Socioeconomic Inequalities In Cervical Cancer Screening: Implications For Health Economics

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ABSTRACT
Cervical cancer remains one of the leading causes of cancer-related deaths among women in Brazil and worldwide, despite being largely preventable through regular and effective screening. This study, through a literature review, analyzes the socioeconomic barriers that hinder early screening, highlighting their impacts on both female mortality and public health costs. The analysis, based on a literature review of primary and secondary data, indicates that strengthening organized screening programs and HPV vaccination campaigns not only reduces mortality but also represents a cost-effective strategy given the expenses associated with treating advanced stages of the disease. The results highlight the importance of targeted public policies that consider regional and socioeconomic inequalities in access to prevention. The study contributes to the debate on prevention as an instrument for reducing inequalities and for economic sustainability in the health system.

KEYWORDS: Cervical Cancer; Early Screening; Prevention; Health Economics.

ABBREVIATIONS: INCA: National Cancer Institute; HPV: Human Papillomavirus.

1. INTRODUCTION

Cervical cancer is currently the third most common type of cancer among women in Brazil and worldwide, representing a major public health challenge, especially in developing countries. According to the World Health Organization [1], more than 600,000 new cases are diagnosed annually, resulting in approximately 340,000 deaths. In Brazil, the INCA projects more than 17,000 new cases per year between 2023 and 2025 [2].

Despite being a largely preventable disease through adequate screening, cervical cancer continues to disproportionately impact women in situations of socioeconomic vulnerability. Recent studies indicate that limited access to preventive services, such as the Pap smear, is one of the main barriers to early detection [3]. According to INCA, this neoplasm continues to be classified as a serious public health problem in Brazil [4].

International experiences indicate that the number of deaths from the disease could be reduced by at least 80%. To this end, the Pan American Health Organization suggests the implementation of national cervical cancer control programs, which include prevention and primary services, early detection, treatment and preventive care [5]. Early screening, in turn, is usually carried out by two main means: through a preventive gynecological examination - Pap smear, and/or through DNA testing for the HPV [6].

The importance of early screening is mainly due to its high capacity to prevent cervical cancer. At present, it is mentioned that HPV is indicated as the main etiological factor of the neoplasia [7]. In addition to screening, early diagnosis becomes essential to ensure timely and effective treatment of cancer, allowing therapeutic interventions that help prevent the progression of the disease to advanced stages. For example, colposcopy and biopsy, usually used to confirm the presence or absence of precursor lesions or invasive cancer in patients who did not have normal results in screening tests [6].

In view of this, it is also extremely important to analyze the expenditures of the Public Health System on cervical cancer, such as expenses and socioeconomic impacts caused by the disease. This is because medical expenses and direct costs are included when talking about expenditures associated with neoplasia [3]. In this context, the role of Health Economics stands out, a field that investigates the economic impacts of health decisions, including the allocation of resources, treatment costs and the benefits generated by prevention actions, in addition to being concerned with national policies derived from the importance that individuals attribute to the economic problems they face when seeking and maintaining their health [8]. From this perspective, it is of equal interest to study more specific themes, such as the Economics of Cancer, with regard to the attempt to reduce the vulnerability of the female population to neoplasms such as cervical cancer itself [9,10].

Although early cervical cancer screening is widely recognized as an effective tool for reducing mortality, several studies point to persistent inequalities in access to these services, especially in regions with greater socioeconomic vulnerability. However, few studies address socioeconomic and structural barriers in the Brazilian context in an integrated manner, analyzing not only screening challenges but also their economic and public health impacts. This article seeks to fill this gap by exploring the difficulties faced by women of different socioeconomic profiles and proposing paths for a more equitable and efficient approach.

Thus, this article aims to identify the main socioeconomic difficulties that affect early screening for cervical cancer, as well as to analyze the impacts of these barriers on the public health system. To this end, a bibliographic review is carried out based on national and international studies.

2. METHODOLOGY

The methodology of this study consists of a descriptive, narrative analysis and a literature review approach. To develop the research, five steps were followed:

1- Choosing the topic and formulating the research hypothesis for the literature review.
2- The topic was selected based on the relevance of early cervical cancer screening in the context of public health and health economics. The initial hypothesis was that socioeconomic and structural barriers significantly limit access to screening and aggravate associated public health costs.
3- Determining the inclusion and exclusion criteria for studies and conducting the literature search.
4- Inclusion criteria: Studies published in the last 12 years, available in full text, that address early cervical cancer screening, socioeconomic barriers, or the economic impact of prevention. Quantitative and qualitative research and systematic reviews were included.
5- Exclusion criteria: Articles that deal exclusively with other neoplasms, publications in languages other than Portuguese, English and Spanish, and studies without a clearly defined methodology.

2.1. DEFINITION OF THE INFORMATION THAT WILL BE EXTRACTED FROM THE STUDIES AND CATEGORIZATION OF THE RESULTS

The databases consulted include PubMed, SciELO, Google Scholar and CAPES Periodicals Portal. The searches used combinations of keywords, such as:

- "cervical cancer";
- "early screening";
- "socioeconomic barriers";
- "HPV vaccination".

2.2. CRITICAL EVALUATION OF THE STUDIES THAT WERE INCLUDED IN THE LITERATURE REVIEW

Data were collected through a detailed reading of the selected studies. The extracted information was categorized into main topics: socioeconomic barriers, impact on access to health, cultural factors and health policies. To ensure consistency, two researchers independently reviewed the included studies, and any disagreements were resolved by consensus.

2.3. PREPARATION AND PRESENTATION OF THE SYNTHESIS OF KNOWLEDGE GENERATED BY THE REVIEW

After applying the inclusion and exclusion criteria, seven studies were selected. The analysis was conducted qualitatively, focusing on comparing the findings of the selected studies and on the practical implications for public policies and health economics. The results were systematized in a table and discussed based on additional literature for contextualization.

3. LITERATURE REVIEW

This section presents a brief review of selected articles on early screening (mainly through Pap smear and HPV tests) in the detection of precursor lesions, as well as the socioeconomic barriers encountered along the way, in addition to their impact on reducing mortality from cervical cancer. In the international context, many research articles were found and selected that addressed early screening for cervical cancer [11-14]. At the national level, a few research articles were also found [15-17].

3.1. CERVICAL CANCER AND EARLY SCREENING

Akinyemiju [11] assessed the influence of household socioeconomic status (household income - poorest, middle and richest), access to health care and national characteristics (those related to the strength and quality of health infrastructure, health expenditure and under-5 mortality rates) on breast cancer and cervical cancer screening in women living in developing countries, especially low-income countries. The database used was the World Health Survey of 2002-2003. Specifically, the variables used for cervical cancer screening were questions about Pelvic Examination and Pap smear, marital status, level of education, employment, age, residence and access to health care. For this purpose, they used descriptive statistics and the Chi-square test.

According to the aforementioned study, only 4.1% (out of a total of 10.021) of women aged between 18 and 69 years had undergone cervical cancer screening in the three years preceding the study period in the countries analyzed. Also, the determinants that had a positive relationship with screening, that is, that hindered early detection of neoplasia, were: the socioeconomic status of the household; living in a rural area; the country's health expenditure (% Gross Domestic Product); and access to health care [11].

Tadesse [12] assessed the relationship between socioeconomic and cultural factors and how sensitive Ethiopian women are to cervical cancer, from April to May 2013. The sample consisted of 198 female patients at Tikur Anbessa Hospital, who were interviewed. The characteristics considered were: age, marital status, permanent residence, religion, occupation, educational status, number of children, monthly family income and family size. From descriptive statistics, it was found that this neoplasm disproportionately affects women with low socioeconomic status (defined by education, income and occupation), suggesting that primary and secondary prevention mechanisms should be initiated and strengthened. Furthermore, challenges in the diagnostic process were highlighted, indicating that an expansion of treatment facilities is needed to help avoid difficulties for patients with future housing and treatment costs, as diagnosed patients become more vulnerable and need counseling and adequate psychosocial support.

Di *et al*. [13] investigated knowledge about cervical cancer prevention and control among women in the provinces of Liaoning, Hubei, and Shaanxi in China in 2013. They conducted a cross-sectional (in-person) survey with 308 women who received screening services. ANOVA and Chi-square tests were used to compare knowledge rates, and logistic regression was used to examine the factors (age, level of education, and whether they received medical advice) associated with patients' knowledge levels. In the results, they found that a higher level of education, receiving medical advice, and younger age were significant predictors of greater knowledge about early screening of the disease. Also, women who visited a health institution were more likely to obtain more complete and meaningful information.

In the national context, Sen *et al*. [14] examined the socioeconomic and regional variations in breast and cervical cancer screening among Indian women of reproductive age (15-49 years). For this, descriptive statistics, the Concentration Index, the Concentration Curve, and logistic regression were used. The variables handled in the study were: age, marital status, religion, social group, place of residence, health insurance, use of hormonal contraception, Body Mass Index (BMI), alcohol and tobacco consumption habits, dietary habits (consumption of fried foods and fruits), regions, education level, gender of the head of the household, and media exposure.

The results of the study showed that women with a higher level of education, who were married and older, were more likely to undergo screening for breast and cervical cancer. Furthermore, those who belonged to female-headed households, were Christian, used tobacco products, were overweight and lived in urban areas had a higher adherence to screening for both cancers. In addition, socioeconomic factors, lack of infrastructure (essential health structures in regional centers and national programs) for screening, lack of awareness, stigmas and cultural taboos were shown to be factors related to low adherence to cancer screening in the country [14].

Meira *et al*. [15] studied the unequal screening followed by higher mortality rates in municipalities in the Brazilian Northeast from 2015 to 2019, where they observed that places with worse socioeconomic indicators were associated with higher mortality rates due to malignant neoplasia of the cervix. The disparities in incidence and mortality from cervical cancer were related to the temporal and spatial distribution of the magnitude of the proportion of risk and protective factors in the female population. Among the most relevant risk factors were: the use of oral contraceptives, the fertility rate, behaviors that increased the risk of infection by the HPV and the incidence of diseases that reduced women's immunity.

When it comes to the main protective factors against cervical cancer, the highlights are the high coverage of the HPV vaccine, the presence of an organized screening program with high coverage and quality related to access to treatment for the disease and its precursor lesions (surgery, chemotherapy and radiotherapy). And, in Brazil, it is notorious that the risk and protective factors are not correctly distributed among the federative units and their municipalities. It is found that a higher fertility rate, lower coverage of gynecological preventive exams, a greater deficit in the performance of Pap smear tests and in the number of biopsies are found in states in regions with greater socioeconomic vulnerability, in this case, the North and Northeast [15].

Júnior *et al*. [16] sought to understand the barriers to meeting proposed goals for effective cervical cancer screening in Brazil. To this end, they sought to identify the main socioeconomic factors that influenced women's adherence to preventive gynecological examinations, as well as to analyze the structural and logistical limitations existing in health services that reflect on the regular performance of examinations, in addition to evaluating the impact of awareness and health education campaigns in relation to screening for the cancer studied. The methodology used was an integrative literature review.

The results of the aforementioned research showed a convergence in the factors that hindered the achievement of cervical cancer screening goals in Brazil, including socioeconomic, psychological, organizational, and structural barriers in diagnosed women. The need for an integrated approach that encompasses better health infrastructure, training of health professionals, and continuous educational campaigns was highlighted. Also, health policies that address socioeconomic and psychological barriers to have appropriate preventive coverage were needed [16].

Finally, Cunha *et al*. [17] sought to clarify the importance of screening and early detection through preventive gynecological examinations for cervical cancer. The study methodology was developed through an integrative literature review. The results indicated that women had little knowledge about the Pap smear, making it difficult to adhere to it, which is a problem, since the test is one of the main means of efficiently detecting cervical cancer. This is especially true for women with low levels of education and low income. Therefore, it is important to improve information about the test so that all women have access to correct information about the neoplasia, in addition to greater dissemination of the relevance of vaccination as a method of preventing HPV, which is correlated with the worsening of the disease.

4. RESULTS AND DISCUSSION

After the search and selection of the works, seven were selected in total, as identified and summarized in the Literature Review. Table 1 expresses the systematization of the studies used in this research.

Table 1: Systematization of the works selected for the research, with titles, authors, place of publication, year, main conclusions and focus of the study.

Title	Authors	Location	Year	Main Conclusions
Socio-Economic and Health Access Determinants of Breast and Cervical Cancer Screening in Low-Income Countries: Analysis of the World Health Survey	Tomi F. Akinyemiju	Michigan	2012	The analysis was conducted qualitatively, focusing on comparing the findings of the selected studies and the practical implications for public policies and health economics. The results were systematized in a table and discussed based on additional literature for contextualization.
Socio-economic and cultural vulnerabilities to cervical cancer and challenges faced by patients attending care at Tikur Anbessa Hospital: a cross-sectional and qualitative study	Sara Kebede Tadesse	Ethiopia	2015	Socioeconomic and cultural vulnerabilities (such as early marriage) make screening difficult. High costs negatively impact access to diagnosis and treatment.
Knowledge of Cervical Cancer Screening among Women across Different Socio-Economic Regions of China	Jiangli Di *et al*.	China	2015	Low knowledge about screening in less developed regions. Education and access to information are decisive factors.
Socio-economic and regional variation in breast and cervical cancer screening among Indian women of reproductive age: a study from the National Family Health Survey	Soumendu Sen *et al*.	India	2022	Cultural taboos, poor infrastructure and regional inequalities are the main factors for low adherence to screening.
Mortality from Cervical Cancer in Northeastern Municipalities: Correlation with Sociodemographic Indicators	Karina Cardoso Meira *et al*.	Brazil	2023	Higher mortality rates are associated with regions with worse socioeconomic indicators.
Barriers to achieving cervical cancer screening targets in Brazil	Cicero Ricarte Beserra Junior *et al*.	Brazil	2024	Organizational and socioeconomic barriers hinder the achievement of tracking goals. Need for infrastructure and training.
Importance of screening and early detection of cervical cancer: a review	Matheus de Almeida Cunha *et al*.	Brazil	2024	Low adherence to screening due to a lack of information and awareness, especially in low-income populations.

Source: Author's elaboration (2025).

The main findings of the studies analyzed were divided into four topics: Socioeconomic Factors, Health Infrastructure, Awareness and Education, and Economic Impact.

4.1. SOCIOECONOMIC FACTORS

Socioeconomic barriers were cited throughout all selected articles. As highlighted by Akinyemiju [11], socioeconomic inequality was one of the main factors that were directly linked to low cervical cancer screening rates. Also, women belonging to poorer families had substantially lower chances of being screened and diagnosed. Another highlight was living in rural areas and, consequently, visiting NGO clinics instead of government or even private ones. Tadesse [12] also identified that socioeconomic fragility, poverty, unequal and low educational levels and limited family income were seen as significant factors for the ineffective early screening of neoplasia, as well as its diagnosis.

4.2. HEALTH INFRASTRUCTURE

In agreement with the results obtained in the studies, the inefficient health infrastructure has a direct impact on early screening. This is because preventive gynecological examinations and HPV tests, for example, have a great magnitude in this process and need to be properly aligned with a good health structure. And, according to the research, there is a divergence in this sense between regions. For example, urban regions tend to offer better access to the health system, while rural areas and/or areas with worse socioeconomic indicators tend to face greater difficulties [15]. This was also an aspect found by Akinyemiju [11] and Di *et al*. [13], where it was pointed out that: more developed regions and with higher levels of education had a positive impact on the adherence to early screening for cervical cancer.

4.3. AWARENESS AND EDUCATION

The importance of health awareness and education was emphasized in almost all of the studies. For example, in the study by Cunha *et al*. [17], it was cited and demonstrated that women with greater knowledge about preventive gynecological examinations tend to adhere more to early screening for neoplasia. For his part, Sen *et al*. [14], in their study focused on India, reached the same conclusion when they pointed out that cultural issues and taboos regarding cervical cancer made screening and early diagnosis difficult. Tadesse [12] also reinforces this idea by citing cultural practices, such as early marriage and polygamy, both of which can increase the risk of HPV infection and prevent efficient screening for the disease.

4.4. ECONOMIC IMPACT

According to what was observed in all the research, it is essential to talk about the relevance of health policies that encourage early screening, vaccination against the HPV and the search for preventive gynecological examinations. Sen *et al*. [14] reinforce that, with these measures, the impact on the health economy would be inevitable, by reducing treatment in advanced stages and, thus, also the direct and indirect expenses related to the disease. Likewise, it was found that these actions would have an equal impact on reducing cancer mortality, since these movements would help to reduce contagion by the HPV, sharing information and knowledge for women from all regions, whether they live in rural, urban or peripheral areas.

5. FINAL CONSIDERATIONS

Understanding the importance of early screening for cervical cancer reveals a dense panorama full of obstacles. This is because there are several barriers, such as socioeconomic and structural inequalities, in addition to low awareness and existing flaws in the infrastructure of the Health System, not only in Brazil, but also worldwide. These difficulties affect the screening process and, it can also be said, contribute to the increase in mortality rates with a neoplasm with great potential for prevention (if not the one with the greatest potential).

Overcoming the aforementioned barriers can even generate significant savings for the Health System and for patients and their families in general, precisely by reducing expenses, especially in advanced stages of cancer, which require greater economic and psychological deprivation. That said, it is important that strategies are developed to ensure early screening, such as reinforcing awareness campaigns not only in a period of rising mortality rates, but as a whole. The health infrastructure, particularly in rural areas and/or areas with lower socioeconomic and demographic indicators, needs ongoing improvement, as well as additional policies to encourage vaccination, screening, and diagnosis.

Finally, there is a lack of studies that focus on the economic impacts of prevention policies, especially on the most economically and psychologically vulnerable women. Another suggestion is to conduct a cost-benefit analysis of educational campaigns in rural areas. It is urgent that all classes of women have equal access to quality basic health services.

CONFLICT OF INTEREST

None.

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