Cancer Epidemiology 102 (2026) 103029

Contents lists available at ScienceDirect

Cancer Epidemiology

journal homepage: www.elsevier.com/locate/canep

Cervical cancer in foreign-born women living in Italy: A systematic review of population-based studies

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ARTICLE INFO

Keywords:
Cervical cancer
Incidence
Immigrant
Italy
Disparities

ABSTRACT

Background: Cervical cancer (CC) incidence in Italy has declined due to organized screening and HPV vaccination programs. However, disparities persist among vulnerable populations, including foreign-born women. This study aims to retrieve and synthesize evidence from population-based studies focusing on CC incidence among foreign-born women in Italy.

Methods: A systematic review was conducted to identify population-based epidemiological studies on CC in Italy. A comprehensive and systematic search was performed in PubMed, CINAHL, and Scopus. Studies were included if they reported data comparing foreign-born and Italian-born women in Italy and were based on cancer registry records. Due to heterogeneity in study designs and data, we used a descriptive and comparative approach rather than a meta-analysis.

Results: A total of five pertinent articles were identified and included in the review. Findings consistently indicate a higher incidence or relative risk of CC among foreign-born women in Italy, with estimates ranging from a modest increase to more than double the risk compared with Italian-born women. Higher incidence of both invasive cervical cancer and high-grade pre-malignant lesions was observed across multiple regions, particularly among women originating from countries with high HPV prevalence and high migratory pressure.

Conclusion: These findings highlight persistent inequalities in cervical cancer risk between foreign-born and Italian-born women in Italy. Differences by country of origin may be associated with unequal access to timely and adequate care and with cultural barriers faced by specific immigrant women. Targeted policies and culturally sensitive interventions are needed to increase awareness, accessibility, healthcare navigation ability, and participation in cervical cancer screening, while addressing structural, linguistic, and informational barriers among high-risk migrant groups.

1. Introduction

Human Papillomavirus (HPV) is the most common sexually transmitted infection in the world, and when high-risk types of HPV persist, they can lead to invasive cervical cancer (CC) [1,2]. Despite being largely preventable through early screening and vaccination, CC remains a serious public health issue in areas with limited healthcare resources [3]. Globally, CC is one of the leading causes of cancer-related deaths in women. In 2019, 565,541 new cases and 280,479 deaths were reported. The burden of CC disproportionately affects low- and middle-Socio-Demographic Index (SDI) countries, where mortality can be up to 18 times higher than in high SDI countries [4,5]. In Europe, substantial declines in CC mortality have been observed in countries with organized screening programs, with Italy ranking among those with the lowest mortality rates [6,7]. However, these overall improvements may mask persistent inequalities affecting specific population subgroups, including migrant women.

Immigrant women, particularly those originating from low- and

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https://doi.org/10.1016/j.canep.2026.103029
Received 13 January 2026; Received in revised form 17 February 2026; Accepted 20 February 2026

middle-SDI countries, experience a disproportionately higher burden of CC globally, reflecting persistent inequalities in HPV prevalence, screening access, and health system resources [8]. Similar disparities have been documented within the European Union, where CC risk among non-Western migrants has been shown to reflect patterns in their countries of origin, particularly in the early years following migration [9]. These disparities may arise from intersecting barriers across the care pathway, including limited knowledge and awareness of CC, cultural or religious beliefs, language and information barriers, structural constraints within the healthcare system, low participation in screening and vaccination programs [10], and limited catch-up services [11].

Recent shifts in migration from low- and middle-SDI countries—-driven by poverty, insecurity, limited access to basic services, conflict, environmental degradation, and disasters—have substantially altered the demographic and health profiles of migrant communities [12,13]. As Europe has become a major destination for these populations, it is imperative to better characterize their cancer risk profiles to inform prevention and control strategies. A comprehensive understanding of how pre-migration exposures, infectious-disease burdens, socioeconomic determinants, and barriers to care interact with host-country risk factors is crucial for designing targeted screening and vaccination programs and for supporting evidence-based policy aimed at reducing cancer-related inequities within European health systems.

Similar patterns have also been observed in Italy, where immigrant women may have lower awareness of CC and organized screening programs, and could be more frequently diagnosed at later stages compared to Italian-born women [14]. This issue is particularly relevant in the context of increasing migration to Italy and the country's commitment to universal healthcare [4,15]. According to the Italian Institute of Statistics (ISTAT), as of January 1, 2024, there were 5.3 million [16] foreign residents in Italy, accounting for 8.9 % of the total population, of whom 53 % were women. Significant geographic variability was observed, with 61.2 % residing in Northern Italy, 24.2 % in Central Italy, and 10.8 % in Southern Italy [17].

In Italy, cancer registries operate independently at the local level (often covering a city, region, or province) and collaborate within a national scientific framework promoted by the Italian Association of Cancer Registries (AIRTUM) [18,19]. These registries collect high-quality population-based data on cancer incidence and now cover nearly 80 % of the Italian population [18,19]. The integration of data from multiple regional registries in Italy offers an opportunity to examine trends in CC incidence and outcomes among foreign-born women within a universal healthcare system and to assess whether disparities persist despite the availability of organized screening [20–22].

In this systematic review, we aim to retrieve and synthesize evidence from population-based studies focusing on CC incidence among foreign-born women in Italy. Its goal is to identify disparities in CC incidence and disease burden between foreign-born and Italian-born women, to compare findings across regions, and to describe patterns or factors associated with these differences in order to inform both national and broader European prevention strategies.

2. Methods

2.1. Study design

We conducted a systematic review to retrieve evidence from Italian population-based studies on the incidence of CC among foreign-born women. The reporting of this review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring methodological rigor and transparency [23].

2.2. Inclusion and exclusion criteria

Studies were eligible for inclusion in this systematic review if they were conducted in Italy and used population data from regional and subregional cancer registries to report CC incidence. Additionally, they had to examine data on CC incidence in both foreign-born and Italian-born Italian women, and report statistical measures such as odds ratio (OR), incidence rate ratio (IRR), or age-standardized incidence rates (ASIRs), and, when available, stratify the results by immigration status and geographical origin of the study population.

2.3. Search strategy

A comprehensive search was conducted in MEDLINE/PubMed, CINHAL, and Scopus databases from inception to October 2025. Database-specific search strategies were developed using both thesaurus terms and free-text terms based on Boolean search strings using OR/AND operators. The search strategy combined terms related to migration status (migrant*, immigrant*, foreign-born, foreigner*, refugee*, asylum seeker*, and *Transients and Migrants* [MeSH]), cervical cancer (*Uterine Cervical Neoplasms* [MeSH] and free-text terms including cervix or cervical combined with cancer, carcino*, tumour*, tumor*, neoplasm*, or malignanc*), epidemiological outcomes (epidemiolog*, regist*, population-based, incidence, and *Registries* [MeSH]), and Italy (Ital*). The reference lists of included articles were also examined to identify additional studies. All types of peer-reviewed articles were eligible for inclusion, with no language or time restrictions.

2.4. Screening and selection process

The screening and selection procedures were conducted in several stages to ensure precision and reduce potential bias. Initially, all retrieved studies were uploaded to Zotero, a reference management software, and duplicate entries were removed. Next, the citations were imported into Rayyan®, enabling independent screening in blinded mode by each reviewer. Then, two researchers (MB and FL) independently screened the titles and abstracts of the retrieved records using a blind review process. Afterward, blind mode was disabled, and researchers compared decisions, resolving disagreements by involving a third researcher (VB). In the second step, the two researchers independently conducted a blind full-text screening. After comparing decisions, conflicts were discussed and, when unresolved, referred to a third reviewer for adjudication, followed by team confirmation of the included articles. Full texts of studies that appeared potentially relevant were later reviewed in detail to assess their eligibility for inclusion.

2.5. Quality appraisal

We evaluated the risk of bias across the included studies using the Newcastle–Ottawa Scale (NOS), a framework for assessing study quality in terms of participant selection, group comparability, and outcome measurement [24]. Each domain contributes to an overall score from 0 to 9, with higher values reflecting stronger methodological rigor. In this scoring system, studies achieving 7–9 points are regarded as high quality, those scoring 4–6 as moderate quality, and those scoring below 4 as low quality. Two reviewers independently evaluated each study across the domains of selection, comparability, and outcome assessment. After completing the assessments for each study, evaluations between reviewers were compared, and any differences were resolved through discussion. When consensus could not be reached, a third reviewer provided adjudication.

2.6. Data extraction

We extracted information on study characteristics, including authorship, year of publication, study region, and data collection period, and on population attributes, including the immigrant indicator (e.g., country of birth, nationality), percentage of foreign women in the total population, and sample sizes. We reviewed cancer-related information, including the number of cases per group, the type of CC (e.g., in situ, invasive, total), screening rates, and whether age at diagnosis was reported. Lastly, we extracted details on statistical methods, including the measures used (e.g., OR, IRR, ASIR), confidence intervals, model covariates, regression models applied, standardization methods, and stratification by age or nationality. To facilitate cross-study comparison, we organized the extracted data in structured summary tables.

2.7. Data synthesis

Due to differences in study design and statistical methods, we did not calculate a pooled effect size as in meta-analyses. Instead, we performed a comparative description to synthesize the magnitude and direction of differences in CC incidence between foreign-born women and Italian-born women. When reported, we examined outcomes stratified by region of origin (e.g., North Africa, Asia, Europe). A methodological comparison table was created to detail each study's statistical methods and adjustment factors. We also considered cross-study comparability and the clarity and reliability of foreign-born population denominators, which are essential for accurate incidence estimates.

3. Results

3.1. Study selection

The PRISMA flow diagram (Fig. 1) summarizes the process used to identify, screen, and include studies in this systematic review. A total of 43 records were initially retrieved from PubMed, Scopus, and CINAHL. After removing 16 duplicates, 27 records were screened by title and abstract, and 13 studies were selected for full-text assessment. After evaluating eligibility, we excluded eight studies for predefined reasons. Ultimately, five studies met all inclusion criteria and were included in the review.

3.2. Quality appraisal

The quality appraisal of the five included studies, conducted using the NOS, showed high agreement among reviewers. Overall, studies were rated as moderate to high quality, with NOS scores ranging from 7 to 8 points.

The main sources of potential bias were related to the selection of the

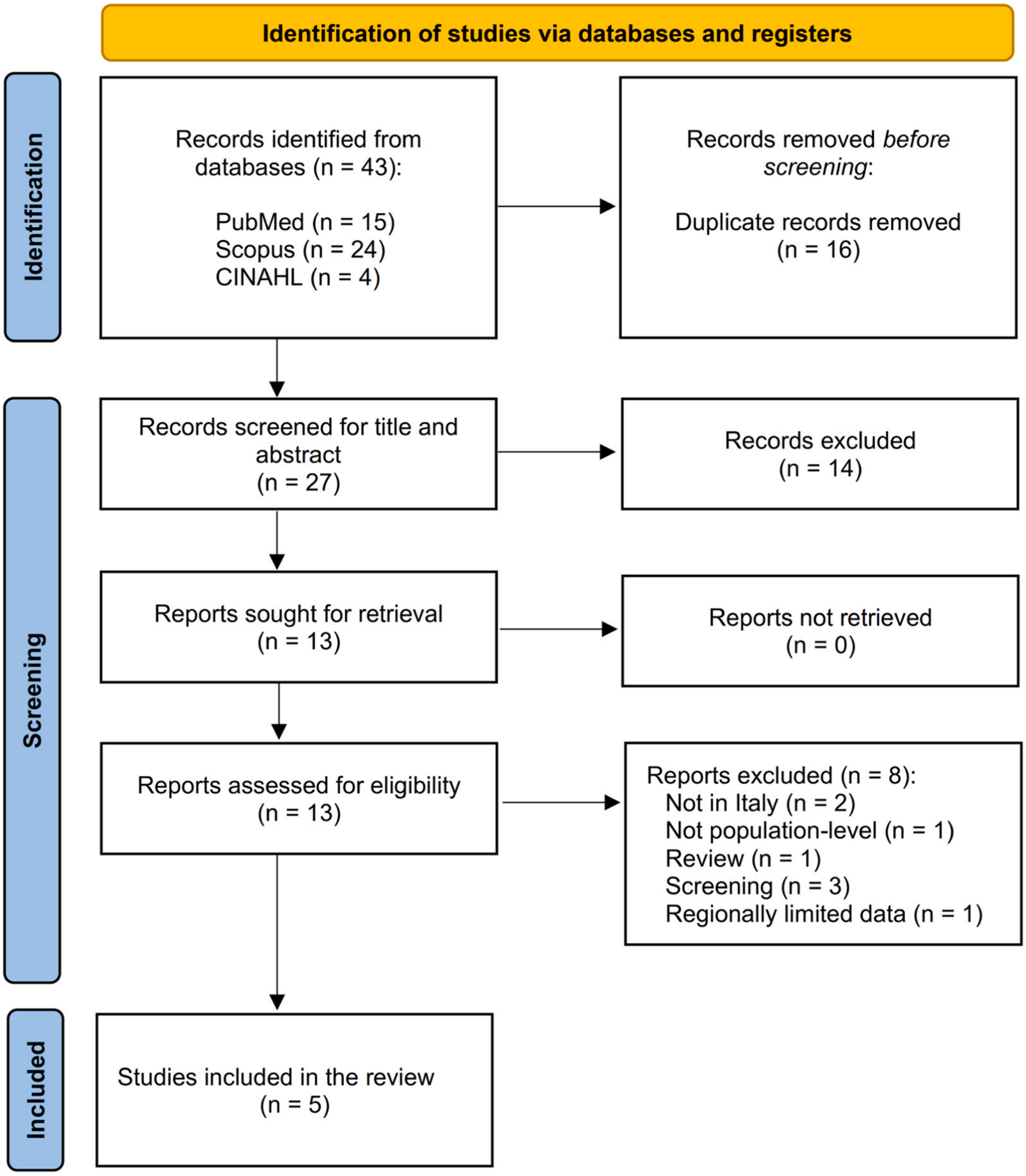

Fig. 1. PRISMA flow diagram.

study population/comparability/outcome ascertainment, while no study was classified as low quality. Details for each study are described in Fig. 2. Overall, the risk-of-bias assessment supports a moderate to high level of confidence in the synthesized evidence, as all included studies were considered sufficiently robust.

3.3. Overview of the included studies

We included five registry-based studies from different regions of Italy: Tuscany [25], Umbria [26], Sicily [4], Veneto [15], and Marche [27]. Each study examined CC among foreign-born women compared to Italian-born women. The study periods differed but substantially overlapped, collectively providing continuous coverage from 1994 to 2019. Table 1 summarizes the characteristics of the included studies, including region, time period, population size, number of CC cases, reported risk metrics, and analytical methods.

The study by Manneschi et al. (2011) was a population-based analysis conducted within the Tuscany Cancer Registry (provinces of Florence and Prato) and covered the period 1998–2005. The analysis was restricted to individuals aged 20–59 years. The aim was to compare overall and site-specific cancer incidence between Italian-born and foreign-born women. ASIR, based on the European standard population, and standardized rate ratios (SRR) were calculated for major cancer types, including CC [25].

The study by Bucchi et al. (2019) analyzed trends in the incidence of CC and carcinoma in situ (ISCC) in Umbria between 1994 and 2013, using data from a population-based cancer registry. The authors compared Italian-born and foreign-born women to examine differences in incidence trends and applied age–period–cohort modeling to disentangle temporal effects, interpreting period effects as proxies for the potential impact of organized screening on CC and CIS incidence [26].

The study by Collatuzzo et al. (2023) was conducted in Sicily and analyzed data from the Eastern Sicily population-based cancer registry (2004–2019). Because reliable population denominators for migrants were not available, incidence rates could not be calculated. Instead, the authors compared the proportions of specific cancer types between Italian-born and foreign-born populations by estimating adjusted proportionate morbidity ratios (PMR) and fitting multivariable logistic regression models (one cancer versus all others) to obtain odds ratios (ORs) for foreign-born status [4].

The study by Ferroni et al. (2024) was based on data from the Veneto Tumor Registry, a population-based cancer registry covering Northeastern Italy, and included all incident cancer cases diagnosed between 2015 and 2019. Subjects were classified according to country of birth into six geographical areas of origin. The authors calculated ASIR using the 2013 European standard population, and IRR with Italy-born subjects as the reference group, stratified by sex and cancer site, including colorectal, liver, breast, and cervical cancer [15].

The study by Di Biagio et al. (2025) was a population-based analysis using data from the Marche Cancer Registry and included all incident cervical cancer cases diagnosed between 2010 and 2019. The authors calculated crude and age-standardized incidence rates (European Standard Population 2013) for ISCC and infiltrating CC (ICC). Poisson regression models were used to estimate age-adjusted IRRs comparing foreign-born and Italian-born women, while Kaplan-Meier analysis was used to compare age at diagnosis between the two groups [27].

3.4. Primary risk estimates

Across the five included studies, CC-related outcomes were evaluated using epidemiological measures such as ASIR, OR, IRR, and SIRR to compare foreign-born women and Italian women. However, the magnitude and precision of the estimated measures varied across the five studies, as shown in Table 2, reflecting differences in study design, sample size, and analytical methods. Overall, all studies included in this systematic review reported a consistent finding: a higher rate of CC among foreign-born women compared to Italian-born women.

Manneschi et al. (2011) reported a SRR for cervical cancer of 1.46 (95 % CI: 0.53–3.39) among foreign-born women from highly developed countries (HDC) and 1.88 (95 % CI: 1.17–2.88; p = 0.0095) among those from High Migratory Pressure Countries (HMPC), compared with Italian-born women (age 20–59 years). These findings suggest a higher incidence of CC among women born in HMPC compared with both Italian-born women and those born in HDC than among those born in HDC [25].

Bucchi et al. (2019) reported a significant annual percentage change (APC) of −2.7 % (95 % CI: −4.3 to −1.1) in CC incidence among Italian-born women between 1994 and 2013, whereas foreign-born women showed a marked increase (APC = 12.2 %, 95 % CI: 7.6–17.0). ASIR (per 100,000) for CC declined among Italian-born women from 6.9 (95 % CI: 6.0–7.4) in 1994–2000 to 5.7 (95 % CI: 5.0–6.6) in 2001–2007, and 4.6 (95 % CI: 3.9–5.4) in 2008–2013. In contrast, foreign-born women experienced an increase from 0.5 (95 % CI: 0.3–0.8) in 1994–2000 to 2.6 (95 % CI: 2.0–3.3) in 2008–2013. For Cervical Intraepithelial Neoplasia (CIN) III, incidence rates increased in both groups, rising from 18.6 (95 % CI: 17.1–20.3) to 37.5 (95 % CI: 35.1–40.0) among Italian-born women and from 1.6 (95 % CI: 1.1–2.1) to 12.9 (95 % CI: 11.5–14.4) among foreign-born women across the same periods [26].

Collatuzzo et al. (2023) reported an OR of 3.54 (95 % CI: 2.99–4.20) for CC among foreign-born women compared with Italian-born women,

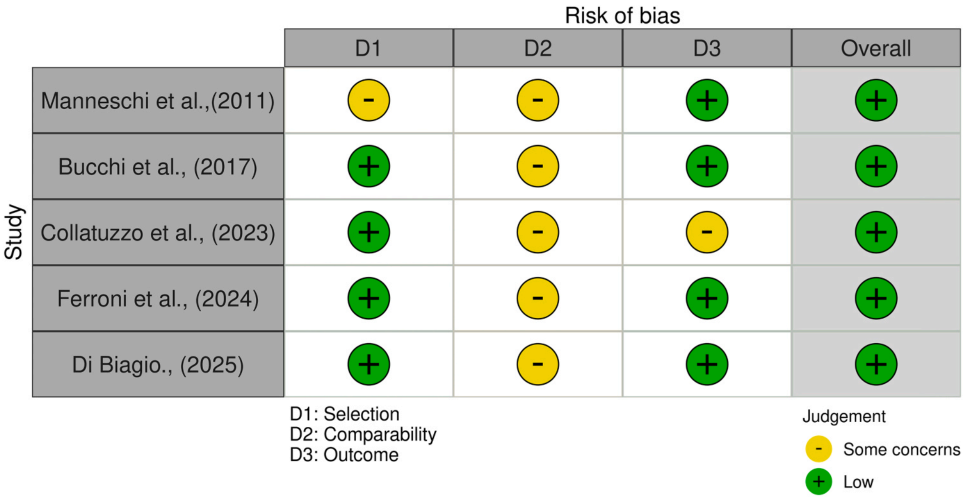

Fig. 2. Risk of bias and overall quality for individual studies.

Table 1
General characteristics and findings of included articles.

Study	Region	Time Period	Population Size	CC Cases	Core Risk Metrics	Analysis
Manneschi et al. [25]	Tuscany (Florence and Prato)	1998–2005	1200,000	206 I[1], 7 HDC[2], 29 HMPC[3]	SRR[4]	Age standardization, Poisson regression models
Bucchi et al. [26]	Umbria	1994–2013	3828	128 F[5], 675 I, 3 U[6]	ASIR[7]	Join point regression, standardization by age, and trends
Collatuzzo et al. [4]	Sicily	2004–2019	4726 M, 224,211 I	165	OR[8], PMR[9]	Logistic regression, adjusted for age category, sex, region, age, and period of diagnosis
Ferroni et al. [15]	Veneto	2015–2019	159,486	767	IRR[10], ASIR	Stratification by age, sex, calendar year, and geographical area of origin
Di Biagio et al. [27]	Marche	2010–2019	1512,672	2570	ASIR, Poisson regression	Kaplan-Meier survival analysis (age at diagnosis), Chi-squared and Fisher's exact tests (group comparison), and the Gamma method for CI[11] calculations

[1] Italians,
[2] Highly developed countries,
[3] High Migratory Pressure Countries,
[4] Standardized rate ratio,
[5] Foreign-born women,
[6] Unknown,
[7] Age-standardized incidence rates,
[8] Odds ratio,
[9] Proportionate morbidity ratio,
[10] Incidence rate ratio,
[11] Confidence interval.

Table 2
The relation between foreign-born status and CC risk.

Study	Cancer Type	Metric	Foreign-born vs. Italian-born Risk Estimate
Manneschi et al. (2011)	CC[1]	SRR[2] (HDC)	1.46 (95 % CI: 0.53–3.39)
Manneschi et al. (2011)	CC	SRR (HCMP)	1.88 (95 % CI: 1.17–2.88)
Bucchi et al. (2019)	CC/CIN III[3]	ASIR	APC[4]= 12.2 % (95 % CI: 7.6-17.0) vs APC= −2.7 % (95 % CI: −4.3–−1.1)
Collatuzzo et al. (2023)	CC (all)	OR	3.54 (95 % CI: 2.99–4.20)
Ferroni et al. (2024)	CC	IRR (Eastern Europe)	2.02 (95 % CI: 1.57–2.61)
Ferroni et al. (2024)	CC	ASIR	HMPC[7]= 11.8, Italians= 6.5
Di Biagio et al. (2025)	ICC[5]	IRR	3.80 (95 % CI: 3.13–4.59)
Di Biagio et al. (2025)	ISCC[6]	IRR	1.77 (95 % CI: 1.58–1.97)

[1] Cervical cancer,
[2] Standardized rate ratio,
[3] Cervical intraepithelial neoplasia III,
[4] Annual percentage change,
[5] Invasive cervical cancer,
[6] In situ cervical cancer;
[7] High Migratory Pressure Countries

based on a multivariable logistic regression model that compared CC to all other cancer sites. Additionally, foreign-born women showed a higher proportion of CC, with a PMR of 2.68 (95 % CI: 2.29–3.10) compared with Italian-born women [4].

Ferroni et al. (2024) reported a significantly higher IRR for CC among women born in Eastern Europe than among women born in Italy (IRR = 2.02; 95 % CI: 1.57–2.61). Overall, women from countries with HMPC had higher ASIR (11.8 cases per 100,000 women per year) than Italian women (6.5 cases per 100,000 women per year) [15].

Di Biagio et al. (2025) reported age-adjusted IRRs of 3.80 (95 % CI: 3.13–4.59) for ICC and 1.77 (95 % CI: 1.58–1.97) for ISCC among foreign-born women compared with Italian-born women. ASIRs (European standard population 2013) were also markedly higher among foreign-born women, with 26.5 vs 7.9 per 100,000 for ICC and 55.1 vs 29.2 per 100,000 for ISCC [15,27]. These findings indicate approximately a 3.4-fold higher incidence of ICC and nearly a twofold higher incidence of ISCC among foreign-born women [27].

3.5. Age, temporal, and cohort trends

Di Biagio et al. (2025) compared the median age at diagnosis between foreign-born and Italian-born women. For ICC, foreign-born women were diagnosed at a significantly younger age (median 50 years, range 24–79) compared with Italian-born women (median 58 years, range 20–93; $p < 0.001$). For ISCC, the median age at diagnosis was 40 years in both groups. Histologically, squamous cell carcinoma was more frequent among foreign-born women (86 %) than among Italian-born women (67 %; $p < 0.001$). Although a slightly higher proportion of foreign-born women were diagnosed with advanced ICC (61 % vs 58 %), this difference was not statistically significant, and the presence of metastases at diagnosis was comparable between groups [27].

From a temporal perspective, Bucchi et al. (2019) reported significant differences in incidence trends by nationality over the period 1994–2013 [26]. Cervical cancer incidence declined among Italian-born women (APC = −2.7 %), particularly in those aged ≥ 65 years, while remaining stable in younger age groups. In contrast, incidence increased significantly among foreign-born women (APC = 12.2 %), especially in more recent years. Foreign-born women were also diagnosed at a younger median age than Italian-born women (47 vs 59 years). For CIN III/CIS, a significant annual increase in incidence was observed in the overall population (APC = 6.4 %), with a more pronounced rise among foreign-born women. Applying an age–period–cohort model, the same study identified distinct period and cohort effects. Period-specific IRRs for cervical cancer remained stable until around 2000, followed by a slight decrease, a subsequent increase, and a more recent decline. Cohort analyses showed lower risks among women born in the early decades of the 20th century, increased risk among cohorts born after the 1950s, and a decline among those born after 1970. For CIN III and CIS, cohort-specific risks increased progressively among successive generations born after the 1970s [26].

3.6. Disparities by country of origin

Both Ferroni et al. (2024) and Di Biagio et al. (2025) analyzed CC incidence according to country or geographical area of birth [15,27]. Ferroni et al. (2024) reported a significantly higher IRR for CC among women born in Eastern Europe than among women born in Italy (IRR = 2.02; 95 % CI: 1.57–2.61) [15]. Similarly, Di Biagio et al. (2025) found that Romanian women—originating from Eastern Europe—accounted for 33.1 % (n = 183) of all CC cases among foreign-born women (n = 553), indicating a substantial contribution of this subgroup to the overall immigrant burden [27]. Ferroni et al. (2024) also identified women from Asia as a higher-risk group (IRR = 1.97; 95 % CI 1.00–5.49), while Di Biagio et al. (2025) reported that Chinese women were among the most represented immigrant subgroups diagnosed with CC. Although women from North African and Sub-Saharan African regions were represented among cases, findings were less consistent across studies, likely reflecting smaller subgroup sizes and limited statistical power [15,27].

3.7. Screening participation and detection disparities

In Umbria, participation in cervical screening among women aged 25–64 years with cervical lesions (2001–2013) did not differ significantly by nationality [26]. Among women diagnosed with CC, 46.3 % had been detected through screening, with comparable proportions among Italian-born (47.3 %) and foreign-born women (43.8 %) (p = 0.7). Similarly, among women diagnosed with CIN III or ISCC, participation in organized screening programs was similar between Italian-born and foreign-born women (62.5 % vs 63.5 %), as was the use of opportunistic screening (37.5 % vs 36.5 %; p = 0.7) [26].

3.8. Socio-demographic and structural influences

Foreign-born women were consistently described as a population experiencing structural and contextual vulnerability. Several studies reported higher CC incidence among women originating from countries characterized by higher HPV prevalence and less established CC screening systems [4,15,26]. These contextual differences were discussed as potential contributors to the observed disparities in incidence trends and stage at diagnosis in Italy. Although screening participation among women diagnosed with cervical lesions did not differ significantly by nationality in Umbria [26], broader migration-related factors were suggested as influencing access to preventive services and timing of diagnosis.

4. Discussion

The synthesis of findings from multiple Italian regions indicates a consistent disparity in CC incidence and outcomes between foreign-born and Italian women. Despite differences in study design and regional data availability, the overall pattern is clear: foreign-born women, particularly those originating from LMIC and regions with high HPV prevalence, experience a higher incidence of both invasive CC and high-grade pre-malignant lesions compared with Italian-born women, consistent with previous evidence [28]. Across studies, higher CC incidence was strongly associated with HPV prevalence in countries of origin. Women from Sub-Saharan Africa, North Africa, Asia, and Eastern Europe (e.g., Romania) showed a higher incidence of CIN III and invasive CC. This finding may be related not only to higher baseline exposure to HPV prior to migration but may also reflect global inequities in HPV prevention and screening infrastructure [10,15,27,29]. Studies from Northern and Central Italy showed that CC risk persists after migration, with foreign-born women more often diagnosed at a younger age and with more severe or invasive disease than their Italian peers [21].

Lower engagement with preventive pathways remains a key factor discussed in relation to the observed disparities in CC burden among migrant women. Although screening participation among women with cervical lesions appeared comparable by nationality in Umbria, incidence trends diverged markedly, with cervical cancer rates declining among Italian-born women and increasing among foreign-born women, who were also diagnosed at younger ages. This pattern suggests that comparable participation at the time of diagnosis does not necessarily reflect equivalent lifetime access to or continuity of screening. Delayed entry into organized screening after immigration may therefore represent a key explanatory mechanism. Women who access screening only years after arrival may have missed earlier opportunities for detection, increasing the probability of identifying prevalent high-grade lesions or early invasive cancers at first contact. At the same time, foreign-born women show higher detection of severe dysplasia and early-stage cancers at their initial screening participation, followed by reduced risk at subsequent rounds, reflecting a “catch-up effect”, where initial screening uptake uncovers previously undiagnosed disease [4,26,29]. Evidence from other European settings further supports the existence of an early post-migration window of increased vulnerability, particularly during the first years following immigration [30,31].

Many migrant women originate from settings where organized screening and HPV vaccination programs are limited or absent, contributing both to higher baseline risk prior to migration and delayed engagement with prevention after arrival. Together, these findings indicate that disparities are more likely to arise from cumulative differences in exposure to prevention and early detection across the life course, rather than from differential management once women enter the Italian healthcare system [15,26]. However, information on time since immigration at diagnosis and prior participation in screening or HPV vaccination in the country of origin is generally not available through Italian cancer registry sources. This limits the ability to disentangle the contribution of delayed entry into screening after arrival from persistently lower participation over time.

Differences in screening participation were frequently discussed in relation to socio-demographic and cultural characteristics of foreign populations. In this regard, lower educational attainment, limited literacy, unstable employment conditions, and weaker social integration were commonly reported among groups with lower engagement in preventive services [26,29,32,33]. Conversely, higher educational level, longer duration of residence in the host country, and greater familiarity with the healthcare system were more often observed among women participating in screening programs. These findings suggest that awareness of and ability to navigate organized public screening pathways may mitigate participation gaps, whereas recently arrived migrants and those in more precarious socioeconomic positions continue to face substantial barriers, often linked to language difficulties, cultural perceptions of preventive care, and limited health literacy [26,27,29,32]. Multilingual, culturally tailored communication campaigns can increase participation rates, highlighting the role of targeted outreach in addressing disparities [4,26,29,32].

The analysis of time adds another layer to these outcomes. The decline in CC incidence among Italian-born women sharply contrasts with the rising rates observed among foreign-born women, particularly in regions like Umbria [26]. This contrasting trend reflects progress in national CC prevention and underscores the importance of addressing immigration health patterns to improve overall population health indicators. The increase in CIS incidence among foreign-born women, especially younger groups, may indicate both better detection and ongoing disparities due to higher HPV exposure. Age–period–cohort analyses reveal that while older Italian cohorts have benefited from long-term screening programs, younger and foreign-born women remain at higher risk. This underscores the need for tailored prevention strategies that include both screening programs and HPV vaccination [26,27].

Despite regional differences in data accessibility, Italy’s universal healthcare framework remains effective in ensuring equitable treatment once disease is detected, but does not consistently guarantee equitable access to prevention [15,27,29,32]. Structural, linguistic, and informational barriers persist for foreign-born women, delaying their access to preventive services. Foreign women who do not participate in organized programs may have limited access to alternative diagnostic pathways, reflecting suboptimal integration and a persistent gap between preventive and general healthcare services [4,15,25–27,29,32]. Beyond its relevance to the Italian context, these findings align with broader European evidence on migration and cervical cancer disparities [9,30]. Previous international syntheses have primarily focused on screening uptake and socio-demographic determinants among migrant populations, particularly in Northern European countries [33]. By integrating population-based cancer registry data from multiple Italian regions, this review contributes complementary evidence on incidence trends, age at diagnosis, and age–period–cohort patterns within a universal healthcare system. These insights may inform other European settings experiencing similar demographic transitions, where organized screening programs coexist with persistent migration-related inequalities.

A key limitation emerging across the included studies concerns the non-systematic production of incidence and survival statistics stratified by country of birth within Italian cancer registries. While the country of birth is generally recorded, it is not uniformly used to generate routine cancer statistics for people born outside Italy. This limits the comparability and interpretability of disparities observed across regions, particularly where reliable population denominators are unavailable. In regions where robust denominator data were available (e.g., Veneto and Marche), authors were able to calculate incidence rates; elsewhere, reliance on proxy measures such as proportionate morbidity ratios further complicates surveillance. Moreover, undocumented migrants—who represent a vulnerable segment of the foreign-born population—are largely excluded from routine data systems, likely leading to underestimation of CC burden. Additional surveillance gaps concern pre-malignant cervical lesions, which are mainly recorded within organized screening programs and are not systematically linked to migration status information. Regular linkage between cancer registries and organized screening program databases would facilitate more comprehensive monitoring of both invasive and pre-invasive disease, improve data completeness, and enhance the capacity to detect disparities along the CC prevention pathway. Strengthening standardized data collection on country of birth, improving denominator estimation, and enhancing linkage with organized screening databases would substantially improve equity-focused cancer surveillance in Italy [4,11,20,34].

Taken together, these outcomes paint a complex but consistent picture: the Italian healthcare system does not consistently ensure early prevention and access for foreign-born populations. Structural, cultural, and informational barriers continue to delay diagnosis and increase disease disparity among foreign-born women, especially those from high HPV prevalence regions. Filling this gap requires comprehensive and inclusive strategies, including culturally adapted communication, strengthened outreach through community health intermediaries, and the integration of HPV vaccination programs for newly arrived immigrant women to reach equity in CC prevention across Italy.

4.1. Strengths and limitations

The selected studies cover different geographical areas of Italy (North, Center, and South). Additionally, the exclusive focus on CC allowed for more precise comparisons across studies and the integration of various epidemiological indicators (e.g., ORs, IRRs, ASIRs), thereby contributing to a clearer understanding of the issue. A key limitation of this review is the inclusion of only five studies, which restricts the breadth and generalizability of the findings. Although the studies cover different regions of Italy, findings cannot be fully generalized to the national level. Additionally, this review does not include pooled effect sizes due to methodological heterogeneity across the five studies. For example, reported IRRs and ORs may not be directly comparable due to variability in data availability, screening coverage, and registry accuracy. In this regard, higher screening coverage may increase the detection of precancers and early cancers, resulting in higher observed incidence, whereas incomplete or inaccurate registries can underestimate incidence. These factors may affect IRR and increase its sensitivity to differences in data quality and surveillance systems, and thus are less directly comparable to OR, which is less strongly tied to case detection over time [35].

Furthermore, this review did not include grey literature or Italian-language websites, which may have led to the omission of relevant national or local data. Moreover, the absence or incompleteness of population denominator data in some studies limited the ability to assess the accuracy of incidence rate estimates across regions. Another limitation is that undocumented foreign-born women were systematically excluded from the included studies, which likely leads to an underestimation of the overall burden and narrows the scope of this review. Finally, the limited reporting of potential confounders, such as HPV vaccination status, screening history, time since immigration, and socioeconomic position, made it challenging to fully disentangle the roles of biological, behavioral, and structural factors in shaping disparities.

5. Conclusion

This systematic review highlights a public health inequality: foreign-born women in Italy are disproportionately affected by a largely preventable disease. CC represents a clear example of health disparity, as early detection through screening programs and HPV vaccination can reduce both incidence and mortality rates [36]. Although Italy offers universal, free access to Pap and HPV testing programs and vaccination for adolescents, many foreign-born women do not attend these programs. The findings suggest that these disparities are strongly associated with various barriers, including inadequate tailored communication and outreach, the absence of targeted screening strategies for migrant populations, and cultural or systematic obstacles to healthcare access. Noteworthy, the earlier age at diagnosis and higher incidence of invasive disease among foreign-born women may reflect missed opportunities for early intervention and prevention of CC [37].

Future research should focus on evaluating the long-term effectiveness of targeted interventions to improve screening and follow-up among foreign-born women. Future studies should examine country of origin factors, including HPV prevalence and prior preventive care, and identify strategies to include undocumented and hard-to-reach populations. Research should also address system-level barriers, such as linguistic barriers, cultural access, and integration of opportunistic and organized screening programs, and investigate the application and potential effects of HPV vaccination programs for adult foreign-born women. In the absence of these efforts, CC in Italy will remain a healthcare challenge and may serve as a marker of social exclusion.

CRediT authorship contribution statement

Diego Serraino: Writing – review & editing, Supervision. **Paolo Boffetta:** Writing – review & editing, Supervision. **Valentina Biagioli:** Writing – original draft, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Mohsen Boughriou:** Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Kazem Zendehdel:** Writing – review & editing, Investigation, Conceptualization. **Fereshte Lotfi:** Writing – review & editing, Investigation, Conceptualization. **Eleonora Gorgati:** Writing – review & editing, Investigation.

Funding

The research leading to these results has received funding from AIRC under MFAG 2024 - ID. 30481 project – P.I. Biagioli Valentina

Declaration of Competing Interest

We have nothing to declare.

Acknowledgments

Manuel Zorzi and Stefano Guzzinati for sharing additional data from their article.

Data availability

The datasets generated during the current study are not publicly available but are available from the corresponding author on reasonable request.

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Glossary

HPV: Human Papillomavirus
CC: Cervical cancer
SDI: Socio-Demographic Index
ISTAT: Italian Institute of Statistics
AIRTUM: Association of Cancer Registries
OR: Odds ratio
IRR: Incidence rate ratio
ASIR: Age-standardized incidence rate
SRR: Standardized rate ratio
CIN III: Cervical intraepithelial neoplasia grade III
HIC: High-income countries
PMR: Proportionate morbidity ratio
ISCC: In situ cervical cancer
ICC: Infiltrating cervical cancer
HDC: Highly developed countries
HMPC: High Migratory Pressure Countries
APC: Annual percentage change
CI: Confidence interval
I: Italians
U: Unknown