Breast and Uterine Cancer in Formiga City, Minas Gerais, Brazil: Government Data, Interviews with Local Physicians, and Mitigation

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ABSTRACT

Introduction: Cancers together rank among the major public health challenges globally, as do individual cancers, such as breast and uterine. Challenges are even greater in less developed countries, and especially in their small and medium-sized municipalities, in part due to the typical insufficiency of data and clinical resources. **Methodology:** We explored Municipal, State, and National databases regarding breast and uterine cancers in the municipality of Formiga, in the landlocked state of Minas Gerais in western Brazil. Additionally, we interviewed physicians in Formiga about their perception of the incidence and mortality of these cancers, and the adequacy of current and planned institutional responses locally and beyond to mitigate their societal costs. **Results:** Incidence and mortality were found to be average or slightly below average compared with the State and Nation. Interviewed physicians expressed greater concern about breast than uterine cancers. Local public health efforts specifically address these cancers, via short-term measures including increased availability of diagnostic exams, and long-term measures including education of the population and of clinical professionals. **Conclusion:** Further research should address the effectiveness of the public health measures at reducing locally the societal costs of breast and uterine cancers to patients, to insurers, and to the Municipality.

Key words: breast cancer; cancer diagnosis; cancer incidence; neoplasms; public health politics; uterine cancer

INTRODUCTION

Cancers result from the cumulative effects of gene mutations that eventually undermine cellular reproductive controls, such as contact inhibition. When such mutations are found to be caused by external factors, the cancers may be classified as environmental (Carrio-Cordo et al., 2020). Nearly all cancers are non-communicable diseases (NCDs). Together, cancers join chronic cardiovascular and respiratory diseases as the top three sources of disease mortality globally (Organization, 2013). Despite advances in screening, cancer continues to be a major public health and clinical challenge, from diagnosis to treatment (Carrio-Cordo et al., 2020; Teixeira et al., 2007).

Among cancers that affect females, breast cancer is globally the most commonly diagnosed, and the fifth most commonly fatal (behind lung, colorectal, liver, and stomach). In 2018, the number of women who died of breast cancer was 626,679 globally and 18,442 in Brazil. Also in 2018, the number of women who died of cervical cancer (a form of uterine cancer, as the cervix is in the lower part of the uterus) was 311,365 globally and 8,079 in Brazil. These and other data (Cataliotti et al., 2007) illustrate the importance of breast and uterine cancers as contributors to female mortality worldwide, together amounting to 938,044 deaths in 2018, or 22.5 percent of female deaths from cancer. In Brazil, breast and uterine cancers are among the five types of cancer with the highest incidence and mortality (Zimet et al., 2013).

More than 36 million deaths annually are caused by NCDs, generating 63 percent of global deaths, including people who die before age 70. More than 90 percent of these premature deaths from NCDs occur in low- and middle-income countries. The good news is, this number is probably subject to major reduction, inasmuch as most premature deaths are linked to common, controllable risk factors (Organization, 2013).

One survey of the disease burden in Brazil divided risk factors into metabolic, behavioral, and environmental/occupational categories (Malta et al, 2017; Winters et al, 2017). NCD risk, as expected, increased with chronological age. Most notably, metabolic risk factors predominated in women, whereas behavioral factors predominated in men. Such identifiable risk factors significantly contribute to development of NCDs, including cancer. Many such risk factors, however, also were found to be subject to modification toward NCD prevention.

In Brazil, excluding non-melanoma skin cancers, breast cancer has the highest incidence among women in all Brazilian regions. Mortality rates continue to rise globally and in Brazil, despite improvements in health care and health conditions. In Brazil, the most developed regions, in the South and Southeast, exhibit the highest incidence rates. Breast cancer incidence and mortality also increase progressively over time, from age 40. Continuing increases in women's life expectancy, especially in countries such as Brazil, reasonably would be expected to exacerbate this trend (Zimet et al 2013; Malta, 2017). Further assessment of factors contributing to breast cancer incidence and mortality, and of the potential to mitigate their controllable risk factors, is urgent for municipalities in Brazil, and beyond.

The most common type of uterine cancer, cervical cancer, is strongly and causally associated with Human Papillomavirus (HPV) infection (Malta et al, 2017; Winters et al, 2017). HPV transmission occurs via unprotected sexual intercourse because of microscopic breaks in the mucosa or skin of the genital region. Routine Pap smears are essential for HPV screening. In Brazil they are provided free of charge to diagnose early cervical alterations. Early HPV diagnosis is associated with good prognosis. In Brazil, cervical cancer is fourth among all cancers contributing to female mortality (Malta et al, 2017; Winters et al, 2017). One estimate of new cases for 2020 is 16,590 women with the neoplasia. The high incidence of cases and of mortality together illustrate the importance of investigating cervical cancer risk factors in Brazil, notwithstanding the potential of periodic Pap smear screening to promote early diagnosis and improve clinical prognosis.

Data on breast and uterine cancers in small and medium-sized municipalities are deficient because infrastructure for diagnosis and treatment of cancer is concentrated predominantly in larger cities. Our research objective was to quantify the incidence of breast and uterine cancers in the medium-sized Municipality of Formiga, using data sources such as DATASUS, and comparing incidence and mortality in the Municipality, the State of Minas Gerais, and the Nation. We augmented this quantitative information with interviews with 12 physicians in the Municipality who were experienced in diagnosing and treating cancers. We also investigated government measures to mitigate cancer incidence and mortality locally.

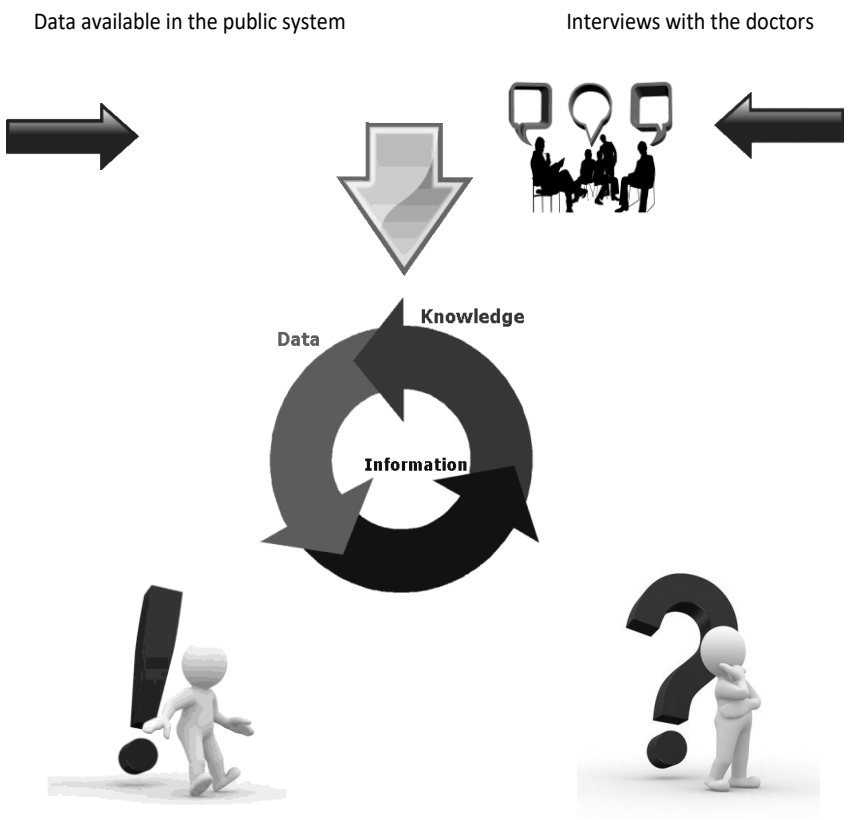
METHODS

Semi-structured interviews were used, posing general questions about cancer in the Municipality, and allowing the physicians to talk freely. The qualitative study offers subjective information from each interviewed physician's viewpoint. From such information, however, we hoped also to gain insight into the biopsychosocial pathology of each physician's patient population and, by extension, the cultural history of the Municipality of Formiga (Kamaraju et al., 2020).

To obtain quantitative data we used to search for public data through the DATASUS portal where mortality data from the municipality were analyzed and compared with State and Federal averages, which we synthesize into graphs for visual communication. Data were collected at the Secretary of Health of the Municipality regarding local measures of diagnosis and treatment that are planned and/or in progress. We sought to determine whether, and to what degree, these measures have been effective at the Federal, State, and/or Municipal level, and to predict what future effectiveness reasonably might be expected.

The interaction of qualitative and quantitative data, with documents and municipal information, constitute a complement of knowledge that generates more complete results. The methodology used followed a flowchart (Figure 1), in accordance with quantitative and qualitative methods of collective discourse analysis.

Figure 1. Flowchart for Data and Interview Analysis*



*Source: Research group methodology (Silva et al., 2019)

RESULTS

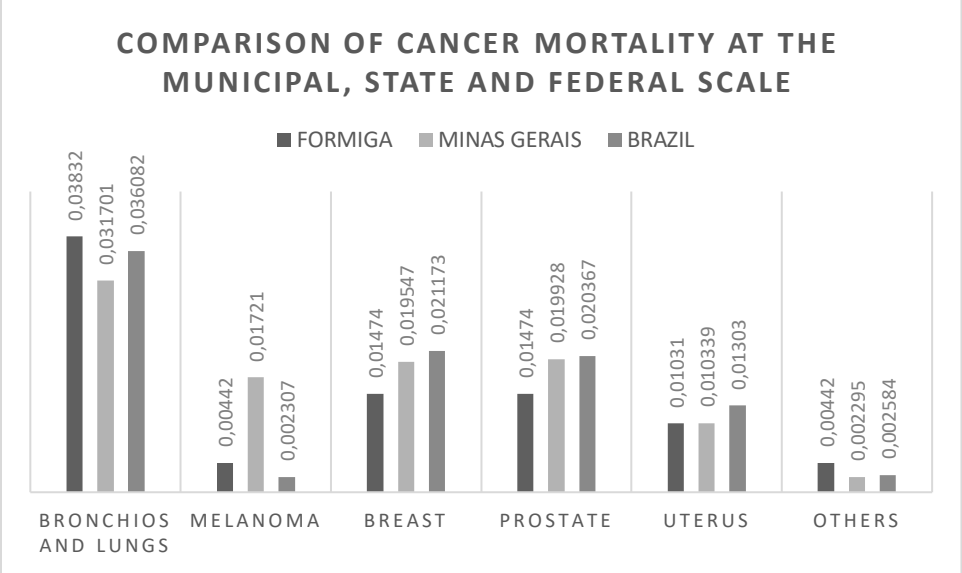
Figure 2 shows a comparison of population mortality rates from common types of cancer in the Municipality of Formiga, in the State of Minas Gerais, and in the Nation. Data were extracted from the Brazilian Federal Government's DATASUS Health Information System.

Figure 3 shows the number of deaths from some of the main types of cancer in the years from 2012 to 2014 in the Municipality of Formiga, including cancers of the uterus and breast.

Figure 4 shows results of interviews with physicians in the Municipality of Formiga. When asked which type of cancer is more prevalent in Formiga, 32 percent indicated breast cancer, making it the most important in the Municipality in the view of these physicians. On the other hand, uterine cancer was not reported as more important than breast cancer by any of the physicians.

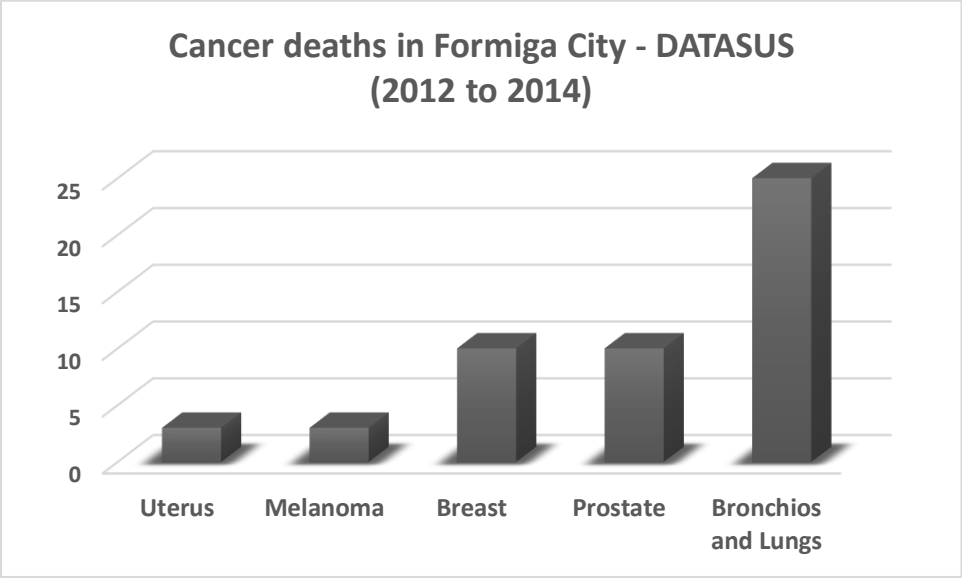
Among the twelve physicians interviewed, half mentioned the high incidence of breast cancer among women in the Municipality, whereas the physicians were silent regarding uterine cancer incidence. However, five of the 12 physicians talked about the availability of diagnostic measures for both types of cancer, such as mammography and Pap smears. Both measures were perceived as more effective for diagnosis than for prevention. Figure 4 also quantifies the percentages of the main types of cancer that were pointed out by the interviewed physicians, highlighting the relatively greater importance ascribed to breast cancer than to uterine cancer.

Figure 2. Mortality Rates from Cancers in the Municipality of Formiga, in the State of Minas Gerais, and in the Nation*



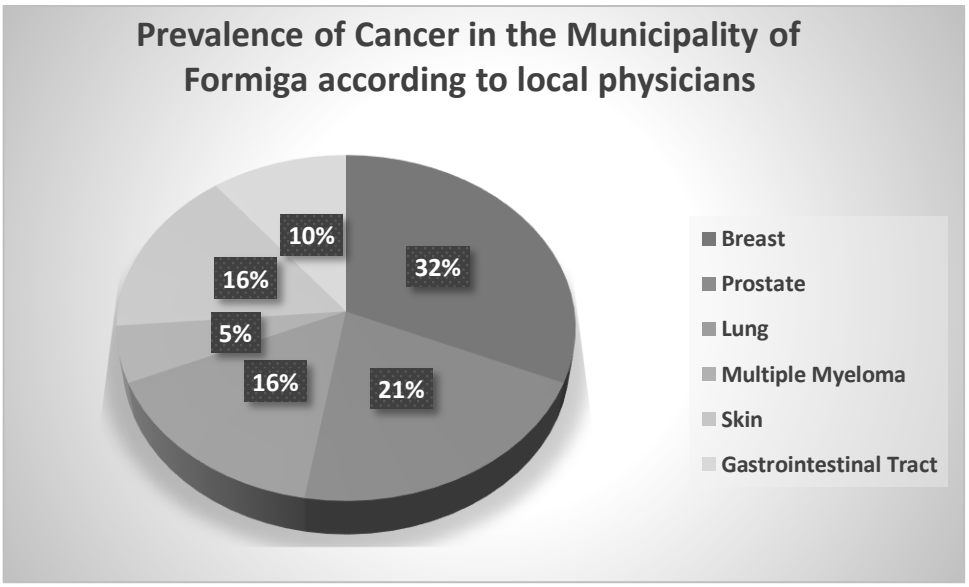
*Source: Data from the Brazilian public health system.

Figure 3. Deaths from Selected Cancers in the Municipality of Formiga, Brazil*



*Source: Research data

Figure 4. Analysis of Interviews with Physicians in the Municipality of Formiga, Brazil



*Source: Research data

SUS standards. The Municipality of Formiga is integrated into the Brazilian Unified Health System (SUS). It therefore should have in place standard measures for breast and uterine cancer prevention and control that are likewise required for medium-sized municipalities that are integrated into SUS. The Formiga Health Department identified measures aimed at controlling incidence and mortality for both types of cancers. The situation in Formiga, and very possibly for other municipalities of similar size, was found to be at variance from the SUS standards, consistent with a policy of regionalization, especially for breast cancer.

Breast cancer. Services that should be provided in Formiga include health education for women to increase their awareness of the importance of preventive examination, and training for medical professionals (Miller et al., 2019). Services also should include mammography examination for all women within the age range recommended by the Ministry of Health, and for other women based upon medical indication. The government of Formiga, however, lacks even a single mammography device for screening and prevention of breast cancer. Women therefore must seek these

services in larger cities. Further, women must provide their own transportation to these cities, unless illness strikes, in which case the Municipality might provide ambulance transport.

Uterine cancer. Services that should be provided in Formiga include health education for women to increase their awareness of the importance of preventive examination and PAP smears, and training for medical professionals. Services also should include active search of the target population to determine HPV vaccination status, and to provide vaccination as needed. The Municipal government also should make PAP smears available, including providing equipment such as speculum, spatula, and fixator. The Municipal government also should provide expert cytopathology services.

DISCUSSION

Brazilian small and medium sized municipalities suffer from several typical difficulties involving cancer prevention, diagnosis, and treatment, as the country has limited public health resources, generally producing regionalization of resources, and therefore only regional availability of the best SUS equipment. Thus, smaller municipalities and localities ultimately rely upon resources allocated to larger municipalities. In short, endeavors to collect data on breast and uterine cancer in Brazil ultimately end up producing data almost exclusively related to state capitals and large cities (Sadovsky et al., 2015).

Despite this difficulty created by regionalization, the Municipality of Formiga has attained reasonable success in controlling the incidence of breast and uterine cancer, as shown in Figure 4. The percentage of deaths from breast cancer is lower than the State and National averages. This favorable number can be attributed to a greater access to physicians, common in medium and small-sized municipalities, and the availability, although not universal, of access to mammography. The data, as reinforced by interviews, confirm that breast cancer is important in the Municipality, and show that physicians frequently attend women with this breast cancer.

Success in preventing and treating uterine cancer in Formiga is less clear. The population mortality rate from this cancer type is within the Minas Gerais State average and below the Brazilian National average. This may be the case, in part because availability of health services in the Formiga is above the average for Brazil, which is a country featuring great regional disparities (Almeida et al., 2013). Interviews with physicians in Formiga reinforced this impression.

Breast and uterine cancer caused significant fractions of total mortality in Formiga over the period 2012 to 2014, as shown in Figure 3. Although the absolute numbers may seem small (three deaths from uterine cancer and 10 from breast cancer), the Municipality has fewer than 70,000 inhabitants. In addition, the number of cases also is of course higher than the numbers of deaths, producing (in addition to the deaths) great suffering and long, complex, and expensive treatment. These societal costs, which include both private and public costs, also must be considered (Warren et al., 2008).

Understanding of the risk factors for breast and uterine cancer in the Municipality must be improved, toward three evidently feasible goals: increasing prevention, early

diagnosis, and successful treatment (Miller et al., 2019). The Municipality provides basic care for both types of cancer, as recommended by the Public Health Service (SUS). Given the potential for increasing education, access to medical resources and treatment effectiveness, further reductions in the incidence and mortality of both cancer types would seem be feasible. We have not performed a financial analysis but, given the high societal costs of the breast and uterine cancer burden, we believe that the probability is high that investments needed to bring about improvements described above would be revenue-positive in the long term.

A series of breast cancer control measures has been described (see Results section) for improvement on already-attained successes. Some measures, such as public education, could take a long time to materialize. Other measures have a more immediate potential for impact on early diagnosis and successful treatment, such as increased availability of mammography devices. Another local government measure that may produce relatively rapid results is training of clinicians involved with breast cancer (Cataliotti et al., 2007).

In relation to uterine cancer, improvement of prevention, diagnosis, treatment, and mortality experience in the Municipality is being pursued institutionally. As with breast cancer, public education may require a long time to produce benefits. Other measures may have more immediate potential impact, such as increased availability of Pap smears and HPV vaccination. Another local government measure that may have relatively rapid results is training of clinicians involved with uterine cancers, especially cervical cancer. Finally, a measure that may have a strong influence on these numbers in the future is the active search for girls and young women who might resist receiving HPV vaccination, because this vaccine is still surrounded by prejudice within a significant part of the population (Zimet et al., 2013).

CONCLUSION

Available data show that the Municipality of Formiga exhibits favorable, but probably improvable, breast cancer and uterine cancer incidence and mortality rates relative to the State of Minas Gerais and the Nation. New measures to confront these neoplasms also are being implemented by the local health department. Ongoing analysis therefore will be necessary in coming years to evaluate incidence and mortality trends, and the influence and cost-effectiveness of control measures on them.

Small-sized and medium-sized municipalities should be studied to identify local factors that might contribute significantly to breast cancer and uterine cancer incidence and mortality. Risk factors of greatest interest will be those subject to the greatest degree of control within feasible budgets. For example, does a peculiar resistance against HPV vaccination occur in a particular municipality? Does local resistance exist against early breast or uterine exams? If so, what is the basis for such resistance?

Development of such information would enable public health policy makers to exert increased influence to control these devastating cancers. Overall, such research even might achieve societal cost savings greater than necessary research investments. Together, such research-informed public health policies might increase the expectation and quality of life of Brazilian women. This type of approach also can be and should be extrapolated throughout Brazil, and beyond.

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