Mortality Trend Due to Cervical Cancer in Campo Grande, Mato Grosso do Sul, 2000-2019

https://doi.org/10.32635/2176-9745.RBC.2025v71n1.4863

Tendência da Mortalidade por Câncer do Colo do Útero em Campo Grande, Mato Grosso do Sul, 2000-2019

Tendencia de Mortalidad por Cáncer de Cuello Uterino en Campo Grande, Mato Grosso del Sur, 2000-2019

Geize Rocha Macedo[1]; Andrey Moreira Cardoso[2]; Renata Palópoli Pícoli[3]; Inês Echenique Mattos

ABSTRACT

Introduction: Cervical cancer (CC) is the second most common gynecological cancer in the world. The analysis of the evolution of CC mortality allows the detection of negative trends for public health and guides preventive strategies. **Objective:** To analyze the trend in CC mortality rates in the municipality of Campo Grande, Mato Grosso do Sul, from 2000 to 2019. **Method:** The Mortality Information System and the Information Technology Department of the National Health System were used as data sources, and JoinPoint regression was used for the analysis. **Results:** A decreasing trend in CC mortality rates was observed in Campo Grande (APC = -3.12; 95% CI: -5.2 to -0.9). Regarding mortality rates by age, a decreasing trend was observed for the age groups of 50 to 59 years (APC = -2.98; 95% CI: -5.7 to -0.2) and 60 to 69 years (APC = -5.33; 95% CI: -9.1 to -1.4). For the other age groups, the trend was stationary. **Conclusion:** Despite the decreasing trend observed, mortality rates due to CC showed a relatively small average annual reduction in the period studied, which, associated with the stationary trend observed for mortality rates due to unspecified portion of the uterus, may indicate that CC control in Campo Grande still remains a challenge for the managers of this municipality.

Key words: Uterine Cervical Neoplasms/mortality; Mortality; Temporal Distribution.

RESUMO

Introdução: O câncer do colo do útero (CCU) é o segundo câncer ginecológico mais comum no mundo. A análise da evolução da mortalidade por CCU permite detectar tendências negativas para a saúde pública e direciona estratégias preventivas. **Objetivo:** Analisar a tendência das taxas de mortalidade por CCU no município de Campo Grande, Mato Grosso do Sul, de 2000 a 2019. **Método:** Foi utilizado como fonte de dados o Sistema de Informação de Mortalidade e o Departamento de Informática do Sistema Único de Saúde e, para a análise, utilizou-se a regressão por *JoinPoint*. **Resultados:** Foi observada tendência decrescente das taxas de mortalidade por CCU em Campo Grande (APC = -3,12; IC 95%: -5,2 a -0,9). Em relação às taxas de mortalidade por idade, observou-se tendência decrescente para as faixas etárias de 50 a 59 anos (APC = -2,98; IC 95%: -5,7 a -0,2) e 60 a 69 anos (APC= -5,33; IC 95%: -9,1 a -1,4). Para as demais faixas etárias, a tendência foi estacionária. **Conclusão:** Apesar da tendência decrescente observada, as taxas de mortalidade por CCU apresentaram redução média anual de valor relativamente pequeno no período estudado, o que, associado à tendência estacionária observada para as taxas de mortalidade por porção não especificada do útero, pode indicar que o controle do CCU em Campo Grande permanece como um desafio para os gestores desse município.

Palavras-chave: Neoplasias do Colo do Útero/mortalidade; Mortalidade; Distribuição Temporal.

RESUMEN

Introducción: El cáncer de cuello uterino (CCU) es el segundo cáncer ginecológico más común en el mundo. El análisis de la evolución de la mortalidad por CCU permite detectar tendencias negativas para la salud pública y orienta estrategias preventivas. **Objetivo:** Analizar la tendencia de las tasas de mortalidad por CCU en el municipio de Campo Grande, Mato Grosso del Sur, de 2000 a 2019. **Método:** Se utilizaron como fuentes de datos el Sistema de Información de Mortalidad y el Departamento de Informática del Sistema Único de Salud y para el análisis se utilizó la regresión *JoinPoint*. **Resultados:** Se observó una tendencia decreciente en las tasas de mortalidad por CCU en Campo Grande (APC = -3,12; IC 95%: -5,2 a -0,9). Con relación a las tasas de mortalidad por edad, se observó una tendencia decreciente para los grupos de edad de 50 a 59 años (APC = -2,98; IC 95%: -5,7 a -0,2) y 60 a 69 años (APC= -5,33 IC 95%: -9,1 a -1,4). Para los demás grupos de edad, la tendencia fue estacionaria. **Conclusión:** A pesar de la tendencia decreciente observada, las tasas de mortalidad por CCU mostraron una reducción promedio anual relativamente pequeña en el período estudiado, lo que, asociado a la tendencia estacionaria observada para las tasas de mortalidad por porción no especificada del útero, puede indicar que el control de la CCU en Campo Grande sigue siendo un desafío para los directivos de este municipio.

Palabras clave: Neoplasias del Cuello Uterino/mortalidad; Mortalidad; Distribución Temporal.

[1,3]Fundação Oswaldo Cruz (Fiocruz), Escola Nacional de Saúde Pública (Ensp). Campo Grande (MT), Brasil. E-mails: geize01@yahoo.com.br; iemattos@yahoo.com.br. Orcid iD: https://orcid.org/0000-0002-0680-171X; Orcid iD: https://orcid.org/0000-0002-3753-6832;

[2,4]Fiocruz. Rio de Janeiro (RJ), Brasil. E-mails: andrey.ensp@gmail.com; renata.picoli@fiocruz.br. Orcid iD: https://orcid.org/0000-0002-7591-7791; Orcid iD: https://orcid.org/0000-0002-7297-1864

Corresponding author: Geize Rocha Macedo. Rua José Amadei, 19 – Buriti. Campo Grande (MS), Brasil. CEP 79091-130. E-mail: geize01@yahoo.com.br

INTRODUCTION

Cervical cancer (CC) is the second most common gynecological cancer in the world[1], with around 604,127 thousand new cases a year, corresponding to 6.5% of cancer cases and being responsible for 341,831 thousand deaths, representing 7.7% of the total of cancer deaths in the world for 2020[2]. The distribution of CC is heterogeneous, with over 85% of cases occurring in low and medium income countries[3], and its incidence and mortality trends have shown variation in different countries over the last decade[4].

In Brazil, CC ranks third among the most frequent tumors in women, representing 7% of cancer types, with 17,010 new cases having been estimated for 2023, with age-adjusted rates per world population of 13.25/100 thousand women[5]. This tumor is the third cause of death among women in the country, with age-adjusted rates per world population of 4.60/100 thousand women in 2020 and represents 6.1% of total female deaths[6,7]. In the State of Mato Grosso do Sul, the estimated age-adjusted incidence rate per world population for 2023 is of 17.73/100 thousand women[5]; the mortality adjusted rated for 2020 was 5.37/100 thousand women[6]. For the capital city Campo Grande, in 2020, the age-adjusted incidence rate per world population was estimated to be 9.24/100 thousand[5] and, for mortality, 2.96/100 thousand[6].

The burden of CC remains heavy in many regions across the world and, in many countries, incidence and mortality rates are beyond the threshold established by the World Health Organization (WHO) for eliminating this type of cancer, which is due to, mainly, geographic and socioeconomic inequalities[8].

Some countries, including Brazil, still present high CC incidence and mortality. One of the issues that has been related to the magnitude of those rates is the use of opportunistic screening programs for CC control. In regions where screening is done in a systematic and organized fashion, the WHO declared that CC mortality may achieve up to 93%[1] reduction. In Brazil, screening is done according to the opportunity, that is, in a limited scope, often leading to a multiplicity of tests performed in a single woman, with a tendency to neglect others who would benefit from a screening test[9], showing it to be less effective on the impact of morbimortality[10].

The great challenge for medium and low-income countries is to ensure strategies for prevention and early diagnosis to decrease incidence of CC. In this context, the analysis of temporal evolution of mortality by CC is particularly important as it allows the detection of negative trends for public healthcare and guides the institution of new preventive strategies that will be effective in reducing mortality[11].

The aim of this study was to analyze the trend in CC mortality rates in the municipality of Campo Grande, Mato Grosso do Sul.

METHOD

Time series ecological analysis on CC mortality rates in the municipality of Campo Grande, Mato Grosso do Sul, from 2000 to 2019.

The information on number of deaths by CC – C53 — and by uterine cancer, part unspecified – C55 – according to the tenth review of the International Classification of Diseases and Related Health Problems (ICD-10)[12] have been extracted from the Mortality Information System (SIM) through the Department of Informatics Portal of the National Health System (DATASUS)[13].

The analysis of mortality by cancer in unspecified portion of the uterus is necessary since there is a considerable number of death records with no localized topography, which can interfere in the trend analysis of mortality rates by CC due to imprecisions in the record of the site of origin of the tumor[14].

Data regarding the female population residing in the municipality by age group were obtained from the DATASUS and are based on the demographic census of 2000 and 2010. The population estimates for intercensal years from 2000 to 2019 were obtained from population projections of 2000 to 2060 performed and made available by the *Instituto Brasileiro de Geografia e Estatística* (IBGE)[15].

Gross mortality rates and age-adjusted rates were calculated through direct method, using the world population as standard[16]. The studied population was then stratified in eight age groups (<20 years, 20 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 59 years, 60 to 69 years, 70 to 79 years and >80 years) to calculate specific cause and age rates.

To identify changes in temporal trends of CC mortality rates, a regression analysis was conducted using the JoinPoint, Statistical Package C[17] software, version 4.9.1.0. This method identifies possible significant change points in the linear inclination of a logarithmic scale throughout the studied period. The linear regression estimates the average annual percentage change (APC) in the mortality rates and the number and location of join points (points in which trends change). The variation of mortality rates values, for growth as well as reduction, are the basis for identifying inflection points. Following the method standard, the number of inflection points varies

according to the number of points (in this case, years) in the analyzed database. The models were adjusted assuming a number of join points different from zero (trend represented by a single straight line) up to three, considering change points in the temporal evolution of rates, with a 95% confidence interval (CI), 5% statistical significance and Monte Carlo permutation test. The trends were classified as increasing (p<0.05 and positive regression coefficient), decreasing (p<0.05 and negative regression coefficient) or stationary (p>0.05), according to the APC evaluation.

Correction of deaths due to CC was also carried out, based on the proportional redistribution of annual deaths by cancer in unspecified portion of the uterus between the two locations of uterine cancer (cervix and body). Initially, deaths from CC and uterine cancer in each year were added together, and the proportions of each location in relation to the total were calculated. Then, proportions observed for cervix were multiplied by the number of deaths classified as cancer in unspecified portion of the uterus in the corresponding years, and the results obtained added to the number of original deaths by CC, to obtaining the number of corrected deaths[18].

Since this study dealt with secondary data in public domain, it was not subjected to a Research Ethics Committee, according to Resolution number 510[19], April 7, 2016, of the National Health Council.

RESULTS

In the 2000 to 2019 historical series, 551 deaths by CC were identified in Campo Grande, of which 19.78% (n=109) occurred in the 50 to 59 years age group and 19.05% (n=105) in the 60 to 69 years age group. The 20 to 29 years age group presented the smaller percentage, 3.08% (n=17). There were no deaths in women under 20.

Adjusted mortality rates per world population in the starting (2000) and final (2019) years of the historical series were 17.45 and 28.45, respectively, for CC, highlighting the increase of its magnitude in the studied period (Table 1). Regarding cancer in unspecified portion of the uterus, the values observed for the start and final periods were similar, with adjusted rates around 1.50/100 thousand women. Regarding the specific mortality rates by age group, higher rates can be observed in the 40 to 79 years age groups, with women aged 50 to 59 years presenting greater magnitude.

In Figure 1 (A), the *JoinPoint*[17] regression model showed a statistically significant decreasing trend (p<0.001) of CC mortality rates in the studied period, with an APC of -3.12 (95% CI: -5.2 to -0.9). A test was performed to verify inflection changes (join points), but no statistically significant changes were found in the values for CC and cancer in unspecified portion of the uterus rates for the studied period.

Table 1. Adjusted* mortality rates for cervical cancer and uterine cancer of unspecified portion and specific cervical cancer mortality rates per age group per 100 thousand women in Campo Grande, Mato Grosso do Sul, in the start and final years of the study 2000-2019

Cancer type	Standardized rates	
	2000	2019
Cervix	17.45	28.45
Uterus, unspecified portion	1.55	1.52
Cervical cancer per age group	**Specified rates per age group**	
	2000	2019
< 20 years old	-	-
20-29 years-old	0.24	-
30-39 years-old	0.41	0.47
40-49 years-old	1.40	0.72
50-59 years-old	2.13	1.29
60-69 years-old	0.91	0.89
70-79 years-old	0.94	1.33
80 years-old and over	-	0.18

Note: Age-adjusted ages per world population.

Over the same period, 165 deaths by cancer in unspecified portion of the uterus were identified. The higher percentages were also found in the 50 to 59 and 60 to 69 years age group, with 22.42% (n=37) and 21.81% (n=36), respectively. There were no deaths in women under 20. The mortality trend graph showed a decrease with APC -1.95 (95% CI: -6.0 to 2.2), being considered a stationary trend due to the lack of statistical significance (Figure 1(B)).

In Table 2, an APC variation by age group can be observed for CC mortality. It was possible to analyze the mortality rates trend in the 30-39, 40-49, 50-59, 60-69 and 70-79 age groups. The JoinPoint[17] statistical software does not perform analysis when there are annual rate values equal to zero, which happened in the other age groups included in this study.

None of the age groups analyzed presented an increasing trend. The 30-39 age group presented 1.3 APC, though with no statistical significance, being classified as a stationary trend.

The 50-59 (Figure 2A) and 60-69 (Figure 2B) age groups presented, respectively, -2.98 APC (95% CI: -5.7 to -0.2) and -5.33 APC (IC 95%: -9.1 to -1.4),

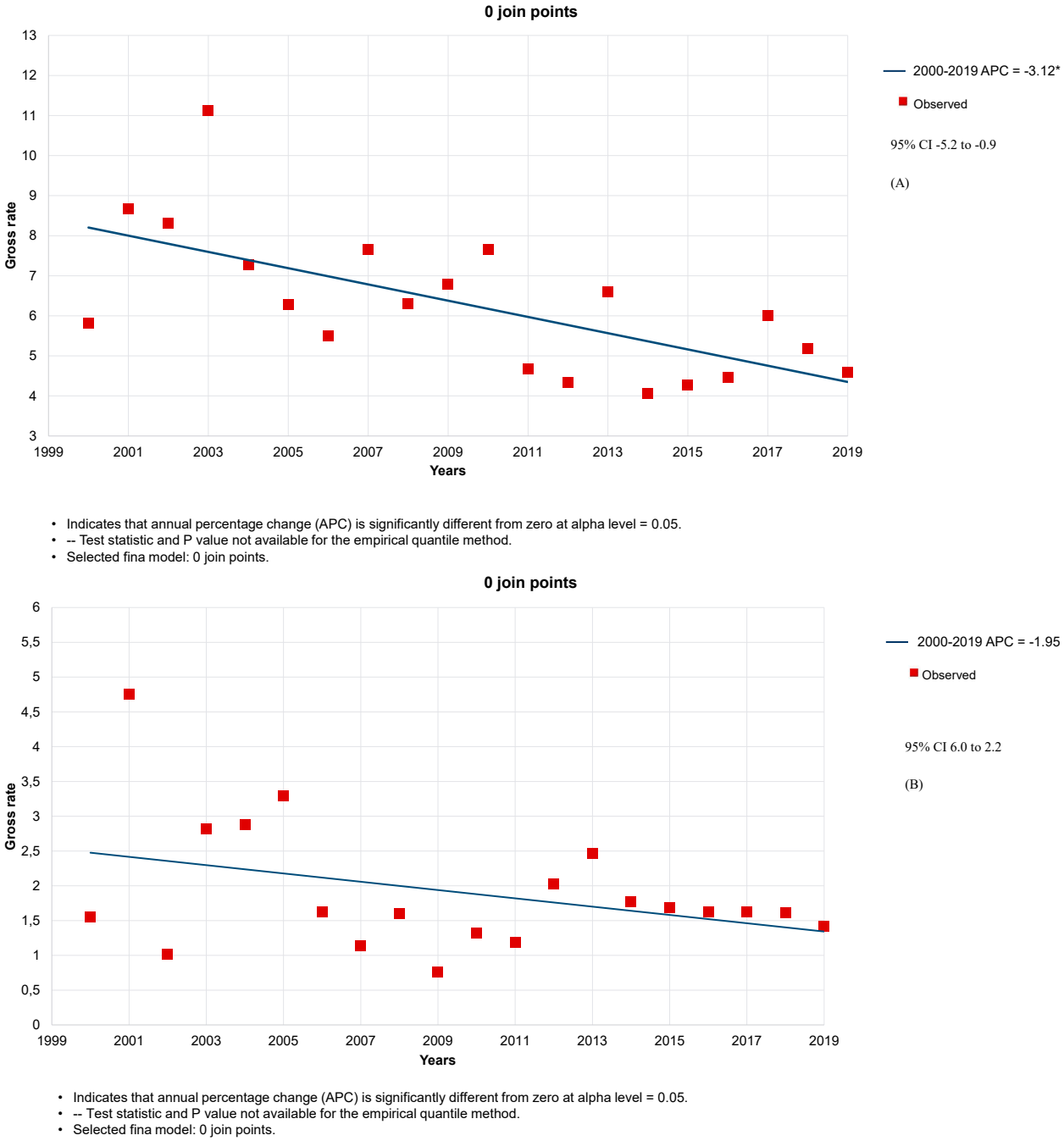


Figure 1. Mortality rate trends for cervical cancer (A) and uterine cancer of unspecified portion (B) in Campo Grande, Mato Grosso do Sul, 2000-2019

Captions: APC = annual percentage change; 95% CI = 95% confidence interval.

Table 2. Mortality rate trends for cervical cancer according to age group in Campo Grande, Mato Grosso do Sul, 2000-2019

Age group (Years)	APC	95% Confidence Interval	p	Trend
30–39	1.3	-3.8 to 6.6	0.614	Stationary
40–49	-3.6	-8.1 to 1.2	0.131	Stationary
50–59	-2.9	-5.7 to -0.2	0.036	Decreasing
60–69	-5.3	-9.1 to -1.4	0.011	Decreasing
70–79	-2.7	-5.8 to 0.5	0.088	Stationary

Caption: APC = annual percentage change.

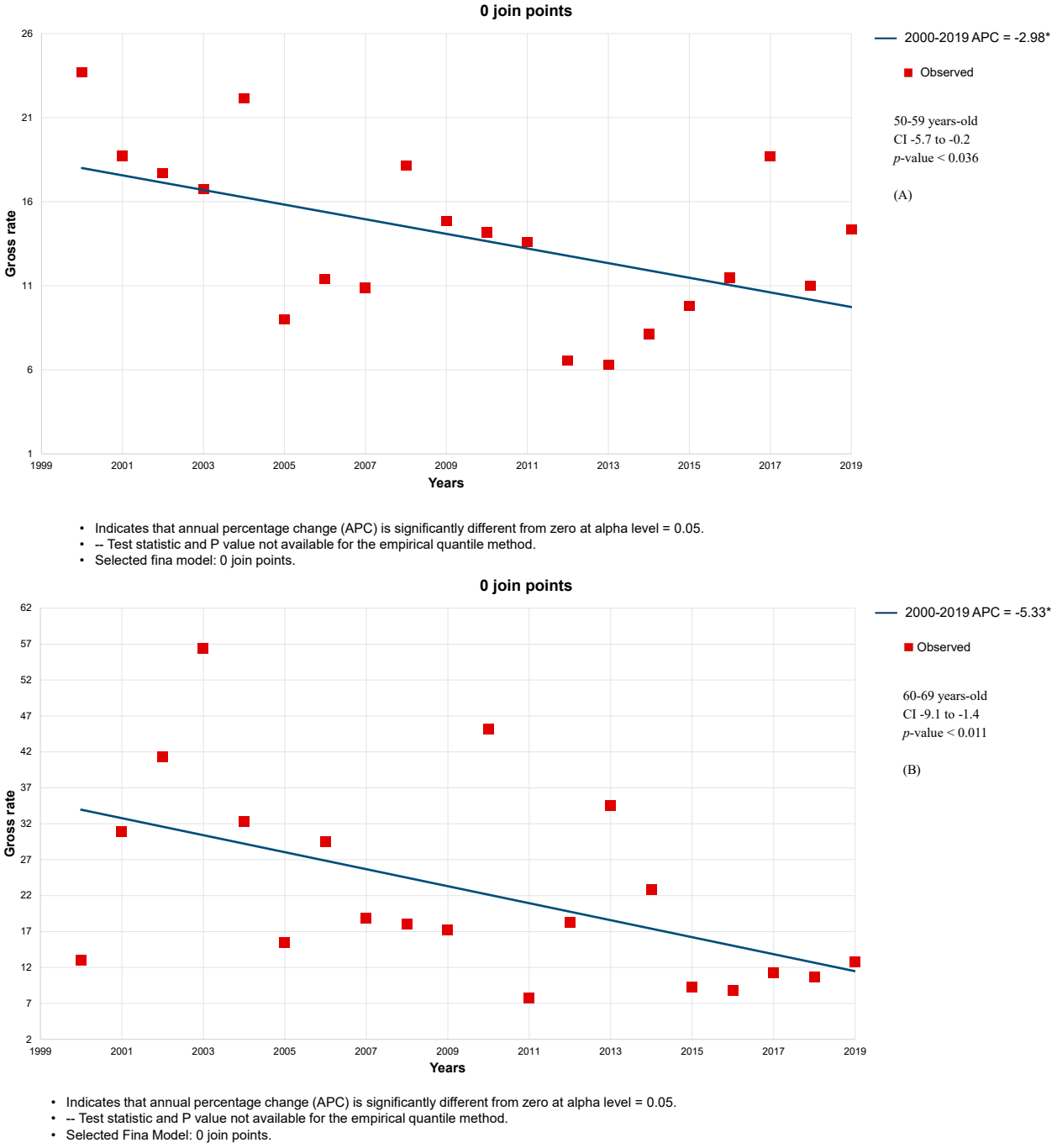


Figure 2. Mortality rate trends for cervical cancer in the 50-59 and 60-69 age groups in Campo Grande, Mato Grosso do Sul, 2000-2019.
Captions: APC = annual percentage change; 95% CI = 95% confidence interval

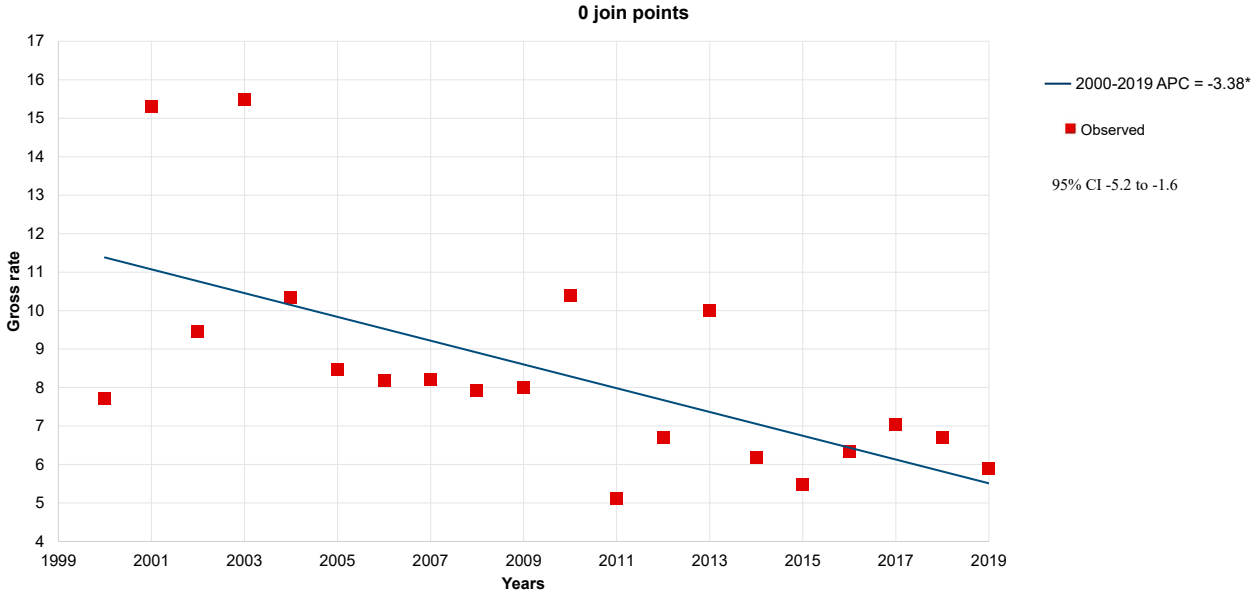
indicating a statistically significant reduction trend in CC mortality rates.

The 40-49 and 70-79 age groups presented, respectively, -3.6 APC (95% CI: -8.1 to 1.2) and -2.7 (95% CI: -5.8 to 0.5), indicating stationary trend in CC mortality rates.

The trend of mortality by cervical cancer after redistribution of deaths by cancer in unspecified portion of the uterus remained decreasing, with -3.38 APC (95% CI: -5.2 to -1.6) (Figure 3).

DISCUSSION

In the most recent year of the historical series analyzed in this study, the adjusted rates for CC mortality in Campo Grande correspond to six times the rate for Brazil in the same year[6]. For cancer in unspecified portion of the uterus, the adjusted mortality rate for 2019 in Campo Grande was also superior to the corresponding rate for Brazil in the referred year[6].



- Indicates that annual percentage change (APC) is significantly different from zero at alpha level = 0.05.
- -- Test statistic and P value not available for the empirical quantile method.
- Selected fina model: 0 Join points.

Figure 3. Mortality rate trends for cervical cancer after redistribution of deaths by uterine cancer of unspecified portion in Campo Grande, Mato Grosso do Sul, 2000-2019

Captions: APC = annual percentage change; 95% CI = 95% confidence interval.

In the historical series analysis of CC rates in Campo Grande in the 2000-2019 period, a decreasing mortality rate was observed, though with a relatively low annual average reduction (APC = 3.12; 95% CI: -5.2 to -0.9). In another study conducted in Mato Grosso do Sul, with data from the 1980-2009 period, those rates were observed as stable in the State[20].

In Brazil, CC mortality rates presented a stationary trend from 2014 to 2020 with APC = -0.205 (95% CI: -1.131 to 0.730)[21]. Other capital cities also showed stationary trend, such as Belém do Pará, from 1998 to 2017[22] and Cuiabá, from 2008 to 2016, with APC = -2.49 (95% CI: -6.61 to 1.62)[23].

Generally, developing countries present greater CC mortality rates, as demonstrated by a study of global estimates of incidence and mortality[8]. In this study, Brazil shows up as the country with the greater decline in the CC incidence, according to an estimated annual percentage variation of -7.9% (95% CI: 12.5 to 3.0) in the period of 2003 to 2012[8]. However, due to the existing heterogeneity in the country, there were variations in the mortality rates of different regions, with some presenting increase of percentage variation, like the Northern Region, with a 7.05% and 1.02% increase and the Center-West Region, with a 3.59% and 8.04% increase in 2012-2014 and 2014-2016, respectively[24].

In studies of CC mortality trends carried out in developed countries, where screening programs are conducted in an organized manner, decreasing trends in mortality rates can be observed. This was the case for Poland, in which APC for the 1980-2018 period was -2.0 (95% CI: -2.2 to -1.8)[25], and the United Kingdom, from 1980 to 2013, which had a reduction of 69% of CC mortality since 1980 and continuous reduction of 1.7% a year[26]. On the other hand, some high-income countries did not show reduction in the mortality trend, as was the case for South Korea from 1986 to 2015, which showed an increase from 1.03 to 2.00 (APC: 2.2; 95% CI: 0.9 to 3.5) and Italy, from 2005 to 2015 (APC: 1.9; $p<0.05$)[27].

Cytological test screening has been a contributing factor for reducing CC mortality rate and the higher the coverage and the better organized the screening program, the greater its effectiveness. In countries that reach coverage of over 70%, the mortality rate is low (lower or equal to two deaths by 100 thousand women per year)[24]. Brazil instituted public policies towards CC prevention, such as the 2006 Health Pact (*Pacto pela Saúde*), which has among its objectives to contribute to reducing mortality from this cancer, establishing 80% coverage for cytological test among its goals[28]. However, in a study that evaluated CC screening in Campo Grande in the period 2006-2018,

a sharp drop in the performance of cytopathological exams in the target population was observed, mainly from 2015 onwards. The number of tests decreased, on average, 1,460.83 each year, and the program's coverage varied between 19.5% and 5.8% in the period[29], much below the threshold. This highlights the need to elaborate strategies that aim at increasing coverage and, consequently, contributing to an increase in reduction in mortality rates.

In a study that compared Brazil and Chile, that have a similar screening program, the decline in CC mortality rates in the country was lower than that observed in Chile. Significant differences were observed in the quality of laboratories, scope of the information system and organization of referral network, with better results for Chile[30]. In China, despite the introduction of screening programs, mortality rates did not drop to adequate levels and CC mortality rates decreased only between 2003 and 2006 (APC: -10.49), keeping a rising trend from 2006 to 2018 (APC: 8.05)[1].

In the present study, the mortality trend decreased for the 50-59 and 60-69 age groups in the municipality of Campo Grande. Studies in other locations found similar results, like in Passo Fundo, where the reduction of the CC mortality trend in the 50-59 age group corresponded to -10.9 (95% CI: -16.8 to -6.7) and the 60-69 age group corresponded to -25.9 (95% CI: -33.9 to -16.8)[31]. On the other side, in other locations, the CC mortality trend was stationary in almost all age groups, like in Sergipe and Rio Grande do Norte[18,32], similarly to the findings of this study for the 30 to 49 and 70 to 79 age groups.

A study conducted in the five regions of Brazil, in the period of 2012 to 2016, that analyzed the CC mortality rates trend per age group observed a CC mortality increase in the 25 to 64 years age group, the standard age group in Brazil for screening, being the greatest increase (16%) observed in the Center-West region. In this same study, the age groups with greater death percentages were the 40 to 49 (17.74%) and 50 to 59 (22.46%)[24]. Those findings are opposite to the findings in the present study and these differences can be derived from the opportunist nature of the preventive program, in which some women do more tests than recommended, while others never do them, especially those in worse health and socioeconomic conditions[18].

Though some studies have reported a reduction in the CC mortality rates, justified by some advances in access to screening tests, diagnosis and early treatment, in addition to signs of improvement in indicators such as the population's income and education, this cancer remains a major challenge for health managers[24,31,32]. Thus, the WHO launched the Global Strategy to Accelerate the Elimination of Cervical Cancer by 2030, requiring 90% of the girls to be vaccinated against HPV by the age of 15 years old, 70% of women screened up to the age of 45, and 90% of women identified with cervical precursor lesions or treated for cancer. The WHO elimination strategy emphasized the need for continuous surveillance and screening and improved CC as a fundamental step towards allowing program managers to identify gaps and make decisions on specific actions[33].

In high income countries, like England, strategies like increasing screening and decreasing waiting time for treatment start up to a month after diagnosis were essential to reduce incidence and mortality by CC. In every year from 2009 and 2021, at least 95% of English people started cancer treatment in up to 31 days after diagnosis[34]. In Brazil, since 2012, a law[35] states that treatment should be started up to 60 days from diagnosis. However, studies are needed to assess the effectiveness of said law, since there are indications that this deadline is not being fulfilled[34]. The National Cancer Institute (INCA) report showed that in Brazil, in 2021, 35.6% of CC cases started treatment in up to 30 days, 18.6% in up to 60 days and 45.8% in over 60 days[7]. A study that analyzed the continuity of care offered to women with high degree lesions or CC in Campo Grande verified that only 50% of women started treatment in up to 60 days[36].

Mortality rates by cancer in unspecified portion of the uterus are relevant for reflecting on the care provided to women. One thing that should be noted is the trend remained stationary in Campo Grande during the studied period, which could be portraying difficulties in access to prevention services, inadequate assistance at the time of death, low quality of record (codification of basic cause), among other causes, leading to a cancer diagnosis in an advanced stage, when it is no longer possible to identify the initial topography of the lesion[18,37]. Literature indicates that most diagnosis of cancer in unspecified portion of the uterus are actually CC[21,23,37]. Although the CC mortality trend remained decreasing, even after redistribution of deaths by cancer in unspecified portion of the uterus, the implementation of strategies that aim on early diagnosis and reducing deaths by CC is necessary.

A weakness of this study is the use of secondary data to identify deaths by CC. Even though proportional redistribution of deaths by cancer in unspecified portion of the uterus was carried out, it is possible that deaths by CC have been classified as ill-defined causes. However, this

is one of the first studies on CC mortality trend performed in the municipality of Campo Grande, and thus, can serve as scientific contribution to subsidize planning decisions and guide actions to improve the CC prevention and control program.

CONCLUSION

Despite the observed decreasing trend, mortality by CC showed a relatively small annual average reduction value in the studied period, which, associated with the stationary trend observed for mortality rates per cancer in unspecified portion of the uterus, indicates that the cervical cancer control program is still a challenge for the managers of Campo Grande. Additionally, it demonstrates the need for investments in expanding active searches, especially for women under 50 years of age, for screening and treatment of CC precursor lesions, in addition to improving the quality of information.

CONTRIBUTIONS

All the authors have contributed to the study design, acquisition, analysis and interpretation of the data, wording, and critical review. They approved the final version for publication.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interest to declare.

FUNDING SOURCES

None.

REFERENCES

1. Guo M, Xu J, Du J. Trends in cervical cancer mortality in China from 1989 to 2018: an age-period-cohort study and Joinpoint analysis. BMC Public Health. 2021;21(1):1329. doi: https://doi.org/10.1186/s12889-021-11401-8
2. International Agency for Research on Cancer [Internet]. Lyon (France): IARC; c1965-2023. Global Cancer Observatory. [acesso 2024 ago 27]. Disponível em: https://gco.iarc.fr
3. International Agency for Research on Cancer [Internet]. Lyon (France): IARC; c1965-2023. Câncer hoje. [acesso 2024 set 26]. Disponível em: https://gco.iarc.fr/today
4. Lin S, Gao K, Gu S, et al. Worldwide trends in cervical cancer incidence and mortality, with predictions for the next 15 years. Cancer. 2021;127(21):4030-9. doi: https://doi.org/10.1002/cncr.33795
5. Santos MO, Lima FCS, Martins LFL, et al. Estimativa de incidência de câncer no Brasil, 2023-2025. Rev Bras Cancerol. 2023;69(1):e-213700. doi: https://doi.org/10.32635/2176-9745.RBC.2023v69n1.3700
6. Atlas On-line de Mortalidade [Internet]. Rio de Janeiro: Instituto Nacional de Câncer; ©1996-2014. [acesso 2023 abr 16]. Disponível em: https://mortalidade.inca.gov.br/MortalidadeWeb/pages/Modelo03/consultar.xhtml#panelResultado
7. Instituto Nacional de Câncer. Dados e números sobre câncer do colo do útero: relatório anual 2022. Rio de Janeiro: INCA; 2023. [acesso 2023 maio 2]. Disponível em: https://antigo.inca.gov.br/sites/ufu.sti.inca.local/files//media/document//dados_e_numeros_colo_22marco2023.pdf
8. Singh D, Vignat J, Lorenzoni V, et al. Estimativas globais de incidência e mortalidade por câncer cervical em 2020: uma análise de base da iniciativa global de eliminação do câncer cervical da OMS. Lancet Glob Saúde. 2023;11(2):e197-206. doi: https://doi.org/10.1016/s2214-109x(22)00501-0
9. Navarro C, Fonseca AJ, Sibajev A, et al. Cobertura do rastreamento do câncer de colo de útero em região de alta incidência. Rev Saúde Pública. 2015;49(17):1-8. doi: https://doi.org/10.1590/s0034-8910.2015049005554
10. Maia MN, Silva RPO, Santos LPR. A organização do rastreamento do câncer do colo uterino por uma equipe de saúde da família no Rio de Janeiro, Brasil. Rev Bras Med Fam Comunidade. 2018;13(40):1-10. doi: http://dx.doi.org/10.5712/rbmfc13(40)1633
11. Texeira C, Pereira AM, Anes E, et al. Time-trends in cervical cancer mortality in Portugal. Acta Med Port. 2019;32(6):427-33. doi: https://doi.org/10.20344/amp.8921
12. Organização Mundial da Saúde. CID-10: Classificação Estatística Internacional de Doenças e problemas relacionados à saúde. São Paulo: Edusp; 2008.
13. SIM: Sistema de Informação sobre Mortalidade [Internet]. Versão 3.2.1.2. Brasília, DF: DATASUS. [data desconhecida]. [acesso 2023 fev 15]. Disponível em: http://sim.saude.gov.br/default.asp
14. Partanen VM, Heinävaara S, Anttila A, et al. Setting the record straight-correcting uterine cancer incidence and mortality in the nordic countries by reallocation of unspecified cases. Acta Obstet Gynecol Scand. 2022;101(3):323-33. doi: https://doi.org/10.1111/aogs.14314
15. População residente [Internet]. Brasília, DF: DataSUS; [Sem data]. [acesso 2023 fev 15]. Disponível em: https://datasus.saude.gov.br/populacao-residente.

16. Segi M. Cancer mortality for selected sites in 24 countries (1950-57). Sendai: Tohoku University School of Public Health; 1960.
17. JoinPoint, Statistical Pakage C [Internet]. Washington, DC: NIH; 2023. [acesso 2023 fev 14]. Disponível em: https://surveillance.cancer.gov/joinpoint/
18. Sousa AMV, Teixeira CCA, Medeiros SS, et al. Mortalidade por câncer do colo do útero no estado do Rio Grande do Norte, no período de 1996 a 2010: tendência temporal e projeções até 2030. Epidemiol Serv Saúde. 2016;25(2):311-22. doi: https://doi.org/10.5123/S1679-49742016000200010
19. Conselho Nacional de Saúde (BR). Resolução nº 510, de 7 de abril de 2016. Dispõe sobre as normas aplicáveis a pesquisas em Ciências Humanas e Sociais cujos procedimentos metodológicos envolvam a utilização de dados diretamente obtidos com os participantes ou de informações identificáveis ou que possam acarretar riscos maiores do que os existentes na vida cotidiana, na forma definida nesta Resolução. Diário Oficial da União, Brasília, DF. 2016 maio 24; Seção I:44.
20. Freitas HG, Silva MA, Thuler LCS. Câncer do colo do útero no estado de Mato Grosso do Sul: detecção precoce, incidência e mortalidade. Rev Bras Cancerol. 2012;58(3):399-408. doi: https://doi.org/10.32635/2176-9745.RBC.2012v58n3.591
21. Luizaga CTM, Jardim BC, Wunsch VF, et al. Mudanças recentes nas tendências da mortalidade por câncer de colo do útero no Sudeste do Brasil. Rev Saúde Pública. 2023;57(25):1-14. doi: https://doi.org/10.11606/s1518-8787.2023057004709
22. Formigosa LAC, Santos LF, Formigosa JDC, et al. Impacto do rastreamento na incidência e mortalidade por câncer do colo do útero em município do norte do Brasil. Ecancermedicalscience. 2022;16:1418. doi: https://doi.org/10.3332/ecancer.2022.1418
23. Oliveira JCS, Castelo LM, Soares MR, et al. Incidência e mortalidade pelos principais tipos de câncer no município de Cuiabá, Mato Grosso, entre os anos de 2008 e 2016. Rev Bras Epidemiol. 2022;25(Sup1):E220011 doi: https://doi.org/10.1590/1980-549720220011.supl.1.1
24. Tallon B, Monteiro D, Soares L, et al. Tendências da mortalidade por câncer de colo no Brasil em 5 anos (2012-2016). Saúde debate. 2020;44(125):362-71. doi: https://doi.org/10.1590/0103-1104202012506
25. Piechocki M, Koziołek W, Sroka D, et al. Incidence and mortality of gynecological and breast cancers in Poland (1980-2018). Clin Epidemiol. 2022;2022(14):95-114. doi: https://doi.org/10.2147/CLEP.S330081
26. Oke JL, O'Sullivan JW, Pereira R, et al. The mapping of cancer incidence and mortality trends in the UK from 1980-2013 reveals a potential for overdiagnosis. Scient Report. 2018;8(14663):1-8. doi: https://doi.org/10.1038/s41598-018-32844-x
27. Wang J, Bai Z, Zhang N, et al. Effects of age, period, and cohort on the mortality of cervical cancer in three high-income countries: Canada, Korea, and Italy. Biomed Res Int. 2021;2021:8829122. doi: https://doi.org/10.1155/2021/8829122
28. Abreu GP, Nascimento RCS. Reflexo das políticas públicas sobre a mortalidade por câncer do colo uterino. Rev Baiana de Saúde Pública. 2109;43(supl.1):152-68 doi: https://doi.org/10.22278/2318-2660.2019.v43.n0.a3222
29. Souza GRM, Cardoso AM, Pícolli RP, et al. Perfil do rastreamento do câncer do colo do útero em Campo Grande, Mato Grosso do Sul: um estudo avaliativo do período 2006-2018. Epidemiol Serv Saúde. 2022;31(2):e2021117. doi: https://doi.org/10.1590/S2237-96222022000200018
30. Claro IB, Lima LD, Almeida PF. Diretrizes, estratégias de prevenção e rastreamento do câncer do colo do útero: as experiências do Brasil e do Chile. Ciênc saúde coletiva. 2021;26(10):4497-509. doi: https://doi.org/10.1590/1413-812320212610.11352021
31. Pecinato V, Jacobo A, Silva SG. Tendência da mortalidade por câncer de mama e colo do útero em Passo Fundo, Rio Grande do Sul: uma análise por faixa etária e escolaridade, 1999-2019. Epidemiol Serv Saude. 2022;31(3):e2022440. doi: https://doi.org/10.1590/S2237-96222022000300021
32. Martins MCV, Carregosa KRS, Anchieta MCM, et al. Tendência temporal da mortalidade por câncer de colo do útero em Sergipe. RSD. 2021;10(1):e29510111680. doi: https://doi.org/10.33448/rsd-v10i1.11680
33. Gultekin M, Ramirez PT, Broutet N, et al. World Health Organization call for action to eliminate cervical cancer globally. Int J Gynecol Cancer. 2020;30(4):426-7. doi: https://doi.org/10.1136/ijgc-2020-001285
34. Moreira DP, Santos MAC, Pilecco FB, et al. Tratamento ambulatorial do câncer do colo do útero em tempo oportuno: a influência da região de residência de mulheres no Estado de Minas Gerais, Brasil. Cad Saúde Pública. 2022;38(10):e00277521. doi: https://doi.org/10.1590/0102-311XPT277521
35. Brasil. Lei nº 12.732, de 22 de novembro de 2012. Dispõe sobre o primeiro tratamento de paciente com neoplasia maligna comprovada e estabelece prazo para seu início. Diário Oficial da União, Brasília, DF. 2012 nov 23; Edição 226; Seção 1:1.
36. Souza GRM, Cardoso AM, Pícolli RP, et al. Continuidade do cuidado a mulheres com alterações citológicas no rastreamento para câncer de colo de útero na rede pública de Campo Grande, MS. Clium. 2024;24(6):237-56. https://doi.org/10.53660/CLM-3153-24F24

37. Alves CMM, Guerra MR, Bastos RR. Tendência de mortalidade por câncer de colo de útero para o Estado de Minas Gerais, Brasil, 1980-2005. Cad Saúde Pública. 2009;25(8):1693-700. doi: https://doi.org/10.1590/S0102-311X2009000800005

Recebido em 13/8/2024
Aprovado em 30/9/2024

Associate-editor: Jeane Tomazelli. Orcid iD: https://orcid.org/0000-0002-2472-3444
Scientific-editor: Anke Bergmann. Orcid iD: https://orcid.org/0000-0002-1972-8777