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Social vulnerability and mortality from gastric cancer in the state of Pará: an ecological study

Vulnerabilidade social e mortalidade por câncer gástrico no estado do Pará: estudo ecológico

Vulnerabilidad social y mortalidad por cáncer gástrico en el estado de Pará: un estudio ecológico

Manuela Cristina Gouveia do Amaral[1]
ORCID: 0000-0002-5938-1181
Laura Maria Vidal Nogueira[1]
ORCID: 0000-0003-0065-4509
Bruna Rafaela Leite Dias[1]
ORCID: 0000-0001-9900-1860
Erlon Gabriel Rego de Andrade[1]
ORCID: 0000-0002-7109-6121
Ivaneide Leal Ataíde Rodrigues[1]
ORCID: 0000-0001-9968-9546
Kamila Ferreira de Souza[2]
ORCID: 0009-0006-3609-141X

[1]Universidade do Estado do Pará. Belém, Pará, Brasil.
[2]Universidade Federal do Pará. Altamira, Pará, Brasil.

Corresponding author:
Erlon Gabriel Rego de Andrade
E-mail: erlon.rego@gmail.com

Abstract

Objective: To analyze the spatial pattern of gastric cancer mortality associated with the Social Vulnerability Index in the period 2016-2020. **Methods:** An ecological study, whose sample consisted of deaths from gastric cancer that occurred in the state of Pará, reported to the Mortality Information System. Population data and Social Vulnerability Index data, respectively, provided by the Brazilian Institute of Geography and Statistics and the Institute of Applied Economic Research, were also used. Descriptive statistical analysis and spatial analysis were performed using univariate and bivariate Local and Global Moran's Index, with the aid of GeoDa and ArcGis softwares, considering $p \leq 0.05$. **Results:** A total of 2,964 deaths were studied, with higher proportions in the age groups of 60-69 (n=777/26.21%) and 70-79 years (n=766/25.84%), males (n=2,007/67.71%), brown race/color (n=2,298/77.53%), married marital status (n=1,321/44.57%) and with one to three years of education (n=865/29.18%). Higher mortality rates occurred in the Lower Amazon, Marajó and Northeast Pará mesoregions, with statistically significant clusters being identified (I=0.791/ $p<0.001$). **Conclusion:** The association between gastric cancer and Social Vulnerability Index highlights the need for measures to encourage risk-avoiding behaviors and enable early screening. In this context, specific care pathways and a responsive care network are necessary.

Descriptors: Stomach Neoplasms; Social Vulnerability Index; Spatial Analysis; Medical Oncology; Public Health.

Whats is already known on this?
Gastric cancer is considered an important public health problem, with a higher incidence in low and medium-developed countries, which have populations with lower socioeconomic power, such as Brazil.

What this study adds?
It was found that there is a relationship between gastric cancer and the Social Vulnerability Index in mesoregions, with challenging social characteristics for public policies in the state of Pará.

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Resumo

Objetivo: *Analisar o padrão espacial da mortalidade por câncer gástrico associado ao Índice de Vulnerabilidade Social no período de 2016-2020.* ***Métodos:*** *Estudo ecológico, cuja amostra se constituiu pelos óbitos por câncer gástrico que ocorreram no estado do Pará, notificados ao Sistema de Informação sobre Mortalidade. Também foram utilizados dados populacionais e dados do Índice de Vulnerabilidade Social, respectivamente disponibilizados pelo Instituto Brasileiro de Geografia e Estatística e pelo Instituto de Pesquisa Econômica Aplicada. Realizaram-se análise estatística descritiva e análise espacial utilizando Índice de Moran Local e Global univariado e bivariado, com auxílio dos softwares GeoDa e ArcGis, considerando p≤0,05.* ***Resultados****: Foram estudados 2.964 óbitos, com maiores proporções nas faixas etárias de 60-69 (n=777/26,21%) e 70-79 anos (n=766/25,84%), no sexo masculino (n=2.007/67,71%), na raça/cor parda (n=2.298/77,53%), no estado civil casado (n=1.321/44,57%) e na escolaridade de um a três anos (n=865/29,18%). Taxas mais elevadas de mortalidade ocorreram nas mesorregiões Baixo Amazonas, Marajó e Nordeste Paraense, sendo identificados aglomerados estatisticamente significativos (I=0,791/p<0,001).* ***Conclusão:*** *A associação do câncer gástrico com o Índice de Vulnerabilidade Social remete à necessidade de medidas para incentivar comportamentos que evitem riscos e para possibilitar o rastreamento precoce. Nesse contexto, são necessárias linhas de cuidado específicas e uma rede de atenção resolutiva.*

Descritores: *Neoplasias Gástricas; Índice de Vulnerabilidade Social; Análise Espacial; Oncologia; Saúde Pública.*

Resumén

Objetivo: *Analizar el patrón espacial de la mortalidad por cáncer gástrico asociado al Índice de Vulnerabilidad Social en el período 2016-2020.* ***Métodos:*** *Estudio ecológico, cuya muestra consistió en las muertes por cáncer gástrico ocurridas en el estado de Pará, notificadas al Sistema de Información de Mortalidad. También se utilizaron datos de población y del Índice de Vulnerabilidad Social, proporcionados por el Instituto Brasileño de Geografía y Estadística y el Instituto de Investigación Económica Aplicada, respectivamente. Se realizó un análisis estadístico descriptivo y espacial mediante el Índice de Moran local y global univariado y bivariado, con la ayuda de los softwares GeoDa y ArcGis, considerando un valor de p ≤ 0,05.* ***Resultados:*** *Se estudiaron 2.964 muertes, con mayor proporción en los grupos de edad de 60 a 69 años (n=777/26,21%) y 70 a 79 años (n=766/25,84%), hombres (n=2.007/67,71%), raza/color pardo (n=2.298/77,53%), estado civil casado (n=1.321/44,57%) y con uno a tres años de escolaridad (n=865/29,18%). Se observaron tasas de mortalidad más altas en las mesorregiones de Bajo Amazonas, Marajó y Noreste de Pará, identificándose conglomerados estadísticamente significativos (I=0,791/p<0,001).* ***Conclusión:*** *La asociación entre el cáncer gástrico y el Índice de Vulnerabilidad Social destaca la necesidad de medidas para fomentar conductas de prevención de riesgos y facilitar la detección temprana. En este contexto, se requieren vías de atención específicas y una red de atención receptiva.*

Descriptores: *Neoplasias Gástricas; Índice de Vulnerabilidad Social; Análisis Espacial; Oncología Médica; Salud Pública.*

INTRODUCTION

Constituting the group of chronic non-communicable diseases (NCDs), cancer (CA) is responsible for a large proportion of deaths among people affected by it, being classified as an important factor of mortality and a barrier to increasing life expectancy in several countries.[1]

Among the various manifestations of this disease, gastric CA stands out, caused by the abnormal proliferation of cells in the digestive tract. The main characteristic is the appearance of small, irregular lesions, typical of malignant tumors. Gastric CA is classified according to histological type, with adenocarcinoma being the most common, along with lymphoma and leiomyosarcoma. It is considered the most common type of CA affecting the upper gastrointestinal tract, and its occurrence is associated with exposure to intrinsic and extrinsic factors, such as genetics, habits, and lifestyle.[2-3]

According to statistics, in 2020, there were approximately 1.089 million new cases and 769,000 deaths from gastric CA worldwide. In this context, it is considered the fifth most common neoplasm and the fourth leading cause of death from CA, affecting men more severely.[4-5] In the last five years, the survival rate of people with the disease in Western countries has been around 30% in developed countries and 20% in developing countries.[2,6-7]

In Brazil, approximately 704,000 new cases of gastric CA are expected between 2023 and 2025, posing a major challenge for health management and public policy. The epidemiological profile of the disease varies widely, depending on its type and the region where it occurs. In the North and Northeast regions, gastric CA has the third-highest rate in the country: six cases per 100,000 inhabitants.[2]

Specifically, in the North region, in 2023, an estimated 12.55 new cases per 100,000 inhabitants among males were estimated, constituting the second most common type of CA among men in the region. For females, an estimated 5.46 cases per 100,000 inhabitants were estimated, corresponding to the fifth most common type among women.[2]

Therefore, understanding the health-disease process requires considering the Social Determinants of Health, as they encompass the conditions in which individuals are born, live, work, and age. In the case of gastric CA, socioeconomic determinants play a central role, as vulnerable populations are more exposed to risk factors such as poor diet, smoking, *Helicobacter pylori* infection, and limited access to healthcare services.[8]

In this scenario, as a medium-developed country, Brazil exhibits marked differences in growth, exclusion and social vulnerability, depending on the geographic region, which is expressed in the Social Vulnerability Index (SVI), an indicator proposed by the Institute of Applied Economic Research (In Portuguese, *Instituto de Pesquisa Econômica Aplicada* – IPEA).[6,9] The concept of social vulnerability refers to access, lack, and insufficiency of assets, such as goods and services, with SVI being the primary instrument used to assess potential gaps in the provision of these resources. This index aims to help characterize social exclusion and vulnerability in the country, as these factors influence the process of illness. This is why low education and low income are risk factors for gastric CA.[3,9-10]

When studying gastric CA as a problem that can be controlled with effective collective measures, it is important to place it in the current context of the Sustainable Development Goals (SDGs) proposed by the United Nations (UN) to improve the living and health conditions of the world's population, establishing targets to be achieved by 2030. The third SDG stands out, which, among its targets, provides for the reduction of premature mortality from NCDs, through actions and strategies for prevention, treatment, and promotion of mental health and well-being[11], which necessarily includes neoplasms, such as gastric CA.

Given the complexity and uneven distribution of gastric CA mortality in Brazil, the use of spatial analysis as a methodological tool is essential. This approach allows for the identification of geographic patterns, risk areas, and spatial clusters of high mortality, contributing to the planning of control and surveillance actions[12]. Recent studies have shown that socioeconomically disadvantaged regions have a higher concentration of deaths, highlighting the significant influence of territorial context on health outcomes.[12-14]

Considering the relevance of the topic, this research aimed to analyze the spatial pattern of gastric cancer mortality associated with the Social Vulnerability Index in the period 2016 to 2020.

METHODS

An ecological study was developed guided by the STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) recommendations.[15] It was carried out in the state of Pará, northern Brazil, with a population of 7,581,051 people, a territorial area of 1,245,870.700 km² and a Human Development Index (HDI) of 0.646.[16] It has 144 municipalities, grouped into six mesoregions: Lower Amazon; Marajó; Metropolitan Belém; Northeast Pará; Southeast Pará; and Southwest Pará.[17]

The sample consisted of deaths from gastric CA that occurred in the state between 2016 and 2020 and were reported to the Mortality Information System (MIS). All reported cases were included, with no exclusions. Data collection took place from August to December 2022.

The variables studied, derived from reports, were sex, age group, race/skin color, marital status, education level, and municipality of residence. Population estimates for the intercensal years provided by the Brazilian Institute of Geography and Statistics (In Portuguese, *Instituto Brasileiro de Geografia e Estatística* – IBGE) were used. On the other hand, SVI was obtained through open access from the official IPEA database for the year 2010, since the calculation of this index depends on detailed and comprehensive data from demographic censuses, which in Brazil are calculated every ten years. Therefore, data from the most recent demographic census, from 2022, are still being processed and analyzed for new versions of SVI.

A descriptive statistical analysis of the sociodemographic variables was performed using Statistical Package for the Social Sciences software (SPSS, version 24.0, 2015, International Business Machines, United States of America) and mortality spatial distribution analysis based on the annual crude rates, by municipality, calculated using the equation:

$$TxMCG = \left(\frac{Number\ of\ deaths\ (2016-2020)}{Total\ population\ of\ residents\ (2016-2020)}\right) \text{X } 100{,}000 \text{ X } \frac{1}{5}$$

To minimize the instability of raw rates and eliminate random fluctuations, especially due to the existence of municipalities with small populations, rate smoothing was applied using the local empirical Bayesian method. Rate calculations were processed using TerraView software (version 4.2.2, 2013, National Institute for Space Research, Brazil), and choropleth maps of the smoothed rates were constructed using ArcGis software (version 10.2, 2019, Esri, United States of America).

For spatial autocorrelation among municipalities in Pará, univariate analysis of Global Moran's Index (I) was applied, followed by Local Indicators of Spatial Association (LISA) maps using Local Moran's

Index. The degree of proximity was determined by the weight matrix, using queen contiguity as the criterion. To estimate the significance of the indices, the pseudosignificance test was used, using 999 permutations.[18] Global Moran's Index allowed us to indicate spatial dependence, considering values from -1 to +1. Thus, values close to 0 indicate no spatial dependence or very low spatial dependence; values close to -1 represent negative or inverse spatial dependence; and values close to +1 represent positive spatial dependence.[19]

In Local Moran's Index, municipalities are classified into four quadrants, based on the relationship between the variable's values in a municipality and its neighboring municipalities. The high-high quadrant indicates municipalities with high values surrounded by neighbors who are also high, suggesting the formation of positive spatial clusters. The low-low quadrant represents the opposite: municipalities with low values surrounded by neighbors who are equally low. Both cases indicate stable, clustered patterns.[19]

The high-low quadrant identifies municipalities with high values surrounded by neighbors with low values, highlighting potential spatial outliers with an inverse trend. Similarly, the low-high quadrant represents municipalities with low values surrounded by neighbors with high values, indicating negative autocorrelation. All quadrants were visually represented using maps called LISA Maps.[19]

Additionally, the relationship between the dependent variable (smoothed gastric CA mortality rate) and the independent variable (SVI) was analyzed using the bivariate Global Moran's Index test, using GeoDa software (version 1.14.0, 2019, Center for Spatial Data Science, University of Chicago, United States of America). Subsequently, maps were constructed using ArcGis software to identify municipalities with statistically significant local correlations. In all statistical analyses, p-values ≤ 0.05 were considered statistically significant.

The study was conducted with publicly available data, exempting the need for review by a Research Ethics Committee. Therefore, the precepts set forth in Resolutions 466/2012 and 510/2016 of the Brazilian National Health Council/Ministry of Health were respected.

RESULTS

According to Table 1, 2,964 deaths from gastric CA were reported, predominantly in the age groups of 60 to 69 (n=777; 26.21%) and 70 to 79 years (n=766; 25.84%), males (n=2.007; 67.71%), brown race/skin color (n=2.298; 77.53%) and among married individuals (n=1.321; 44.57%). Regarding education, cases predominated among people with one to three years of study (n=865; 29.18%).

Table 1. Sociodemographic profile of gastric cancer mortality (n=2,964). Pará, Brazil, 2016 to 2020.

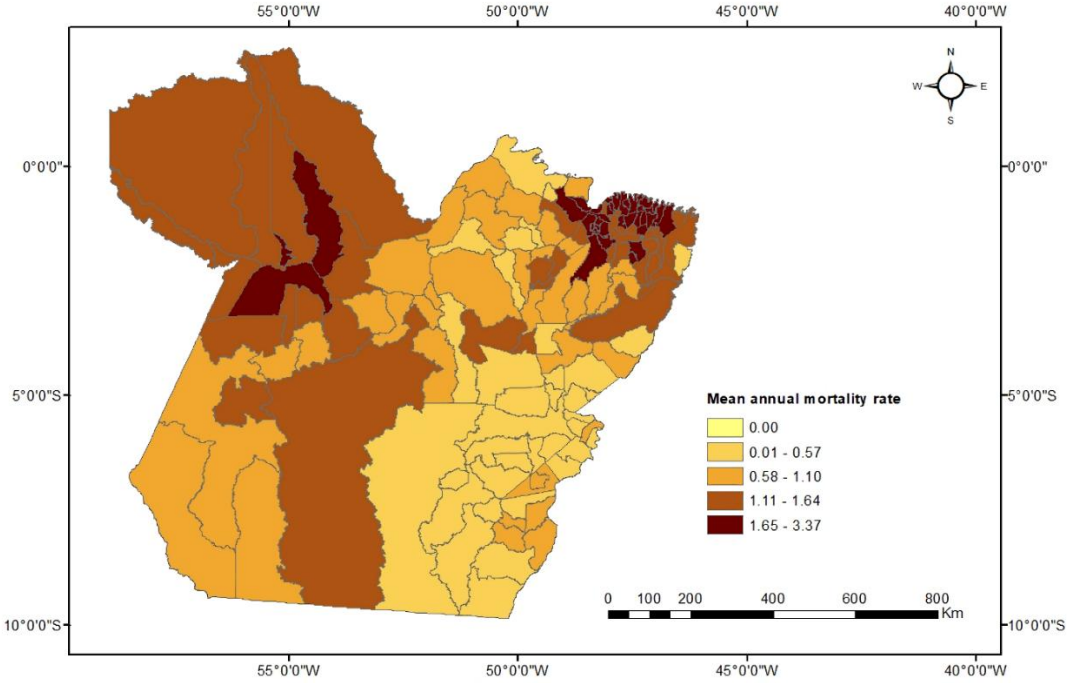
Variables	*N*	*%*
Age range		
< 30 years	30	1.01
30 to 39 years old	128	4.32
40 to 49 years old	315	10.63
50 to 59 years old	517	17.44
60 to 69 years old	777	26.21
70 to 79 years old	766	25.84
80 years or older	430	14.51
Ignored	1	0.03
Sex		
Male	2.007	67.71
Female	957	32.29
Race/skin color		
Brown	2.298	77.53
White	428	14.44
Black	185	6.24
Ignored	37	1.25
Yellow	11	0.37
Indigenous	5	0.17
Marital status		
Married	1.321	44.57
Single	583	19.67
Widower	436	14.71

Other	399	13.46
Ignored	134	4.52
Legally separated	91	3.07
Education		
None	530	17.88
1 to 3 years	865	29.18
4 to 7 years	665	22.44
8 to 11 years	512	17.27
12 years or more	136	4.59
Ignored	256	8.64

Source: own authorship, 2022.

Figure 1 shows the spatial distribution of smoothed mortality rates due to gastric CA, identifying municipalities in the Northeast Pará mesoregion with the highest rates in the period, namely: Marapanim (n=3.37 per 100,000 inhabitants/year); Magalhães Barata (n=3.29 per 100,000 inhabitants/year); and Maracanã (n=2.85 per 100,000 inhabitants/year).

Figure 1. Distribution map of smoothed gastric cancer mortality rates. Pará, Brazil, 2016 to 2020.

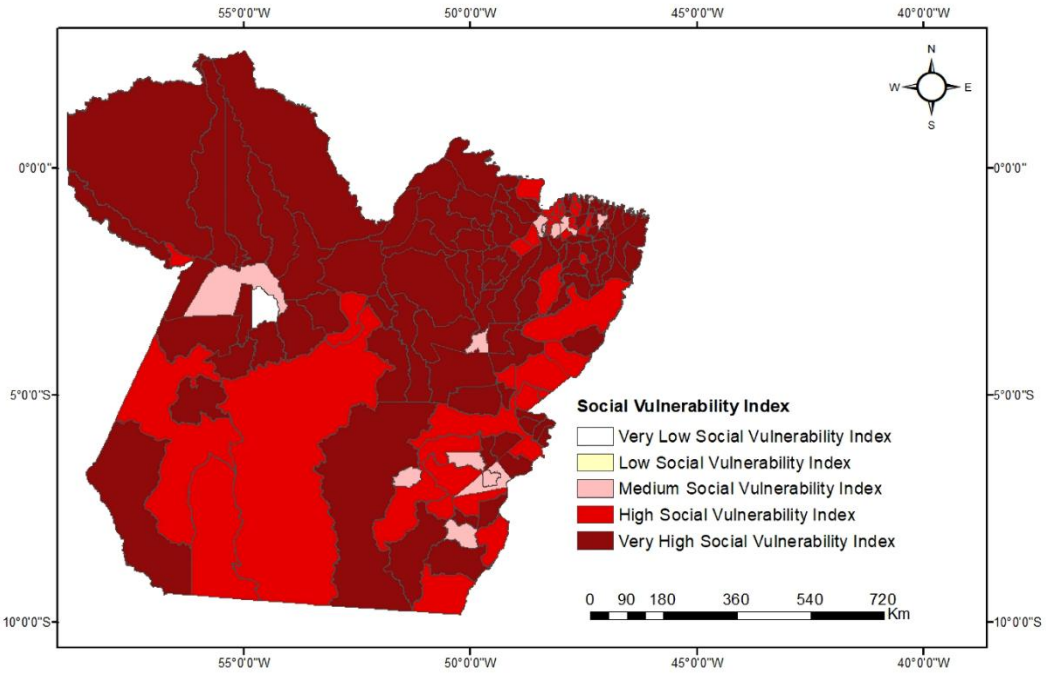


Source: own authorship, 2022.

Figure 2 presents the municipalities classified as high or very high in social vulnerability, corresponding to 90 municipalities distributed across the mesoregions. The highest values were identified in the Lower Amazon (Prainha), Marajó (Afuá, Chaves, Melgaço, and Bagre), Northeast Pará (Garrafão do Norte), and Southwest Pará (Aveiro and Vitória do Xingu). These municipalities have in common that they are located in coastal regions and have Municipal Human Development Indexes (MHDI) classified as very low or low, ranging from 0.418 to 0.596.[20]

Those classified as having medium, low or very low SVI totaled 54 municipalities, with those with the lowest SVI located in the Metropolitan Region (Ananindeua, Castanhal, Belém and Santa Izabel do Pará), in the Northeast Pará (Capanema, Salinópolis and Santarém) and in the Southeast Pará (Canaã dos Carajás, Redenção, Sapucaia, Tucumã, Tucuruí and Xinguara). As the main common data, these municipalities have MHDI classified in the medium and high categories, with values between 0.646 and 0.746.[20]

Figure 2. Municipal classification map according to the Social Vulnerability Index. Pará, Brazil, 2016 to 2020.



Source: own authorship, 2022.

Figure 3-A presents statistically significant clusters (I=0.791; p<0.001) in the univariate spatial autocorrelation analysis, formed by 28 municipalities with high mortality rates due to gastric CA that are part of the Metropolitan Region of Belém and Northeast Pará. Forty-two municipalities with low mortality rates were identified, neighboring municipalities with the same epidemiological characteristics that, after being subjected to univariate correlation analysis, received a low-low classification.

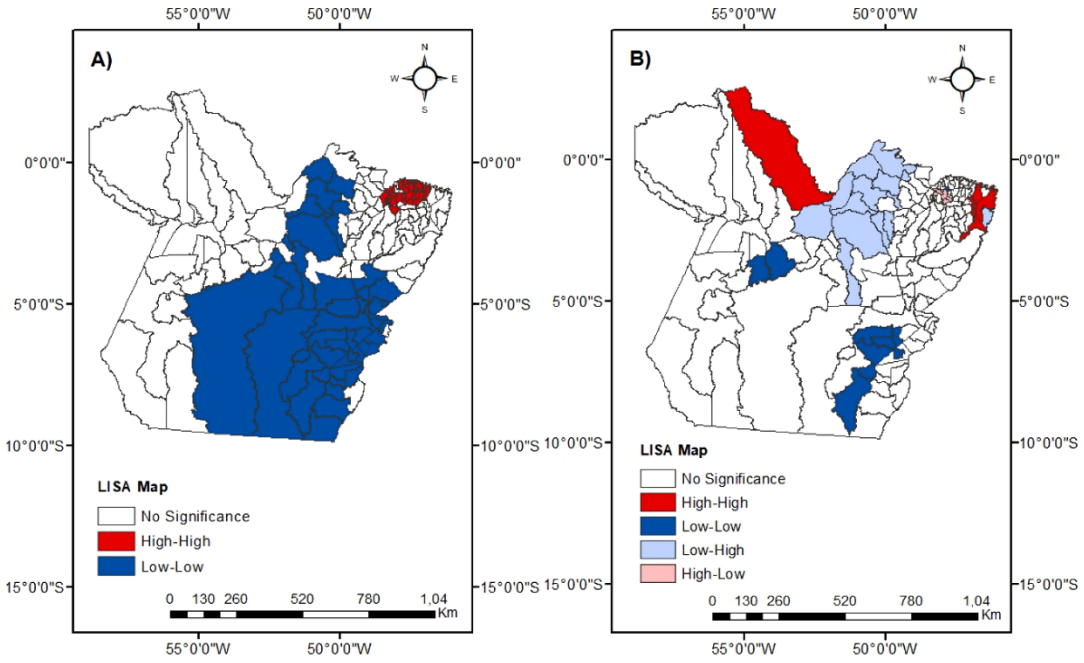
Still in Figure 3-A, the other municipalities represented by the color white correspond to areas with no spatial autocorrelation or with very low spatial autocorrelation, given the variation in p-value between 0.06 and 0.49.

According to Figure 3-B, municipalities located in Northeast Pará presented high mortality rates due to gastric CA associated with SVI, and are surrounded by areas that also present high SVI (I=0.041; p=0.014), represented by the color red.

The municipalities represented by the color dark blue, located in Southeast Pará, presented a low-low cluster classification, that is, they are areas with low mortality rates due to gastric CA, surrounded by areas with low mean SVI values. These municipalities are Sapucaia (0.375), Bannach (0.461), Canaã dos Carajás (0.373), Cumaru do Norte (0.548), Curionópolis (0.547), Água Azul do Norte (0.452), and Parauapebas (0.406).

Despite being shown in blue, the other regions are not considered a cluster, as they only include two municipalities.[21]

Figure 3. Gastric cancer mortality rates (A) and in association with the Social Vulnerability Index (B). Pará, Brazil, 2016 to 2020.



Source: own authorship, 2022.

DISCUSSION

Based on the data presented, it is clear that mortality from gastric CA was heterogeneous in the state of Pará, predominating among individuals aged 60 or older, male, brown, married, and those with one to three years of education. Mortality also predominated in municipalities in the Northeast Pará mesoregion, showing an association with SVI, with a positive correlation in territories classified as highly socially vulnerable.

A higher percentage of deaths was identified in people aged between 60 and 79, a result similar to that of a study that showed a higher proportion of deaths from the disease from the age of 60 onwards.[22] It is accepted that aging generates physiological changes in the body, reducing protective factors against gastric CA, in addition to causing greater exposure to external risk factors.[2,22]

Regarding gender, the higher percentage in males is consistent with other studies, which identified occurrences of 62%[23], 64.73%[24], and 68.33%[25] of gastric CA cases in men. This predominance is linked to lifestyle, as men are more exposed to environmental factors and, consequently, are more susceptible to gastric mucosal damage. Among other factors, the higher mortality rate in this population is also explained by the low demand for healthcare services and low adherence to primary and secondary prevention measures for modifiable risks.[23-24]

A higher proportion of deaths occurred among people with brown race/skin color, a finding similar to that of research in the state of Tocantins, which assessed mortality from gastric CA, showing that people who self-declared as brown corresponded to 61% of deaths, data that suggests an important indicator of socioeconomic inequality.[7]

Groups vulnerable to racial inequality face precarious access to healthcare services. In this context, people who self-identify as black or brown have less access to preventive, diagnostic, and therapeutic measures, which is why they are more susceptible to advanced disease stages at the time of diagnosis compared to the self-identified white population.[23,26]

Thus, racial inequality can increase the risk of developing CA, as disadvantaged ethnic groups are more exposed to risk factors such as a sedentary lifestyle, excess weight, tobacco use, and genetic predisposition. The Brazilian population is highly mixed, adding genetic variables related to both protection and susceptibility to CA.[23]

Another social characteristic of deaths concerns marital status, the majority of which was identified among married couples. Although this characteristic is not recognized as a determinant of the development of CA, or even of mortality from the disease, it has been shown to be related to the outcome. From this

perspective, it is noteworthy that the highest proportions were found among adults/older adults, people who, in general, have longer-lasting marital relationships.[27]

Concerning social profile, low educational levels (one to three years of schooling) were observed, highlighting the relationship between mortality and low socioeconomic status of those affected. Research conducted in the United States of America identified an association between low educational levels and rising poverty levels, resulting in decreased survival rates for patients with gastric CA, regardless of the stage of the disease at diagnosis.[28]

It is important to emphasize that the education level of human groups has a direct impact on their self-care. Therefore, low education levels leave the body susceptible to illness from certain types of neoplasia[29], such as gastric CA.[30-32]

Economic and social development is an important factor in reducing the emblematic gaps in individuals' health conditions in both developed and developing countries. Such conditions have significant implications for the social vulnerability of individuals and groups, increasing the risk of illness. Hence, SVI summarizes variables that must be addressed to bring about changes in living conditions and health protection. Through public policies, it is the State's duty to promote changes/improvements in these conditions, which may arise from the deprivation of assets, such as employment, housing, human capital, and social capital, or from the inadequate management of these assets.[9,33]

The high mortality rates associated with SVI, identified in the Northeast Pará, Marajó, and Lower Amazon mesoregions, reflect the social exclusion to which their populations are exposed. In this context, the Salgado region is known to be the main microregion of Northeast Pará, whose main economic activities are artisanal fishing and crabbing. Fishing is considered fundamental to the region's economic growth, as many communities depend on fish, the primary source of food and income for families.[34]

In summary, the population of Northeast Pará has a socioeconomic profile with a predominance of males, fishing as a work activity, especially for family consumption, the age range between 61 and 80 years, low education and income below a minimum wage[34], which are, therefore, characteristics present in the cases of death due to gastric CA evidenced in this study.

The Marajó mesoregion's economy is focused on extractive, fruit, and fishing production, as well as cattle/buffalo livestock and their derivatives. It comprises the ten poorest municipalities in Pará, with the lowest MHDI in Brazil, such as Melgaço, with 0.418, and, therefore, these municipalities have the highest SVI. There are 180,048 people living in extreme poverty, with the highest rates of illiteracy, land concentration, social and economic inequality, lack of technical and financial support for innovative projects, and an absence of effective public policies.[35-36]

The Lower Amazon mesoregion exhibits, as an economic characteristic, the development of agricultural activities and animal and plant extraction, with its main sources of income being agriculture and livestock. The socioeconomic profile of the population is predominantly male, aged between 20 and 78 years, married, and with low levels of education[37-38], somewhat similar to the Northeast Pará and Marajó mesoregions.

Therefore, it is important to recognize that these mesoregions suffer from socially vulnerable populations, whose indicators are aligned with SVI classification dimensions, combining urban infrastructure, human capital, income, and labor, which are predisposing factors for social vulnerability. Generally speaking, most mesoregions in the state of Pará have infrastructure that does not match demographic growth, resulting in human exposure to various factors that contribute to diseases and injuries, with a lack of effective care for essential needs. This scenario is characterized by conditions ranging from the lack or absence of basic sanitation to limited access to healthcare services.[39-40]

Studies examining the relationship between socioeconomic inequalities and gastric CA mortality rates have concluded that populations living in poorer areas and with lower levels of education have a higher risk of illness and lower survival rates. Studies highlight the consequences of poor sanitation and nutrient-poor dietary patterns as conditions that increase the risk of gastric CA. Furthermore, they have linked the condition to reduced access to financial resources to initiate or continue treatment, as many patients must travel from their homes to referral hospitals for CA treatment.[25,41-42]

In this context, aiming to guide healthcare in the field of oncology, it is worth highlighting that the Federal Government enacted Law 14,758 of December 19, 2023, establishing the Brazilian National Policy for Cancer Prevention and Control within the Brazilian Health System (In Portuguese, *Sistema Único de Saúde* – SUS) and the Brazilian National Cancer Navigation Program. To this end, this policy aims to reduce the incidence of various types of CA, ensure access to comprehensive care, contribute to improving the

quality of life of people with CA, and reduce mortality and disabilities associated with the disease.[43] Thus, it has great potential to expand the SUS's capacity in caring for CA, directing collective reflections and proposals, with the aim of promoting/recovering health and preventing illness, in line with the social reality of human groups.

The limitations of this study include the use of secondary data, which allows for the possibility of errors in the data sources used in the systems. However, based on its results, it can contribute to: public administration by implementing more effective measures to address gastric CA in daily healthcare services; public policies to reduce the social vulnerability to which many human groups are exposed; and the academic community by providing scientific evidence capable of assisting or guiding future work on the topic, enabling greater visibility and dissemination, as well as the development of actions and strategies to prevent and control the disease.

CONCLUSION

The relationship between gastric CA and SVI was observed in mesoregions with social characteristics that pose challenges for public policies, particularly in Northeast Pará, Marajó, and Lower Amazon. These mesoregions share similar characteristics, such as low education levels, low income, lack of basic sanitation, and a precarious healthcare network, particularly in the oncology field.

The state of Pará exhibits high rates of social vulnerability, and when associated with gastric CA, the importance of implementing health promotion and disease prevention actions at all levels of care becomes clear, with well-established plans, policies, and programs that recognize health determinants and conditions. Thus, it is worth highlighting that among the main ways to prevent disease are the adoption of health education measures to encourage risk-avoiding behaviors and early screening, since in many cases, gastric CA presents a silent course, with signs and symptoms that tend to manifest in an advanced stage.

This consideration is made considering that, in mesoregions whose population exhibits a sociodemographic profile with low socioeconomic power and, consequently, high SVI, there is greater exposure to the development of gastric CA, pointing to intrinsic and extrinsic factors.

To strengthen services within the SUS, it is recommended that professionals, managers, and public authorities discuss the possibility of creating and/or implementing specific lines of care in care networks that are effective and managerially sustainable, especially at the primary and secondary levels. This aims to meet individual and collective needs in a timely manner, reducing the high demand for tertiary care, which overloads hospitals, compromises the quality of care, and significantly delays the processes of diagnosis, treatment, rehabilitation, and cure.

CONTRIBUITIONS

Contributed to the conception or design of the study/research: Amaral MCG, Nogueira LMV, Dias BRL, Souza KF. Contributed to data collection: Amaral MCG, Dias BRL, Souza KF. Contributed to the analysis and/or interpretation of data: Amaral MCG, Nogueira LMV, Dias BRL, Andrade EGR, Rodrigues ILA. Contributed to article writing or critical review: Amaral MCG, Nogueira LMV, Dias BRL, Andrade EGR, Rodrigues ILA, Souza KF. Final approval of the version to be published: Amaral MCG, Nogueira LMV, Dias BRL, Andrade EGR, Rodrigues ILA, Souza KF.

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