within facilities.
- Research that seeks to understand how multiple factors including cultural and gender norms, income, and geography interact to limit screening uptake differentially across populations and regions.

Discussion

5.1   Findings

This review provides a broad overview of the evidence base available that assesses the barriers to uptake of cervical cancer screening services in LMICs. It includes a wide range of studies and articles (including gray literature published up until December 2020), underscores findings previously reported in the literature. The review identifies five key categories of barriers to uptake of cervical cancer screening in LMICs. These categories are individual/personal level barriers, cultural/traditional/religious barriers, social barriers, health system barriers, and structural barriers. Although these barriers are presented separately, they overlap significantly. The barriers were also generally the same across countries and continents. Different study designs also found and corroborated similar findings. The review also identified four key underlying reasons for these barriers and proposes research gaps that could be targeted to support increased access to and uptake of screening.

Across the different types of studies and in different countries lack of knowledge and information about cervical cancer, cervical cancer screening and its value, and low risk perception were among key individual/personal level barriers. Low risk perception was further exacerbated by a misunderstanding of the value of screening, with women questioning the need for screening when they had no symptoms. This suggests that even where screening could be provided at no cost, failure to address the knowledge and information gaps – including addressing myths and misconceptions – could continue to limit uptake. Another common barrier was fear, which ranged from fear of the screening procedure to fear of receiving a cancer diagnosis from screening. Fear of the screening process could indicate limited knowledge about the screening processes, limited rollout of the more modern screening processes such as self-sampling, and possibly poor technique of healthcare professionals undertaking screening procedures. Some studies reported poor knowledge among healthcare workers, limited trained staff, as well as concerns about supervision by healthcare workers (Batool *et al.*, 2017; Chary & Rohloff, 2014; Chidyaonga-Maseko *et al.*, 2015; Dykens *et al.*, 2020; Guillaume *et al.*, 2020; Munthali *et al.*, 2015; Mwaka *et al.*, 2013; Paz-Soldán *et al.*, 2012; Rahman *et al.*, 2019; Shiferaw *et al.*, 2018; Stormo *et al.*, 2012). Fear of receiving bad news of a cancer diagnosis from screening could indicate negative experiences and stigma associated with cervical cancer in some communities. Fear of a cancer diagnosis is exacerbated by experiences of those with advanced cervical cancer detected at a late stage. In Uganda, cervical cancer patients were abandoned by their families, while in Zambia, cervical cancer was associated with shame (Mwaka *et al.*, 2013; Wigginton *et al.*, 2018). These findings highlight the need for dissemination of correct and easily understood information about the importance of cervical cancer screening as a preventive measure, and the need for adequate and ongoing training of healthcare personnel providing screening services.

Cultural/traditional/religious and social barriers were identified across many studies in all continents but mainly in Africa and Asia. Lack of spousal and or familial support were key barriers, and these may be driven by misconceptions about cervical cancer and traditional, cultural, or religious beliefs about 'exposure' during a pelvic examination. Some of the studies suggest that some concessions could be mediated by only allowing female or older healthcare workers to provide screening services, or screening by self-sampling (Baskaran *et al.*, 2013; Batool *et al.*, 2017; Kibicho *et al.*, 2014; Lott *et al.*, 2020; Megersa *et al.*, 2020; Munthali *et al.*, 2015; Oketch *et al.*, 2019; Reis *et al.*, 2012; Spagnoletti *et al.*, 2019). Overlapping with cultural/traditional/religious barriers were social factors that include gender relations, societal misconceptions, stigmatisation of cervical cancer screening, and the association of screening and cervical cancer with promiscuity and/or infidelity of women, sex work, and HIV (Kokuru 2017; Learmonth *et al.*, 2015; Lunsford *et al.*, 2017; Momberg *et al.*, 2017, Mupepi *et al.*, 2020; Stormo *et al.*, 2012). In Kenya, Kangmennaang *et al.*, found low levels of screening in women associated with strong gender norms that support male dominance over women, including intimate partner violence (Kangmennaang *et al.*, 2018). These barriers highlight the need for women's empowerment, measures to address intimate partner violence, as well as community-wide education and dissemination of accurate information about cervical cancer. Such advocacy and community education programmes should also target and involve young and older men. The literature also suggests that stigma may be indirect in that some women were not keen to undergo screening for fear of concurrent HIV testing, and fear of receiving bad news of a cancer diagnosis. The impact of gender norms and inequality were common barriers. When men hold decision-making power, women and girls can have limited access to the social, economic and health resources necessary for their well-being. At the household level, men often shape the logistical, educational and psychosocial factors that directly affect to women's accessing cervical cancer services. Women who are emotionally and financially supported by their families and partners are more likely to get screened. Conversely, family and partners can play a key role in stigmatizing, isolating, and prohibiting women from accessing screening.

Well-functioning health systems with services that are accessible to the population are a critical factor in the success of any health programme. This review found gaps in the health systems in LMICs concerning cervical cancer screening. These gaps ranged from lack of high-level system elements such as policies and guidelines, poor referral systems, limited service points, inadequate human resources and equipment, to poor attitudes of healthcare workers. These findings indicate the need for policymakers and implementers to urgently evaluate and remedy weaknesses and gaps in cervical cancer screening programmes in LMICs, including increased and more efficient allocation and use of resources. It was notable that studies found that healthcare workers frequently omitted to promote or offer cervical cancer screening during consultations. While this may be related to lack of technical skill by healthcare workers, lack of equipment and limited consultation time, it still represents missed opportunities for health education and promotion, and screening and prevention. Poor attitudes of healthcare workers, which were a frequently reported barrier, while inexcusable, may be driven by staff overload in healthcare workers working in challenging and constrained conditions (Abdulkadir, 2013; Aduda & Mkhize 2014; Andersen *et al.*, 2020; Atuhaire *et al.*, 2013; Dykens *et al.*, 2020; Guillaume *et al.*, 2020; Kibicho *et al.*, 2014; Munthali *et al.*, 2015; Nugus *et al.*, 2018; Pierz *et al.*, 2020; Shiferaw *et al.*, 2018). All these factors should be evaluated and addressed as part of remedying cervical cancer screening programmes in LMICs.

Limited availability and difficultly in accessing healthcare facilities providing cervical screening services were reported across the different continents. Facilities were reported to be far from where people live and hence travel costs were a barrier to screening access and uptake. These travel costs are a significant barrier given that women often reported wanting someone to accompany them when attending screening (Gottschlich *et al.*, 2020) – possibly because of fear – thus adding to travel costs and other associated costs such as provision for meals and/or accommodation in a context where many have limited financial means. The structural barriers of costs (screening costs and travel costs) and distance were reported almost universally in Africa, Asia, and the Americas.

Low levels of education were also a barrier to screening uptake (Bishwajit & Kpoghomouya, 2017; Islam *et al.*, 2017; McFarland *et al.*, 2016; Ng'ang'a *et al.*, 2018; Rad *et al.*, 2010). This may partly explain low levels of knowledge and awareness about cervical cancer screening and about cervical cancer in general, although educated women also reported lack of information about cervical cancer screening (Abdullah *et al.*, 2011). Given the known benefits of education and empowerment of women, policies to educate and empower women, implementation of gender equality-promoting policies, together with advocacy and community education and accessible services, will benefit screening uptake.

5.2   Strengths and limitations

This review includes a wide range of published studies that are both qualitative and quantitative, and gray literature published over the period 2010 to 2020, enabling an extensive investigation of barriers to cervical cancer screening. However, it was not possible to undertake a meta-analysis since the studies included were descriptive and qualitative in nature.

Although we undertook a comprehensive search and review of published literature, some relevant studies may have been excluded. We also included studies where barriers to cervical screening uptake were not a primary objective and were thus assessed in small subsamples. This may limit the generalisability of some findings.

Recommendations and policy implications

6.1 Implementation of clear cervical cancer policies and guidelines with prerequisite structures and resources

Countries should review their cervical cancer policies and fully implement cervical cancer screening guidelines, which should prioritise structured rather than opportunistic screening together with efficient referral systems. This may require more resource allocation or redirection to support human resources including training and supervision, procurement and maintenance of equipment, and supplies. These policies should support geographic access and exclude user fees, and other associated or hidden costs, including travel costs. Community-based screening sites run by skilled women healthcare workers could be important to increase reach and acceptability.

6.2 Education, information dissemination, and advocacy about cervical cancer and screening

There is a need for increased advocacy and expansion of information dissemination to all communities. As has been learned from other programmes in many LMICs (e.g. the HIV programmes), this process should be based and grounded in accessible language and presented to engage both women and men of all ages. It should also empower women and communities to take ownership of and sustain the advocacy. Targeting men and cultural/religious leaders and organisations is critical to discuss and challenge barriers to screening including religious, cultural and gender norms. Such advocacy should be supported by necessary resources at national, regional, local, and community levels. Advocacy and education should address myths about cervical cancer, prevention, screening, risk factors, causes, and the prognosis of a cervical cancer diagnosis.

Advocacy and education should also target healthcare workers and equip them to integrate cervical cancer screening into the health system, and to support cervical cancer policies in a coordinated manner.

6.3 Strengthening and expansion of policies that promote gender equality, health equity, and the sexual and reproductive health and rights of women

Policies that support the sexual and reproductive health and rights of women should be strengthened and expanded and account for inequities in access to care for diverse groups of women. This can include gender responsive and culturally appropriate interventions, as well as better addressing social and structural barriers to care, including discrimation, physical access requirements and financial needs. Central to this is a need to increase the educational level of women since many women of lower educational and socio-economic status reported lack of knowledge about cervical cancer and the benefits of screening. There is a need for programmes, communications, and advocacy that educate and empower women to enable them to access health services, and in particular sexual and reproductive health services.

6.4 Intervention and implementation research to assess, monitor, and refine interventions

Extensive research has identified, defined, and corroborated barriers to screening uptake in LMICs. However, there is a clear need for strengthened data collection that accounts for the differential experiences of women across diverse categories (e.g., age, socioeconomic status, geography, disability, etc.) in LMICs. It is this information and the women themselves, that need to inform and guide how barriers are addressed and access is improved moving forward. There is now a need for interventions and implementation research to assess, monitor and refine interventions to address these barriers.

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Search strategies

Search #	Search Texts and Syntaxes	Date	Output
PubMed			
#1	"Uterine Cervical Neoplasms" OR "cervical neoplasm" OR "cervical cancer" OR "cervix neoplasm" OR "cervix cancer" AND	22 February 2021	
#2	"Vaginal Smears" OR Papanicolaou OR "pap smear" OR "pap stain" OR "pap test" OR "vaginal smear" OR "Mass Screening" OR "Early Diagnosis" OR "cervical screening" OR "cervical cancer examination" OR "early detection" OR "early diagnosis" OR early detect* AND		
#3	barrie* OR obstacle* OR challeng* AND		
#4	Afghanistan* OR Albania OR Algeria OR Angola OR Argentina OR Armenia OR Azerbaijan OR Bangladesh OR Belarus OR Beliz OR Benin OR Bhutan OR Bolivia OR Bosnia OR Herzegovin OR Botswana OR Brazil OR Bulgaria OR "Burkina Faso" OR Burundi OR "Cabo Verde" OR Cambodia OR Cameroon OR "Central Africa" OR Chad OR China OR Chinese OR Colombia OR "Comoro Islands' OR Congo OR "Costa Rica" OR "Cote d'Ivoir" OR "Ivory Coast" OR Cuba OR Djibouti OR "Dominican Republic" OR Ecuador OR Egypt OR "El Salvador" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR Gambia OR Ghana OR "Guinea Bissau" OR Kenya* OR Lesotho* OR Liberia* OR Libya* OR Macedonia* OR Madagascar OR Malawi OR Malaysia OR OR Mali OR * OR Mauritius OR Morocco* OR Mozambique OR Namibia OR Niger OR Nigeria OR Pakistan OR Rwanda OR "Sao Tome" OR Senegal OR Seychelles OR "Sierra Leon" OR Somalia OR South Africa OR Sudan OR "Sri Lanka" OR Tanzania OR Togo OR Tunisia OR Uganda OR Zambia OR Zimbabwe OR Africa* OR resource-poor OR low-resource OR limited-resource OR resource-constrain* OR under-resource* OR poor*-resource* OR resource-scarce* OR scarce*-resource* OR low-income OR middle-income OR "low income" OR "middle income" or LMIC*		
#1 AND #2 AND #3 AND #4			385 articles

Search #	Search Texts and Syntaxes	Date	Output
Scopus			
#1	*"Uterine Cervical Neoplasms"* OR *"cervical neoplasm"* OR *"cervical cancer"* OR *"cervix neoplasm"* OR *"cervix cancer"* AND *"Vaginal Smears"* OR *papanicolaou* OR *"pap smear"* OR *"pap stain"* OR *"pap test"* OR *"vaginal smear"* OR *"Mass Screening"* OR *"Early Diagnosis"* OR *"cervical screening"* OR *"cervical cancer examination"* OR *"early detection"* OR *"early diagnosis"* OR *early* AND *detect* AND *barrier* OR *obstacle* OR *challenge* AND *afghanistan* OR *albania* OR *algeria* OR *angola* OR *argentina* OR *armenia* OR *azerbaijan* OR *bangladesh* OR *belarus* OR *beliz* OR *benin* OR *bhutan* OR *bolivia* OR *bosnia* OR *herzegovin* OR *botswana* OR *brazil* OR *bulgaria* OR *"Burkina Faso"* OR *burundi* OR *"Cabo Verde"* OR *cambodia* OR *cameroon* OR *"Central Africa"* OR *chad* OR *china* OR *chinese* OR *colombia* OR *"Comoro Islands"* OR *congo* OR *"Costa Rica"* OR *"Cote d'Ivoir"* OR *"Ivory Coast"* OR *cuba* OR *djibouti* OR *"Dominican Republic"* OR *ecuador* OR *egypt* OR *"El Salvador"* OR *eritrea* OR *ethiopia* OR *fiji* OR *gabon* OR *gambia* OR *ghana* OR *"Guinea Bissau"* OR *kenya* OR *lesotho* OR *liberia* OR *libya* OR *macedonia* OR *madagascar* OR *malawi* OR *malaysia* OR *mali* OR *mauritius* OR *morocco* OR *mozambique* OR *namibia* OR *niger* OR *nigeria* OR *pakistan* OR *rwanda* OR *"Sao Tome"* OR *senegal* OR *seychelles* OR *"Sierra Leon"* OR *somalia* OR *"South Africa"* OR *sudan* OR *"Sri Lanka"* OR *tanzania* OR *togo* OR *tunisia* OR *Uganda* OR *zambia* OR *zimbabwe* OR *africa* OR *resource-poor* OR *low-resource* OR *limited-resource* OR *resource-constrain* OR *under-resource* OR *poor-resource* OR *resource-scarce* OR *scarce-resource* OR *low-income* OR *middle-income* OR *"low income"* OR *"middle income"* OR *lmic*	24 February 2021	1 280 articles

Search #	Search Texts and Syntaxes	Date	Output
Web of Science			
#1	TS="Uterine Cervical Neoplasms" OR TS="cervical neoplasm" OR TS="cervical cancer" OR TS="cervix neoplasm" OR TS="cervix cancer" AND TS="Vaginal Smears" OR TS=papanicolaou OR TS="pap smear" TS=OR "pap stain" OR TS="pap test" OR TS="vaginal smear" OR TS="Mass Screening" OR TS="Early Diagnosis" OR TS="cervical screening" OR TS="cervical cancer examination" OR TS="early detection" OR TS="early diagnosis" OR TS=early OR TS=detect AND TS=barrier OR TS=obstacle OR challenge AND TS=afghanistan OR TS=albania OR TS=algeria OR TS=angola OR TS=argentina OR TS=armenia OR TS=azerbaijan OR TS=bangladesh OR TS=belarus OR TS=beliz OR TS=benin OR TS=bhutan OR TS=bolivia OR TS=bosnia OR TS=herzegovin OR TS=botswana OR TS=brazil OR TS=bulgaria OR TS="Burkina Faso" OR TS=burundi OR TS="Cabo Verde" OR TS=cambodia OR TS=cameroon OR TS="Central Africa" OR TS=chad OR TS=china OR TS=chinese OR TS=colombia OR TS="Comoro Islands" OR TS=congo OR TS="Costa Rica" OR TS="Cote d'Ivoir" OR TS="Ivory Coast" OR TS=cuba OR TS=djibouti OR TS="Dominican Republic" OR TS=ecuador OR TS=egypt OR TS="El Salvador" OR TS=eritrea OR TS=ethiopia OR TS=fiji OR TS=gabon OR TS=gambia OR TS=ghana OR TS="Guinea Bissau" OR TS=kenya OR TS=lesotho OR TS=liberia OR TS=libya OR TS=macedonia OR TS=madagascar OR TS=malawi OR TS=malaysia OR TS=mali OR TS=mauritius OR TS=morocco OR TS=mozambique OR TS=namibia OR TS=niger OR TS=nigeria OR TS=pakistan OR TS=rwanda OR TS="Sao Tome" OR TS=senegal OR TS=seychelles OR TS="Sierra Leon" OR TS=somalia OR TS="South Africa" OR TS=sudan OR TS="Sri Lanka" OR TS=tanzania OR TS=togo OR TS=tunisia OR TS=Uganda OR TS=zambia OR TS=zimbabwe OR TS=africa OR TS=resource-poor OR TS=low-resource OR TS=limited-resource OR TS=resource-constrain OR TS=under-resource OR TS=poor-resource OR TS=resource-scarce OR TS=scarce-resource OR TS=low-income OR TS=middle-income OR TS="low income" OR TS="middle income" OR TS=lmic	26 February 2021	461 articles
	Google scholar		18
	Google and networks		4
Total number of articles retrieved			**2 148 articles**

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