COMPARING THE EPIDEMIOLOGICAL DATA OF CERVICAL CANCER MORTALITY BETWEEN THE BRAZILIAN CITIES OF SALVADOR AND BARREIRAS, BAHIA

COMPARAÇÃO DOS DADOS EPIDEMIOLÓGICOS DE MORTALIDADE POR CÂNCER DO COLO DO ÚTERO ENTRE AS CIDADES BRASILEIRAS DE SALVADOR E BARREIRAS, BAHIA

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ABSTRACT: Cervical Cancer (CC), even though it can reach high cure rates when early diagnosis occurs, is a severe public health problem, especially in less developed regions, such as interior regions, categorizing itself with increased diagnosis rates and mortality. To conduct a survey of mortality rates by year and age of cervical cancer between 2009 and 2019 and draw a comparative profile of these indicators in the population of Salvador and Barreiras. This is quantitative, descriptive, epidemiological, and cross-sectional research, in which data were obtained through the information contained in DATASUS (http://www.tabnet.datasus.gov.br) and available bibliographies, being processed and listed based on statistical calculations for analysis, considering the years studied. In Salvador, between 2009 and 2019, it was possible to observe an increasing temporal trend over the years for mortality from cancer, unlike Barreiras, which had a decreasing rate since 2017, where older women were the most affected in both regions, aged between 50 and 79 years, with similar prevalence in the areas, but with delayed cases in women living in the city of Barreiras. In brief, the results presented the importance of obtaining an early diagnosis for the neoplasm is verified, taking into account that increased rates over the years can be avoided with screening services since it is an easily detectable neoplasm with a high cure rate.

KEYWORDS: Oncology, Incidence, Epidemiology, Women's Health, Public Health.

RESUMO: O Câncer do Colo do Útero (CCU), mesmo podendo atingir elevados índices de cura quando ocorre o diagnóstico precoce, é um sério problema de saúde pública, principalmente em regiões menos desenvolvidas, como regiões interioranas, categorizando-se com altos índices de diagnósticos e mortalidade. Como objetivo, visa-se realizar um levantamento dos índices de mortalidade por ano e idade do Câncer do Colo do Útero entre 2009 a 2019 e traçar um perfil comparativo destes indicativos na população de Salvador e Barreiras. Trata-se de uma pesquisa quantitativa, descritiva, epidemiológica e transversal, na qual, obteve-se os dados através de informações contidas no DATASUS (http://www.tabnet.datasus.gov.br) e bibliografias disponíveis, sendo processados e elencados baseando-se em cálculos estatísticos para análise, considerando os anos estudados. Em Salvador, entre os anos de 2009 a 2019, foi possível observar uma tendência temporal crescente durante os anos para a mortalidade da neoplasia, diferente de Barreiras que apresentou taxa decrescente desde o ano de 2017. Mulheres com maior idade foram as mais acometidas nas duas regiões, com a faixa etária entre 50 a 79 anos, com prevalências similares nas regiões, porém com retardo dos casos em mulheres residentes da cidade de Barreiras. Tendo em vista os resultados apresentados, verifica-se a importância de se obter um diagnóstico precoce para a neoplasia, devendo
levar em consideração que o aumento das taxas durante os anos pode ser evitado com serviços de rastreamento, já que se trata de uma neoplasia de fácil detecção e com alto índice de cura.

PALAVRAS-CHAVE: Oncologia, Incidência, Epidemiologia, Saúde da Mulher, Saúde Pública.

1. Introduction

Cancer is understood to be a series of different malignant pathologies in which the disordered growth of cells is the main characteristic (INCA, 2023). These cells with uncontrolled growth divide quickly, which makes them very aggressive and invasive, thus leading to malignant tumors that can invade other tissues throughout the body, causing metastases (Hanahan & Weinberg 2011). Mutations in cells that lead to the appearance of cancer are due to the relationship of genetic factors with external biological, physical, and chemical characteristics (INCA, 2023). In addition, tumor cells have features such as resistance to multiple drugs (Marques et al., 2019a; Marques et al., 2019b; Marques et al., 2021) and altered energy metabolism (Marques et al., 2023).

The World Health Organization (WHO) maintains that cancer is a severe public health problem affecting individuals worldwide, from developing to developed countries. About one in six deaths worldwide are related to cancer. In this context, this pathology is considered by the WHO as the second main factor of death, with the vast majority of these deaths recorded in low and middle-income countries (OMS, 2020).

In Brazil, Cervical Cancer (CC) is among women's three most frequent neoplasms, as revealed by INCA data. CC is a neoplastic malignancy, which
is located in the epithelium of the cervix of the uterus, causing changes in healthy cells, such as their disordered growth, where over time, it evolves into what is called Invasive Cervical Carcinoma (Meira, 2013; Olusola et al., 2019).

The WHO demonstrates the relationship between Human Papillomavirus (HPV) infection and the development of CC; however, its isolated infection is insufficient to develop the neoplasm since other factors, such as smoking, alcohol use, and multiparity, influence its emergence when accompanied by HPV. Attesting to this assertion, women who test positive for Anti-HPV antibodies may never develop Cervical Cancer, thus requiring the additional factors to work together. Therefore, HPV infection is a risk factor of great magnitude for this type of cancer because despite being insufficient if isolated, its presence is still necessary to cause the neoplasm (da Rosa et al., 2009).

The relationship between HPV and CC is due to the interaction of the virus genome with that of the host cell, in which the virus modulates proteins and makes them oncogenic, as it contains the DNA of the two viruses (HPV 16 and 18). Over the years, with the persistence of the viral infection, genetic alterations and progressions of different degrees may arise until invasive cancer develops (Almeira, Sakama & Campos, 2009). It is known that early diagnosis can minimize mortality rates, in general, for all cancers, including CC. Thus, with the gynecological Pap smear, early detection of neoplasia helps unravel lesions in the early stages. This gynecological exam has several advantages, such as low cost and high effectiveness, a method of screening for lesions. The Unified Health System (SUS) offers it to screen this type of cancer (Casarin & Escobar, 2011).

The incidence of CC is intimately related to places with little development and, consequently, less economically favored. In Brazil, the low economic status makes accessing preventive, diagnostic, and treatment methods difficult, as health services are restricted. In turn, in the Northeast
region of the country, there are cities with few or no intermediate health centers, in municipalities in the interior of the state reveal the inexistence of a decrease or stability in the cancer incidence rates, in which this scenario is related to the difficulty in tracking the neoplasm in the population residing outside urbanized areas, where wealthier regions, such as capitals, have fewer cases compared to peripheral areas (Barbosa et al., 2016).

Although it is possible to achieve high rates of cervical cancer cure when early diagnosis occurs, its epidemiology in places with little development has high incidence and death rates. Thus, the need to adopt quality therapeutic and diagnostic measures to improve assistance to women by preventive means, such as the Pap smear (da Silva et al., 2014).

Therefore, because the municipality of Barreiras is located in the western region of the state of Bahia and far from the capital, and still based on the importance of studies in the area of cancer epidemiology, the objective of this study is a survey of mortality rates due to year and age by Cervical Cancer between 2009 and 2019 and to draw a comparative profile of these indicators in the population of Salvador and Barreiras.

2. Materials and Methods

The present research is configured as a quantitative study of a descriptive, epidemiological, transversal, or longitudinal nature of positive cases of Cervical Cancer (CC), in which practical analyzes were carried out in the DATASUS database, which provided transparent information on the public data with notifications and records of 3 diagnoses in women with cancer between the years 2009 to 2019 in Salvador and the city of Barreiras.

In obtaining the data for the development of the study, information was collected and analyzed in July 2023. This information contained some pre-defined aspects such as mortality, age group, period, region, municipality, and the number of inhabitants.
All data were obtained from the SUS information department, generating graphics relevant to the criteria as mentioned earlier, using the programs TabWin, TabNet (http://www.tabnet.datasus.gov.br)(tools associated with DATASUS), and Microsoft Excel that provided subsidies to the analyses, where the data were obtained from statistical calculations for interpretation and display of results considering the relevant variables.

In addition to the information contained in the DATASUS database, articles included in the SciELO, Biblioteca Virtual em Saúde (BVS), and PUBMED databases were used in this study for the bibliographic survey, in which the present research had as inclusion criteria: selection of specific bibliographies in the area, published in the corresponding period between 2006 and 2021, which addressed the proposed theme. Exclusion criteria were articles published before 2006, those that did not sufficiently address the proposed theme and those that were repeated in different databases. For the search in the databases, the descriptors both in Portuguese and in English were used: “cervical cancer,” “HPV,” “CC mortality,” and the epidemiological variants that provided a better outline of the profile of this pathology. With this, 50 articles were selected for reading their respective abstracts. Among them, 16 articles were chosen that developed the study because they contemplated all the pre-defined criteria.

3. Results

In this study, only women residing in Salvador and Barreiras were included, with cases reported and registered in DATASUS. Therefore, the exclusion criteria adopted for the research were: male and female non-residents of the studied regions. As they are public data, authorization from the ethics and research committee on human beings was not required.

With the analysis of the graphs obtained by the DATASUS database, with the description of mortality caused by Cervical Cancer (CC), significant
results were obtained regarding the age with the highest rate of diagnosed cases, location of the tumor, region (Salvador and Barreiras), the total number of deaths and annual incidence of fatalities, both for each location.

The collection of information from the DATASUS database made it possible to obtain actual results by creating topics categorically chosen for the discussion of this article. Initially, the mortality rates of the 5 most frequent primary locations were observed from 2009 to 2019, adjusted for age, by the world population, per 100,000 women, Salvador and Barreiras.

With the research carried out in the DATASUS information department, a ranking of the five most frequent primary locations of the decade (2009 to 2019) and their mortality rate was obtained. In Salvador Graph 1, the percentage is 4.88% of the mortality rate for cancer, with the CC in 4th place in the ranking, the 1st place occupied by Breast Cancer with 16.19%, the 2nd place by Bronchial Cancer and Lungs with 7.83%, and the 3rd place of Colon Cancer with 4.98% of the rate, as shown in Graph 1.

Graph 1. Ranking of the most frequent primary locations of tumors from 2009 to 2019 and their mortality rate in the capital of the state of Bahia, Salvador.

In the city of Barreiras, the CC reaches the 3rd place in the ranking,
obtaining a rate of 5.35% of deaths, being the 1st and 2nd place respectively occupied by Breast Cancer with 8.12% of the rate and Bronchial and Lung Cancer with 5.43%, as shown in **Graph 2**.

Graph 2. Ranking of the most frequent primary locations of tumors from 2009 to 2019 and their mortality rate in the city of Barreiras-BA

![Barreiras Mortality Rate Graph](image)

In a second moment, the total number of deaths from Cervical Cancer (CC) was analyzed, per year, according to the primary location of the tumor, in women, in Salvador and Barreiras between 2009 and 2019 (**graph 3**). After the graphic analysis, the total number of deaths of women caused by Cervical Cancer (CC) in the last decade (2009 to 2019) and the annual number of these deaths were obtained, selecting the year with the highest index.

In the Capital, Salvador, the number of deaths is 954, whereas, in 2019, 107 deaths from cancer were reported, the year with the highest incidence of mortality compared to the others, as seen in **Graph 3** left. On the other hand, this trend is different in the city of Barreiras, as it has a total of 35 women, and the highlight year is 2017, with 8 deaths compared to other years, as shown in **Graph 3**, right.
Graph 3: Total number of deaths of women caused by cervical cancer between 2009 and 2019 and the annual number of these deaths in the capital of the state of Bahia, Salvador (left) and Barreiras (right)

Source: DATASUS

Finally, the analysis of mortality rates for Cervical Cancer was performed, adjusted by age in Salvador and Barreiras between the years 2009 to 2019. In a categorization by age group with the highest mortality rate, it was possible to observe that in Salvador, the highest rates were concentrated between 50 and 59 years of age, as described in Graph 5. In the city of Barreiras, the age group with the highest rates was 70 to 79. The city's female population demonstrates a delay of 20 years for death from CC to occur compared to another region studied, as seen in Graph 4.

Graph 4: Age with the highest CCU mortality rate in the capital of the state of Bahia, Salvador (left) and Barreiras (right)

Source: DATASUS
Cervical Cancer is a severe public health problem in Brazil, as it is one of the main causes of mortality among women due to neoplasms. However, since the introduction of the cervical-vaginal oncotic cytology test, popularly known as Pap smear, to track cases of CC, the mortality numbers resulting from this neoplasm have decreased (Almeida, Sakama & Campos, 2006; Lopes & Ribeiro, 2019).

Due to its slow development, this neoplasm has a high percentage of prevention and cure, with early detection facilities and effective diagnosis and treatment (da Silva et al., 2014). Countries that adopt mass screening programs with early diagnosed neoplasm have a reduction in its morbidity and mortality. However, less developed countries such as Brazil, even with advances in CC control, still have diagnoses primarily performed in late stages (Lopes & Ribeiro, 2019). The collection of information from the DATASUS database showed 989 deaths from CC in the sum of the 2 regions studied. Among the cancers with the highest mortality rates, between 2009 and 2019, the occupies third place in Barreiras. In the capital of the state of Bahia, Salvador, the neoplasm occupies the fourth place.

Analyzing the results regarding the central locations that cancer affects, the CC presents itself as one of the four main neoplasms in the studied regions. Unlike other types of neoplastic malignancy, this one presents a slow evolution. These lesions can be observed in the early stages, contributing to a high probability of prevention and cure, among other cancers. However, there are real problems with the quality and coverage of cases, especially in more vulnerable regions (Fonseca & Rêgo, 2013).

As a result, cervical cancer mortality is still high in these regions, unlike areas with better economic conditions, which have reduced, in recent decades, the rates of Occurring mortalities (Fonseca & Rêgo, 2013). In the data analysis, the cases reported in the city of Barreiras in 2019 did not
exceed those reported in 2017 (Graph 3, left), unlike Salvador, which had an increase in the number of records over the years (Graph 3, right). However, mortality rates are still a concern considering that CC is a neoplasm with a slow evolution, which can be detected early through preventive examination (Almeida, Sakama & Campos, 2006).

Considering the data obtained and comparing the records of the city of Barreiras with the records of Salvador, it is noted that the rates increased in 2019 in the capital, with a temporal trend, while in Barreiras, there was a decrease in cases in that same year.

This fact can be explained, possibly, by the city of Barreiras not being faithful to the tracking methods and, consequently, to the records, because due to being located in the western region of the state of Bahia, it was expected that these numbers would be more expressive for the city and not to the capital, as it is a location with better resources, making this picture inconsistent with what is observed in the literature.

Corroborating the above, researchers demonstrated that corrected mortality data in the interior regions of the state obtained higher coefficients when compared to cases reported in the capital. As a result, they revealed an increasing temporal trend of mortality in the countryside over the years and an association between the highest records of cases with worse living conditions, while the lowest forms are observed in places with better conditions. This fact can be explained due to the precariousness of case records in the interior, which leads to conflicts in access to the prevention, diagnosis, and treatment of neoplasia (Gamarra, Valente & Silva, 2010).

Considering the increasing rate in Salvador, the decreasing mortality rates identified in Barreiras are precisely correlated with the deficiency in CC screening through cytopathological examination and, consequently, underreporting. Unfortunately, many women still do not undergo the Pap smear due to socioeconomic and cultural factors and lack of information (da Rocha et al., 2013). However, the possibility that the habits and lifestyle of
these women influenced the delay of cases cannot be ruled out.

The Pap smear is a worldwide prevention and screening strategy, including in Brazil. This test only detects changes caused by HPV and not the virus itself since molecular biology techniques are used for its identification, such as hybrid capture and PCR (Polymerase Chain Reaction) (da Silva et al., 2014).

The Pap smear is a painless, low-cost method, effective in screening and preventing cervical cancer, and available in the Unified Health System (SUS) (Lopes & Ribeiro, 2019). It is imperative that any woman who has initiated sexual activity, especially those who are sexually active, perform the preventive examination periodically, especially those aged between 25 and 59 years old (Casarin & Escobar, 2011).

The WHO indicates that when screening CC, it is necessary to cover the Pap smear of at least 80% of women with sexual activity. However, tracking is not as extensive in Brazil, especially among the most socially vulnerable areas, often in the country's interior (Barcelos et al., 2017; Piña-Sánchez P, 2022).

When analyzing the age group of women with higher CC mortality rates in the regions studied, it was observed that the ages between 50 and 79 years were the most affected in the study period, compared to younger women, making the variation clear between the city of Barreiras and Salvador. The literature supports the information obtained, showing that the incidence of CC increases with age. Women aged between 50 and 54 have a higher mortality percentage, whereas those over 70 have also demonstrated an increase in death rates. In turn, older women are diagnosed in advanced stages of the neoplasm, especially those without adequate screening (Tallon et al., 2020).

Reinforcing this study, the age group most affected by the neoplasm is concentrated in women over 35, aged between 45 and 50. CC mortality is an essential indicator of these women's living conditions and health care
quality. High mortality rates reveal failures in this pathology's early diagnosis, treatment, and prognosis. From that, one can assess the quality of access to health for the female population (de Mendonça et al., 2008).

Taking into account the estimates presented in this study, it is advisable to observe them as approximations of confirmed cases, as some limitations were faced in obtaining the data for their comparison, such as the possible lack of case records for the synthesis of the epidemiological profile, characterized as underreporting, and it is credible that mortality rates, especially in the city of Barreiras, are higher than those presented in the DATASUS database, impairing the reliable analysis of the materials, in addition to the pandemic scenario that the world meets.

It is recommended that other studies be carried out comparing the inequality in CC mortality between the regions studied here based on the tracking and coverage service, the number of Pap smears performed in the areas, and the quality of these services. so as to provide accurate comparisons. It is also advisable that future studies look for the factors that most cause CC in the regions to devise strategies that reduce the actual mortality of the neoplasm, such as improving access to preventive examinations.

It is essential to point out that, on the part of the researchers, it was not possible to list the highest incidence of diagnosis regarding the early or late phase, considering the severity of the neoplasm. It is not known if there is a mass screening program for these diagnoses, especially in Barreiras and neighboring cities, and not even if there is a control or socio-educational program for this purpose.

Therefore, it was possible to observe from the results investigated that the CC had a temporal growth in Salvador, but with decreasing rates since 2017 in Barreiras, which can be explained by failures in coverage in this interior city, making it a challenge, thus being plausible. The need for improvements in cancer screening. These rates can be reduced when quality
screening services are adopted, using the Pap smear, with early detection and health promotion.

Based on what has been presented, the investigation in a determined period of 10 years revealed that older women are more affected in these regions, as already seen in the literature, with the diagnosis mostly made at a late stage.

One of the limitations of the work is the possible non-reporting of data obtained from DATASUS, given that the notified cases are only sometimes included in the SUS bioinformatics platform. Furthermore, it is known that many patients treated in the city of Barreiras are not residents of the same city but instead from nearby regions. This is because Barreiras is a satellite city for treating milder cancer occurrences.

As possible tangible solutions concerning public health and the epidemiology of cervical cancer, it is understood that concrete actions involving prevention, early detection, access to health services, and the advancement of science are necessary. It is also worth mentioning that the vaccine against HPV 16 and 18, the main oncogenic viral agents, is free of charge in the SUS. With coordinated efforts and continued commitment, it is possible to significantly reduce the incidence and impact of this disease, improving women's quality of life and saving lives.

5. Final Considerations

It is concluded that the data will serve for further investigations on the CC in the studied locations and may contribute to comparisons on the subject since limitations and recommendations for other studies were presented, especially in Barreiras, western Bahia. It is suggested that socio-educational measures, public policies such as lectures, and scientific dissemination actions are carried out to prevent and make the population aware of the epidemiological factors of cancer.
References


