https://doi.org/10.1590/1980-549720220010.supl.1

ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Cancer Incidence in Mato Grosso state, Brazil: analysis of population-based registries (2007 a 2011)

Incidência de câncer em Mato Grosso: análise dos registros de base populacional (2007 a 2011)

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ABSTRACT: ***Objective*:** To analyze five types of cancer health region in the state of Mato Grosso according to sex. ***Methods*:** A descriptive ecological study of the health regions of Mato Grosso state using two data sets on the incidence of population-based cancer registries in Mato Grosso – inland and Cuiabá. Age-adjusted annual incidence rates were calculated for the world population in 1960, according to sex, for the period comprising 2007 to 2011. ***Results*:** Although we are still facing problems related to data completeness and quality, the most common cancer types were prostate, female breast, cervix, lung, colorectal and stomach cancer in the state of Mato Grosso from 2007 to 2011. The most frequent types among men were prostate and lung cancer. Among women, breast and cervix cancer were the most frequent ones. The highest incidence rates of cancer per 100,000 inhabitants were found in health regions Tangará da Serra, Sinop, Rondonópolis, and Porto Alegre do Norte. ***Conclusions*:** Identifying the main types of cancer is important for the improvement of cancer prevention and control actions, as well as to understand its magnitude and impact on society. We must continue to improve the quality of information available in population-based cancer records in the state of Mato Grosso, Brazil.

Keywords: Incidence. Information Systems. Cancer. Epidemiology.

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Conflict of interests: nothing to declare – **Financial support:** Mato Grosso State Health Department, with funding for the outreach project "Cancer surveillance and associated factors: population and hospital-based registry update" (contract 088/2016); Public Ministry of Labor of the 23rd Region, with funding for the research project "Cancer and associated factors: population-based and hospital registry analysis" (technical cooperation agreement 08/2019).

RESUMO: ***Objetivo:*** Descrever os cinco principais tipos de câncer por região de saúde no Estado de Mato Grosso e por sexo. ***Métodos:*** Estudo ecológico descritivo das regiões de saúde do Estado de Mato Grosso, com as informações da incidência de câncer dos Registros de Câncer de Base Populacional do Mato Grosso — Interior e Cuiabá. Foram calculadas taxas médias anuais de incidência ajustadas por idade pela população mundial de 1960, desagregadas por sexo, para o período de 2007 a 2011. ***Resultados:*** Apesar de problemas de completude e qualidade dos dados, os principais cânceres do Estado de Mato Grosso (capital e interior) entre 2007 e 2011 foram próstata, mama feminina, colo do útero, pulmão, cólon e reto e estômago. Os cânceres mais frequentes para os homens foram os de próstata e pulmão. Entre as mulheres, foram os de mama e colo do útero. As maiores taxas de incidência de neoplasia por 100 mil habitantes por região de saúde foram: Tangará da Serra, Sinop, Rondonópolis e Porto Alegre do Norte. ***Conclusão:*** A identificação dos cânceres mais incidentes constitui fator fundamental para o aprimoramento das ações de prevenção e controle do câncer, assim como para a compreensão dessa magnitude e seu impacto na sociedade. Para isso, é necessária a continuidade na melhoria da qualidade das informações disponíveis nos Registros de Câncer de Base Populacional do Estado de Mato Grosso.

Palavras-chave: Incidência. Sistemas de informação. Câncer. Epidemiologia.

INTRODUCTION

In 2020, worldwide estimates pointed to 19.3 million new cases of cancer, except for non-melanoma skin cancer. About 10 million cases were in men, the most frequent being lung (14.3%), prostate (14.1%), colorectal (10.6%), stomach (7.1%) and liver cancer. (6.3%); around 9.3 million cases were in women, the most frequent being breast (24.5%), colorectal (9.4%), lung (8.4%), cervix (6.5%) and thyroid cancer (4.9%)[1].

The increase in cancer incidence worldwide can be explained by the combination of environmental, behavioral and demographic factors (population aging, change in prevalence of cancer risk factors – smoking, healthy eating habits, and physical activity)[2].

National estimates of new cases for the triennium 2020–2022 pointed to 625,000 new cases of cancer. The most common types were: breast and prostate (66,000 each), colon and rectum (41,000), lung (30,000) and stomach (21,000). Estimates accounted for more than 8,000 and 1,000 new cases of cancer in the state of Mato Grosso and the capital, respectively. The top five most frequent types in the state, excluding non-melanoma skin cancers, were: prostate, lung, colorectal, stomach and oral-cavity cancer in men; and breast, cervix, colorectal, thyroid and lung cancer in women[3].

Knowing the incidence of cancer in a given location is important to identify priorities for controlling the disease, and the basis for planning national oncology actions and policies. Piñeros et al., in 2017, stated that cancer registries are the main strategy for surveillance and monitoring of the magnitude of the disease, as they allow describing risk factors, numbers of new cases according to their extension, as well as mortality and survival rates[4].

In Brazil, one of the main pillars of cancer surveillance are Population-Based Cancer Registries (RCBP), which are important sources for epidemiological studies and a guidance for adequate planning of disease control and prevention in the country.

This article aims to describe the distribution of the five leading types of cancer, by sex, in the State of Mato Grosso, according to health regions, for the period from 2007 to 2011.

METHODS

This is an ecological descriptive study of the five most common types of cancer, stratified by sex, in the health regions of Mato Grosso State, for the period comprising 2007 to 2011.

Information about incidence was obtained with the diagnostic confirmation of malignant neoplasm through anatomopathological, cytological, hematological exams, surgical exploration, imaging, clinical examination, necropsy or other means with medical opinion[5] and coming from the RCBP of Mato Grosso inland and Cuiabá, separated by health regions: Água Boa, Alta Floresta, Baixada Cuiabana, Barra do Garças, Cáceres, Colíder, Diamantino, Juara, Juína, Peixoto de Azevedo, Pontes e Lacerda, Porto Alegre do Norte, Rondonópolis, São Felix do Araguaia, Sinop and Tangará da Serra. The area covered by RCBP Cuiabá is made up of the municipalities of Cuiabá and Várzea Grande, while RCBP Mato Grosso inland I made up of the other municipalities of the State. This information is part of a data quality control procedure that is fundamental and necessary to pursue record excellence. Initially, this control is performed by the RCBP in the steps of typing and processing data using a specific program — BasePopWeb. This tool was developed by the National Cancer Institute (INCA) and is free of charge to all RCBPs in Brazil.

The system was proven flexible and timely for cancer monitoring[6]. An evaluation of information quality indicators was carried out: percentage of microscopic verification (%MV), percentage of death certificate only (%DCO) and mortality/incidence ratio (M/I) using the criteria of the International Agency for Research on Cancer (IARC)[7]. The importance of evaluating quality of data from cancer databases is highlighted. Several qualitative and quantitative methods have been described by Bray and Parkin[8]. They can be evaluated by the following indicators: comparability, validity, timeliness and completeness. Comparability is the topography coding and morphological classification, which are internationally standardized for neoplasms and used in registries. Validity is applied by quantitative methods as the percentage of morphologically verified neoplasms, that is, percentage of diagnostic criteria and percentage of DCO cases[7-9].

The criteria for evaluating the quality of RCBP databases, based on CI5 (IARC), have changed over the years. In the publication of CI5 VIII, RCBP databases were classified into groups according to the quality of information. Acceptable parameter values were above 75% (%MV) and below 10% (%DCOO). Currently, CI5 XII (IARC) does not define parameter values for quality indicators; it refers to two quality-related papers by Parkin and Bray[10], who, in turn, refer to the IARC Technical Publication No. 43, with emphasis

on RCBP from low- and middle-income countries. An analysis of quality indicators of the Brazilian RCBP was also carried out and is included in the IARC technical publication. Due to this information and using common sense, the information quality parameters defined for this study were: above 70% for the percentage of MV and from 10 to 12% for the percentage of DCO[7-12].

Until this research was conducted, the RCBP of Mato Grosso inland had information from the years 2001 to 2011 available, and the RCBP of Cuiabá from 2000 to 2016. In order to compare them, the time frame 2007 to 2011 was chosen.

When selecting the five most common types of cancer, according to sex, the highest average age-adjusted rates in the study period (2007–2011), by the world population of 1960, was considered. Thus, the types of cancer (except non-melanoma skin cancer) or primary locations selected for males were: lip, tongue, oral cavity and oropharynx (C00-10/C07-08), stomach (C16), colorectal (C18-C21), trachea, bronchus and lung (C33-C34), and prostate cancer (C61). For females, they were: colorectal (C18-C21), trachea, bronchus and lung (C33-C34), breast (C50), cervix (C53) and uterine body/uterus, not otherwise specified (NOS) cancer (C54-55), in addition to the total number of malignant neoplasms (C00-C97; D46).

Incident cases for the period between 2007 and 2011 were recorded in RCBPs based on the International Classification of Diseases for Oncology (ICD-O) (in the third edition—ICD-O3) and converted to the International Statistical Classification of Diseases and Related Health Problems tenth revision (ICD-10)[13-15].

The variables were: types of cancer (primary locations), age (categorized into age groups: 15-19 years to 85 years and older), sex (male and female), health regions of Mato Grosso, and study period.

Crude and age-adjusted incidence rates per 100,000 inhabitants were calculated for each year between 2007 and 2011, dividing the number of new cases by the population over the period, and then multiplying by 100,000 inhabitants. Specific crude rates were calculated for each age group using five-year intervals[5,16] and adjusted incidence rates by the direct method, considering the standard world population proposed by Segi[17] and modified by Doll and Payne[18]. Thus, this procedure makes it possible to eliminate (or minimize) the effect of age differences between populations (or within the same population in different periods), so that geographic or temporal differences are not attributed to differences in age structure.

To calculate the gross incidence rates, the intercensus populations (2007 to 2009 and 2011) were used, except for 2010, year of census population, according to age groups. These data were obtained from the Department of Informatics of the Unified Health System (DATASUS) and provided by the Brazilian Institute of Geography and Statistics (IBGE)[19].

All the information was compiled and analyzed in a spreadsheet using the Microsoft Excel program.

The study was approved by the Ethics Committee of Hospital Universitário Júlio Muller (CEP-HUJM), opinion number 3,048,183, dating from November 20, 2018; Ethics Committee of Mato Grosso State Health Department (CEP-SES-MT), opinion number 3,263,744, dating form April 12, 2019.

RESULTS

From 2007 to 2011, the RCBP of Mato Grosso inland and Cuiabá had 16,221 new cases of cancer studied; 8,977 in men (55.3%) and 7,244 in women (44.7%).

The types with the highest rates in men were prostate cancer, especially in the age groups from 50 to 54 years and above, with a peak at 60 years, and lung cancer, in the groups from 45 to 49 years and above, with peak at age 60 (Tables 1 and 2). Among women, breast and cervical cancers were more common and the incidence was higher from 25 years onwards and, with advancing age, in the age group of 84 years. Other cancers are more incident at 50 years of age. The medians of rates adjusted for the five most frequent locations between 2007 and 2011 were higher in the capital than in Mato Grosso inland.

Table 1. Specific incidence rates by age group and adjusted rates for the five most frequent primary locations, per 100,000 men, Population-Based Cancer Registry, Cuiabá and Mato Grosso, 2007 to 2011.

RCBP Mato Grosso/males																
Type of cancer	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	≥85	AR
C61	0.00	0.00	0.00	0.43	0.70	1.78	4.39	22.93	66.50	158.04	277.66	434.93	506.84	668.64	698.69	39.50
C33-34	0.19	0.39	0.00	0.22	0.70	3.56	7.61	19.60	24.63	52.64	79.99	115.98	127.24	97.26	116.45	11.90
C16	0.00	0.00	0.59	0.65	2.11	3.81	8.78	9.62	27.09	36.99	57.92	93.57	89.07	149.94	98.98	9.76
C18-21	0.19	0.39	1.38	1.51	3.05	3.30	11.13	9.99	16.26	26.23	27.58	59.31	63.62	101.31	29.11	6.80
C00-10/C07-08	0.19	0.19	0.39	0.43	0.94	4.57	11.13	15.90	18.72	21.52	28.50	31.63	40.29	32.42	46.58	5.80
RCBP Cuiabá/males																
C61	0.00	0.00	0.64	0.72	3.35	1.88	18.31	64.08	218.58	437.01	677.02	871.86	1057.70	1417.18	1259.13	92.64
C33-34	0.67	0.00	0.00	0.00	0.84	2.82	21.54	24.03	51.96	78.04	128.40	151.87	75.55	248.01	277.01	18.24
C16	0.00	0.62	0.64	0.72	1.68	5.64	17.23	28.04	32.25	46.82	70.04	135.00	141.66	212.58	201.46	14.47
C18-21	0.00	1.24	0.64	2.88	6.71	16.93	17.23	38.72	35.83	41.62	85.60	123.75	132.21	106.29	176.28	15.59
C00-10/C07-08	0.00	0.00	0.64	0.72	4.19	11.29	24.77	32.04	28.67	39.02	50.58	73.12	75.55	0.00	50.37	10.81

RCBP: Population-Based Cancer Registry; AR: Adjusted rate. C00-10/C07-08: oral cavity cancer; C16: stomach cancer; C18-21: colon and rectum cancer: C33-34: bronchi, trachea and lung cancer; and C61: prostate cancer.
Source: Population-Based Cancer Registry (RCBP), Cuiabá and Mato Grosso

Table 2. Specific incidence rates by age group and adjusted rates for the five most frequent primary locations, per 100,000 women, Population-Based Cancer Registry, Mato Grosso and Cuiabá, 2007 to 2011.

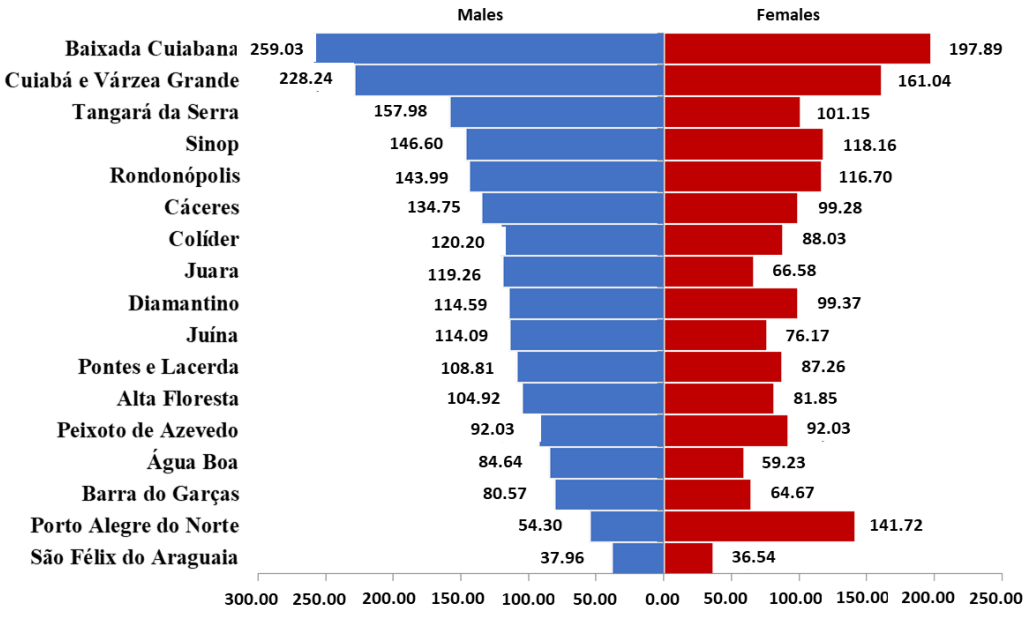
RCBP Mato Grosso/females																
Type of cancer	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	≥85	TA
C50	0.00	0.41	3.81	9.65	19.53	39.49	54.83	70.74	71.99	66.37	91.80	85.23	99.01	106.40	114.27	23.37
C53	0.40	2.07	5.09	12.64	17.75	23.58	31.96	37.96	39.99	42.94	43.26	45.66	61.88	77.38	42.10	14.42
C18-21	0.00	0.21	1.70	1.84	4.31	5.68	9.08	18.98	21.71	20.30	28.49	48.70	54.46	87.06	42.10	7.06
C33-34	0.20	0.00	0.64	0.46	2.03	2.84	5.38	9.49	13.71	21.86	40.10	48.70	64.38	82.22	72.17	6.20
C54-55	0.00	0.00	0.21	0.92	1.27	3.69	6.05	8.20	14.28	17.96	25.33	30.44	14.85	43.53	24.06	4.29
RCBP Cuiabá/females																
C50	0.00	1.23	4.38	22.25	39.20	54.33	92.01	128.89	124.91	133.47	186.69	179.25	252.39	151.80	171.69	43.02
C53	0.00	0.62	9.38	13.21	23.20	33.85	30.33	42.14	62.45	49.17	101.83	70.75	141.04	37.95	78.04	19.87
C18-21	0.00	0.62	1.25	5.56	5.60	11.58	12.13	30.98	50.64	65.56	71.28	136.79	96.50	164.45	46.82	15.33
C33-34	0.00	0.00	0.00	0.70	1.60	2.67	12.13	13.63	13.50	42.15	27.15	94.34	89.08	88.55	62.43	8.28
C54-55	0.00	0.00	0.00	0.70	0.80	3.56	6.07	9.91	20.26	7.02	16.97	28.30	29.69	63.25	31.22	4.10

RCBP: Population-Based Cancer Registry; AR: Adjusted rate. C00-10/C07-08: oral cavity cancer; C16: stomach cancer; C18-21: colon and rectal cancer; C33-34: bronchial, trachea and lung cancer; C50: breast cancer; C53: cervical cancer; C54-55: body of the uterus and uterus cancer, not otherwise specified.
Source: Population-Based Cancer Registry (RCBP), Cuiabá and Mato Grosso

Figure 1 shows the highest age-adjusted incidence rates of all cancers, except for non-melanoma skin cancer. Most health regions have a good coverage and validity standard for both men and women, with a percentage of DCO below 12% and percentage of MV above 70%.

In general, the quality of information was better for females, mainly in Porto Alegre do Norte and São Félix do Araguaia, where strategies to improve coverage are needed (Tables 3 and 4), but in Saúde de Água Boa, Baixada Cuiabana and Barra do Garças, information was good for both sexes.

It is worth mentioning the high percentage of DCO cases (%DCO), above 12%, for tumors with good prognosis and early detection, such as female breast and cervix cancers, observed in some regions of the state. In males, prostate cancer had better quality information in relation to other tumors, with a worse prognosis (Tables 3 and 4).



Source: Population-Based Cancer Registry (RCBP), Cuiabá and Mato Grosso
*World population in 1960.

Figure 1. Incidence rate of all neoplasms, except non-melanoma skin, adjusted for age*, per 100,000 inhabitants, health region and RCBP of Cuiabá, for 2007-2011.

DISCUSSION

RCBPs are structured and specialized centers for the collection, storage, processing, analysis and dissemination of information about people or patients with a confirmed diagnosis of cancer[5,7]. They are one of the pillars of cancer control programs, and their data are used for epidemiological research, planning, implementation of prevention services, diagnosis, treatment and health promotion[20]. The RCBPs of Mato Grosso inland and Cuiabá meet the proposed objectives, despite their operational complexity, because they allow to determine, annually, the incidence and distribution of different neoplasms in the State, health regions and municipalities.

The spread of information from several national health information systems has been developing and expanding the possibilities of analyses. Despite this, the fear for low quality of information has been a fundamental and limiting factor for its wide use in research. However, some Brazilian studies reported a positive assessment of completeness of information in certain types of health information systems in Brazil[21-23].

The acceptability assessment based on indicators showed acceptable parameters according to the recommendations of IARC / World Health Organization—WHO[24-26]. Our descriptive study showed a low degree of adequacy of the RCBP in the state.

Due to the low quality and non-validity of the information available through the annual registry, they have been little used by managers of teaching and research institutions. INCA /

Table 3. Quality indicators, according to primary location in men, health region of Mato Grosso, between 2007 and 2011.

Health region/males	C61 (%)			C33-C34 (%)			C16 (%)			C18-C21 (%)			C00-10/C07-08 (%)		
	HV	DCO	M/I	HV	DCO	M/I	HV	DCO	M/I	HV	DCO	M/I	HV	DCO	M/I
Água Boa	56.8	43.2	47.7	8.3	91.7	108.3	37.5	62.5	75.0	42.9	57.1	57.1	75.0	0.0	25.0
Alta Floresta	80.4	19.6	23.5	37.5	68.8	93.8	50.0	50.0	91.7	50.0	50.0	60.0	85.7	14.3	64.3
Baixada Cuiabana	93.3	5.6	22.3	70.5	26.2	103.3	80.6	17.6	78.2	88.3	8.6	50.4	96.0	3.0	42.4
Barra do Garças	53.8	46.3	53.8	25.0	75.0	100.0	45.5	54.5	90.9	53.3	40.0	66.7	50.0	50.0	75.0
Cáceres	78.9	20.5	32.4	44.2	53.8	84.6	69.2	28.8	76.9	74.2	25.8	41.9	75.8	24.2	48.5
Colíder	70.0	28.0	48.0	31.3	68.8	87.5	52.2	47.8	73.9	85.7	14.3	50.0	66.7	33.3	50.0
Diamantino	84.8	15.2	25.3	20.7	75.9	110.3	59.1	40.9	77.3	58.3	33.3	41.7	73.3	20.0	53.3
Juara	83.8	16.2	27.0	18.8	81.3	100.0	50.0	50.0	75.0	33.3	66.7	100.0	88.9	11.1	22.2
Juína	71.8	28.2	39.4	22.9	74.3	88.6	38.9	61.1	72.2	91.7	8.3	41.7	75.0	18.8	37.5
Peixoto de Azevedo	81.6	15.8	28.9	33.3	66.7	95.2	44.4	55.6	88.9	66.7	33.3	33.3	85.7	14.3	21.4
Pontes e Lacerda	76.5	23.5	36.5	35.3	64.7	88.2	64.3	35.7	71.4	66.7	33.3	88.9	66.7	33.3	50.0
Porto Alegre do Norte	45.5	50.0	59.1	16.7	83.3	83.3	0.0	100.0	133.3	57.1	42.9	42.9	0.0	100.0	200.0
Rondonópolis	77.3	20.5	37.0	29.6	62.6	107.0	55.3	42.1	70.2	67.4	18.6	43.0	76.1	17.9	50.7
São Felix do Araguaia	50.0	50.0	75.0	25.0	75.0	50.0	100.0	0.0	0.0	0.0	100.0	100.0	100.0	0.0	0.0
Sinop	78.6	18.3	35.7	35.9	55.1	101.3	68.8	25.0	62.5	82.4	11.8	39.2	86.2	13.8	41.4
Tangará da Serra	83.9	15.5	29.2	41.3	58.7	78.3	60.7	39.3	78.6	87.9	9.1	42.4	95.0	5.0	20.0

HV: histological verification; DCO: only by death certificate; M/I: mortality/incidence ratio.
Source: Population-Based Cancer Registry (RCBP), Cuiabá and Mato Grosso

MS has been its main user for the disclosure of estimates of cancer incidence in the State of Mato Grosso, in the Midwest region and in Brazil, in addition to applying them to targeting campaigns at the national level[3].

The adjusted cancer incidence rates in the capital and Mato Grosso inland suggest an epidemiological transition in the state, with types of cancer associated with infections and attributed to socioeconomic development and to unhealthy lifestyle habits. Martel

Table 4. Quality indicators, according to primary location in women, health region of Mato Grosso, between 2007 and 2011.

Health region/females	C50 (%)			C53 (%)			C18-C21 (%)			C33-C34 (%)			C54-55 (%)		
	HV	DCO	M/I	HV	DCO	M/I	HV	DCO	M/I	HV	DCO	M/I	HV	DCO	M/I
Água Boa	68.4	31.6	47.4	76.9	23.1	30.8	40.0	60.0	60.0	33.3	66.7	66.7	50.0	50.0	50.0
Alta Floresta	80.0	17.8	28.9	87.0	8.7	39.1	100.0	0.0	28.6	45.5	54.5	90.9	75.0	25.0	50.0
Baixada Cuiabana	95.3	2.9	28.7	97.1	2.6	21.6	92.4	6.2	42.2	64.4	35.0	108.6	90.0	10.0	33.6
Barra do Garças	75.7	24.3	37.8	66.7	29.6	51.9	66.7	33.3	50.0	12.5	87.5	100.0	50.0	50.0	100.0
Cáceres	90.3	7.8	28.2	90.3	8.3	26.4	77.8	22.2	41.7	48.3	51.7	96.6	70.8	29.2	50.0
Colíder	89.7	7.7	33.3	92.3	0.0	38.5	100.0	0.0	30.0	37.5	62.5	112.5	50.0	50.0	66.7
Diamantino	85.7	14.3	34.9	78.6	21.4	50.0	78.6	21.4	42.9	14.3	85.7	100.0	71.4	28.6	28.6
Juara	77.8	11.1	33.3	77.8	22.2	33.3	80.0	20.0	20.0	-	-	-	100.0	0.0	300.0
Juína	91.1	8.9	17.8	94.4	5.6	38.9	75.0	25.0	62.5	30.0	70.0	100.0	66.7	33.3	50.0
Peixoto de Azevedo	88.6	8.6	25.7	79.3	20.7	44.8	80.0	20.0	20.0	40.0	60.0	100.0	75.0	25.0	100.0
Pontes e Lacerda	90.7	9.3	34.9	97.1	2.9	22.9	66.7	33.3	44.4	33.3	66.7	83.3	100.0	0.0	100.0
Porto Alegre do Norte	57.1	42.9	64.3	71.4	21.4	28.6	80.0	20.0	40.0	40.0	60.0	80.0	100.0	0.0	0.0
Rondonópolis	78.2	12.0	37.3	82.5	14.4	38.1	78.9	17.8	50.0	37.1	50.0	90.3	62.0	38.0	88.0
São Felix do Araguaia	-	-	-	60.0	40.0	60.0	-	-	-	100.0	0.0	0.0	0.0	100.0	0.0
Sinop	91.3	5.6	24.2	90.7	8.2	32.0	70.8	25.0	50.0	43.8	43.8	87.5	68.8	18.8	62.5
Tangará da Serra	83.5	11.0	26.4	93.8	4.7	23.4	75.0	25.0	45.0	28.0	68.0	104.0	83.3	16.7	83.3

HV: histological verification; DCO: only by death certificate; M/I: mortality/incidence ratio; -: no information.
Source: Population-Based Cancer Registry (RCBP), Cuiabá and Mato Grosso

et al., in 2020, estimated 2.2 million cases of cancer attributed to infections in 2018 worldwide, which corresponds to 25 cases per 100,000 inhabitants[27].

Compared with adjusted world rates, the results for all cancers in the health regions of Mato Grosso inland RCBP were close to those of Latin American countries and the Caribbean, Asian and African countries, except for health region Baixada Cuiabana,

whose numbers were close to those of European countries for both sexes. It happens because the city of Cuiabá, where the RCBP Cuiabá is located, is part of Baixada Cuiabana health region, which has better quality of information regarding all cancers analyzed[7].

Descriptive studies by Lorenzoni et al.[28] and Jedy-Agba et al.[29] also showed high percentages of quality indicators, but the results reflected the epidemiological profile of the area covered by the registry in Mozambique and the lack of diagnosis services in the region, as well as poor access to early diagnosis in Nigerian registries, as noted by Curado et al.[30].

Cancer registries in Latin America are evolving, especially when it comes to monitoring data quality. Several initiatives to improve quality of information and sustainability of cancer registries in the region have been implemented, led by IARC and INCA, in Brazil[4,11].

Regarding the percentage of DCO found in our study, especially for tumors with worse prognosis such as lung and stomach, it was much higher compared to studies carried out in the cancer registry in Mendoza, Argentina. The authors reported an improvement in the quality and validity of information after routine tracking of DCO cases (2006 to 2012) in 2018, although this strategy is a challenge given the structures of records in low- and middle-income countries[31].

In another study that analyzed the quality of data from four RCBP in Colombia, there was underreporting, since only two records included information on cases informed by Death Certificate in the database. Highly lethal cancers, such as liver, lung, pancreas, and stomach cancer, do not add up to statistics during an analysis of results, because some records are not directly or indirectly linked to the mortality database[32].

Regarding the types of cancer related to women, the pattern in the capital and in the inland followed the same worldwide behavior, as stated by Torre et al.[33]. They identified disparities in cancer burden among women and an increasing trend in cancers associated with socioeconomic development, such as breast, lung, colorectal cancer, especially in low- and middle-income countries[33].

It is worth noting that the latest global estimates of cancer incidence rates were to be 19% higher in men (222 per 100,000 inhab.) than in women (186 per 100,000 inhab.) in 2020, with variability between regions of the world up to five times higher for men and four times higher for women, which reflects differences in exposure to risk factors and barriers to access. According to this world estimate, breast cancer is the most incident in the world, surpassing lung cancer ad corresponding to 2.3 million new cases (11.7%), followed by lung cancer (11.4%), colorectal (10.0%), prostate (7.3%) and stomach cancer (5.6%). In men, prostate cancer is the most frequently diagnosed in 112 countries, followed by lung cancer in 36 countries, colorectal and liver cancer in 11 countries[34]. This result was also found by another Brazilian study[35].

The research pointed a higher incidence in men than in women, according to health regions. The least developed regions in the state had a decrease in rates by sex, except for Porto Alegre do Norte, where the highest risk was reported among women (61%).

Although the current burden of cancer incidence is higher in countries with a higher human development index, a greater piece of the global mortality burden belongs to less

developed countries, where the average case fatality rate is higher. Furthermore, the future burden of cancer is expected to disproportionately affect less developed regions; in particular, countries with low and medium human development indexes are expected to show an increase of 100 and 81% in cancer incidence from 2008 to 2030, respectively[30].

According to Goss et al., Latin American and Caribbean countries accounted for the increase in morbidity and death from advanced disease. The authors pointed out several challenges for disease control in these countries and addressed the need for an effective control action plan[36].

Curado et al.[30] point out that the quality indicators used to assess RCBP data are directly related to the number and type of healthcare facilities available for cancer diagnosis and treatment within the registry's coverage area. In low- and middle-income countries, these indicators are challenging because data is usually incomplete in records, and there is a lack of active case-finding and sustainability of registries for long-term follow-up of cancer rate and trend patterns in the geographic region covered by the RCBP. Health system problems can be identified through the evaluation of quality control indicators, in which clinical diagnosis is the only means of diagnosis, and the high DCO percentage reflects the low coverage. The dissemination and analysis of information from existing cancer records is useful and can provide guidance on the deficiencies of the health systems, in addition to supporting the planning of control actions, even if not meeting all quality control standards[12,30].

Identifying the main types of cancer is important for the improvement of cancer surveillance, prevention and control strategies, as well as to understand the magnitude of this disease occurrence and its impact on society. The continuous improvement of RCBP information quality in the State of Mato Grosso is therefore justified.

ACKNOWLEDGEMENTS

We thank the National Cancer Institute (INCA) for the contribution in the training of cancer registrars, for collaborating in the financial execution of the outreach and research project; and the Institute of Collective Health of UFMT for allowing use of its facilities.

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Received on: 10/18/2021
Reviewed on: 03/21/2022
Accepted on: 03/21/2022
Preprint: 04/25/2022
https://preprints.scielo.org/index.php/scielo/preprint/view/4018

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