Health Vigilance and Risk Factors for Cervical Cancer: A Study in the State of Maranhão, Brazil

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Abstract

The purpose of this cross-sectional study was to investigate the importance of health vigilance in the prevention of cervical cancer. The sample consisted of 536 women. To identify which risk factors were associated with cervical cancer or with an increase in the mortality rate of this kind of cancer, a logistic regression model was used. The *Odds Ratios* (OR) and their respective 95% confidence intervals were also calculated. Most of them were at the age of highest incidence of cervical cancer (21 - 59 years old), had an unstable conjugal situation, minimal educational level (78.7%), low income (58.3%), consumed alcoholic beverages (56.4%), had a history of smoking (57.0%) and possessed limited knowledge about the prevention. These results are discussed in terms of a predictive model for cervical cancer that considers the importance of public health vigilance in the screening and precocious diagnosis.

Keywords

Cancer, Cervix Uteri, Public Health Surveillance, Epidemiology

1. Introduction

In 2020, the International Agency for Research on Cancer (IARC) reported that the global burden of cancer was profound, with an estimated 19.3 million new cases (excluding nonmelanoma skin cancer) and nearly 10.0 million cancer-related deaths. Female breast cancer emerged as the most diagnosed cancer, surpassing lung cancer, with an estimated 2.3 million new cases (11.7%). This was followed by lung cancer (11.4%), colorectal cancer (10.0%), prostate cancer (7.3%), and stomach cancer (5.6%) [1].

Despite advances, lung cancer maintained its position as the leading cause of

cancer-related deaths, claiming an estimated 1.8 million lives (18%). Other significant contributors to cancer mortality included colorectal cancer (9.4%), liver cancer (8.3%), stomach cancer (7.7%), and female breast cancer (6.9%) [1].

Noteworthy disparities were observed between transitioning and transitioned countries. Overall cancer incidence was 2 to 3 times higher in transitioned countries for both sexes, while death rates for female breast and cervical cancers were considerably elevated in transitioning countries.

Looking ahead to 2040, the global cancer burden is anticipated to rise to 28.4 million cases—a 47% increase from 2020. Transitioning countries are expected to experience a more substantial surge (64% to 95%) compared to transitioned countries (32% to 56%). This projection is attributed to demographic shifts and the rising impact of risk factors associated with globalization and economic growth.

Of particular concern are the elevated death rates for female breast and cervical cancers in transitioning countries. This underscores the urgency of addressing these disparities and implementing effective strategies for cancer prevention, early detection, and treatment on a global scale [1].

In recent decades, Brazil has witnessed a notable rise in the incidence of malignant neoplasms. In 2008, the National Institute of Cancer under the Ministry of Health (in Portuguese Ministério da Saúde [MS]) documented a total of 472,000 new cases of cancer and 134,000 associated deaths [2]. This positioned cancer as the second leading cause of mortality in the Brazilian population, ranking only below circulatory diseases.

Back in 2004, Brazil recorded 141,000 deaths attributed to cancer, with lung, prostate, and stomach cancers emerging as the predominant causes of cancer-related mortality in men. For women, breast cancer, along with uterine, colon, and intestinal cancers, were identified as the most prevalent contributors to cancer-related deaths. Notably, uterine and colon cancers represented the third most frequent cancer diagnoses and the fourth leading causes of mortality among women [3].

These statistics underscore the substantial impact of cancer on public health in Brazil, prompting a need for comprehensive strategies and initiatives in cancer prevention, early detection, and treatment. The prominence of specific cancer types highlights the importance of targeted efforts to address the unique challenges posed by different forms of the disease in both men and women.

In the state of Maranhão, mortality resulting from neoplasms differs from the situation in the rest of the country. This epidemiological reality of cancer is not different in the municipality of São José de Ribamar, which is part of the metropolitan area of São Luís, where neoplasms are the third leading cause of death in all age groups [4].

Epidemiological studies of cervical cancer have related its development to sexual behavior and the transmission of infectious agents. According to the *World Health Organization* (WHO), the main risk factor for cervical cancer is infection by Human Papillomavirus (HPV). All sexually active women are sus-

ceptible to the development of the cancer. Poor hygiene and diet, smoking, the precocious initiation of sexual activity, have many sexual partners and the use of oral contraceptives also favors the development of this cancer. However, due to the overlap of many of these factors, the population exposed to the most risk is women between 25 and 59 years old with a low socioeconomic status [5].

Although early diagnosis of cervical cancer is easy, the disease has a slow evolution. In most cases, a period of approximately 10 years passes between the precursor phase and the development of the cancer itself. More than 70% of the patients who are diagnosed present with an advanced stage at their first consult, which hinders the possibility of a cure [5].

From 2012 to 2016, Brazil experienced a rise in cervical cancer-related deaths, totaling 27,716 cases during this period. The specific mortality rate for the country increased from 6.86 to 7.18, reflecting a growth of 4.6% in the mortality coefficient [6].

Examining age groups, 189 deaths were reported among women under 25 years old, constituting 0.68% of the total deaths. Most cervical cancer fatalities occurred between the ages of 25 and 64, with 18,574 deaths (67.02%), while 8950 deaths (32.29%) were recorded in the group over 64 years old. Notably, the 50 - 54 age group exhibited the highest percentage of deaths [6].

Regional disparities were evident, with the North region having the highest death rates attributed to cervical cancer. Interestingly, the South region stood out for experiencing the highest growth rate in mortality during the observed period [6].

In summary, cervical cancer mortality in Brazil witnessed an overall increase, with a concentration of deaths among women aged 50 - 54. The regional analysis revealed that the North region faced higher death rates, while the South region experienced a more pronounced growth in mortality rates. These findings underscore the importance of targeted interventions and awareness campaigns, especially in regions with elevated mortality rates, to address the growing impact of cervical cancer in Brazil [5].

The means of prevention are included within levels of medical attention. The primary method of prevention is to decrease exposure to the risk factors; in other words, by the creation of barriers to infection by HPV through the encouragement of safe sex practices, the adoption of a healthy lifestyle, and decreasing the consumption of greasy foods [1] [5] [6].

The secondary method of prevention is the detection of the cancer *in situ* or of precursor lesions by the cytological cervicovaginal exam (*Papanicolau* or "Pap smear"), where the cancer can be cured in 100% of cases. This exam consists of a cervical smear that is examined in the laboratory, allowing prevention, precocious detection, and treatment. Pap smear screening is the most adequate and sensible instrument available and is inexpensive and well-tolerated by patients. Studies have demonstrated that, after a negative exam, the cumulative risk of developing this type of cancer decreases substantially, such that women can safely have the exam only once every three years after two negative annual exams

[5] [6].

Using epidemiological concepts and information about a determined area, municipality, or region, a health professional can, for example, establish the association between risk and protection factors and certain diseases, identify the population exposed to these factors, and define actions for prevention or precocious detection of diseases [5] [6].

The overlife in cancer refers to the time between the diagnosis of the tumor and the occurrence of some specific event, such as relapse, metastasis, or death. To cure patients with cervical cancer or increase their overlife, it is necessary to encourage the precocious detection and treatment of this pathology, which is only possible if there is a well-organized oncological attention model [5] [6] [7].

The 1988 Federal Constitution of Brazil, through its article 1988, instituted the Health Unique System (HUS), which administers an ensemble of health actions and services developed by the three levels of government to ensure universal access to the system, fairness of service, and the organization of the hierarchy of service. To contribute to this reorientation of the Health Attention Model through primary care, the Family Health Program (FHP) has been in operation since 1995 [8].

The FHP is part of Brazil's primary net of health services. In practice, however, oncological care is not offered at this organizational level because patients with cervical cancer in Brazil have poor access to the Health Service Net, especially in rural areas where the screening and diagnosis of this cancer do not take place according to the clinical protocols of this disease [9].

Cancer prevention, however, inserts the oncological attention model into all levels of health care: health promotion, follow-up of risk factors, populational or opportunistic screenings of cancers of precocious detection, assessments of the quality of health care and mortality, and over life studies, among others [5] [6] [10].

The municipality of São José de Ribamar is located near the city of São Luís, making access between these areas easy and making São José de Ribamar an example of the social and demographic conditions of both an eminently rural and an urban population. In the Director Plan of Regionalization (DPR) of the state of Maranhão, patients who need secondary (mammography, colposcopy, breast biopsy, histopathological exam) and tertiary (oncological surgeries, radio- and chemotherapy) oncological attention are to be treated in São Luís, the main municipality of the Macro/Micro Area of Health [11] [12].

Thus, in this research, information was collected to measure the impact of cervical cancer in Jardim Tropical in the municipality of São José de Ribamar, Maranhão, Brazil. Specifically, the epidemiological profile of this disease and the potential risk to women between 25 and 59 years old of developing this type of cancer were investigated. In addition, the study aims to demonstrate the efficacy of the screening actions, secondary prevention (precocious diagnosis), treatment and stages of the disease and the clinical and surgical protocols defined for these pathologies at the Oncologic Primary Attention Net of this municipality.

2. Materials and Methods

After approval by the Ethics and Research Committee from the Hospital of the Federal University of Maranhão (UFMA) (process n˚ 33104-847/2006), a cross-sectional study was performed through the application of questionnaires to collect information about the incidence and risk factors, determinant or not, of cervical cancer (gender, age, marital status, ethnic group, income, occupation, educational attainment, family history of cancer, consumption of alcohol and smoking, the use of oral contraceptives, age of first sexual intercourse, etc.), as well as the accessibility, diagnosis and treatment of the network of health services.

The sample was comprised of women between 25 and 59 years old who visited the Primary Units of Health of FHP and lived in the Jardim Tropical area in the municipality of São José de Ribamar, Maranhão, Brazil. This area consists of a transitional urban/rural zone that has a population of 4236 inhabitants [13], and 720 women in the age range under study visited the FHP. In addition to meeting the age criterion, the women who participated in the study accepted and signed the informed consent form, lived in the area between August 2007 and July 2008, and did not have negative results on their two most recent annual Pap smear examinations. Thus, 536 women were included in the final sample of the study.

Professionals from FHP's group, technical and administrative staff from the municipality of São José de Ribamar, Maranhão, Brazil, and medical and nursing students from the Federal University of Maranhão were trained to interview the participants and collect data. The quality control of the work performed by the Primary Units of the FHP involved verifying the occurrence of the interviews, reviewing the completed questionnaires and verifying the data entry. The data analysis was performed with the Supervision of Data Procession from the State Health Secretary and Municipal Health Secretary of São José de Ribamar.

A descriptive analysis was first performed on the data. Second, to identify which of the factors are associated with cervical cancer or with an increase in mortality from cervical cancer, a logistic regression model was used. The *odds ratios* (OR) and their respective 95% confidence intervals were also estimated. The studied variables included the following: 1) education level (up to 5 or more years of study), 2) income (up to 1 wage earner in the household or more than 1 wage earner in the household), 3) age of first sexual activity (≤18 years old or >18 years old), 4) number of lifetime sexual partners (1 - 4 or more than 4 partners), 5) parity (up to 2 parturitions or more than 2 parturitions), 6) the use of oral contraceptives (yes or no), 7) lifetime history of smoking (smoker or never smoked), 8) presence or absence of transmissible sexual diseases (TSDs) in the woman, 9) presence or absence of TSDs in the partner, 10) gynecological disorders (with the presence or absence of HPV). Finally, multivariate logistic regression was used to establish the association of the factors with the incidence of cervical. The data were analyzed using EpiInfo 2003 and STATA 10 software, with a 5% significance level.

3. Results and Discussion

Most women in the sample were 30 to 39 years old (36.5%). The percentage of women related to this age was 45.5%. Most of the sample was of mixed ethnicity (51.2%), and only 24.5% of the interviewed women were married.

Regarding educational attainment, 51.2% of the interviewed women had a basic education (eight years of study). Educational attainment has been used as an indicator in studies related to cervical cancer because a poor education can compromise a woman's comprehension of the prevention of diseases, especially cervical cancer, as well as her understanding of the evolution process of the disease and her adherence to prevention programs [5] [6] [7].

Regarding family finances, 58.3% of the studied women reported earning one to two wages in the household.

Regarding harmful habits reported by the sample, 56.4% of the participants drank alcoholic beverages, and 57.0% had a lifetime history of smoking (29.0% smokers and 28.0% ex-smokers).

More than one-half of them (52.0%) had begun sexual activity at less than 18 years old, which can be considered precocious. In addition, 86.0% of the studied women declared that they used oral contraceptives, and 67.4% of the interviewed women said that they used condoms (Table 1).

Most of the studied sample (83.8%) had undergone their Pap smear exam at the Units of Public Health. In addition, 94.3% of the sample reported delays in the service they received at the Units of Public Health of at least 30 minutes. One third of the studied women (32.1%) underwent this exam annually, 42.3% did it every two or three years and 25.6% had never had the exam or had undergone it more than three years before.

A history of some type of cancer in the family was indicated by 10.5% of the interviewed women. Another 79.7% did not know whether they had a family history of cancer.

A substantial percentage of women admitted having had more than five-lifetime sexual partners (41.9%). Regarding TSDs, 5.0% of the sample reported being infected, and 95.0% reported that they were not infected. Only 6.0% of the participants reported that their current sexual partner was infected with a TSD.

Table 1. Smoking and oral contraceptive use in the study sample.

Specification	F	%
Smoking		
Current	155	29.0
Never	230	43.0
Ex-smoker	150	28.0
Use of oral contraceptives		
Yes	461	86.0
No	75	14.0

All the women agreed that their health is extremely important, but they differed in their conceptions about health. For 32.0% of them, health means the absence of symptoms, not being sick. Another group (37.0%) defined health in a wider way because of one's living conditions, while 19.0% related health directly to their physical condition and/or ability to work. Only 12.0% of the women defined health as the prevention of diseases.

Most women in the sample had known about the Pap smear exam for more than 10 years (66.0%), and 34.0% responded that they had had this knowledge for less than 10 years. While some women learned about Pap smears for the first time when they were young, others reported having first heard more recently on television or the radio, probably as part of recent public health campaigns. Only 10% of the women did not remember at what time they first heard about the Pap smear exam.

The women indicated multiple reasons for not having their Pap smear exams at the prescribed time intervals. For analysis, the explanations were grouped according to similarity. For 23.0% of the women, "absence of symptoms" was a central theme. Another 22.0% indicated their family and work obligations, including fear of losing their jobs, as the major problem. For another group (17.0%), feelings of fear and/or shame were the main obstacle to the execution of the exam. A lack of motivation to undergo the exam while at the same time acknowledging responsibility for the problem was indicated by 14.0% of them, and for another 13.0%, the central issue was the difficulty of obtaining the exam at the Health Unit. Only 5% of the sample did not undergo the exam because they were no longer sexually active.

A large majority of the women (85.0%) did not report other health problems. The remaining 15.0% reported a range of chronic diseases, like hypertension, diabetes, and osteoporosis, and other, more sporadic, illnesses were reported (e.g., menstrual cramps, back pain, influenza).

As a group, the studied women were involved in a constant struggle to provide for themselves and their families. Most worked in unskilled occupations, with 52.0% performing domestic labor (e.g., maids) with low remuneration.

Of the interviewed women, 84.0% underwent the Pap smear exam, a percentage slightly lower than the minimal coverage of the population (85.0%) recommended by the WHO [14] but within the parameters of the Health Agreement between the municipality of São José de Ribamar and the State Secretary of Health and the Ministry of Health. Of the 450 executed preventive exams, 27 were inconclusive, 2 were negative, 373 (82.9%) presented inflammatory disturbances and 48 showed varied grades of cervical-vaginal pathologies, as defined by the Brazilian Nomenclature for Cervical Decisions and Extolled Conducts [5] [6] [7]. Of the 48 exams that presented varied grades of cervical-vaginal pathologies, 14 exams presented H-SIL results compatible with HPV virus infection. However, the hybrid capture exam was not done in these patients (Table 2). The difficulties related to obtaining the results of the preventive exams were a delay in the arrival of the results, the absence of the professional on the appointed day,

Table 2. Results of preventive exams performed in the sample in 2006/07, as defined by the Brazilian nomenclature of cervical decisions.

Specification	F	%
Inconclusive	27	5.92
Negative	2	0.54
Inflammatory	373	82.88
Undetermined meaning (squamous) (ASC)	25	5.62
Undetermined meaning (glandular)	4	0.88
Indefinite origin	0	0.00
Low grade LSIL (NIC I+HPV)	14	3.11
High grade HSIL (NIC II-III)	4	0.88
High grade (including micro-invasion)	0	0.00
Invasive squamous cell carcinoma epidermoide invasor	1	0.17
Adenocarcinoma *in situ*	0	0.00
Invader adenocarcinoma	0	0.00
Other malignant neoplasms	0	0.00
Total	450	100.00

an excess number of patients to attend to, and the need to return many times to the Health Service.

According to the results of the preventive exams, 48 subjects were informally referred to a Health Unit with the ability to provide secondary and/or tertiary care in oncology, more specifically in São Luís because São José de Ribamar, does not have the necessary equipment and services to provide oncological diagnosis and treatment, despite having capable professionals.

The information obtained in this research illustrates the precarious circumstances of women between 25 and 59 years old who are part of the lower income working class including their concrete limits for assuming control of their health and, in this context, viewing the prevention of cervical cancer as a routine in their lives. The limitations of this population include deficiencies in the area's health services and the absence of a health vigilance system.

The analysis of the social, economic, and cultural conditions of these women reported in the present study increase the comprehension of the difficulties encountered by the studied population and of their experiences in relation to the prevention of cervical cancer. Thus, the study raises other questions that need to be understood regarding the problem of cervical cancer in Brazil.

The interviews with the women revealed elements essential to the comprehension of the routine lives of women from the lower income working class who are the most vulnerable to the risk factors leading to cervical cancer. Thus, even though this study cannot be extended to the entire population of Brazilian women,

it indicates elements that are common social indicators, as reported by Home Inquiry about Risk Behaviour [15], for the women of these parts of the population. They can also serve as points of reference when considering the difficulties experienced by a portion of the female population when attempting to exercise their right to preventive care, specifically for cervical cancer.

The study also demonstrates that it is not just the lower income and the precarious living conditions of this subset of women that compromise their health care, knowledge, and preventive measures, and in this case the routine execution of preventive exams for cervical cancer. Other factors are present, including the advancement of knowledge and technologies for prevention, diagnosis, and precocious treatment of this cancer, that completely justify the use of health vigilance for the identification of the many causes of cervical cancer.

One of these factors is the definition of health. Although some women demonstrated an understanding of health determinants, in other words, "health as a result of life conditions", the idea of "health as the absence of disease" is very strong. Thus, the concept of prevention was almost nonexistent among these women.

The number of women who, because they "felt nothing", did not seek out or undergo the preventive exam for cervical cancer is notable. Other reasons for not undergoing the preventive exam included family responsibilities, financial conditions, work obligations, fear of losing their jobs, emotions like fear and shame, and even deficiencies in health services. Women giving the reason for not undergoing the Pap smear examination of "feeling nothing" also provided these other reasons.

A central issue is that these women don't realize that a hallmark feature of cervical cancer is its "damper" evolution through a long asymptomatic phase. Their understanding of the disease is related to their education level, but the regular Pap smear examinations are promoted by the health system and by the proper professionals.

It is known that the prevalence of HPV infection is greater in young women [16] who have not been prioritized by the cervical cancer prevention campaign. Thus, the profile of the disease among young women must be investigated. Teenagers must also be educated about the risk of infection by HPV, this information can be included in education about other TSDs and the risks of a more precocious beginning of sexual activity. Moreover, future campaigns for cervical cancer must include this target population.

The Brazilian Control Program of Cervical Cancer of the Ministry of Health and State and Municipal Secretaries, despite recognizing males' involvement in the transmission of HPV by the "culturally tolerated" multiple partnerships, have neglected to target males in the prevention of cervical cancer and have instead focused on the gynecological aspect and thus only women.

Another relevant aspect revealed in the study was the women's limited knowledge about the functioning of the body and about the prevention of cervical cancer. They were unaware of the risk factors, the development process of the

disease (beginning with precursor lesions, with damper and asymptomatic evolution) and the appropriate execution of the preventive exam.

The women revealed difficult experiences with the health services when they sought a Pap smear exam. The issue of access to preventive care is related to the service structures, the organization of the process of seeking medical attention, the difficulty of access, pent-up demand, a shortage of professionals, conflict resolution, and the questions related especially to the care service.

Thus, the resistance and the difficulties that these women expressed regarding the prevention of cervical cancer can be related to these negative experiences with health services.

Thus, many interrelated factors need to be understood within the health service because, while the women's failure to adhere to the preventive exam schedule is related to their social, economic, and cultural conditions [17], the deficiencies of the health service and the relations of the professionals with the women can partially explain the fact that they did not incorporate a preventive attitude in their lives.

The recent development of a structured National Oncology Program has not succeeded in developing health services at the state and municipal levels that meet the HUS protocol for cervical cancer, which includes structured oncological care that is systematic and provides continuous treatment. The Basic Unit of the Family's Health Program in Jardim Tropical, São José de Ribamar, does not execute monitoring for cervical cancer, although they do offer the cytology exam. An ideal Vigilance Health System would involve the systematic collection, analysis, research on and control of the risk factors; the upgrading of the capabilities of the health agents (doctors, nurses, etc.); the installation of a Public Health Laboratory connected to the Central and Regional Nets of Public Health Laboratories, all necessary equipment and supplies and human resources policies that dignify and qualify the professionals who work in this area.

Regarding the absence of a network of oncological care in the municipality of São José de Ribamar, Maranhão, Brazil, it becomes difficult to obtain diagnostic confirmation at secondary attention (follow-up visit) due to the absence of equipment or pathological anatomy services (biopsy of lesions), laboratories (hybrid capture exam to identify the type of HPV) and treatment of primary lesions by high-frequency surgery (HFS) or radical tracalectomy. Thus, patients must seek these services in São Luís, which entails many difficulties, like transport to the clinic and long waits for oncological care.

The need for patients with precursor lesions or with advanced stage cervical cancer to seek further treatment is also compromised because the referral to secondary and/or tertiary attention (radio- and chemotherapy and oncological surgery for advanced cases of cervical cancer) is made in an informal way. As a result, the patients' follow-ups are not performed.

The risk factors identified in the study to be associated with cervical cancer/HPV infection were smoking ($p < 0.05$) and the use of oral contraceptives ($p < 0.02$). These results match those found in other studies [5] [6] [18] [19]. Pro-

longed use of oral contraceptives increases the risk of developing cervical carcinoma. Oral contraceptive pills contain hormones like dexamethasone, progesterone and estrogen that intensify the genetic expression of HPV [18]. Smoking decreases the quantity and activity of Langerhans cells, the antigen presenting cells that are responsible for the activation of local cellular immunity against HPV. The reminiscent of nicotine metabolism remains can be found in cervical mucus [5] [6] [19].

In that sense, the adoption of practices that do not displace these women from health services but strengthen their bond with health professionals through trusting relationships is necessary. Education for health professionals regarding building relationships with female patients, improving the quality of the collection and analysis of cells in the Pap smear exam, and increasing the technical skill of the professionals specializing in gynecology and oncology are important steps in this process [5] [6] [20].

In sum, is necessary to improve the quality of oncological attention, education, to emphasize the collective responsibility of women's health professionals, and prioritize preventive health care, health promotion, and the prevention of diseases [5] [17].

This new focus on health promotion must include the following: 1) the identification of risk factors for known diseases, such as cervical cancer; 2) education and motivation about lifestyle changes; 3) strategies for adhesion to treatment; 4) creation of multidisciplinary treatment teams (incorporating other health professionals, like psychologists, occupational therapists, physiotherapists, etc.); and 5) giving the individual the power to manage their disease and control their risks [5].

Although precarious life circumstances result in increased risk for women in the working class, these segments of society can be saved from severe problems if they have access to qualified preventive care, diagnosis, and early treatment. This will require democratizing the available technological advances and practicing systematic health vigilance in all areas, municipalities, and states.

Public health policies must be grounded in objective information based on scientific evidence. Health vigilance has an important role in this process for the development of research and for the systematic collection of data from health information systems that enable the systematic evaluation of data about the prevalence, characteristics, and consequences of the diseases and, consequently, their control [5] [21].

Health vigilance can help to reduce the incidence of some health risks by the evaluation of factors, with significance or not, involved in the process of health/disease. For example, for cervical cancer, health vigilance involves the identification of risk factors and vulnerable groups of the population (risk groups). This contribution of health vigilance allows for the development of more efficient health programs, allowing a greater impact of the actions on public health. This process is named Sanitary Practice of Health Vigilance [5] [22]. It implies a permanent, continuous, and dynamic process of proper identification,

analysis, intervention, and monitoring of the health-disease process for a determined population or area [5] [23].

The necessary intervention process requires a wide range of technologies, *i.e.*, simple technologies for the cervical-vaginal cytology exam, intermediate technologies, like the CAF, and highly complex procedures like radio- and chemotherapy [5] [24]. Oncological care must therefore be well coordinated and allow women between 25- and 59-years old access to all levels of care.

The results of this study demonstrate that there is no structured service of health vigilance in the Municipal Health Secretary of São José de Ribamar, Maranhão, Brazil, with regular data collection or research on the population. The medical and government groups that contribute to health vigilance are absorbed by the responsibilities of the programs' coordination, which rarely learn new information or analyze and disseminate information to all who need it. Thus, they hinder the control of health risks and do not assume the role of a connection between the production of scientific and technological knowledge and the services of public health.

There are sub-systems of information linked to the State Health Secretary and Ministry of Health [4] that limit the dispersal of data obtained by the public net of health services to the information center, which are also referred to as the sub-notification system. Therefore, health care planning and programs are not based on epidemiological data that indicate, both globally and regionally, which diseases are prevalent in each municipality.

This research also confirmed the absence of an Oncological Attention Model, in other words, a net of oncological attention organized by technological complexity and specialized human resources (doctors, nurses) that can ensure adequate attention to the patient with cervical cancer. This issue contributes to the decrease of overlive and an increase in mortality for patients with cervical cancer in Jardim Tropical, São José de Ribamar, Maranhão, and Brazil [5] [6] [25].

The Oncological Attention Model must be organized into primary, secondary, and tertiary levels, with well-defined functions of each considering the clinical protocol of each type of cancer to effectively work as a net of oncological attention with guaranteed access to treatment and formal referrals [5] [23].

This research is one of the three pillars that support [26] our well-received work on Brazilian public health, and this result was achieved through our ability to create a well-articulated process of induction, production, and consumption of the epidemiological studies [27].

The use of health vigilance with the recommendations presented in this text constitutes an important step for Brazilian public health because it is an efficient instrument in identifying gaps in knowledge regarding the behavior of diseases, such as cervical cancer. This research will help define priorities for public health.

This was the first study in the state of Maranhão on determinant and non-determinant factors for cervical cancer, *i.e.*, the description of the epidemiological, social, economic, educational, and cultural profiles of the women between 25 and 59 years of age in the area of Jardim Tropical, São José de Ribamar,

Maranhão, Brazil and the magnitude of the public health problem due to the absence of a health vigilance program with an integrated net of oncological attention for the prevention of cervical cancer.

Therefore, we recommend that this study be replicated in other places to construct a predictor model for cervical cancer that considers the importance of health vigilance in screening, access to health services, precocious diagnosis, and immediate treatment that is in line with the clinical-surgical protocol of this pathology.

4. Conclusions

1) The majority of the sample was within the age range of highest incidence of cervical cancer (21 - 59 years old), had an unstable marital situation, minimal educational level, low income, a past or current smoking habit, and used oral contraceptives;

2) The studied population presented limited knowledge about the prevention of cervical cancer, its risk factors, the development of the disease, and the interval at which to undergo preventive screening;

3) There is neither a structured health vigilance service in the studied area and in the municipality of São José de Ribamar, Maranhão, Brazil, nor a net of oncological attention organized by treatment levels;

4) This study demonstrated that the Pap smear exam, even with the high coverage of the target population, if done alone as a simple program of prevention, is not sufficient to control the high incidence of cervical cancer in this population of women.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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