Saúde e Pesquisa
DOI: 10.17765/2176-9206.2024v17n1.e11403

Male mortality from external causes and its trend in three ecological clusters, 2010 to 2019: implications of schooling, race, and gender on the epidemiological profile and trends

Mortalidade masculina por causas externas em três agregados ecológicos (Brasil, Mato Grosso do Sul e Campo Grande), 2010 a 2019: implicações de classe, raça e gênero no perfil epidemiológico e suas tendências

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ABSTRACT
This study described the profile and trend of male mortality from external causes in three ecological clusters. This was a descriptive study of time series with data from the municipality of Campo Grande (CG), the state of Mato Grosso do Sul (MS), and Brazil, from 2010 to 2019. The numbers of deaths and inhabitants for each cluster were retrieved from DATASUS. From 2010 to 2014, the state of MS showed higher death rates from external causes, which came to be close to the rates in Brazil from 2015 to 2019. There was a general downward trend in mortality rates in the historical series, however, there was an increase in deaths from self-inflicted injuries and deaths of indigenous and yellow people, especially in CG. The psychosocial issues interrelated in the constitution of male vulnerabilities to external causes have to be deepened in further studies, as well as effective preventive actions have to be developed for the male population.

Keywords: Mortality. Men Health. External causes.

RESUMO
Este estudo descreve o perfil e a tendência de mortalidade masculina por causas externas em três agregados ecológicos. Trata-se de estudo descritivo de séries temporais com dados do município de Campo Grande (CG), do estado de Mato Grosso do Sul (MS) e do Brasil, de 2010 a 2019. Os números de óbitos e de habitantes para cada agregado foram recuperados do DATASUS. De 2010 a 2014, o estado de MS apresentou taxas mais elevadas de mortes por causas externas que passaram a ser próximas às taxas do Brasil de 2015 a 2019. Houve tendência geral de queda das taxas de mortalidade na série histórica, contudo, observou-se aumento de óbitos por lesões autoprovocadas e óbitos de indígenas e amarelos especialmente em CG. É necessário aprofundar as questões psicossociais que se interrelacionam na constituição de vulnerabilidades masculinas às causas externas e construir ações preventivas efetivas para a população masculina.

Palavras-chave: Mortalidade. Saúde do Homem. Causas externas.

INTRODUÇÃO

In Brazil, as in other Latin American countries, men live approximately seven years less than women, are more vulnerable to various injuries and illnesses1-3, and adhere less to health promotion and disease prevention actions, in addition to their greater distance and less search for health services, especially Primary Care4,5. In this sense, men frequently use urgent and emergency services in situations of already manifest disease and already advanced state, often taken by a woman3-5. Therefore, studies indicate the need to consider the implications of psychosocial variables in the analysis of the determinants of illness and mortality in the male population1-3,6.

This scenario of men's health draws attention to the cultural and institutional barriers that hinder men to link up with health services and self-care practices5-8, taking into account the implications of how men are still socialized, which reflect the different culturally attributed and widespread meanings of being a "real man"9,10. In Brazilian macho and patriarchal society, men are still perceived as hierarchically superior to women and supposedly endowed with a virile nature, whose physical strength, courage, and feelings of invulnerability are expressed as essential and permanent biological attributes3,10.

In this regard, in some Brazilian contexts, from an early age, men deal with social pressure to prove their virility, often by exposing boys to different risk situations, in which they must, at any cost, defend their honor and attest, before others, their masculinity3,9-12. This scenario also points to the need to reflect on the meanings culturally attributed to being a man9,10. In this perspective, beyond the anatomical and biological dimension, it is possible to characterize masculinity as a set of stereotypes and social practices that reflect cultural expectations about men, who are encouraged, during the socialization process, to assume behaviors considered as masculine, above all, practices of power and violence, but also of productivity, material provision, and security, favoring the exposure of these subjects to risk3,12.

In Brazil, external causes, especially homicides, traffic accidents, and suicides, are the main cause of disability, hospitalization, and death, compromising well-being and quality of life, in addition to reducing men's life expectancy1,13,14. Male morbidity and mortality from external causes, therefore, is considered one of the main Public Health problems, being more significant in capitals and large urban centers15-17, but also present in rural and indigenous contexts18.

Race/ethnicity, generation, and social class are markers that make male mortality statistics more expressive, indicating groups of men more susceptible to external causes14. Studies have found greater vulnerability to external causes of young, black, and poor men, reaching four times greater19, in some contexts, compared to adult/elderly, white men with higher purchasing power. For example, Araújo et al.20 showed that the black population of Salvador dies from external causes at an earlier age and loses 12.2 more potential years of life compared to white people in the same context. This indicates the need to analyze the intersectionality of these markers in determining male vulnerabilities to external causes of illness and death21-24.

Although the male population is more affected by external causes, the Brazilian scientific production, as well as actions aimed at Men's Health, are incipient and still focused on diseases related to the genital and urological system, prostate cancer, and erectile dysfunction25,26, and it is imperative that, together with the gender perspective, multiple factors are evaluated that add up to build contexts of greater male vulnerability, in order to define proposals for policies, programs, and actions aimed at confronting external causes, in particular,

homicides, traffic accidents and suicides25,26. Furthermore, analytical approaches are needed in addition to quantitative approaches that address the issue to understand the implications of gender, especially the process of the social construction of masculinities, in the production of morbidity and mortality from external causes in the male population27.

Thus, this study aimed to describe the trend and epidemiological profile of male mortality from external causes in three ecological clusters (Campo Grande, Mato Grosso do Sul, and Brazil), in the period between 2010 and 2019, discussing the implications of schooling, race, and gender in the epidemiological profile and trends.

METHODOLOGY

This was a retrospective observational study, with a quantitative description of time series of male mortality from external causes in three ecological clusters in the period from 2010 to 2019. The clusters compared were Brazil, the state of Mato Grosso do Sul, and its capital, Campo Grande. The numbers of deaths from external causes (chapter XX of the International Statistical Classification of Diseases and Related Health Problems - ICD 10 - 10th Revision) as well as the numbers of inhabitants per year for each ecological unit were retrieved from DATASUS[28].

Crude and age-standardized mortality rates (age groups) per year per 100,000 inhabitants were calculated using the direct method based on the corresponding Brazilian population obtained in the 2010 census. The standard method in the PHEindicatormethods package was applied. In the analyses, deaths with unknown age or race/color, or schooling were not included. Yellows and indigenous people were grouped due to their low absolute frequencies. For the comparison between the three clusters, we used the characteristics of race/skin color, education, and the ICD-10 Major Groups of External Causes.

To check the upward or downward trend in the rates in the period under analysis, the variation in the crude and standardized rates of mortality from external causes in the ten years under study was evaluated by simple linear regression as a function of the years under study, assuming a significance level of 5 %. F-test statistics was applied to compare the model without predictors (with only the intercept of mortality rates) with the model containing the years under analysis. The null hypothesis is that the fits of the models without the independent variables (with the intercept only) and with the independent variables are the same. As a rule, if the p-value of the overall significance F-test is lower than the stipulated significance level, the null hypothesis is rejected.

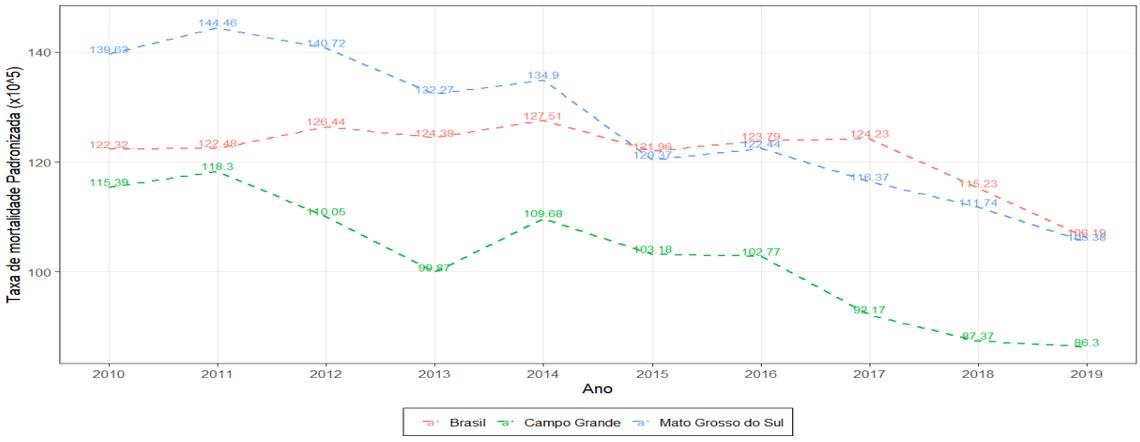
The adjusted or modified R-square (R^2) value was used to estimate the extent of variance in mortality rates that could be explained by the year variable. This test takes into account only the impact of independent variables with a statistically significant effect on the dependent variable. The value of R^2 ranges from 0 to 1 and the higher it is, the better the fit of the regression equation, indicating that the independent variable included in the model is a good candidate for determining the variation in the dependent variable.

RESULTS

In the period under analysis, 1,242,443 (100.0%) male deaths from external causes occurred in Brazil, of which 16,623 (1.34%) in the state of Mato Grosso do Sul and 4,292 (0.35%) in the municipality of Campo Grande. From 2010 to 2014, the state of Mato Grosso do Sul had higher rates, which became close to the rates in Brazil from 2015 to 2019.

Linear regression models indicate a general downward trend in standardized mortality rates in the analyzed period (Table 1) for Campo Grande (p-value <0.001) and Mato Grosso do Sul

(p-value <0.0001), from 139.63/100 thousand to 105.38/100 thousand in Mato Grosso do Sul and from 115.39/100 thousand to 86.30/100 thousand in the municipality of Campo Grande. The downward trend for Brazil was statistically borderline (p-value 0.054), from 122.32/100 thousand to 106.19/100 thousand (Figure 1).



Age-standardized death rates per year per 100,000 inhabitants using the direct method based on the corresponding Brazilian population obtained in the 2010 census.

Figure 1. Standardized male mortality rates (x10^5 inhabitants) from external causes, 2010 to 2019
Source: Research data.

Table 1. Linear regression for standardized male mortality rates from external causes as a function of the year from 2010 to 2019

	Linear coefficient	Angular coefficient	*F*	modified R^2	p-value
Standardized rates					
Campo Grande	7007.82	-3.43	48.21	0.8399	<0.001*
Mato Grosso do Sul	8711.06	-4.26	97.69	0.9148	<0.0001*
Brazil	2737.79	-1.30	5.11	0.3136	0.054
Crude rates					
Campo Grande	5283.35	-2.55	0.41	0.006	0.526
Mato Grosso do Sul	7659.00	-3.71	0.80	0.002	0.373
Brazil	1403.19	-0.62	0.04	0.011	0.855

Source: Research data.

F = overall significance test statistics of the linear regression.

R^2 = extent of variance in mortality rates that could be explained by the year variable.

*Statistically significant at 5%

In the most affected age group, 20 to 29 years old, for every 100,000 men, this age group accounted for 196.92 deaths in 2010 and 108.13 deaths in 2019 in the municipality of Campo Grande. In the state of Mato Grosso do Sul, this age group accounted for 212.89 deaths in 2010 and dropped to 136.87 deaths in 2019, while in Brazil as a whole, this age group accounted for

197.53 deaths in 2010 and 168.16 deaths from external causes for every 100,000 men in 2019.

Importantly, male mortality in the state of Mato Grosso do Sul had rates higher than the average for Brazil until 2015 when it stabilized just below the national average. As of 2015, there was a reduction in the number of deaths in all three ecological clusters.

MORTALITY PROFILE BY ICD-10 MAJOR GROUP OF EXTERNAL CAUSES

Figure 2 showed that traffic accidents were the main external causes of death in the municipality of Campo Grande and the state of Mato Grosso do Sul in the period under study, followed by aggression. In Brazil, from 2010 to 2019, aggression was the predominant causal link between external causes, followed by traffic accidents. Other external causes of accidental injuries represented the third largest contributor to deaths from external causes, indicating the need to detail this major group of external causes in the ICD-10.

At the beginning of the period under analysis, traffic accidents, despite maintaining the highest contribution as external causes of death, registered a proportional decrease in the period, from 39.25% in 2010 to 29.08% in 2019, in the municipality of Campo Grande, and from 36.83% in 2010 to 33.49% in 2019 in the state of Mato Grosso do Sul.

There was a significant increase in the proportion of deaths from voluntary self-harm in the municipality of Campo Grande, from 7.02% in 2010 to 17.86% in 2019, an increase of 154.42% in the period. The most important reduction was found in the proportion of deaths from aggression, from 34.21% in 2010 to 19.90% in 2019. In the state of Mato Grosso do Sul, the proportion of deaths from self-inflicted injuries increased from 8.67 % in 2010 to 13.62% in 2019, and there was a reduction in the proportion of deaths from aggression, from 33.31% to 26.64%, in 2010 and 2019, respectively. In Brazil as a whole, aggression predominated, ranging from 40.40% in 2010 to 35.15% in 2019, with a significant drop also in the proportion of deaths from traffic accidents, from 30.32% in 2010 to 23.83% in 2019. There was an increase in the proportion of deaths from voluntary self-inflicted injuries, which increased from 6.24% in 2010 to 9.26% in 2019, and events whose intention was undetermined, which were 6.14% in 2010 to 11.20% in 2019.

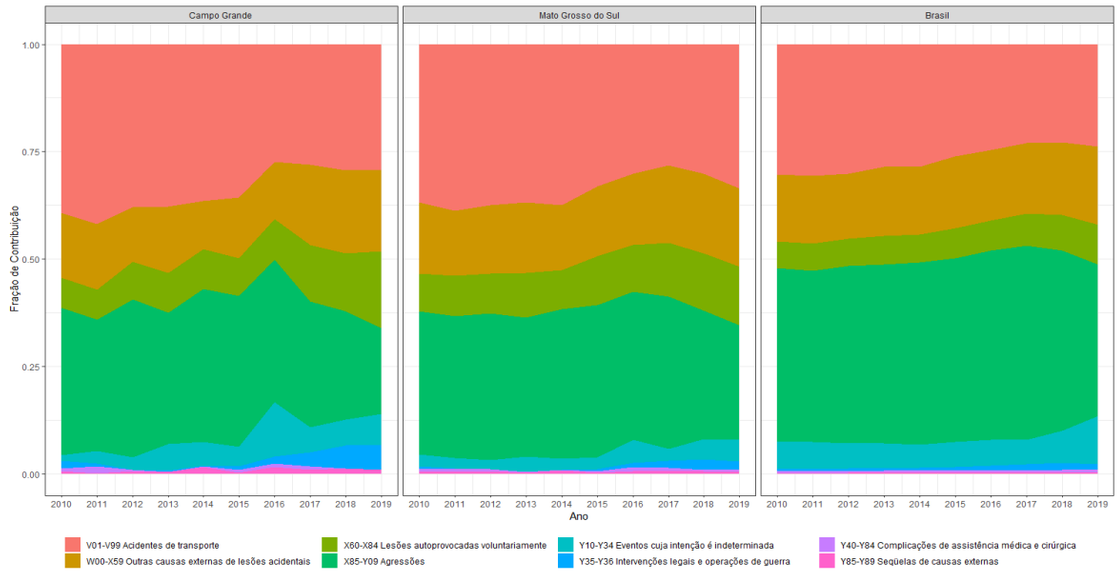


Figure 2. Proportional deaths of men from external causes according to ICD-10 Major Groups of external causes, in Campo Grande, Mato Grosso do Sul, and Brazil, 2010 to 2019
Source: Research data.

MORTALITY PROFILE ACCORDING TO AGE GROUP

The age groups that contributed most to the proportion of deaths from external causes in the period under analysis were 20 to 29 years old and 30 to 39 years old, in the three clusters under analysis. A similar pattern of proportional deaths by age group was observed between Brazil, Mato Grosso do Sul, and the municipality of Campo Grande, although the contribution of the 20 to 29 years old group is more expressive when considering Brazil alone, as can be seen in Figure 3.

In Campo Grande, the highest age groups, 80 and over, 70 to 79 years, 60 to 69 years, and 50 to 59 years, recorded a slight increase in the proportions of deaths from external causes, especially from the middle of the historical series (the year 2015). For example, the age group of 80 and over, increased from 4.19% in 2010 to 7.40% in 2019, an increase of 76.61% in the period. The age groups from 70 to 79 years old, from 60 to 69 years old, and from 50 to 59 years old, increased from 3.08% to 5.87%, from 3.74% to 9.18%, and from 9.91% to 12.24%, respectively from 2010 to 2019.

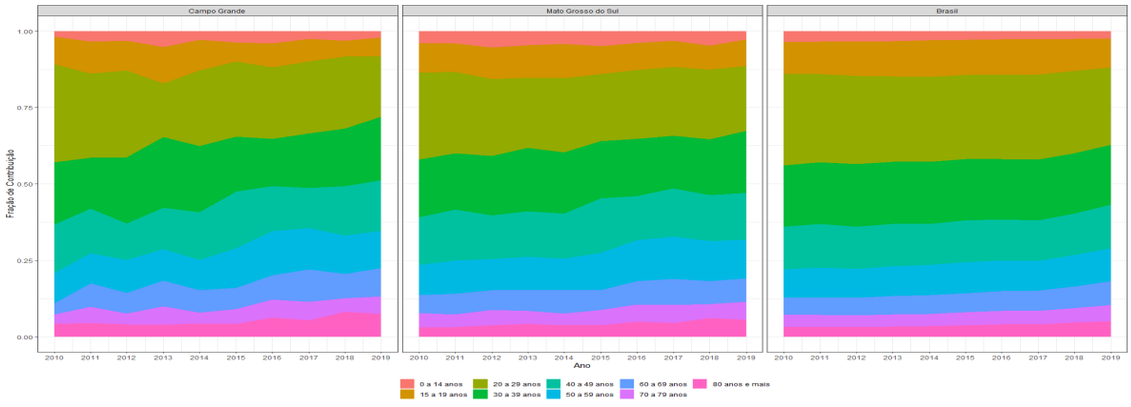


Figure 3. Proportional deaths by age group from external causes for the male population in Campo Grande, Mato Grosso do Sul and Brazil, 2010 to 2019

Source: Research data.

MORTALITY PROFILE ACCORDING TO RACE/ SKIN COLOR

In the period from 2010 to 2019, deaths by race/skin color overlapped the pattern in the three geographic clusters analyzed, except for indigenous and yellow people who, together, contributed to the highest proportion of deaths from external causes in the state of Mato Grosso do Sul, 5.55% in 2010 and 7.13% in 2019. A reduction in the proportion of deaths of white people was observed in the state, from 40.01% in 2010 to 34.13% in 2019, while the proportion of brown people increased from 49.67% in 2010 to 54.47% in 2019 (Figure 4).

In the municipality of Campo Grande, brown men, alone, contributed with more than half of the proportion of deaths from external causes in the time series under analysis, that is, 59.16% in 2010 and 57.40% in 2019. Indigenous and yellow men together contributed with 0.66% in 2010, and 2.30% of the proportion of deaths from external causes in 2019. When looking at data from Brazil as a whole, indigenous and yellow men were affected by 0.54% and 0.73% of the proportion of deaths from external causes in 2010 and 2019, respectively. For brown men, the proportion increased from 53.47% in 2010 to 57.96% in 2019, while among whites there was a reduction from 38.75% to 33.97% in the same

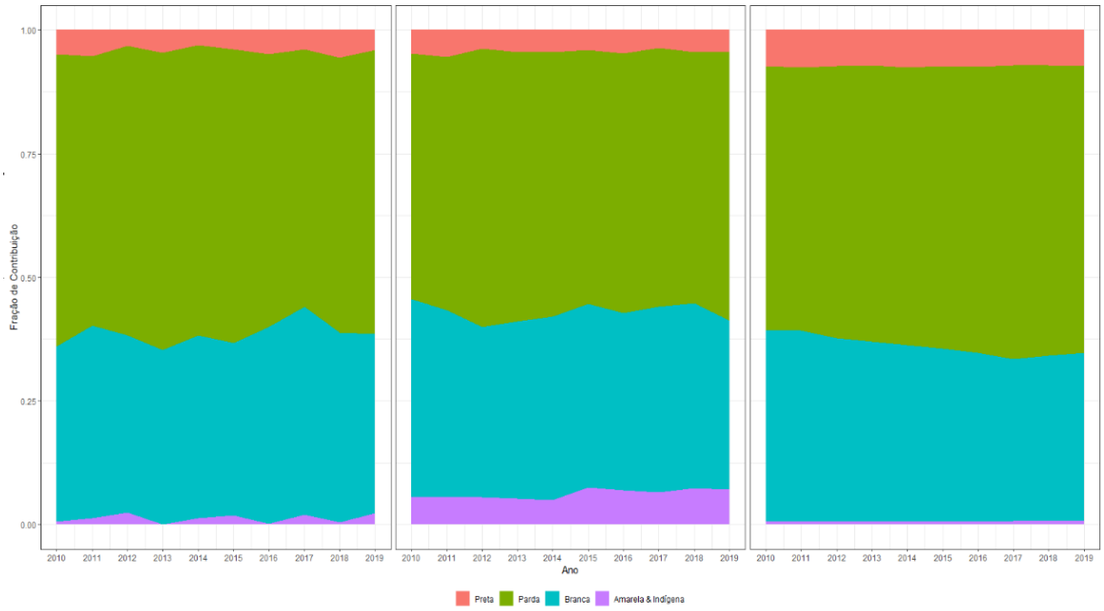


Figure 4. Proportional deaths of men from external causes according to race/skin color, in Campo Grande, Mato Grosso do Sul, and Brazil, 2010 to 2019.

Source: Research data

PROFILE ACCORDING TO SCHOOLING

Mortality according to schooling overlapped the pattern in the three geographical clusters analyzed, with a higher proportion of deaths among men with 8 to 11 years of study. The exception was found for men with 1 to 3 years of formal education who, in the municipality of Campo Grande and the state of Mato Grosso do Sul, presented proportions lower than the national average. (Figure 5).

Most deaths from external causes occurred among men with 4 to 11 years of schooling, both in the municipality of Campo Grande and in the state of Mato Grosso do Sul. In Campo Grande, the proportions of deaths of men with 12 years of schooling or more are noteworthy, which were above the state averages and national averages throughout the analyzed period.

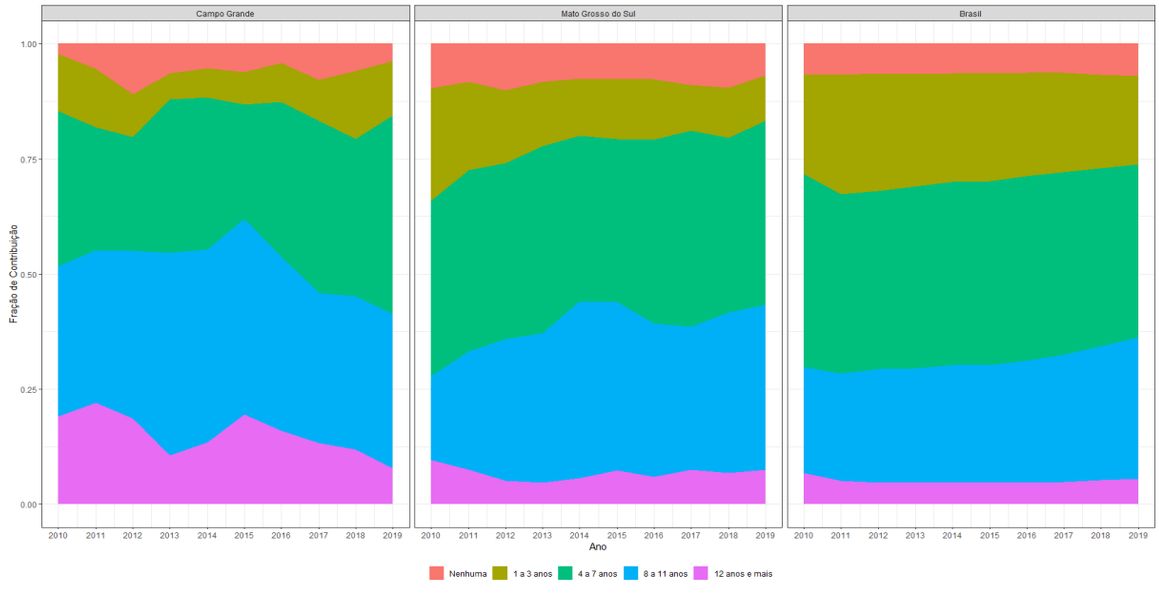


Figure 5. Proportional deaths of men from external causes according to schooling years, in Campo Grande, Mato Grosso do Sul, and Brazil, 2010 to 2019.

Source: Research data.

DISCUSSION

Our findings point to the vulnerabilities of men to external causes, especially suicide, homicides, and accidents, in addition to differences that indicate groups of men more susceptible to these injuries, that is, young, brown, yellow, and indigenous men. Therefore, men's health policies must consider the social determinants of these male vulnerabilities. The results corroborate other national and Latin American studies pointing to external causes as the main causes involved in male illness, hospitalization, and death, requiring the construction of health promotion and prevention strategies that value the processes of sociocultural construction of masculinities and, consequently, its effects on the health of different segments of men[2,8,13-15].

Male susceptibility to external causes is a complex and multi-determined phenomenon, influenced by social and cultural aspects, especially men's socialization and ways of life[3], shaping a model of masculinity that is still widespread in the media and social institutions (families, churches, work, school)[9-11]. Despite advances and changes in gender relations, a model of hegemonic masculinity persists, based on the association of strength, bravery, and courage as synonyms of virility, contributing to men getting involved in situations of violence, vulnerabilities, and increased risks that go through weak or no adoption of measures to prevent injuries and self-care with health[9-11].

Several studies draw attention to the centrality of violence in the construction processes of male identities[9,11,29]. The male socialization process has been indicated in the literature as an important element for understanding the greater number of male hospitalizations and deaths from situations of violence[14,30]. Thus, our findings corroborate the scientific literature that points to the impacts of violence on men's health, resulting in damage to this group, including disabilities, hospitalizations, and deaths that, in addition to being preventable, result in years of life lost[14,16,30].

The male mortality trend by age follows a national pattern of high proportions of deaths among men aged 20 to 39[8,12,13]. However, it is important to emphasize the increase in deaths among elderly people, which, in part, can be explained by the phenomenon of demographic transition, characterized by the increase in the population aged 50 to 79 years in the country[31]. Between 2010 and 2019, the population of this age group grew by 27.05% in the municipality of Campo Grande and 25.59% in the state of Mato Grosso do Sul[31].

Violent deaths from aggression, and firearms, among others, although they have shown a decrease in the period studied, represent the most expressive portion of occurrences of male deaths in the three ecological clusters analyzed, in line with Moura et al.[14]. It should be noted the increase in deaths from legal interventions and war operations (Y35 and Y36) from the year 2015 in the municipality of Campo Grande, which suggests an increase in police violence, which affects more vulnerable populations, such as the black, poor, peripheral and with low schooling population[20, 21]. Unfairly, these interventions shorten the lives of many men, as they are preventable deaths, inflict pain and suffering on families and communities, and burden the health system[32].

In terms of race and social class, studies indicate greater vulnerability of black and poor young people, whose mortality rate is up to four times higher than that of white men with higher purchasing power[21-24]. In the present study, brown men alone are the majority of victims of external causes in all ecological clusters and throughout the analyzed period. The proportions of deaths from external causes of whites, yellows, and indigenous people together do not exceed those of browns, even without adding them to blacks, which makes it essential to think about the effects of racism and socio-racial inequalities in determining male mortality[24].

Also in this context, an alarming data is the 348.48% increase in the number of indigenous/yellow deaths in the municipality of Campo Grande, especially because the state of Mato Grosso do Sul concentrates the second largest indigenous population in the country[31]. In addition, the city of Campo Grande is the fourth city in the state with the highest number of indigenous residents, increasing the need for health analysis and actions to take ethnic aspects into account[31]. People from the state are systematically excluded and suffer from an accumulation of disadvantages, with higher rates of deaths from external causes, infectious diseases, respiratory diseases, and, especially, suicide[18,33].

Concerning suicide among indigenous people, the cosmovision and rituals, the struggle to fight for the right to the territory, and the vilified way in which they are treated, are the causes for the indigenous population to commit suicide[33]. The right to territory is essential for maintaining their health and maintaining their culture and spirituality, so ignoring the importance of the struggle for land is losing sight of a factor of paramount importance for the constitution of original peoples[33]. The marginal insertion of these groups in the economy and the increasing violence against the original peoples and their reservations, as well as the non-demarcation of land, are pointed out in the literature as factors that generate suffering[33].

Also noteworthy in the present study is the high number of male deaths from external causes among educated men. These data, especially those from the municipality of Campo Grande, disagree with the scientific literature that has been identifying higher rates of violence among men with less education[2,12]. These data seem to indicate that male involvement in situations of violence does not refer to a lack of information, requiring the inclusion of new social variables that allow a broader analysis of this phenomenon. Thus, it is necessary to consider historical, political, and cultural aspects in the determination of violence, especially in a context marked by patriarchy and machismo, as structuring relationships between men and women, and men with other men[29].

Considering this scenario, marked by a relevant number of male deaths from external causes and, therefore, preventable, many are the challenges faced for the implementation of the PNAISH, which has been identified as a public policy capable of contributing to actions that encourage men to modify the way they see themselves, value and take care of their health needs[34,35]. In a survey carried out in 2009, the year the PNAISH was launched, male SUS users had difficulty recognizing their health needs[34]. This is because, in their speeches, they pointed out that they did not recognize themselves as subjects of care and that they came to interpret the creation of a specific policy for them as a prejudice[34].

Thus, the data reveal the need to develop preventive actions aimed at the male population, considering the social determinants and addressing the issue of external causes that are often not included, by teams and managers, in discussions on Men's Health[7,25,32]. Finally, it is worth mentioning a question about how the implementation of the PNAISH has been over the more than 10 years of the policy's existence. The literature has been pointing out the need to strengthen promotion, prevention, and popular education actions in health, built with the active participation of men, favoring the protagonism of this group in their search for their social right to health[32]. Such actions should be developed together with the provision of spaces for training and continuing education for health professionals, to provide an understanding of the PNAISH, as well as the particularities involved in the provision of health care for men[32].

CONCLUSION

In the present study, despite the overall downward trend in male mortality rates from

external causes in the analyzed historical series, the data also show a significant increase in deaths from self-inflicted injuries, especially in the capital of Mato Grosso do Sul. The results indicate that, in the period investigated, the state had higher rates of male deaths from external causes, which became close to the same rates as in Brazil, in the period from 2015 to 2019. An overall downward trend in mortality rates was found in the historical series, with an increase in deaths from self-inflicted injuries and deaths of indigenous and yellow men, especially in Campo Grande, MS.

The analysis of the results indicates the importance of a comprehensive understanding of the phenomenon of mortality of Brazilian men, especially about external causes, since the data corroborate other studies reporting that men continue to be victimized, in greater numbers, by violent deaths, accidents, and suicides. As previously mentioned, although external causes are the main cause of illness and death among Brazilian men, the discussion on the subject in the national scientific literature, as well as the design of interventions to prevent male homicides, accidents, and suicides, still are incipient, demanding the constant production of studies on the topic, in different theoretical and methodological perspectives.

Also, the data presented here were limited to the analysis of the information available in DATASUS which, despite its importance in the construction of health data, also depends on the correct filling by health professionals. In this way, new studies can be carried out, considering the use of new methodological strategies, such as, for example, the analysis of the Violence Notification Forms, the medical records, and, above all, listening to professionals, managers, and the men and their families, broadening the debate and reflection on the subject.

Finally, the results of this investigation become even more relevant when analyzing information from a state in the Central-West region of the country, marked by local singularities and health demands, not always problematized in the scientific literature. At the same time, as it is a study carried out in a Brazilian capital, the results are expected to contribute to reflections on the theme of men's health both in this region, as well as in other capitals and large urban centers in the country, subsidizing the design of actions, programs, and local and regional health policies.

ACKNOWLEDGEMENTS

The authors thank the in part by the Coordination of Superior Level Staff Improvement - Brazil (CAPES) - Finance Code 001, and the National Council for Scientific and Technological Development (CNPq) and the Federal University of Mato Grosso do Sul, Ordinance UFMS 141/2020.

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