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Financial risk protection and distress financing for cervical cancer treatment in low- and middle-income countries: a systematic review

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Abstract

Background: Cervical cancer is a major health challenge in low- and middle-income countries (LMICs), where households face high out-of-pocket costs and limited financial risk protection (FRP). Insufficient FRP for treatment leads to catastrophic health expenditure (CHE), impoverishing health expenditure (IHE) and distress financing.

Objective: This review aimed to synthesise evidence and highlight gaps related to FRP and distress financing (cost-coping strategies) associated with treatment-related cervical cancer care in LMICs.

Methods: A systematic search of PubMed, Scopus, Cochrane Library and EBSCOhost was conducted on 1 July 2024 for peer-reviewed observational studies published from 1 January 2003. Using the Population, Exposure and Outcome framework, the review focused on women with cervical cancer or caregivers (Population), treatment and follow-up care (Exposure) and outcomes on CHE, IHE and cost-coping strategies (Outcome). Eligible studies were quantitative or qualitative with independently extractable outcomes.

Results: Twenty-nine studies (10 quantitative and 19 qualitative) met the inclusion criteria. Evidence on FRP for cervical cancer in LMICs remains scarce. Only four studies reported on CHE, with incidence ranging from 62% to 86%, all using unadjusted thresholds. No studies assessed IHE. Common coping strategies included selling assets and borrowing, while forgoing care for financial reasons was rarely examined. Predictors and long-term impacts of distress financing remain underexplored.

Conclusion: This study underscores the need for more research into the financial burden associated with cervical cancer treatment in LMICs and calls for stronger financial protection measures to mitigate these hardships.

Keywords: *cervical cancer, catastrophic health expenditure, distress financing, out-of-pocket expenditure, LMICs*

Review

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Introduction

Cervical cancer is the fourth leading cause of cancer incidence and mortality worldwide, presenting a major public health challenge, particularly in low- and middle-income countries (LMICs), where approximately 90% of global new cases and deaths occur [1]. According to 2022 statistics, incidence is 19.3 per 100,000 in LMICs compared to 12.1 per 100,000 in high-income countries (HICs), while mortality is 12.4 per 100,000 versus 4.8 per 100,000, respectively [1]. While new cases and deaths have substantially declined over the past four decades in HICs due to extensive screening and treatment, rates in many LMICs continue to rise [2]. Despite progress in Human Papillomavirus (HPV) vaccination, screening methods and treatments in HICs, LMICs still have low screening rates [3], uneven HPV vaccination coverage [4] and cancer treatment disparities, which have exacerbated the late-stage diagnoses [5].

The impact of cancer, including cervical cancer, extends beyond individual health, affecting families, communities and institutions and leading to significant economic and social disruptions [6]. In LMICs, where health service out-of-pocket (OOP) expenses are high, cancer patients often spend an average of 42% of their annual income on related healthcare costs such as transport/travel, medications, caregiver costs, medical consultations and in-hospital care [7]. Recent findings highlight the significant financial hardships faced by cancer patients in LMICs [8]. This burden is significantly lower in HICs, where only 23% of cancer patients experience similar financial strain, compared to 68% in LMICs [9]. Given the chronic nature of cancer, prolonged treatment and associated expenses can further deplete household resources, disproportionately affecting poorer families who may already be struggling with limited financial resilience. The burden of OOP expenses highlights the gaps in these regions' financial risk protection mechanisms and universal health coverage (UHC). Many people in LMICs lack access to affordable health services, including health insurance, and the few with health insurance still face substantial co-payments and deductibles, leaving them underprotected [10]. Achieving UHC, a key target of the Sustainable Development Goal (SDG 3.8), to provide quality healthcare without financial hardship, remains a formidable challenge in many LMICs.

Challenges persist despite some progress towards UHC in LMICs [11, 12]. Progress is assessed by coverage of essential health services and financial risk protection, which includes catastrophic health expenditure (CHE) and impoverishing health expenditure (IHE) [13, 14]. According to the SDGs, CHE occurs when OOP expenses within a defined period exceed a given threshold of total household expenditure or income, typically 10% and 25%, forcing families to reduce spending on other essentials [15, 16]. IHE, on the other hand, measures the extent to which direct OOP costs drive households into poverty or make existing poverty worse [15]. In LMICs, these OOP costs often lead to distressed financing where households adopt different cost-coping strategies (distress financing mechanisms) such as borrowing money, selling assets, utilising assets, seeking contributions from family/friends or forgoing care for financial reasons (FCFR), which perpetuate poverty cycles and undermine the long-term financial stability of households [17]. The incidence of distress financing is typically measured as the proportion of households engaging in one or more of these actions to cover healthcare expenses [18, 19], while FCFR is measured by the proportion of households that forgo needed care because they cannot afford OOP costs [20].

Recent systematic reviews have highlighted significant gaps in the understanding of financial burdens, specifically CHE, IHE and distress financing related to cancer care in LMICs. Doshmangir *et al* [9] provide global estimates of CHE in cancer-affected households; however, the study is dated and does not specifically address cervical cancer. Similarly, Iragorri *et al* [7] highlight the high prevalence of OOP costs among cancer patients in LMICs but lack cervical cancer-specific insights. Broader reviews that examine financial burdens, focused on non-communicable diseases (NCDs) in general and often neglect key measures of financial hardship [21], with limited evidence specific to LMICs [22]. More recent reviews attempting to bridge these gaps remain limited in scope. For example, Fuady *et al* [23] introduced a standardised framework for evaluating the economic burden of cervical cancer in LMICs but did not account for CHE, IHE or distress financing. Dau *et al* [24] explored the socioeconomic impact of cervical cancer but relied on health-related quality of life (HRQoL) measures rather than direct financial indicators. Lastly, Udayakumar *et al* [25] provided qualitative insights into the financial toxicity of cancer (defined as the emotional and material distress caused by financial burden) but did not provide quantitative estimates specific to cervical cancer-related CHE, IHE or distress financing.

Collectively, these reviews underscore the critical need for updated, comprehensive research that directly addresses all dimensions of financial risk associated with cervical cancer in LMICs to inform policy and intervention strategies better. This study aimed to systematically review and synthesise evidence on the levels of financial risk protection and distress financing strategies associated with cervical cancer treatment among households in LMICs. By documenting available evidence and examining the empirical and methodological limitations of existing

evidence, this review supports efforts that align with the World Health Organization's (WHO) global cervical cancer strategy. This strategy aims to meet the 90–70–90 target by 2030: vaccinating 90% of eligible girls by age 15, screening 70% of women with a high-performance test (HPV based) by ages 35 and 45 and optimal treatment of 90% of women identified with cervical pre-cancer or invasive cancer [26, 27].

Methods

This systematic review, registered with the International Prospective Register of Systematic Reviews (PROSPERO, Registration ID: CRD42024577031), adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [28]. This review was guided by an adopted conceptual framework [29] shown in Figure 1. The framework illustrates how households requiring healthcare may experience CHE, IHE and distress financing depending on whether care is sought, how healthcare is financed and the economic consequences of OOP payments. Households that finance healthcare through direct OOP payments may experience CHE when healthcare spending consumes a substantial share of available household resources, forcing reductions in the consumption of other essential goods and services. Similarly, households experience IHE when OOP healthcare payments push them below, or further below, the poverty line. The framework further recognises that some households may avoid CHE or IHE in the short term through distress financing strategies such as borrowing money, selling assets or reducing future consumption; however, these coping mechanisms may negatively affect long-term household welfare and economic stability [29, 30]. In addition, the framework highlights that lack of financial risk protection (FRP) extends beyond households making OOP payments. Some households may forgo necessary healthcare entirely because of financial barriers, resulting in unmet healthcare needs despite zero OOP expenditure. Such households are also considered financially unprotected because inability to access needed healthcare may worsen health outcomes and perpetuate future economic hardship [30].

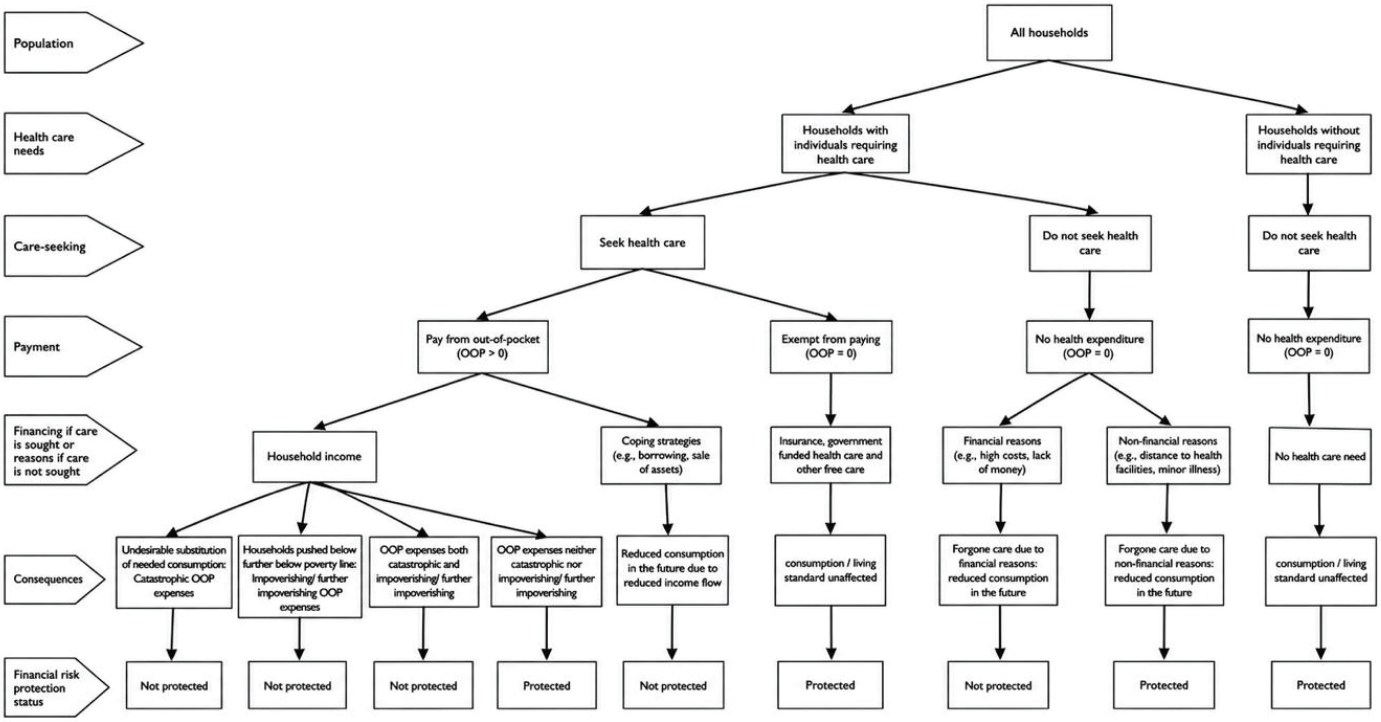

Figure 1. Conceptual framework for financial risk protection.

Eligibility criteria

Inclusion criteria

Studies were included if they were observational research (quantitative, qualitative or mixed methods) conducted in LMICs (as per the World Bank's 2024 classification) [31] and reported independently extractable outcomes on CHE, IHE or distress financing mechanisms/cost-coping strategies related to cervical cancer treatment and follow-up care. Eligible studies could be nationally representative, region-specific or facility-based. Research on cervical cancer patients and/or caregivers was included, as well as multicancer studies if cervical cancer-specific outcomes could be isolated. Only studies published in English between 1 January 2003 and 1 July 2024 were considered. The start date (2003) was chosen because that was the earliest time when standardised methods for assessing CHE and IHE were published [32].

Exclusion criteria

Publications were excluded if they were editorials, opinion pieces, commentaries, letters, systematic reviews, abstracts, position papers or clinical trials; if they focused on non-LMICs or if they adopted provider- or payer-perspective costing only. Studies that reported treatment costs or economic burden without assessing whether expenditures were catastrophic or impoverishing, or without examining household-level distress financing or cost-coping strategies, were excluded, as such studies do not permit direct inference on financial risk protection. Publications focusing solely on clinical outcomes or HRQoL were also excluded.

Data sources

This review utilised four electronic databases: PubMed, Scopus, Cochrane Library and EBSCOhost, which include Africa-Wide Information, EconLit, CINAHL, APA PsycInfo and Academic Search Premier. The selection of these four electronic databases was based on their relevance, breadth of coverage and ability to provide high-quality literature on the subject matter. The search was further enhanced by manually searching the reference lists of included publications.

Search strategy

The search was structured around the research question, following the Population, Exposure and Outcome framework [33]. The research question was: *What are the levels of financial risk protection and the cost-coping strategies associated with treatment-related cervical cancer spending in LMICs?* The Population (P) consisted of women diagnosed with cervical cancer and/or their caregivers, the Exposure (E) was cervical cancer treatment and associated follow-up care and the Outcomes (O) were CHE, IHE and cost-coping strategies.

With guidance from an expert subject librarian, search terms were developed and the search was conducted on 1 July 2024. The search strategy incorporated terms related to key concepts such as cervical cancer, CHE, IHE, cost-coping strategies, cost of illness and LMICs. Medical Subject Headings (MeSHs), keywords and free-text terms were combined using "AND" and "OR" Boolean operators to refine the search. See Supplementary Table 1 for the initial search strategy on PubMed. This was adapted for the other databases.

Screening and data extraction

Studies retrieved from databases were exported to Rayyan systematic review software for management [34]. Initially, automatic de-duplication was applied to the library of publications. Subsequently, two reviewers (D.O. and A.T.L) independently screened the titles and abstracts of the studies for eligibility. Articles deemed relevant by either reviewer were advanced to full-text review. This stage was also conducted independently by D.O. and A.T.L., with any discrepancies resolved through consensus or by a third reviewer (J.A., B.G. or J.M.) if needed. The

same reviewers independently extracted data from the included articles using an electronic form (Microsoft Excel 2021), capturing study identifiers, methodological details, key findings on CHE, IHE and cost-coping strategies, along with conclusions. Data on cost-coping strategies were extracted using a four-tiered socioecological framework, capturing mechanisms at the individual, relational, community and health system levels [8, 35]. Any differences in data extraction were discussed and resolved by consensus.

Quality assessment

D.O. and A.T.L independently evaluated the quality of included studies using the Joanna Briggs Institute Critical Appraisal Checklists for qualitative and quantitative research. Qualitative studies were appraised using the checklist specified for qualitative research [36], and quantitative studies followed the checklist for analytical cross-sectional studies [36]. Quality was assessed on a three-point scale: '1 = yes', '0 = no' and '0.5 = unclear', with nonapplicable items marked as not applicable. The risk of bias was calculated by averaging the scores, converting them to a percentage and categorising them as low (≥80%), moderate (60%–80%) or high (<60%). Any scoring discrepancies between D.O. and A.T.L. were resolved through consensus, with full details and risk of bias scores provided in Supplementary Tables 2 and 3.

Data synthesis and analysis

A meta-analysis to determine pooled prevalence rates for CHE and IHE was not feasible as only four studies reported CHE estimates, and none provided IHE estimates. Instead, a narrative synthesis was conducted on the prevalence of CHE and IHE based on quantitative studies, and empirical and methodological gaps were also identified. A narrative synthesis approach was also used to describe distress financing/cost-coping strategies, drawing on both quantitative and qualitative research. This synthesis utilised a four-tiered socioecological framework to examine cervical cancer patients' layered approaches to cost-coping [8, 35]. The framework categorised coping strategies across four interconnected levels: individual, relationship, community and health system. Individual-level strategies referred to patient-directed actions taken in response to financial hardship, including using personal savings, selling or mortgaging assets, borrowing from financial institutions or family/friends, seeking cheaper alternatives from traditional/spiritual healers, skipping appointments and forgoing treatment. Relationship-level strategies captured reliance on support from partners, family members or close social networks. Community-level strategies referred to broader forms of social support, including community fundraising, assistance from religious organisations and informal community support mechanisms. Health system-level strategies included responses shaped by healthcare structures and service delivery arrangements, such as financial assistance programmes, and other system-level mechanisms influencing access to care [8]. Some coping strategies overlapped across framework levels; therefore, strategies were categorised according to the level that best represented the primary coping response.

The review also discussed limitations in the measurement and reporting of these strategies.

Results

Study selection

The database search identified 3,754 records. After removing 1,170 duplicates, 2,584 records remained for title and abstract screening, where 2,484 were excluded. The full texts of 100 records were assessed, with one excluded due to the unavailability of a full text. Of the 99 records available for full-text screening, 71 were excluded, leaving 28 records (9 quantitative and 19 qualitative). Reference screening yielded ten additional records, but nine were excluded, resulting in the inclusion of one additional record. In total, 29 studies (10 quantitative and 19 qualitative) were included in the review. This is summarised in the PRISMA flow diagram [28] in Figure 2. Articles were excluded for the following reasons: absence of data on CHE, IHE or cost-coping strategies (n = 55); outcomes not specific to cervical cancer (n = 18); costing perspectives that were not relevant (provider/payer perspective) (n = 4); language other than English (n = 2) and publication outside the specified date range – 1,999 (n = 1).

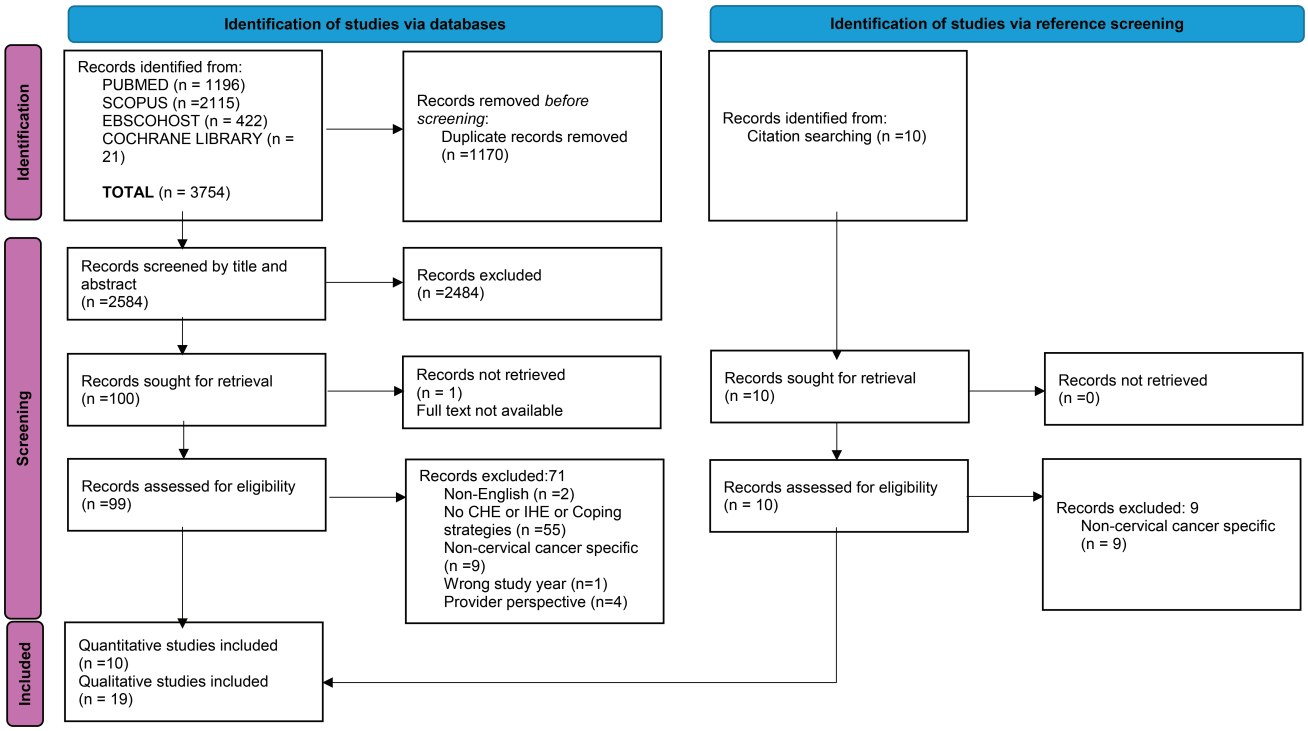

Figure 2. PRISMA flow diagram.

Study characteristics

Ten quantitative and nineteen qualitative studies met the inclusion criteria (Table 1 and Supplementary Table 4). The ten quantitative studies were predominantly hospital-based. Of the ten studies, seven were cross-sectional studies, two were prospective observational studies and one was a mixed-method study. Studies were distributed across ten countries: Ethiopia had three studies [37–39], and China [40], India [41], Zimbabwe [42], Kenya [43], Uganda [44], Argentina [45] and Malawi [46] each had one study. The sample sizes varied across studies, ranging from 89 participants in Malawi [46] to 3,471 participants in China [40].

The distribution of the qualitative studies was as follows: Ghana (five studies) [47–51], Ethiopia (four) [52–55], Tanzania (three) [56–58], Uganda (two) [59, 60], Kenya (two) [61, 62] and one study each from India [63], Nepal [64] and Mexico [65]. While most qualitative studies interviewed women with cervical cancer, three studies also interviewed male partners [48, 57, 58].

Incidence of CHE

Among the ten quantitative studies examined, only four specifically reported on the incidence of CHE; two from Ethiopia, and one each from India and Malawi [38, 39, 41, 46] (Table 2). Two studies applied a 40% capacity-to-pay threshold, with one estimating a CHE incidence of 62% (India) [41] and the other, 69% (Ethiopia) [39]. Kasahun *et al* [38] (Ethiopia) used a 10% annual household income threshold and reported a CHE incidence of 71%. The highest incidence, 86%, was observed in a study from India that also used a 20% nonfood household expenditure threshold [41]. The study from Malawi reported a CHE of 75% at the 20% annual household income threshold [46]. Of note, the studies from Malawi [46] and India [41] were conducted exclusively in public hospitals, whereas the Ethiopian studies [38, 39] included participants from both public and private healthcare facilities, with the majority being drawn from the public sector. In one of the Ethiopian studies [38], disaggregation of CHE by facility type revealed high incidence rates: 76% among cancer patients attending private hospitals and 74% among

those in public hospitals. However, these estimates were not further stratified by cancer type. The other Ethiopian study did not provide CHE disaggregation by facility type [39].

Table 1. Characteristics of included quantitative studies.

Authors	Year of publication	Type of study	Country	Sample size	Study population
Matebie *et al* [39]	2024	Cross-sectional	Ethiopia	305 (64 cervical cancer)	Cancer inpatients (Breast, cervical, colorectal and blood) in five cancer care hospitals
Kasahun *et al* [38]	2020	Cross-sectional	Ethiopia	404 (58 cervical cancer)	All cancer patients attending treatment services in four healthcare facilities
Endale *et al* [37]	2022	Cross-sectional	Ethiopia	423	Cervical cancer patients attending tertiary hospitals
Bates *et al* [46]	2021	Prospective observational	Malawi	89 (60 cervical cancer)	Women diagnosed with advanced cancer at Queen Elizabeth Central Hospital
Singh *et al* [41]	2020	Cross-sectional	India	248	Women on treatment or post-treatment for cervical cancer
Chen *et al* [40]	2023	Cross-sectional	China	3,471	Females with cervical precancerous or cervical cancer in 26 hospitals
Tapera *et al* [42]	2019	Mixed-method study	Zimbabwe	212 (134 cervical cancer)	Cervical cancer patients and healthcare providers
Owenga and Nyambedha [43]	2018	Mixed-method study	Kenya	334	Women on cervical cancer treatment
Dau *et al* [44]	2024	Cross-sectional	Uganda	338	Women on cervical cancer treatment
Arrossi *et al* [45]	2007	Cross-sectional	Argentina	120	Women with cervical cancer receiving radiotherapy

Table 2. CHE and IHE in cervical cancer care in LMICs.

Authors	Medical costs	Non-medical costs	Operational definition of CHE	% CHE	OOPC/CHE stratified by stage of disease	IHE (Definition, %IHE, determinants)
Matebie *et al* [39]	Consultation, lab tests, drugs	Transport, food	OOPC exceeding 40% of household capacity to pay (nonfood expenditure)	68.8%	No	NR
Kasahun *et al* [38]	Consultation, investigation, medicine and bed charges	Transport, food and accommodation	OOPC exceeding 10% of annual household income	70.7%	No	NR
Endale *et al* [37]	NR	NR	NR	NR	No	NR
Bates *et al* [46]	Consultation, medications	Transport, food, nutritional changes	OOPC exceeding 20% of annual household income before illness	75%	No	NR
Singh *et al* [41]	Diagnostic tests, drugs and user fees	Patient/caregiver transport, accommodation and food	OOPC exceeding 40% of household capacity to pay (nonfood expenditure)	62% at 40%; 86% at 20%, 71% at 30%, 52% at 50% thresholds	Yes. OOP stratified by stage of illness	NR

Continued

Table 2. CHE and IHE in cervical cancer care in LMICs. *Continued*

Chen *et al* [40]	Drugs, investigations and admission	Transport, accommodation, nutrition, caregiver wages	OOPC exceeding 40% of annual disposable income per capita	NR	Yes. OOP and CHE are stratified by stage of illness.	NR
Tapera *et al* [42]	NR	NR	NR	NR	No	NR
Owenga and Nyambedha [43]	NR	NR	NR	NR	No	NR
Dau *et al* [44]	NR	NR	NR	NR	No	NR
Arrossi *et al* [45]	NR	NR	NR	NR	No	NR

NR; Not reported in the original study and therefore not extractable
CHE; Catastrophic health expenditure
OOPC; Out-of-pocket costs

Table 3. Determinants of CHE.

Author/Year	Determinants of CHE (Adjusted odds ratio; *p* value)
Matebie *et al* [39]	Living outside the capital city (2.40; $p = 0.03$) 5–8 and more than 8 chemotherapy cycles relative to 1–4 cycles (4.00; $p < 0.01$); (5.6; $p = 0.02$) More than 42 days of hospital stay relative to 1–21 days (3.5; $p = 0.02$) No insurance relative to having community-based health insurance (5.6; $p < 0.01$) Living more 600 km from hospital relative to 300 or less km (12.00; $p = 0.02$) Being in the poorest and poor quintiles relative to richest (9.8; $p < 0.01$) (4.1; $p = 0.03$)
Kasahun *et al* [38]	Greater than five chemotherapy cycles relative to three or less (3.64; $p < 0.05$)
Endale *et al* [37]	NR
Bates *et al* [46]	NR
Singh *et al* [41]	Being in the poorest, poor and middle wealth quintile relative to the richest quintile (23.89; $p < 0.001$); (25.39; $p < 0.001$);16.16; $p < 0.001$)
Chen *et al* [40]	NR
Tapera *et al* [42]	NR
Owenga and Nyambedha [43]	NR
Dau *et al* [44]	NR
Arrossi *et al* [45]	NR

NR; Not reported in the original study and therefore not extractable
CHE; Catastrophic Health Expenditure

While CHE incidence was not universally reported, several studies provided estimates of OOP costs by disease stage. In India, the mean OOP costs incurred during treatment were highest for Stage I (714 USD) and declined in Stage IV (505 USD) [41], whereas in Ethiopia, Stages II and III had the highest expenses, with costs decreasing in Stage IV [66]. In China, direct nonmedical costs increased as the disease progressed from early to advanced stages [40]. Methodologically, only the study conducted in India [41] stratified CHE by disease stage, with CHE incidence rising from 55% in Stage I to 67% in Stage IV (Stage II: 59% and Stage III: 63%) [41].

It is essential to note that all the reviewed studies assessing CHE were based on health service users and did not employ cervical cancer-specific thresholds in calculating CHE, which may better reflect the burden specific to the service [11].

The determinants of CHE, though not a focus of this review, are summarised in Table 3 and utilised in the Discussion section.

Impoverishing health expenditure

None of the included quantitative studies directly investigated IHE resulting from cervical cancer costs.

Cost-coping strategies

Of the 29 included studies, 5 did not report any coping mechanisms. In 27% (*n* = 8) of all included studies, patients borrowed from financial institutions for treatment costs, while in 40% (*n* = 12) of the studies, patients/caregivers borrowed from friends and family. Additionally, 53% (*n* = 16) of all studies reported that households had to sell assets. Strategies are summarised below and in Supplementary Tables 4 and 5 using the socioecological framework.

Individual-level cost-coping strategies

Individual-level cost-coping strategies were extracted from 24 studies and included utilising savings, selling or mortgaging assets, borrowing from financial institutions or friends and relatives, seeking alternative treatments (such as traditional or spiritual healers), forfeiting or delaying treatment, skipping appointments, reducing household expenses, halting development projects and begging for money [37–39, 41, 42, 44–46, 48, 49, 52–61, 63–65, 67]. The most common strategy at the individual level was selling assets (Supplementary Table 6).

Relationship/community/health system-level cost-coping strategies

The most commonly reported cost-coping mechanism at the relationship level involved financial support from friends and relatives [38, 39, 44, 47, 56, 58, 68]. At the community level, financial assistance was obtained from various sources, including religious organisations [38, 43, 49, 60], employers [48], community groups [57], charity organisations [43] and nongovernmental organisations [37, 38]. Regarding the health system level, the only exception in reporting was Owenga and Nyambedha [43], which documented that low socioeconomic status (SES) patients received hospital fee waivers.

The reviewed quantitative studies on cost-coping strategies primarily reported proportions but did not capture details such as the amounts borrowed or the value of assets sold. Notably, none of the studies examined the predictors of distress financing. Additionally, most studies focused on financial strategies, including depleting savings, borrowing and seeking financial help from friends and relatives, while less attention was given to coping strategies with direct consequences on the health of cancer patients, such as delaying treatment [42, 43], forfeiting treatment [40, 42] or skipping follow-up visits [59].

In terms of study designs, all studies (quantitative and qualitative) examined cost-coping cross-sectionally.

Quality assessment

The results of the quality assessment of the included studies are presented in (Supplementary Tables 2 and 3). All the included quantitative studies had a low risk of bias (Score ≥80%). All qualitative studies demonstrated high overall quality scores; however, weaknesses were noted in the lack of cultural or theoretical contextualisation and insufficiently addressing reflexivity.

Discussion

This systematic review aimed to synthesise existing evidence and highlight gaps related to financial risk protection and cost-coping strategies associated with treatment-related cervical cancer spending in LMICs. Although the evidence base was limited, the available studies suggest that cervical cancer care may impose substantial financial hardship on affected households in some LMIC settings. Only four studies reported CHE, no studies assessed IHE and important gaps remain regarding distress financing and the associated long-term economic consequences.

Although based on only four studies, the reported CHE levels ranging from 62% to 86% suggest that cervical cancer treatment may expose households to substantial financial hardship in some LMIC settings. However, these estimates should be interpreted cautiously given the substantial heterogeneity across studies in healthcare systems, study populations and CHE thresholds used. Consequently, direct comparison of CHE estimates across studies may be limited. Nevertheless, these findings are broadly consistent with wider evidence on cancer-related CHE in LMICs where pooled estimates ranged between 57% [8] and 68% [9]. Importantly, the included studies were cross-sectional and hospital-based, potentially excluding women unable to access care due to financial constraints. As a result, observed CHE levels may underestimate the true economic burden of cervical cancer. The findings may also reflect inequities in service utilisation, where financial barriers influence who accesses care, when care is sought and the intensity of treatment received [69–71]. Moreover, selection and survivorship biases may have influenced the findings, as women unable to seek care, discontinue treatment due to financial hardship or die before reaching care may be systematically excluded from facility-based datasets [38, 72]. This exclusion may distort the true scope of the burden and mask the extent of unmet need for cervical cancer services. In effect, this creates a pattern of inverse equity [73], where financial barriers filter utilisation, exacerbating disparities in service access and potentially leading to delayed care-seeking, disease progression and worse outcomes among poorer populations [69, 74–76].

This dynamic may also help explain the stark contrast with findings from HICs, where studies report significantly lower levels of pooled CHE in cancer care, such as 23.4% [9] and 16% [7]. In HICs, more comprehensive insurance systems and stronger public financing mechanisms may reduce reliance on OOP spending and improve access to care without severe financial hardship [77, 78]. By comparison, substantial financial vulnerability may persist despite expanded insurance coverage in many LMIC settings. Importantly, this vulnerability may increasingly be driven not only by residual medical costs but also by nonmedical expenditures such as transport, accommodation, food and income loss associated with accessing treatment [79].

The limited evidence also suggests that lack of health insurance may be associated with the risk of CHE among cervical cancer patients [39, 40], consistent with broader cancer literature showing that insured patients are less likely to incur catastrophic expenditure [9, 80]. Beyond insurance status, the four studies also identified low SES, rural residency, older age and increased chemotherapy cycles as possible predictors of CHE [38–41]. These findings underscore the need for comprehensive and inclusive health benefit packages in LMICs that specifically target high-risk women such as the economically disadvantaged, rural residents, patients with advanced stage disease and older women to strengthen financial protection and advance equity in the pursuit of UHC.

Despite the growing burden of cervical cancer in LMICs, this review identified only four studies examining CHE and no studies assessing IHE specific to cervical cancer. This finding reflects a broader evidence gap in FRP research, which has historically focused more heavily on infectious diseases [18, 29], maternal and child health [79] and general health service utilisation [81–83] with cancers being underrepresented [18]. Although limited, the available evidence suggests that cervical cancer may impose substantial financial strain on households, particularly as the disease affects women during economically productive years [6]. Experiences from countries such as Mexico demonstrate how evidence on cancer-related financial hardship can inform reforms aimed at improving financial protection and reducing OOP spending among vulnerable populations [84–86].

As noted earlier, the present study found no study on IHE with respect to cervical cancer treatment. This aligns with broader evidence suggesting that impoverishment is less frequently studied compared to CHE [87], perhaps due to the challenge of choosing the appropriate poverty line and attributing impoverishment to a specific disease [88, 89]. Existing studies from Asia examining IHE related to NCDs have reported impoverishment levels ranging from 1.3% to 15.6% [87, 90–99], although few provide disease-specific estimates for cancer. Consequently, important gaps remain regarding the extent to which cervical cancer treatment contributes to long-term poverty in LMIC settings. Beyond monetary poverty, impoverishment may also be reflected through multidimensional indicators such as food insecurity, reduced school attendance, loss of employment, asset depletion, indebtedness and forgone care due to financial constraints. Assessing these dimensions alongside CHE may therefore provide a more comprehensive understanding of how cervical cancer affects household welfare in LMICs.

This review also found that all four studies all-included CHE relied on traditional spending thresholds (40% of capacity to pay; 10% and 20% of annual household income). Recent methodological work has argued that applying these unadjusted thresholds to service/disease-specific spending may underestimate financial hardship because households often incur OOP costs for multiple conditions simultaneously rather than for a single disease/service alone [11]. To address this, Ataguba *et al* [11] proposed adjusting conventional thresholds according to the proportion of total OOP expenditure attributable to a specific disease or service. This framework was subsequently applied in Ghana using service-specific expenditure shares for outpatient, inpatient and medical product expenditures to derive adjusted CHE thresholds and assess

service-specific financial catastrophe [100]. In settings where disease-specific expenditure data are unavailable, an alternative exploratory approach may involve using disease burden estimates, such as disability-adjusted life years (DALYs), as a proxy for the relative contribution of cervical cancer to overall disease burden. Such DALY estimates can be obtained from sources such as the Institute for Health Metrics and Evaluation Global Burden of Disease repository [101]. However, further empirical and methodological work is needed to validate these approaches before disease-specific thresholds can be routinely applied in cervical cancer research.

An additional methodological limitation within the current evidence base is the lack of disease-stage stratification in most studies, limiting the precision of policy responses and resource allocation. This limitation may reflect the persistent challenge in many LMICs where cervical cancer is often diagnosed at advanced stages, reducing opportunities for stage-specific analysis [75, 102–104]. The only study that stratified CHE by disease stage reported the highest incidence in stage IV disease and the lowest in stage I disease [41]. Similar findings have been reported in broader cancer literature [19], suggesting that advanced disease may increase financial burden through more intensive treatment requirements. Nevertheless, even early-stage disease appears associated with substantial costs, reinforcing the need for financial protection across the cervical cancer care continuum [105, 106]. This also demonstrates the missed opportunity in preventing cervical cancer, a preventable but often not prevented disease [1, 27]. Scaling up HPV vaccination, screening and early treatment is both a public health and a financial imperative, aligning with the global elimination agenda [27, 107].

This review found that selling assets and/or borrowing were the most common cost-coping mechanisms. Similar findings have been documented in broader NCD literature in LMICs [108, 109]. However, evidence on distress financing remains largely derived from cross-sectional studies, limiting understanding of how coping strategies and financial hardships evolve over time. FCFR, as typified by delaying treatment [40, 43], abandoning treatment [42] and skipping appointments [59], has been less examined despite its potential consequences for disease progression, emergency hospitalisation, higher treatment costs and preventable mortality [110]. In addition, quantitative studies rarely quantified the severity or persistence of distress financing, such as debt accumulation or long-term asset depletion, and none examined predictors of distress financing among cervical cancer patients.

Taken together, the findings of this review underscore important evidence gaps regarding FRP and distress financing among cervical cancer patients in LMICs. Future research should not only expand empirical evidence on FRP in cervical cancer but also incorporate longitudinal designs to better understand how financial hardship and coping strategies evolve over time. The current lack of longitudinal evidence limits understanding of long-term impoverishment, debt accumulation, treatment discontinuation and broader intergenerational economic consequences associated with cervical cancer care. Greater attention should also be given to FCFR, the severity and duration of distress financing and the socioeconomic and clinical predictors of financial vulnerability.

Implications for policy and practice

Although the available evidence remains limited, the findings of this review suggest that strengthening financial protection for cervical cancer care may be important for reducing household vulnerability in LMICs. Expanding insurance coverage and improving benefit packages for high-cost conditions such as cervical cancer may help reduce reliance on OOP spending, particularly among economically disadvantaged populations. These packages ought to account for nonmedical costs, disease stage and income level, similar to Mexico's Fondo de Protección contra Gastos Catastróficos under Seguro Popular, which improved access and reduced OOP spending for breast cancer patients [84]. Another example is Rwanda, which has a community-based health insurance scheme that is set to provide free treatment to all cancer patients [111]. Second, FRP monitoring can adopt disease-specific thresholds for CHE to better capture the financial burden of cervical cancer, which is likely underestimated using unadjusted thresholds. Third, financial protection indicators (CHE, IHE and distress financing) can be embedded into national cervical cancer elimination strategies to monitor, track and strengthen progress towards UHC. Further, where possible, these indicators should be disaggregated by disease stage, SES and geography to expose and address vulnerabilities.

Strengths and limitations

To our knowledge, this is the first systematic review to examine cervical cancer-specific financial risk protection and distress financing in LMICs, thereby advancing the limited but growing body of evidence on the economic burden of cancer in these settings. Its main strength lies in its breadth, covering diverse LMIC's contexts and including both qualitative and quantitative studies focused on the treatment and

follow-up phases. This approach provides a more granular understanding of household financial vulnerability and aligns with the WHO's call for evidence to guide equity-focused UHC reforms, particularly in contexts where OOP payments dominate health financing [112]. Importantly, it also adds to debates on the urgency of the global cervical cancer elimination initiative, which prioritises HPV vaccination, screening and early treatment; which supports progress toward SDG 1 (No Poverty), SDG 3 (Good Health and Well-being), SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities) [27]. Nevertheless, several limitations should be considered when interpreting the findings. Most importantly, only four studies examined CHE specific to cervical cancer, limiting the ability to draw robust conclusions regarding the magnitude of financial burden. Considerable heterogeneity in study methodologies, settings and populations may also limit comparability across studies. In addition, only English-language studies were included and grey literature was excluded. This may have resulted in omission of relevant regional reports, government and policy documents, programme evaluations, theses and nonindexed studies from LMIC settings where financial risk protection research is often underrepresented in indexed international journals. Consequently, important contextual and locally generated evidence on cervical cancer-related financial hardship may not have been captured in this review. An additional limitation relates to the included quantitative studies, which were largely cross-sectional, hospital-based and reliant on self-reported expenditure data. These designs may be prone to recall bias, selection bias and survivorship biases. Consequently, the findings may underestimate the true extent of financial hardship among the most vulnerable populations. Moreover, the predominance of hospital-based populations limits generalisability, particularly to rural, underserved and nonfacility-attending populations in LMIC settings.

Conclusion

Although based on a limited number of studies, the available evidence suggests that cervical cancer treatment may impose substantial financial strain on affected households, often resulting in reliance on distress financing strategies. Achieving UHC requires access to quality health services without undue financial hardship. Unfortunately, the high levels of financial hardships and the burdening coping strategies that households adopt to cater for family members with cervical cancer reported in the studies covered in this systematic review raise a concern regarding the progress countries are making to achieve universal access to health services. As demonstrated, vulnerable households suffer more due to the various social determinants of health. Providing financial protection to households must recognise existing heterogeneities in households, ensuring that no one is left behind. The exorbitant costs associated with cancer treatment have meant that LMICs with existing health insurance systems often exclude them from their core benefit packages. The evidence from this review supports the need for these countries to consider broadening their health benefits packages to integrate cost-effective cervical cancer care, as is currently being done in Rwanda [111], for instance, to significantly reduce the household burden of paying OOP for care, as this is a crucial step towards ensuring universal access to health services.

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Conflicts of interests

The authors declare no competing interests.

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Consent to participate

N/A.

Ethical approval

N/A.

Author contributions

D.O.: Conceptualization, Methodology, Literature search, Study selection, Data curation, Formal analysis, Interpretation of findings, Writing – original draft, Writing – review & editing, Project administration. A.T.L.: Study selection (screening), Data extraction, Data verification, Writing – review & editing. P.M.: Search strategy development, Literature search, Methodology, Writing – review & editing. J.M.: Conceptualization, Methodology, Supervision, Writing – review & editing. B.T.G.: Supervision, Methodological guidance, Writing – review & editing. J.E.A.: Conceptualization, Supervision, Methodological guidance, Writing – review & editing. All authors have read and agreed to the published version of the manuscript.

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Supplementary materials

Supplementary Table 1. Search strategy for PubMed database.

Action	Term	Records returned
1	Cost of illness[MeSH Terms]	34,349
2	(burden of illness[Text Word] OR illness burden[Text Word] OR illness cost[Text Word] OR cost of illness[Text Word] OR economic burden[Text Word] OR socioeconomic impact[Text Word] OR household economic[Text Word] OR household economic burden[Text Word] OR economic stress[Text Word] OR economic distress[Text Word] OR economic difficulty[Text Word] OR economics[Text Word] OR economic hardship[Text Word] OR bankruptcy[Text Word] OR insolvency[Text Word] OR burden of illness[Text Word] OR Cost of illness[Text Word] OR Household economic burden[Text Word] OR Health expenditure[Text Word] OR direct costs[Text Word] OR direct medical costs[Text Word] OR direct non-medical costs[Text Word] OR human capital[Text Word] OR patient side costs[Text Word] OR disease costs[Text Word] OR cost of sickness[Text Word] OR sickness cost[Text Word] OR cost of disease[Text Word] OR disease cost[Text Word] OR cost of treatment[Text Word] OR cost of care[Text Word] OR treatment cost[Text Word] OR healthcare costs[Text Word] OR health financing[Text Word] OR health care financing[Text Word] OR health spending[Text Word] OR social security[Text Word] OR out-of-pocket spending[Text Word] OR out-of-pocket costs[Text Word] OR out-of-pocket expenditures[Text Word] OR out-of-pocket payment[Text Word] OR out-of-pocket expenses[Text Word] OR Treatment cost[Text Word] OR hospital costs[Text Word] OR healthcare costs[Text Word] OR financial hardship[Text Word] OR material hardship[Text Word] OR financial effect[Text Word] OR financial risk[Text Word] OR financial risk protection[Text Word] OR FRP[Text Word] OR copayment[Text Word] OR deductible[Text Word] OR financial catastrophe[Text Word] OR catastrophic health expenditures[Text Word] OR catastrophic health expenditure[Text Word] OR CHE[Text Word] OR financial toxicity[Text Word] OR financial distress[Text Word] OR financial stress[Text Word] OR Impoverishing Health expenditures[Text Word] OR Impoverishing Health expenditure[Text Word] OR IHE[Text Word] OR impoverishment[Text Word] OR poverty effects[Text Word] OR poverty implications[Text Word] OR indirect costs[Text Word] OR productivity losses[Text Word] OR productivity loss[Text Word] OR Income loss[Text Word] OR opportunity cost[Text Word] OR waiting times[Text Word] OR waiting time[Text Word] OR productivity cost[Text Word] OR productivity loss[Text Word] OR premature mortality[Text Word] OR absenteeism cost[Text Word] OR presenteeism cost[Text Word] OR absenteeism[Text Word] OR presenteeism[Text Word] OR cost-coping strategies[Text Word] OR cost-coping[Text Word] OR cost-coping mechanisms[Text Word] OR coping strategies[Text Word] OR coping mechanisms[Text Word] OR intangible costs[Text Word] OR psychosocial costs[Text Word] OR psychosocial effects[Text Word] OR psychosocial impact[Text Word] OR unmet psychosocial care needs[Text Word] OR unmet psychosocial needs[Text Word] OR unmet supportive care needs[Text Word] OR social effects[Text Word] OR spiritual effects[Text Word] OR psychological effects[Text Word] OR physical effects[Text Word] OR psychosexual effects[Text Word] OR sexuality[Text Word] OR experiences[Text Word] OR negative experiences[Text Word] OR emotional challenges[Text Word]))	1,374,974
3	#1 OR #2	1,376,765

Continued

Supplementary Table 1. Search strategy for PubMed database. *Continued*

4	Uterine Cervical Neoplasms[MeSH Terms]	87,552
5	Uterine Cervical Neoplasms[Text Word] OR Cervical cancer[Text Word] OR cancer of the cervix[Text Word] OR uterine cervical diseases[Text Word] OR cervix uteri[Text Word] OR uterine cervical neoplasms[Text Word] OR cervical neoplasms[Text Word] OR cervical malignant neoplasm[Text Word] OR advanced cervical cancer[Text Word] OR cervical tumour[Text Word] OR cervical tumor[Text Word]	132,237
6	#4 OR #5	132,237
7	Deprived Countries[Text Word] OR Deprived Population[Text Word] OR Deprived Populations[Text Word] OR Developing Countries[Text Word] OR Developing Country[Text Word] OR Developing Economies[Text Word] OR Developing Economy[Text Word] OR Developing Nation[Text Word] OR Developing Nations[Text Word] OR Developing Population[Text Word] OR Developing Populations[Text Word] OR Developing World[Text Word] OR LAMI Countries[Text Word] OR LAMI Country[Text Word] OR Less Developed Countries[Text Word] OR Less Developed Country[Text Word] OR Less Developed Economies[Text Word] OR Less Developed Nation[Text Word] OR Less Developed Nations[Text Word] OR Less Developed World[Text Word] OR Lesser Developed Countries[Text Word] OR Lesser Developed Nations[Text Word] OR LMIC[Text Word] OR LMICS[Text Word] OR Low GDP[Text Word] OR Low GNP[Text Word] OR Low Gross Domestic[Text Word] OR Low Gross National[Text Word] OR Low Income Countries[Text Word] OR Low Income Country[Text Word] OR Low Income Economies[Text Word] OR Low Income Economy[Text Word] OR Low Income Nations[Text Word] OR Low Income Population[Text Word] OR Low Income Populations[Text Word] OR Lower GDP[Text Word] OR lower gross domestic[Text Word] OR Lower Income Countries[Text Word] OR Lower Income Country[Text Word] OR Lower Income Nations[Text Word] OR Lower Income Population[Text Word] OR Lower Income Populations[Text Word] OR Middle Income Countries[Text Word] OR Middle Income Country[Text Word] OR Middle Income Economies[Text Word] OR Middle Income Nation[Text Word] OR Middle Income Nations[Text Word] OR Middle Income Population[Text Word] OR Middle Income Populations[Text Word] OR Poor Countries[Text Word] OR Poor Country[Text Word] OR Poor Economies[Text Word] OR Poor Economy[Text Word] OR Poor Nation[Text Word] OR Poor Nations[Text Word] OR Poor Population[Text Word] OR Poor Populations[Text Word] OR poor world[Text Word] OR Poorer Countries[Text Word] OR Poorer Economies[Text Word] OR Poorer Economy[Text Word] OR Poorer Nations[Text Word] OR Poorer Population[Text Word] OR Poorer Populations[Text Word] OR Third World[Text Word] OR Transitional Countries[Text Word] OR Transitional Country[Text Word] OR Transitional Economies[Text Word] OR Transitional Economy[Text Word] OR Under Developed Countries[Text Word] OR Under Developed Country[Text Word] OR under developed nations[Text Word] OR Under Developed World[Text Word] OR Under Served Population[Text Word] OR Under Served Populations[Text Word] OR Underdeveloped Countries[Text Word] OR Underdeveloped Country[Text Word] OR underdeveloped economies[Text Word] OR underdeveloped nations[Text Word] OR underdeveloped population[Text Word] OR Underdeveloped World[Text Word] OR Underserved Countries[Text Word] OR Underserved Nations[Text Word] OR Underserved Population[Text Word] OR Underserved Populations[Text Word]	209,462

Continued

Supplementary Table 1. Search strategy for PubMed database. *Continued*

8	Afghanistan[Text Word] OR Albania[Text Word] OR Algeria[Text Word] OR American Samoa[Text Word] OR Angola[Text Word] OR Armenia[Text Word] OR Azerbaijan[Text Word] OR Bangladesh[Text Word] OR Belarus[Text Word] OR Byelarus[Text Word] OR Belorussia[Text Word] OR Belize[Text Word] OR Benin[Text Word] OR Bhutan[Text Word] OR Bolivia[Text Word] OR Bosnia[Text Word] OR Botswana[Text Word] OR Brazil[Text Word] OR Bulgaria[Text Word] OR Burma[Text Word] OR Burkina Faso[Text Word] OR Burundi[Text Word] OR Cabo Verde[Text Word] OR Cape Verde[Text Word] OR Cambodia[Text Word] OR Cameroon[Text Word] OR Central African Republic[Text Word] OR Chad[Text Word] OR China[Text Word] OR Colombia[Text Word] OR Comoros[Text Word] OR Comores[Text Word] OR Comoro[Text Word] OR Congo[Text Word] OR Costa Rica[Text Word] OR Côte d'Ivoire[Text Word] OR Cuba[Text Word] OR Djibouti[Text Word] OR Dominica[Text Word] OR Dominican Republic[Text Word] OR Ecuador[Text Word] OR Egypt[Text Word] OR El Salvador[Text Word] OR Equatorial Guinea[Text Word] OR Eritrea[Text Word] OR Ethiopia[Text Word] OR Fiji[Text Word] OR Gabon[Text Word] OR Gambia[Text Word] OR Gaza[Text Word] OR Georgia[Text Word] OR Georgia Republic[Text Word] OR Ghana[Text Word] OR Grenada[Text Word] OR Grenadines[Text Word] OR Guatemala[Text Word] OR Guinea[Text Word] OR Guinea- Bissau[Text Word] OR Guyana[Text Word] OR Haiti[Text Word] OR Herzegovina[Text Word] OR Hercegovina[Text Word] OR Honduras[Text Word] OR India[Text Word] OR Indonesia[Text Word] OR Iran[Text Word] OR Iraq[Text Word] OR Ivory Coast[Text Word] OR Jamaica[Text Word] OR Jordan[Text Word] OR Kazakhstan[Text Word] OR Kenya[Text Word] OR Kiribati[Text Word] OR Democratic People's Republic of Korea[Text Word] OR Kosovo[Text Word] OR Kyrgyz[Text Word] OR Kirghizia[Text Word] OR Kirghiz[Text Word] OR Kyrgyzstan[Text Word] OR Lao PDR[Text Word] OR Laos[Text Word] OR Lebanon[Text Word] OR Lesotho[Text Word] OR Liberia[Text Word] OR Libya[Text Word] OR Macedonia[Text Word] OR Madagascar[Text Word] OR Malawi[Text Word] OR Malay[Text Word] OR Malaya[Text Word] OR Malaysia[Text Word] OR Maldives[Text Word] OR Mali[Text Word] OR Marshall Islands[Text Word] OR Mauritania[Text Word] OR Mauritius[Text Word] OR Mexico[Text Word] OR Micronesia[Text Word] OR Moldova[Text Word] OR Mongolia[Text Word] OR Montenegro[Text Word] OR Morocco[Text Word] OR Mozambique[Text Word] OR Myanmar[Text Word] OR Namibia[Text Word] OR Nepal[Text Word] OR Nicaragua[Text Word] OR Niger[Text Word] OR Nigeria[Text Word] OR Pakistan[Text Word] OR Palau[Text Word] OR Papua New Guinea[Text Word] OR Paraguay[Text Word] OR Peru[Text Word] OR Philippines[Text Word] OR Principe[Text Word] OR Romania[Text Word] OR Ruanda[Text Word] OR Rwanda[Text Word] OR Samoa[Text Word] OR Sao Tome[Text Word] OR Senegal[Text Word] OR Serbia[Text Word] OR Sierra Leone[Text Word] OR Solomon Islands[Text Word] OR Somalia[Text Word] OR South Africa[Text Word] OR South Sudan[Text Word] OR Sri Lanka[Text Word] OR St Lucia[Text Word] OR St Vincent[Text Word] OR Sudan[Text Word] OR Surinam[Text Word] OR Suriname[Text Word] OR Swaziland[Text Word] OR Syria[Text Word] OR Syrian Arab Republic[Text Word] OR Tajikistan[Text Word] OR Tadzhikistan[Text Word] OR Tajikistan[Text Word] OR Tadzhik[Text Word] OR Tanzania[Text Word] OR Thailand[Text Word] OR Timor[Text Word] OR Togo[Text Word] OR Tonga[Text Word] OR Tunisia[Text Word] OR Turkey[Text Word] OR Turkmen[Text Word] OR Turkmenistan[Text Word] OR Tuvalu[Text Word] OR Uganda[Text Word] OR Ukraine[Text Word] OR Uzbek[Text Word] OR Uzbekistan[Text Word] OR Vanuatu[Text Word] OR Venezuela[Text Word] OR Vietnam[Text Word] OR West Bank[Text Word] OR Yemen[Text Word] OR Zambia[Text Word] OR Zimbabwe[Text Word]	1,934,805

Continued

Supplementary Table 1. Search strategy for PubMed database. *Continued*

9	#7 OR #8	2,034,826
10	#3 AND #6 AND #9	1,310
11	#3 AND #6 AND #9 with **Filters: from 2003/1/1 - 2024/7/1**	1,196

Supplementary Table 2. Joanna Briggs Institute critical appraisal checklist for analytical cross-sectional studies.

Study ID	Checklist items								Final score (%)
	A	B	C	D	E	F	G	H	
Matebie *et al* [39]	1	1	1	1	1	1	1	1	100
Kasahun *et al* [38]	1	1	1	1	1	1	1	1	100
Hailu and Mariam [66]	1	1	1	1	1	1	1	1	100
Endale *et al* [37]	1	1	1	1	1	1	1	1	100
Singh *et al* [41]	1	1	1	1	1	1	1	1	100
Chen *et al* [40]	1	1	1	1	1	0.5	1	1	93.75
Tapera *et al* [42]	1	1	1	1	1	1	1	1	100
Owenga and Nyambedha [43]	1	1	1	1	1	1	1	1	100
Dau *et al* [44]	1	1	1	1	1	1	1	1	100
Arrossi *et al* [45]	1	1	1	1	1	1	1	1	100
Bates *et al* [46]	1	1	1	1	1	0.5	1	1	93.75

A – Were the criteria for inclusion in the sample clearly defined?
B – Were the study subjects and the setting described in detail?
C – Was the exposure measured in a valid and reliable way?
D – Were objective, standard criteria used for measurement of the condition
E – Were confounding factors identified?
F – Were strategies to deal with confounding factors stated?
G – Were the outcomes measured in a valid and reliable way?
H – Was appropriate statistical analysis used?
Assign **1 point** for each question where the answer is "Yes" (i.e., the study clearly meets the criterion)
Assign **0 points** for each "No" (i.e., the study does not meet the criterion)
Assign **0.5 points** if the answer is "Unclear" (i.e., the study partially meets the criterion or lacks sufficient information to judge)
Mark "N/A" (no score assigned) if the criterion is not relevant to the study

Supplementary Table 3. Joanna Briggs Institute critical appraisal checklist for qualitative research.

Study ID	Checklist items										Final score (%)
	A	B	C	D	E	F	G	H	I	J	
Binka *et al* [49]	1	1	1	1	1	0.5	0	1	1	1	85
Germans *et al* [59]	1	1	1	1	1	0	0	1	1	1	80
Pati *et al* [63]	1	1	1	1	1	0	0	1	1	1	80
Dirar *et al* [53]	1	1	1	1	1	1	1	1	1	1	100
Dhakal *et al* [64]	1	1	1	1	1	0.5	0.5	1	1	1	90
Kassaman *et al* [61]	1	1	1	1	1	0	0	1	1	1	80
Binka *et al* [48]	1	1	1	1	1	0	0	1	1	1	80
Binka *et al* [47]	1	1	1	1	1	0	0	1	1	1	80
Gosse *et al* [57]	1	1	1	1	1	0	0	1	1	1	80
Hobenu *et al* [50]	1	1	1	1	1	0	0	1	1	1	80
Okyere Asante *et al* [51]	1	1	1	1	1	0	0	1	1	1	80
Chona *et al* [56]	1	1	1	1	1	0	0	1	1	1	80
Kebede and Kebede [54]	1	1	1	1	1	0.5	0.5	1	1	1	90
Ngutu and Nyamongo [62]	1	1	1	1	1	0	0	1	1	1	80
Knaul *et al* [65]	1	1	1	1	1	0	0	1	1	1	80
Tadesse [55]	1	1	1	1	1	0	0	1	1	1	80
Burrowes *et al* [52]	1	1	1	1	1	0	0	1	1	1	80
Msengi *et al* [57]	1	1	1	1	1	0	0	1	1	1	80
Natuhwera *et al* [60]	1	1	1	1	1	0.5	0.5	1	1	1	90

A – Congruity between philosophical perspective and methodology
B – Congruity between methodology and research question/objective
C– Congruity between methodology and method of data collection
D – Congruity between methodology and representation and data analysis
E – Congruity between methodology and interpretation of results
F – Statement locating the research culturally or theoretically
G – Influence of the researcher on the research and vice versa addressed
H– Participants and their voices adequately represented
I – Evidence of ethical approval by an appropriate body
J –Conclusions drawn in the research flow from the analysis/interpretation of the data/
Assign **1 point** for each question where the answer is "Yes" (i.e., the study clearly meets the criterion)
Assign **0 points** for each "No" (i.e., the study does not meet the criterion)
Assign **0.5 points** if the answer is "Unclear" (i.e., the study partially meets the criterion or lacks sufficient information to judge)
Mark "N/A" (no score assigned) if the criterion is not relevant to the study

Supplementary Table 4. Cost-coping strategies reported in qualitative studies.

Authors	Year of publication	Country	Sample size	Study population	Cost-coping strategies			
					Individual	Relationship	Community	Health system
Binka *et al* [47]	2018	Ghana	15	Women with cervical cancer at a health facility in the Volta Region	NR	Financial assistance from children, siblings, spouses, parents, other relatives and neighbours	Church financial assistance programme	NR
Germans *et al*[59]	2022	Uganda	13	Women with a histological diagnosis of cervical cancer at three not-for-profit cancer centres in Uganda	Skipping appointments borrowing	NR	NR	NR
Pati *et al* [63]	2017	India	21	Women diagnosed with cervical cancer and undergoing at least one treatment intervention	Selling assets	NR	NR	NR
Dirar *et al* [53]	2022	Ethiopia	11	Cervical cancer patients receiving follow-up treatment	Savings Borrowing Selling assets	NR	NR	NR
Dhakal *et al* [64]	2023	Nepal	31	Women on cervical cancer treatment	Selling assets Treatment discontinuation	NR	NR	NR
Kassaman *et al* [61]	2022	Kenya	18	Women on cervical cancer treatment at a public sector facility and a private sector facility.	Skipping treatments. Delaying the start of treatment	NR	NR	NR
Binka *et al* [46]	2019	Ghana	41	Cervical cancer patients and their partners.	Selling assets Borrowing	NR	Financial support from the employer	NR
Binka *et al* [45]	2017	Ghana	15	Women attending a gynaecologic clinic who had survived cervical cancer or were at its early stages.	Selling assets Borrowing from banks/ microfinance Borrowing from friends/relatives	NR	NR	NR

Continued

Supplementary Table 4. Cost-coping strategies reported in qualitative studies. *Continued*

Gosse *et al* [57]	2024	Tanzania	13	Male partners of women in cervical cancer treatment	Selling assets Halting development projects	NR	Financial support from community groups (e.g. KIKOBA)	NR
Hobenu *et al* [50]	2023	Ghana	15	Women who were diagnosed with advanced cervical Cancer and had lived with the disease for one to three years	Borrowing from bank. Borrowing from friends/relatives	NR	NR	NR
Okyere Asante *et al* [51]	2023	Ghana	45	Breast and cervical cancer patients on treatment	Borrowing	NR	NR	NR
Chona *et al* [56]	2023	Tanzania	12	Women with cervical cancer for at least one year post-diagnosis	NR	Financial assistance from family members	NR	NR
Kebede and Kebede [54]	2017	Ethiopia	15	Women with cervical cancer and key informants	Selling assets Borrowing from friends Borrowing from banks Borrowing from the church	NR	NR	NR
Ngutu and Nyamongo [62]	2015	Kenya	18	Women with cervical cancer enrolled for follow-up care.	Selling assets	NR	NR	NR
Knaul *et al* [65]	2020	Mexico	20	Women with a history of cervical cancer	Borrowing money Begging for money	NR	NR	NR
Tadesse [55]	2015	Ethiopia	10	Women on cervical cancer treatment	Begging for money Selling assets Borrowing from family members	NR	NR	NR
Burrowes *et al* [52]	2022	Ethiopia	38	Women on cervical cancer treatment and health care workers	Borrowing	NR	NR	NR

Continued

Supplementary Table 4. Cost-coping strategies reported in qualitative studies. *Continued*

Msengi *et al* [57]	2024	Tanzania	13	Male partners of women on cervical cancer treatment	NR	Financial assistance from friends and relatives	NR	NR
Natuhwera *et al* [60]	2021	Uganda	10	Women with incurable cervical cancer attending a palliative care centre.	NR	NR	Financial support from local church	NR

NR; Not reported in the original study and therefore not extractable

Supplementary Table 5. Cost-coping strategies reported in quantitative studies.

Authors	Socioecological framework			
	Individual	Household	Community	Health system
Matebie *et al* [39]	Savings, selling assets, borrowing	Household member's income	Financial support from friends	NR
Kasahun *et al* [38]	Savings, borrowing, selling assets	Money from relatives	NGO/religious organisation support	NR
Endale *et al* [37]	Savings, selling assets, borrowing, mortgaging assets	NR	NGO support	NR
Bates *et al* [46]	Selling assets, borrowing	NR	NR	NR
Singh *et al* [41]	Borrowing, selling assets	NR	NR	NR
Chen *et al* [40]	Delay or forfeit treatment, use traditional healers	NR	NR	NR
Tapera *et al* [42]	Abandonment of treatment	Financial support from friends/ relatives	Charity/church support, hospital waiver	NR
Owenga and Nyambedha [43]	Borrowing, selling assets, cutting costs	Financial support from friends/ relatives	NR	NR
Dau *et al* [44]	Savings, selling assets, borrowing	Reduction of household budgets	NR	NR

NR; Not reported in the original study and therefore not extractable

Supplementary Table 6. Analysis of individual-level cost-coping strategies.

Study	Individual-level cost-coping strategies											
	Savings	Selling assets	Mortgaging assets	Borrowing from financial institution	Borrowing from family/ friends	Traditional/ spiritual healers (Cheaper alternative)	Skipping appointments	Forfeit treatment	Delay treatment	Cut down household budget	Halting development projects	Begging for money
Matebie *et al* [39]	1	1		1								
Kasahun *et al* [38]	1	1		1								
Hailu and Mariam [66]												
Endale *et al* [37]	1	1	1		1							
Bates *et al* [46]		1			1							
Singh *et al* [41]		1			1							
Chen *et al* [40]												
Tapera *et al* [42]						1		1	1			
Owenga [68]								1				
Dau *et al* [44]		1			1			1		1		
Arrossi *et al* [45]	1	1			1					1		
Binka *et al* [49]												
Germans *et al* [59]					1		1					
Pati *et al* [63]		1										
Dirar *et al* [53]	1	1			1							
Dhakal *et al* [64]		1						1				
Kassaman *et al* [61]							1		1			
Binka *et al* [48]		1			1							

Continued

Supplementary Table 6. Analysis of individual-level cost-coping strategies. *Continued*

Study	Individual-level cost-coping strategies											
	Savings	Selling assets	Mortgaging assets	Borrowing from financial institution	Borrowing from family/ friends	Traditional/ spiritual healers (Cheaper alternative)	Skipping appointments	Forfeit treatment	Delay treatment	Cut down household budget	Halting development projects	Begging for money
Binka *et al* [47]		1		1	1							
Gosse *et al* [57]		1									1	
Hobenu and Naab [67]				1	1							
Okyere Asante *et al* [51]					1							
Chona *et al* [56]												
Kebede and Kebede [54]		1		1	1							
Ngutu and Nyamongo [62]		1										
Knaul *et al* [65]				1								1
Tadesse [55]		1		1								1
Burrowes *et al* [52]				1								
Msengi *et al* [57]												
Natuhwera *et al* [60]												
Count	5	16	1	8	12	1	2	4	2	2	1	2