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Indicators of social inequalities associated with cancer mortality in Brazilian adults: scoping review

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Abstract *The objective of this study was to identify indicators of social inequalities associated with mortality from neoplasms in the Brazilian adult population. A scoping review method was used, establishing the guiding question: What is the effect of social inequalities on mortality from neoplasms in the Brazilian adult population? A total of 567 papers were identified, 22 of which were considered eligible. A variety of indicators were identified, such as the Human Development Index and the Gini Index, which primarily assessed differences in income, schooling, human development and vulnerability. A single pattern of association between the indicators and the different neoplasms was not established, nor was a single indicator capable of explaining the effect of social inequality at all levels of territorial area and by deaths from all types of neoplasms identified. It is known that mortality is influenced by social inequalities and that the study of indicators provides an opportunity to define which best explains deaths. This review highlights important gaps regarding the use of non-modifiable social indicators, analysis of small geographical areas, and limited use of multidimensional indicators.*

Key words *Mortality, Neoplasms, Social differences, Health inequality, Brazil*

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Introduction

In 2022, it was estimated that Brazil had a population of 212 million. Projections for 2040 indicate a population increase of 9.5%, with a reduction of 32% in the population under 15 and an increase of 138% in those 65 or over[1]. Brazilian demographic adjustment tends to align with the epidemiological and health adjustment, whose mortality has been more frequent in more advanced age strata for non-communicable chronic diseases (NCCD), requiring an organized social response for their control[2]. Among the NCCD, neoplasms demand special attention, as the growth in mortality resulting from these conditions in Brazil is a consolidated fact, with a tendency to increase over time[3-5]. By 2020, the neoplastic mortality rate in Brazil was 122.7/100,000 inhabitants and, by 2040, it could reach 222/100,000, a rise of 80.9%[6].

Neoplasms are considered different diseases not only in molecular aspect, but also in the social, due to regional variability in the incidence and mortality profile, which are, in turn, influenced by different levels of socioeconomic development[7]. Socioeconomic development, which unfolds into different axes, such as income inequalities, schooling, geographical location, degree of urbanization, life expectancy, race/ethnicity and housing conditions, is considered a fundamental cause of mortality disparities, which affects the whole *continuum* of neoplasms[8-11].

Modifiable risk factors for occurrence and mortality by neoplasms are subdivided into conventional and unconventional, the former being related to behavioral[12,13], food[14], environmental[15,16] and biological[17] factors, and the latter to social risk factors, whose magnitude of association may be greater than the association with conventional risk factors[18-20]. Given this, different research aims at evaluation of the impacts of social inequalities on mortality by neoplasms, and seek to understand how they affect mortality, what indicators are involved, and how they are associated with the outcome.

The use of indicators is relevant to observe and describe the health condition of a population, boosting decision-making that impacts health improvement and reducing avoidable inequalities[21]. Understanding the indicators that relate to mortality by neoplasms contributes to identification of vulnerable groups and to the debate on which measures should be adopted to control it, especially in cases of deaths from avoidable and preventable neoplasms[9-11]. It is important to highlight that mortality is also considered a potent indicator of the population's health condition, and, like others, enables situation analysis, planning, assessment of actions and programs, reflecting not only the current situation, but the health changes of population groups, since mortality data is linked to demographic, geographical and cause of death information[21,22].

The increase in the number of deaths from neoplasms, which is linked to age and the effect of social inequalities, arouses researchers' interest in this health condition and how the relationship between death and socioeconomic contexts occurs. The research that describes this relationship present different methodologies, producing diversity in the correlations and associations found. Part of this is due to the very diversity of the causes of death by neoplasms and the different mechanisms of carcinogenesis[23], which make the mapping of existing information complex, but also serious gaps in the literature have been identified that make understanding of where we have reached unfeasible, and how much must be done to elucidate the relationship between social inequality and neoplasm mortality[24]. Thus, the aim of this study was to identify scientific evidence via the indicators of social inequalities associated with the outcome of neoplasms in the Brazilian adult population.

Methodology

This is a scope review developed from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews, whose recommended use is to assist with preparation of a report that contributes to the extension examination, range and nature of the available evidence[25,26]. This report was registered with the Open Science Framework (DOI 10.17605/OSF.io/C8UEX). The Population, Concept and Context strategy was applied, the Population being the mortality from neoplasms; the Concept, the relationship between mortality from neoplasms and social inequality; and the Context, Brazil. This review aimed to understand the differences in neoplasm mortality rate in socioeconomically distinct groups, starting from the following guiding question: "What is the effect of social inequalities on neoplasms in the Brazilian adult population?".

Considered eligible for this review were articles in periodicals reviewed by peers, without initial date restriction, which were published until May 2022, written in Portuguese, English and Spanish, and analyzed the effect of different socioeconomic conditions on deaths caused by one or more causes defined in Chapter II – Neoplasias (tumors) – from the International Classification of Diseases, 2010 (ICD-10), which occurred in the Brazilian adult population (aged 19 year or over), of both sexes.

The exclusion criteria were articles that did not contemplate the age group in focus, review articles, meta-analyses and meta-syntheses; even so, their references were analyzed to verify the existence of some publication that had not been found in the search, experimental studies, conferences, abstracts, editorials, reports, comments, theses and dissertations.

The documents were extracted from the bases, Medical Literature Analysis and Retrieval System Online (MEDLINE) via PubMed, in the Portal of the Biblioteca Virtual em Saúde (BVS), Scopus and Web of Science. These bases were chosen in terms of the benefits offered by each: Scopus provides a range of academic information, allowing a broader view of the research area; MEDLINE is the world's most accessed international database, contemplating millions of quality references; Web of Science is a site that provides access to various databases, enabling simultaneous exploration; and BVS focuses on information and knowledge production for the Latin America and Caribbean region[25].

The search was conducted from March to May 2022. The descriptors and terms were extracted from the descriptors in Ciências da Saúde (DeCS) and Medical Subject Headings (MeSH), respectively. Data management was performed with the aid of Zotero and Microsoft Excel 2010 softwares. The search strategy used (Chart 1) was planned to retrieve studies that contained at least one of the terms of each concept (neoplasms; mortality; socioeconomic factors; Brazil). The first stage of evidence selection was independent and sequential from the title, followed by the abstract. Once elements corresponding to the guiding question were identified, the document was considered potentially relevant. The second stage involved complete reading of the publication and whether or not its inclusion in the review would be granted.

Results

The search covered 567 works, 284 of which were duplicates; after reading the titles and abstracts, 236 were removed because they did not comply with the inclusion criteria. In the end, 47 articles were read in full; of these, 22 were considered eligible (Figure 1). The studies included in this review were published between 2008 and 2022, 16 (72.7 %) in the last five years. 10 (45.5 %) assessed the Breast Neoplasia Mortality outcome and only one approached all the neoplasms. Regarding the type of study, 17 were described as ecological, three as temporal series, one as observational and one as ecological and temporal series combined.

Different demographic profiles were addressed in the studies. 54.5% of the work assessed mortality only among women, 45.5% for both sexes and only 1 exclusively assessed the elderly. The levels of territorial area covered in the studies were municipality (27%), state (45.5%), region (22%) and intermediate regions of urban articulation (13.6%) exceeding 100%, as some analyzed more than one area level. Chart 2 includes a summary of the studies included.

Social inequality indicators

In all the articles selected, unidimensional indicators were identified that proposed measurement of the effect of income on neoplasm mortality. They were: income per capita[7,10,11,27-33], poverty percentage[11,34], income quintile[35], average household income[36], Palma Index[35], Theil-L Index[35], Gini Index[10,11,27,31,32,35-41] and percentage of household heads who declared absence of a formal income[42].

Following the income indicators, those of schooling were the most outstanding, present in 45.5% of the studies, measured through: the population's average number of years of study[27], percentage of individuals aged ≤ 25 years with over 11 years of schooling[43], educational level[36], percentage of household heads with less than 4 years of schooling[42], percentage of household heads who had completed a university course[42], female illiteracy rate[11,27] and general illiteracy rate[7,29,30,32,34,36,43].

Other unidimensional indicators were identified, namely: fertility rate[7], unemployment rate[36], aging rate[10], life expectancy[32], percentage of economically active women[34], live alone[34], percentage of female family heads, single and with children ≤ 15[43], percentage of heads of household who declared absence of formal income[42], degree of urbanization[10,30,33], Gross Domestic Product[7,31], infant mortality rate[41,43], and housing conditions[34,43].

The multidimensional indicator, Human Development Index was what stood out, found in

Chart 1. Search strategy, databases and references.

Search strategy	Databases	References retrieved
(Neoplasias OR Neoplasms OR Tumeurs OR Câncer OR Neoplasia OR Neoplasmas OR Tumor OR Tumores OR Cancer OR Cancers OR Neoplasm OR Tumors) AND (Mortalidade OR Mortality OR Mortalidad OR Mortalité OR "Taxa de Casos Fatais" OR "Taxa de Fatalidade" OR "Taxa de Letalidade" OR "Taxa de Mortalidade" OR "Índice de Casos Fatais" OR "Índice de Fatalidade" OR "Índice de Letalidade" OR "Índice de Mortalidade" OR "Death Rate" OR "Death Rates" OR Mortalities OR "Mortality Rate" OR "Mortality Rates") AND ("Fatores Socioeconômicos" OR "Socioeconomic Factors" OR "Factores Socioeconómicos" OR "Facteurs socioéconomiques" OR "Aspectos Socioeconômicos" OR "Desigualdade Social" OR "Desigualdades Sociais" OR "Inequidade Social" OR "Iniquidade Social" OR "Fatores Econômicos" OR "Economic Factors" OR "Factores Económicos" OR "Facteurs économiques" OR "Fatores Sociais" OR "Social Factors" OR "Factores Sociales" OR "Disparidades nos Níveis de Saúde" OR "Health Status Disparities" OR "Disparidades em el Estado de Sal"d" O" "Disparités de'l'état de san"é" O" "Desigualdade em Saú"e" O" "Desigualdade na Saú"e" O" "Desigualdades em Saú"e" O" "Disparidades em Saú"e" O" "Iniquidade em Saú"e" O" "Iniquidade na Saú"e" O" "Saúde e Desigualda"e" O" "Social Inequaliti"s" O" "Social Inequali"y" O" "Social Inequi"y" O" "Socioeconomic Fact"r" O" "Health Status Dispari"y") AND (Brasil OR Brazil OR Brésil)	Biblioteca Virtual em Saúde	256
(Neoplasms OR Neoplasias OR Neoplasia OR Cancer OR Cancers OR Neoplasm OR Tumor OR Tumors) AND (Mortality O" "Death Ra"e" O" "Death Rat"s" OR Mortalities O" "Mortality Ra"e" O" "Mortality Rat"s") AND"("Socioeconomic Facto"s" O" "Economic Facto"s" O" "Social Facto"s" O" "Health Status献Dispariti"s" O" "Social Inequali"y" O" "Social Inequi"y" O" "Socioeconomic Fact"r" O" "Health Status Dispari"y") AND (Brasil OR Brazil)	MEDLINE via PubMed	139
	Web of Science	46
	Scopus	126

Source: Authors.

63.7% of the studies[7,11,28-30,33,36-38,40,41,43,44]. Other less frequently used multidimensional indicators were the Health Vulnerability Index[33] and the Social Vulnerability Index[23], which appeared once each.

Discussion

The majority of the studies were ecological, but it is important to consider their limitations. In this design, exposure measurements are a proxy based on the population average, and require care when extrapolating the findings to the individual level. Another limiting factor is the information quality, as there may be systematic differences in the recording of disease frequency and the completeness of the data, as well as the availability of information about confusing factors[45,46].

In this review, the use of unidimensional indicators was identified, which refer to a single dimension of inequalities, and for this reason they are not able to contextualize the complexity of the disparities between groups. Multidimensional indicators were also observed, which seek to unify the individual, home and social dimensions of the inequalities, thus offering a more realistic response to health conditions[47].

The existence of multiple social indicators provides an opportunity to study neoplasm mortality, enabling observation of the difference in the association patterns with the various types of neoplasms, and how social factors, information quality and geographical area level impact outcomes. According to CID-10, there are approximately 852 neoplastic conditions whose carcinogenesis processes are influenced by behavioral[48], environmental[49], social[20], biological[50] factors and access to health services[11,51], all these, in turn, influenced by social inequalities[30,33,35,36,40,43].

Regarding social factors whose exposure increases the mortality risk, they are considered

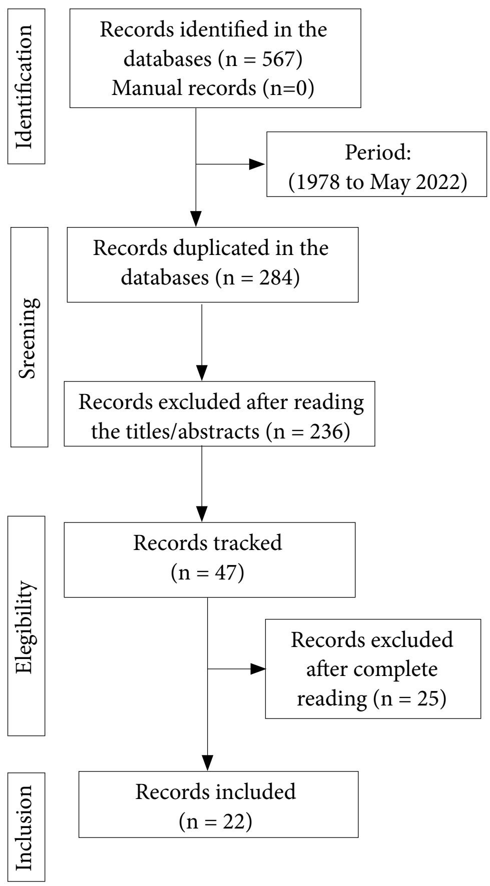

Figure 1. Flow diagram of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) for the process of scope review.

Source: Authors.

heterogeneous, reflecting differences in human development, exposure to carcinogens and availability of health resources in different areas of the country[10,27,29,34,35,38,44]. According to Dean et al. (2018)[52], socioeconomic position influences the incidence and mortality from neoplasms, and needs to be considered in the research, as lack of understanding of this factor is what sustains the disparities in incidence and mortality.

The outstanding social indicators were the Human Development Index (HDI) and income measurements, which, when associated with neoplasm mortality from different causes, did not have a single associative pattern. In the research by Oliveira et al. (2020)[11]. standardized cervical neoplasm mortality rates were negatively associated with regions presenting lower HDI levels, while the opposite was verified for standardized breast neoplasm mortality rates. In this same research, the authors demonstrate that the effect of inequality on uterine neoplasm mortality demands action to reduce exposure to risk factors and expand access to prevention, diagnosis and treatment services, especially among socioeconomically disadvantaged women resident in regions with the highest levels of social inequality and the lowest levels of human development. Regarding Breast Neoplasia Mortality, Oliveira et al. (2020)[11] suggest reverse causality, that is, areas with greater development and greater provision of licensed oncology services have more diagnoses and, consequently, higher mortality.

In the work by Lima et al. (2022)[10], which assessed, among other indicators, the effect of income per capita on lung neoplasm mortality, it was evidenced that the highest mortality rates according to age were verified in regions with higher income per capita, and regions with lower income concentrated lower rates. The authors believe that this effect is due to factors such as high exposure to risk agents, the highest aging rates in regions with better demographic and socioeconomic indicators, plus the effect of reverse causality[10].

For Sakamoto et al. (2019)[28], who assessed the effect of mean income per capita on oral and oropharynx neoplasms among the elderly, the association was negative: with increase in income there was a reduction in the mortality rate. The authors emphasize that the findings diverge from those of other previously published studies, whose associations with socioeconomic conditions are positive, due to the longer life expectancy in these locations and the death records system of better quality. Thus, they believe that the inverse effect is due to the use of a sample more vulnerable to the occurrence of the disease, as well as the increased exposure to risk factors in socioeconomically disadvantaged groups[28].

The quality of information, necessary to reflect the health condition of the population, is not homogeneous throughout the country[46]. Less developed regions are those with worse data quality indicators, a fact that impacts the mortality rate by neoplasms and the possibility of knowing the real trend of this event[3,31,37,41,42,53]. For this reason, correction of deaths from ill-defined causes is essential, especially in regions where data quality is considered regular or poor[54,55]. A study by Oliveira et al. (2018)[31], whose principal objective was to assess mortality from colorectal neoplasia, showed that mortality rates increased from 1996

Chart 2. Studies included in the review according to a neoplastic site, indicator of social inequality and main results, 2008-2022.

Author, year of publication, place and type of study	Neoplastic site (CID)	Social Inequality Indicator	Principal results
Lima et al. (2022)[10], Brazil (RIAU), ecological study.	Lung (C33-34)	Income per capita; Aging rate; Gini Index; Degree of urbanization.	Age-adjusted lung neoplasm mortality rates were influenced by social contexts, causing high mortality clusters in the RIAU of the Centre-west and South, and low mortality in the Northern and Northeastern RIAU, i.e. high rates were verified in regions with better socio-economic indicators, while the less developed concentrated lower rates.
Ferreira et al. (2022)[23], Campinas Municipality, ecological study.	Breast (C50); Colorectal (C18-20); Lungs and Bronchi (C33-34), Stomach (C16); Cervix (C53); Thyroid (C73)	Social Vulnerability Index in São Paulo, 2010.	Higher mortality rates due to cervical, stomach and lung neoplasms and the lowest mortality rates by breast and colorectal neoplasms were identified among women of greater social vulnerability compared to women with less vulnerability.
Oliveira et al. (2021)[37], Brazil (RIAU), ecological study.	Breast (C50)	Gini Index; HDI.	Adjusted mortality rates for breast neoplasia showed positive and statistically significant correlation with HDI in the southern and southeastern regions, which have generally high levels of global socioeconomic development, concentrating high mortality rates.
Duarte et al. (2020)[33], Minas Gerais State, ecological study.	Breast (C50)	Health Vulnerability Index; Regional HDI; Degree of urbanization; Income per capita.	Microregions with higher degrees of urbaniza-tion, higher income and high regional HDI are those that have the highest rates of mortality due to breast neoplasia in Minas Gerais State.
Freire et al. (2020)[38] Brazil (Municipalities), retrospective cohort observational study.	Oral (C00-C06)	Municipal HDI; Gini Index.	Greater Municipal HDI (≥ 0.700) and higher inequality (Gini Index> 0.4) are associated with the highest frequency of deaths.
Ramos et al. (2020)[27], Brazil (states/regions), ecological study.	Breast (C50); Inferior genital tract (C51-C57)	Gini Index; female illiteracy rate per 100,000 inhabitants; Income per capita; mean found in the population study over the years.	**Reproductive period:** Low income per capita is associated with high mortality rates. **Non-reproductive period:** The average number of years of study is directly associated with the high mortality rate.
Oliveira et al. (2020)[11], Brazil (RIAU), ecological study.	Breast (C50); Cervix (C53)	Gini Index; HDI; Income per capita; female illiteracy rate; % of poverty.	Standardized rates of cervical neoplasm mor-tality was higher in Brazilian regions with the highest rates of social inequality and the lowest levels of HDI. The opposite was observed for standardized breast neoplasia standard rates, whose most developed areas had higher stan-dardized adjusted values.
Fernandes et al. (2020)[44], Brazil (states), temporal study series.	Lung (C33-C34)	HDI	Lung neoplasm mortality rates in both sexes by state were greater in those with higher HDI compared to those with lower HDI, most of the time, but with a higher percentage reduction in mortality rates among states higher HDI.

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Chart 2. Studies included in the review according to a neoplastic site, indicator of social inequality and main results, 2008-2022.

Author, year of publication, place and type of study	Neoplastic site (CID)	Social Inequality Indicator	Principal results
Carvalho, Paes (2019)[34], Northeast Region, ecological study.	Breast (C50)	**Environmental condition:** % household households; sewerage system; Garbage collection service. **Socioeconomic condition:** illiteracy; poverty; % of economically active women; nominal income of up to one minimum wage; live alone.	Microregions with lower percentage of illiterate elderly and in poverty situations and higher percentage of elderly residents of homes with piped water showed higher mortality rates by breast neoplasms.
Figueiredo, Adami (2019)[39], Brazil (states), ecological study.	Breast (C50)	Gini Index.	Higher mortality from breast neoplasia in states with high income inequality (Gini Index> 0.62) compared to low/medium income inequality (Gini Index ≤ 0.62), after adjustments by HDI and aging index.
Sakamoto et al. (2019)[28], São Paulo State, ecological study.	Oral (C00-C06); Oropharynx (C10)	Municipal HDI; Mean income per capita.	Mortality by oral and oropharynx neoplasms has significantly reduced the increase in municipal HDI and per capita average income
Vale et al. (2019)[7], Brazil (states), ecological study.	Cervix (CID not specified)	HDI; Income per capita; Illiteracy rate (% of population > 15 who cannot read and write); PIB; Fertility rate	The fertility rate positively associated with cervical neoplasm mortality rates.
Moi et al. (2018)[29], Brazil (states), ecological study.	Oral (C00-C14)	Illiteracy rate; % of population whose household income per capita is < half a minimum salary; HDI.	The HDI presented significant inverse association with oral neoplasm mortality rates.
Rocha-Brischiliari et al. (2018)[30], Paraná State, transversal retrospective ecological study.	Breast (C50)	Illiteracy (% of illiterate ≥ 15); Income per capita; Degree of urbanization; Municipal HDI.	The illiteracy rate showed inverse correlation with the mortality rate due to breast neoplasms.
Oliveira et al. (2018)[31], Brazil (states/reguions), ecological study and temporal series.	Colorectal (C18-20)	PIB; Income per capita; Gini Index.	The increase in the mortality rate due to colorectal neoplasia was significant for men in 10 states, and in 14 states and in Brazil as a whole for women, when adjusted by socioeconomic indicators. There was no national association standard; the growth in the mortality rate was present in some states with higher per capita GDP, and in states that still have higher income inequality, especially in states in the Northeast region.
Figueiredo, Adami (2018)[35], Brazil (states), ecological study.	Breast (C50)	Gini Index; Palma Index; Theil-L Index; Ratio of income quintiles.	Increased income increases assessed by Gini, Palma and Theil-L rates were related to increases in standardized and proportional mortality by breast neoplasia.
Barbosa et al. (2016)[32], 268 Municipalities (118 in the following regions: Southeast, 56 Northeast, 52 South, 25 Centre-west, 17 North, ecological study.	All sites (C00-C97)	Gini Index; Income per capita; Life expectancy; Illiteracy rate of persons > 25.	The best socioeconomic condition is directly associated with higher risk of mortality from neoplasms. In Brazil, the South and Southeast regions recorded the highest mortality rates and the best socioeconomic indicators, expressed by income and life expectancy.

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Chart 2. Studies included in the review according to a neoplastic site, indicator of social inequality and main results, 2008-2022.

Author, year of publication, place and type of study	Neoplastic site (CID)	Social Inequality Indicator	Principal results
Girianelli et al. (2014)[43], Brazil (Regions/ Capitals/Interior), temporal study series.	Breast (174; C50); Cervix (180; C53)	**Positive Indicators:** HDI; % of individuals at age ≤ 25 years with over 11 years of education; % of individuals in households with electricity; % of people in plumbing households. **Negative Indicators:** % of the population aged ≤ 25 illiterate; % of People Living Below the Poverty Line; Mortality Rate in Children <5/1,000 Live Births; % of Female Heads of Households, Single and with Children ≤ 15.	**Breast:** In capitals, % of individuals aged ≤ 25 years, over 11 years of schooling, and % of people in households with mains water were positively associated with increased mortality rate. The reduction in mortality occurred when the % of a household head, single and with children ≤ 15 years increased. Inside, the relationship is direct with positive and inverse indicators with the negative indicators. **Cervical:** In the capitals, the mortality rate is inversely correlated to the indicators of better socioeconomic conditions and directly correlated to negative indicators; Inside, only % of individuals living below the poverty line was related to increased mortality.
Ferreira et al. (2012)[40], São Paulo Municipality , ecological study.	Oral/Orofaringe (C00-C10; C14.8)	Gini Index; HDI.	Negative correlation between mortality rates and HDI and Gini Index.
Müller et al. (2011)[36], Paraná State, temporal study series.	Cervix (180; C53)	Family income; HDI; Unemployment rate; Gini Index; Illiteracy rate; Educational level indicators.	The trend toward an increased mortality rate was associated with worst illiteracy rates (higher % of residents with <4 years of study), income per capita and HDI lower than regional ones that presented stable trends.
Borges et al. (2009)[41], Brazil (regions), ecological study.	Oral (CID not specified)	Gini Index; Income per capita; Municipal HDI; Infant mortality.	A very significant correlation between municipal HDI and oral neoplasia was evidenced, as well as with the sub-items of this index, demonstrating that the better the municipal development the higher the oral neoplasm index, among all deaths, finding it repeats for correlation with the income per capita.
Antunes et al. (2008)[42], São Paulo Municipality, ecological study.	Lung (162; C33-C34)	% of heads of household who declare absence of formal income; % of household heads with less than 4 years schooling; % of heads of family that had completed university courses; HDI.	The association between HDI and lung neoplasia mortality was positive, the richest areas having a higher average mortality rate.

CID – International Classification of Diseases; RIUA – intermediate regions of urban articulation; HDI – Human Development Index; GDP – Gross Domestic Product.

Source: Authors.

to 2012 in all the states for males, but the majority were females. By adjusting the statistical model due to poorly defined causes, the tendency to increase remained in 20 states for males and 10 for females, highlighting the influence of information quality on the analysis of trends. The authors also pointed out that the highest average mean mortality rates due to poorly defined causes were observed in states in the North and Northeast, which are considered less developed[31].

For research on health outcomes, such as neoplasm mortality, to achieve more reliable results matching the Brazilian reality, it is recommended that the impact of social inequalities be placed at the center of discussion and verified in the spatial sphere, taking into account the country's different regional scenarios[30,56]. In this review, different levels of geographical area were addressed, and the similarity between neoplastic site and inequality indicators did not confer equivalence to the findings.

The research conducted by Freire et al. (2020)[38] and Borges et al. (2009)[41] described that Brazilian municipalities and regions with high HDI had high rates of mortality from oral neoplasia in comparison to less developed municipalities and regions. For Sakamoto et al. (2019), however, the effect was the opposite, that is, lower rates of oral neoplasia mortality in the municipalities of São Paulo state with high HDI. It is necessary to stress that the studies are methodologically distinct, and that the territorial area used can have influence on the difference between the findings, since regions, states and municipalities are very comprehensive geographical areas and that, within these spaces, there are great socioeconomic differences. Thus, when analyzing the results and extrapolating them, it is necessary to consider that this factor can produce different results from what is experienced by the population. In this sense, the recommendation is that the lowest possible territorial area be used to approximate individual reality.

This review summarizes part of the efforts made in Brazil to determine which social inequality indicators affect neoplasm mortality in the country. This effort is necessary, as it is long known that the *continuum* of neoplasms and persistent mortality disparity cannot be explained only biologically and genetically[52].

This study concluded that it was not possible to identify a single indicator that can explain this effect on all levels of geographical area and for deaths by all types of neoplasms in the Brazilian adult population. However, it was possible to list a diversity of income, education and human development indicators and their associations, as well as identify the demand for inclusion of other indicators and other levels of geographical area as a census sector.

The limitations of this study corroborate those that permeate literature reviews, such as, possibility of heterogeneity of selected studies, publication biases and constant need for updating. However, it made it possible to understand which gaps still remain and how the indicators are used in the face of the neoplasm mortality outcome.

This review highlights three gaps, which will need to be filled by other reviews and future research on neoplasms in the Brazilian adult population. One is the absence of non-modifiable social indicators, such as race/ethnicity, considered an indicator of accessibility to oncological care, especially early detection, as well as being a complex inequality indicator due to its intersectional effect[57]. The second gap is the demand for studies that analyze small territorial areas, which would minimize ecological fallacies and better describe the social reality in which individuals are placed[39]. The third gap is the limited use of multidimensional indicators compared to the extensive use of unidimensional ones, especially income. Income alone is not able to convey the different experiences of inequality. In this sense, the debate on the need for the use of multidimensional measurements has grown, ones which consider what the inequality is, who experiences it, when and where it occurs, thus enabling improved definition of its effects[47].

The second and third gaps may be filled in the near future by research involving the use of composite measurement to assess material deprivation in census sectors; this measure has already been implemented to monitor health inequalities and to estimate the effect of deprivation on the mortality outcome, thus following the experience of other countries[58].

Collaborations

ACO Costa and DO Ramos: conception, planning, analysis, interpretation and writing. Paes-Sousa R: conception, planning, supervision, interpretation and writing.

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