Ciência & Saúde Coletiva
cienciaesaudecoletiva.com.br
ISSN 1413-8123. v.31, n.4
DOI: 10.1590/1413-81232026314.08992024EN

THEMATIC ARTICLE

Gender gap in life expectancy: the impact of mortality from external causes in Minas Gerais, Brazil (1980-2018)

Hisrael Passarelli-Araujo https://orcid.org/0000-0003-3534-8392 [1]; Larissa Gonçalves Souza https://orcid.org/0000-0003-3536-3912 [2]; Pamila Cristina Lima Siviero https://orcid.org/0000-0003-2042-812X [3]

Abstract *The gender gap in life expectancy reflects broader social inequalities. Despite advances in longevity, gender disparities persist, especially in mortality from external causes. These often-preventable causes raise the male mortality rate. In Minas Gerais, the extent and nature of these disparities and the impact of external causes have not been adequately explored. This study examines the impact of mortality from external causes on the gender gap in life expectancy in Minas Gerais from 1980 to 2018. Using scenarios of mortality reduction from external causes (25%, 50%, 75%, and total elimination), the study calculates the change generated by different scenarios in life expectancy at birth. Death data were combined with population data to calculate multiple decrement life tables. The results suggest that reducing external causes significantly decreases the gender gap in life expectancy. Eliminating 25% of external causes would already reduce the male disadvantage, with more pronounced gains as the proportion of eliminated causes increases. In a scenario of total elimination, the male disadvantage would drop drastically, also reflecting changes in the social and cultural norms that perpetuate these practices.*

Key words *Mortality Differentials, Gender, External Causes, Minas Gerais*

[1] Universidade Federal de Minas Gerais. Av. Antônio Carlos 6627, Pampulha. 31270-901 Belo Horizonte MG Brasil. hisraelpassarelli@gmail.com
[2] Universidade Federal de Alfenas. Alfenas MG Brasil.
[3] Universidade Federal de São Paulo. São Paulo SP Brasil.

Introduction

The gender gap in life expectancy is a key indicator of broader social inequalities, including economic disparities, healthcare access, and social status[1-3]. Despite overall improvements in life expectancy, this gap persists, particularly due to mortality from external causes such as accidents, homicides, and suicides[4]. These preventable causes heavily contribute to higher male mortality worldwide[5,6].

Studying the gender gap requires clarifying some fundamental concepts, such as the distinction between "sex" and "gender". While "sex" refers to the biological and physiological characteristics that differentiate men and women, "gender" relates to the socially constructed roles, behaviors, and expectations attributed to each sex[7-9]. This distinction is crucial because social and cultural norms strongly influence the risk behaviors leading to mortality[10], especially from external causes. For instance, norms of masculinity that value courage and competitiveness drive men to engage in riskier behaviors, which are more closely tied to social expectations than biological factors[11]. Therefore, the term "gender gap" is more appropriate to describe the difference in life expectancy between men and women, capturing the complexity of these influences on mortality.

Mortality from external causes remains a significant concern in Brazil. Since 1980, these causes have shifted age-specific mortality rates, cutting years from life expectancy[12]. In São Paulo, for example, a study revealed that preventable deaths, particularly those caused by external factors, significantly contributed to the gender gap in life expectancy between men and women from 2014 to 2016[13]. These findings highlight the persistence of gender disparities in preventable mortality, posing challenges for health policies and initiatives aimed at reducing inequalities among specific population groups[13,14].

In Minas Gerais, one of Brazil's most populous and diverse states[15], the impact of external causes on the gender gap in life expectancy at birth has not been extensively studied. Between 1999 and 2008, male mortality from external causes rose from 82.7 to 95.7 deaths per 100,000 inhabitants, a 15.7% increase[16]. Studies have also shown that the leading causes of death were traffic accidents, suicides, and homicides, with most victims being young adult men aged 20-39. More recently, external cause mortality in Minas Gerais was about 68 deaths per 100,000 in 2022[17].

Moreover, previous research has analyzed the profile of deaths from external causes among specific population subgroups, such as the older adults in Minas Gerais[18], while others have examined the quality of mortality data related to these causes in the state[19]. However, the effect of external causes on the gender gap in life expectancy at birth remains unclear. This gap limits understanding of how external deaths shape mortality differences and how trends evolved over decades. Addressing this issue is essential for designing public health strategies to reduce gender disparities.

This article examines the impact of mortality from external causes on the gender gap in life expectancy in Minas Gerais from 1980 to 2018. Simulating distinct scenarios of mortality reduction has been an effective strategy employed in various studies[20-22], proving to be a valuable tool for assessing health policies, resource planning, comparing interventions, and understanding the complex interactions between health determinants. Moreover, working with different scenarios is crucial, as it is practically impossible to completely eliminate mortality from these causes. Simulating such scenarios provides concrete data that can assist public health policies.

Methods

This study relied on population data from 1980 and 2000, disaggregated by age and gender, obtained from Brazilian demographic censuses. The 2018 data resulted from population projections conducted by the *Instituto Brasileiro de Geografia e Estatística* (IBGE). Mortality data for all causes and external causes, disaggregated by age group and gender, were sourced from the Mortality Information System (SIM) through the Department of Informatics of the Unified Health System (DATASUS).

Mortality data were collected for the three-year periods 1979-1981, 1999-2001, and 2017-2019. The average number of deaths for each period was used to represent age-specific mortality for 1980, 2000, and 2018, reducing random fluctuations in the data. The final period was chosen to avoid the effects of the COVID-19 pandemic, which began in 2020 and caused a temporary rise in mortality. In Minas Gerais, mortality registration was nearly complete from 1980 to 2010, so no correction for underreporting was necessary.

From 1979 to 1995, death certificates were coded using the 9th Revision of the International Classification of Diseases (ICD-9), with external causes classified under Chapter XVII (E800-E999). Since 1996, the 10th Revision (ICD-10) has been used, with external causes classified under Chapter XX (V01-Y98). The transition from ICD-9 to ICD-10 in 1996 showed no abnormal fluctuations in external cause mortality, so the original data were used without adjustment for classification differences.

To analyze the age-specific gender gap in mortality, age-specific mortality rates for men and women were calculated for all causes and external causes. The sex ratio of age-specific mortality rates for external causes was then determined. This ratio compares men's and women's risk of death; higher values indicate a greater disadvantage for men.

The next step involved constructing life tables for men and women to examine the gender gap in life expectancy at birth. Two measures were used to analyze this gap: the absolute and relative differentials. The absolute differential is the difference between female and male life expectancy, while the relative differential indicates, in percentage terms, how much the gender gap would reduce compared to real data without eliminating external causes.

Finally, single-decrement associated life tables were calculated to assess the impact of external cause deaths on the gender gap in mortality. These tables estimate changes in life expectancy at birth if a specific cause of death were eliminated[23,24].

Single-decrement life tables describe a hypothetical scenario where a specific cause of death is eliminated, setting its death probability to 0 and its survival probability to 1. Eliminating a cause of death does not simply involve removing related deaths from the dataset. When a cause is removed, individuals who would have died from it are exposed to the risk of death from other causes, altering overall death probabilities.

This scenario requires addressing the violation of the independence assumption in competing risks. While mortality rates remain unchanged, more survivors at a given age increase exposure to other causes, modifying death probabilities[23].

To adjust for this, the decrement proportionality constant, R_x^{-i}, is calculated as follows:

$$R_x^{-i} = \frac{D_x - D_x^{-i}}{D_x}$$

Where *-i* represents the eliminated cause (external causes), and is the total observed deaths from all causes at age *x*. This constant assigns relative importance to each cause in relation to total deaths within each age group.

The method for calculating this constant follows the steps outlined in *Grupo Foz*[23]. This study highlights its importance, as it is the basis for simulating scenarios with varying degrees of mortality reduction. While complete elimination (100%) of causes is standard, this approach allows adjustments for partial reductions (e.g., 25%, 50%, 75%), creating different scenarios.

The difference between total life expectancy and life expectancy after eliminating a cause quantifies the potential gain in life expectancy. In this study, we analyzed four hypothetical scenarios of external cause mortality reduction—25%, 50%, 75%, and 100%—to estimate potential life expectancy gains at various reduction levels.

Detailed methods for single-decrement life tables are available in Preston *et al.*[24] and *Grupo Foz*[23]. Data were analyzed using Microsoft Excel 2019 and R[25].

Since this study used only aggregated, publicly available data without personal identifiers, it did not require ethical approval from the Research Ethics Committee/National Research Ethics Commission (CEP/CONEP). This ensured compliance with ethical principles, maintaining confidentiality and privacy while preventing individual identification.

Results

In Minas Gerais, 94,447 deaths occurred in 1980, of which 7,645 (8.1%) were caused by external causes. By 2000, this number rose to 96,093, with external causes accounting for 8.5% of deaths. In 2018, external causes represented 9.8% of the 130,603 total deaths. However, when disaggregating deaths by gender, a clear pattern emerged: in all analyzed years, the proportion of deaths from external causes was consistently higher for men than for women (Table 1).

Figure 1 displays age- and sex-specific mortality rates for all causes and external causes separately. A general decline in mortality over the study period was evident for all cause mortality (upper quadrant). However, this decline was more consistent for women, with reductions observed across all ages during all three years. For men, there was an increase in mortality among young individuals in 2018, reaching levels similar to those recorded in 1980 (Figure 1).

The lower quadrant of Figure 1, which focuses on external cause mortality, helps explain these differences. While the shapes of the curves for men and women are similar, men consistently experienced much higher rates, especially in younger and middle-aged groups.

For men, the age-specific mortality rates from external causes in younger age groups were nearly identical to overall mortality rates, indicating that external causes were the primary contributors to mortality among young men. As men aged, overall mortality rates increased, while external cause mortality remained relatively stable, except among those over 70. Notably, in 2018, the mortality risk among 15-25-year-olds exceeded that of earlier years (Figure 1, lower quadrant).

For women, external cause mortality rates decreased across all ages between 1980 and 2000. However, by 2018, these improvements were observed only among children. Women consistently exhibited lower external cause mortality rates than men, reaching comparable levels only after age 75 (Figure 1, lower quadrant).

Figure 2 highlights the sex ratios of external cause mortality rates, underscoring a persistent male disadvantage. In every year and age group analyzed, the sex ratio exceeded 1, indicating higher risks for men. In 1980, the pattern resembled an inverted U, with a peak at ages 35-39. During this period, men aged 35-39 were nearly six times more likely to die from external causes than women of the same age. By 2000, two trends emerged: an increase in the sex ratio across almost all ages, suggesting that men's relative risk compared to women had risen over time; and a shift in the peak toward younger ages. In 2000, men aged 20-24 were seven times more likely to die from external causes than women of the same age. In 2018, this risk had increased to nearly eight times.

Table 2 provides life expectancy at birth for men and women and the gender gap for 1980, 2000, and 2018. It also includes results for four scenarios of external cause reduction, illustrating their impact on life expectancy and the gender gap in mortality.

In 1980, women in Minas Gerais could expect to live 69.0 years, 6.0 years longer than men. By 2000, this gap widened to 7.0 years, with men achieving a life expectancy of 70.9 years. In 2018, the gender gap began to narrow, with men facing a disadvantage of 6.6 years compared to women. However, while the gap narrowed to 6.6 years in 2018, it remained wider than the 6.0 years observed in 1980 (Table 2).

In all four external cause reduction scenarios, the gender gap narrowed primarily due to significant gains in male life expectancy. For instance, in the first scenario (25% reduction in external causes), the male disadvantage would shrink to 5.6 years in 1980 (a 6% reduction), 6.6 years in 2000 (a 5% reduction), and 6.1 years in 2018 (a 7% reduction). As the proportion of external cause reduction increased, the gender gap diminished further. Notably, in Scenario 3 (75% reduction), the gap in 2018 reached levels similar to 1980. In this scenario, the male disadvantage would be 5.0 years in 1980 (17% lower) and 5.1 years in 2018 (14% lower). Under complete elimination of external causes (Scenario 4), the male disadvantage would decrease substantially: 4.6 years in 1980 (23% reduction), 5.5 years in 2000 (21% reduction), and 4.6 years in 2018 (29% reduction).

Figure 3 complements this analysis, illustrating the gender gap in life expectancy gains under the four reduction scenarios. As expected, the largest gains occurred with complete elimination of external causes. However, even in moderate reduction scenarios, the male disadvantage decreased significantly, particularly in 2018.

Table 1. Total deaths and deaths from external causes, by gender - Minas Gerais (1980-2018).

Year	Deaths	Men	Women	Total
1980	Total	53,689	40,788	94,477
	External causes	5,881	1,764	7,645
	Proportion	11.0%	4.3%	8.1%
2000	Total	54,824	41,269	96,093
	External causes	6,645	1,555	8,200
	Proportion	12.1%	3.8%	8.5%
2018	Total	70,052	60,551	130,603
	External causes	9,945	2,832	12,777
	Proportion	14.2%	4.7%	9.8%

Source: MS/SVS/CGIAE - Mortality Information System (SIM); IBGE, Demographic Censuses (1980 and 2000) and Population Projections (2018).

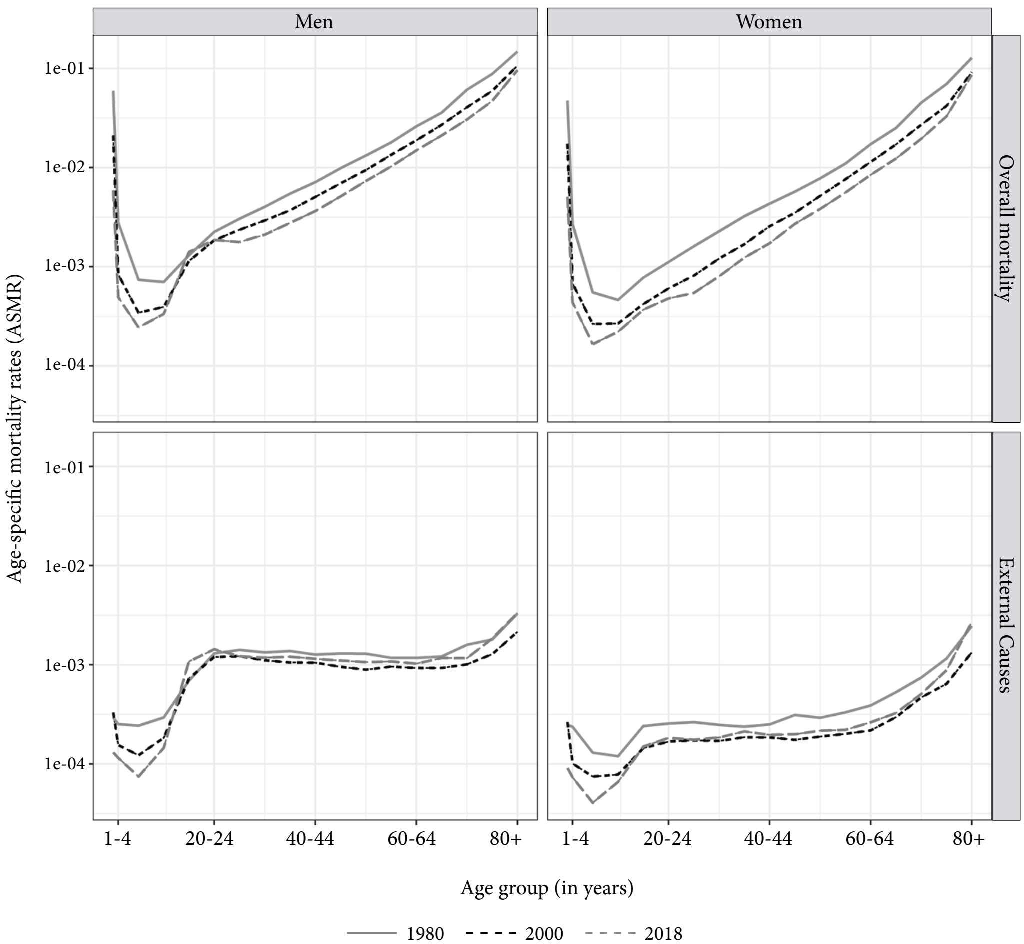

Figure 1. Age-specific mortality rates (ASMR) by gender. Mortality from All Causes and External Causes – Minas Gerais (1980-2018).

Source: Authors.

Discussion and conclusion

This study examined the impact of external cause mortality on the gender gap in mortality in Minas Gerais from 1980 to 2018. Simulating different scenarios of external cause reduction showed a significant decrease in the gender gap in life expectancy at birth. Eliminating just 25% of external causes would reduce the male mortality disadvantage across all analyzed periods, with the gap shrinking further as the proportion of eliminated causes increased. Under a total elimination scenario, the male disadvantage would decrease dramatically, highlighting the significant role external causes play in the gender gap. Reducing these deaths would have a substantial impact on male life expectancy, narrowing the mortality gap between men and women.

The literature provides several explanations that help contextualize the findings of this study. Demographically, external causes of mortality—such as accidents, homicides, and suicides—are significantly higher among men, particularly in younger and middle-aged groups[4,13]. This pattern results in a disproportionately higher male mortality rate compared to women, negatively impacting male life expectancy—a trend observed across Brazil[20,26], in Latin American cities[27] and globally[28]. Eliminating external causes would lead to a substantial increase in male life expectancy, thereby reducing the gender gap.

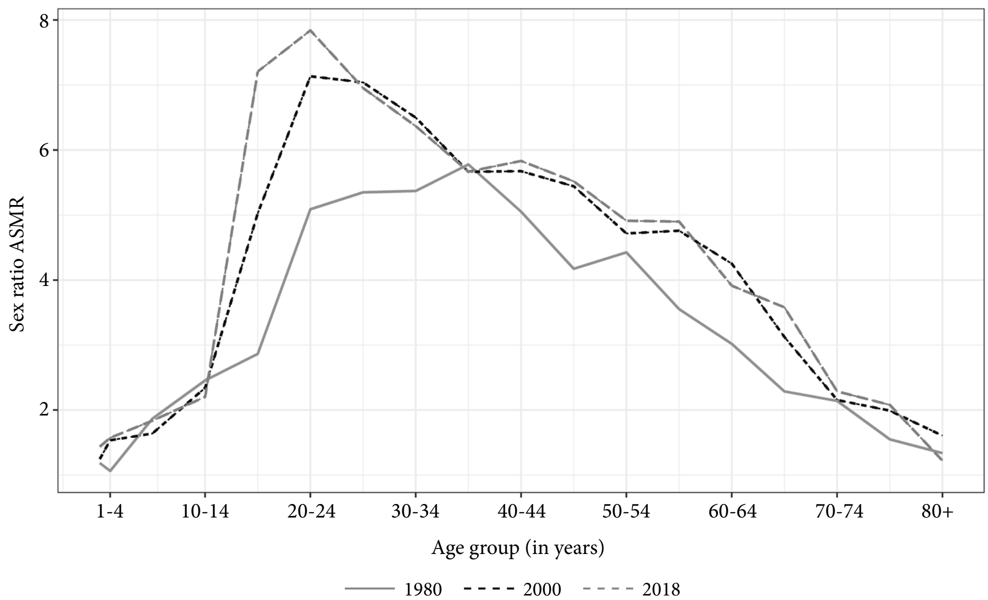

Figure 2. Sex ratios of age-specific mortality rates (ASMR) from external causes – Minas Gerais (1980-2018).

Source: Authors.

Table 2. Gender gap in life expectancy at birth - Minas Gerais (1980-2018).

Scenarios	Men	Women	GAP	
			Absolute	Relative*
Life expectancy at birth (e0)				
1980	63.0	69.0	6.0	
2000	70.9	77.8	7.0	
2018	75.3	81.8	6.6	
Scenario 1: reducing 25% of deaths from external causes				
1980	63.6	69.2	5.6	5.7
2000	71.4	78.0	6.6	5.3
2018	76.0	82.1	6.1	7.2
Scenario 2: reducing 50% of deaths from external causes				
1980	64.1	69.4	5.3	11.4
2000	71.9	78.1	6.2	10.6
2018	76.6	82.3	5.6	14.4
Scenario 3: reducing 75% of deaths from external causes				
1980	64.6	69.6	5.0	17.2
2000	72.4	78.3	5.9	16.0
2018	77.3	82.5	5.1	21.7
Scenario 4: reducing 100% of deaths from external causes				
1980	65.1	69.7	4.6	23.2
2000	73.0	78.4	5.5	21.5
2018	78.0	82.7	4.6	29.1

*Note: The relative differential indicates the percentage by which the gap would reduce compared to the real data (without eliminating external causes).

Source: MS/SVS/CGIAE - Mortality Information System (SIM); IBGE, Demographic Censuses (1980 and 2000) and Population Projections (2018).

Previous studies support the finding that external cause mortality rates are higher among men due to risk-taking behaviors and greater exposure to dangerous environments[4,29]. For example, in Minas Gerais, both in 2000 and 2018, men had a higher proportion of deaths from transport accidents compared to women, although this difference slightly decreased in 2018[30]. Additionally, publicly available data revealed a significant increase in the percentage of deaths from assaults among men, who remain disproportionately affected by this cause in both periods[30].

Findings from Minas Gerais align with evidence from other regions. A study analyzing adult mortality profiles in ten Latin American countries found that external causes, particularly homicides and traffic accidents, are major contributors to higher male mortality rates[31]. Despite differences in overall adult mortality across these countries, the elevated external cause mortality among men is consistent, suggesting a widespread regional issue[31].

The age-specific analysis of male mortality disadvantage in Minas Gerais between 1980 and 2018 highlights two main trends: rising mortality levels across most age groups and the "rejuvenation" of the external cause mortality curve. These patterns are consistent with findings from studies conducted in other locations, including São Paulo[32,33] and some developed countries[34].

The rejuvenation of external cause mortality suggests that younger men are increasingly affected, likely due to urbanization and migration to cities in the late 20th century in search of better opportunities[35], increasing the exposure to risks associated with external causes, such as urban violence and traffic accidents, which disproportionately affect young men[4]. Other factors, such as changes in social norms and increased occupational hazards (e.g., high-risk jobs in construction and transportation), may also explain the shifting patterns but require further investigation.

The gender gap in mortality also reflects broader social inequalities, shaped by social norms, economic conditions, and cultural practices[10]. Higher male mortality from external causes often stems from gender roles that encourage risky and aggressive behaviors among men[11,36,37].

Traditional masculinity promotes bravery, competitiveness, and risk-taking, which heightens risky behaviors[36,38]. Gender norms often push men to be assertive and competitive, leading to aggressive behaviors like fighting or extreme sports to assert their position[39].

Reducing external causes of death, such as traffic accidents and homicides, would significantly decrease deaths associated with these behaviors and, consequently, the gender gap in mortality[40,41]. However, such a reduction would not occur in isolation; it would reflect broader social and cultural changes that perpetuate these practices[42]. Reducing these deaths would signal not only an improvement in public health but also a shift in cultural norms around traditional masculinity[43]. Norms that once valued

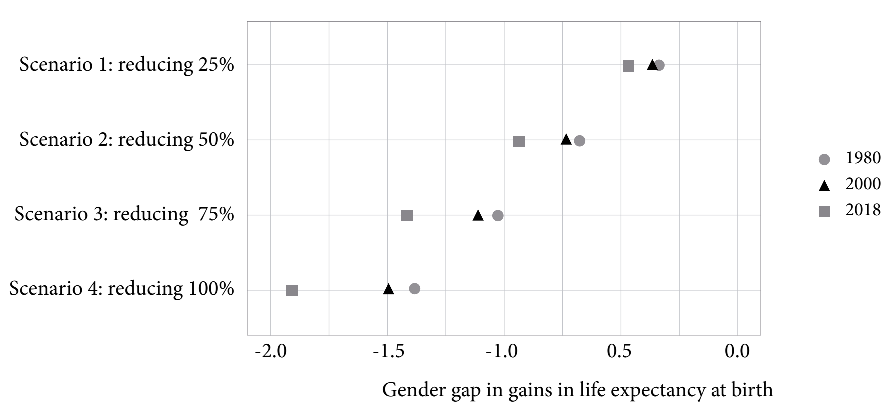

Figure 3. Gender gap in gains in life expectancy at birth – Minas Gerais (1980-2018).

Fonte: Autores.

bravery, competitiveness, and risk-taking would be gradually replaced by a greater emphasis on health and safety, both personally and socially. Addressing external cause mortality would thus promote cultural change toward gender equity and healthier lifestyles[41].

While reducing the gender gap in mortality from external causes is often seen as primarily benefiting men, it is also important to consider the impact on women. Reducing these deaths reflects a change in norms that perpetuate male risk behaviors, but it also involves a shift in gender dynamics that can affect women's health[44,45].

As men gain in life expectancy through reduced risk behaviors, women may experience changes in their own mortality and longevity. Increased female participation in traditionally male-dominated sectors, like emergency services and technical industries, brings new occupational challenges, including physical and biomechanical risks[46]. This female advantage in longevity could be threatened if changing social norms lead women into riskier environments traditionally dominated by men.

Thus, a balanced view requires recognizing that reducing the gender gap in mortality is not solely about male gains but also about how changing social and cultural norms reshape mortality and longevity experiences for both genders[47]. As these norms evolve to encourage less risky behavior, external cause mortality should decline, supporting the idea that social changes can directly impact public health[48,49].

This study contributes to the literature by providing evidence of how external cause deaths influence the gender gap in mortality in Minas Gerais and how this trend has evolved over decades. However, it also acknowledges some limitations. First, the analysis relies on aggregated mortality data, which may mask significant intra-regional and socioeconomic differences within Minas Gerais. Additionally, the quality of mortality data may vary over time and across regions, potentially affecting the accuracy of external cause mortality estimates.

Future research should include more detailed analyses in sub-regions of Minas Gerais to identify areas needing intervention. Qualitative data, such as interviews and focus groups, could help explore cultural and social factors influencing risky behaviors among men. Further, it is important to examine how different age groups and causes of death contribute to variations in external cause mortality rates using decomposition methods. Other measures of inequality, such as variability in age at death across municipalities, should also be investigated using survival tables for both men and women.

Ciência & Saúde Coletiva, 31(4):1-11, 2026

Collaborations

H Passarelli-Araujo: conceptualization; data curation; formal analysis; investigation; methodology; software; visualization; writing – original draft; writing – revision and editing. LG Souza: conceptualization; data curation; formal analysis; investigation; methodology; validation; writing – original draft; writing – revision and editing. PCL Siviero: conceptualization; data curation; formal analysis; investigation; methodology; validation; writing – original draft; writing – revision and editing.

Data availability statement

The data sources adopted in the research are indicated in the article's body.

References

1. Kolip P, Lange C. Gender inequality and the gender gap in life expectancy in the European Union. *Eur J Public Health* 2018; 28:869-872.
2. Medalia C, Chang VW. Gender equality, development, and cross-national sex gaps in life expectancy. *Int J Comp Sociol* 2011; 52:371-389.
3. Phillips SP. Risky business: explaining the gender gap in longevity. *J Men's Heal Gend* 2006; 3:43-46.
4. Moura EC, Gomes R, Falcão MTC, Schwarz E, Neves AC, Santos W. Gender inequalities in external cause mortality in Brazil, 2010. *Cien Saude Colet* 2015; 20(3):9-18.
5. OECD/Eurostat. *Avoidable mortality: OECD/Eurostat lists of preventable and treatable causes of death* [Internet]. [cited 2025 jun 16]. Available from: https://www.oecd.org/content/dam/oecd/en/data/datasets/oecd-health-statistics/avoidable-mortality-2019-joint-oecd-eurostat-list-preventable-treatable-causes-of-death.pdf.
6. Health Organization (WHO). *Mortality from external causes. European Health Information Gateway* [Internet]. [cited 2024 maio 19]. Available from: https://gateway.euro.who.int/en/indicators/h2020_14-mortality-from-external-causes/#id=17085.
7. Phillips SP. Defining and measuring gender: A social determinant of health whose time has come. *Int J Equity Health* 2005; 4:11.
8. Council of Europe. *Sex and gender* [Internet]. [cited 2024 maio 20]. Available from: https://www.coe.int/en/web/gender-matters/sex-and-gender#20.
9. Nanda S. *Gender Diversity: Crosscultural Variations*. 2ª ed. Illinois: Waveland Press, 2014.
10. Gailliot MT, Stillman TF, Schmeichel BJ, Maner JK, Plant EA. Mortality Salience Increases Adherence to Salient Norms and Values. *Personal Soc Psychol Bull* 2008; 34(7):993-1003.
11. Kraemer S. The fragile male. *BMJ* 2000; 321:1609-1612.
12. Albuquerque FRPC, Silva LGC. Tendências dos níveis e padrões de mortalidade e seus diferenciais regionais no período 2000-2030: Brasil, Grandes Regiões e Unidades da Federação. In: Ervatti LR, Borges GM, Jardim AP, editores. *Mudança demográfica no Brasil no início do século XXI: subsídios para as projeções da população*. Rio de Janeiro: IBGE; 2015. p. 49-86.
13. Souza LG, Siviero PCL. Diferenciais por sexo na mortalidade evitável e ganhos potenciais de esperança de vida em São Paulo, SP: um estudo transversal entre 2014 e 2016. *Epidemiol Serv Saude* 2020; 29(3):e2018451.
14. Cobo B, Cruz C, Dick PC. Desigualdades de gênero e raciais no acesso e uso dos serviços de atenção primária à saúde no Brasil. *Cien Saude Colet* 2021; 26(9):4021-4032.
15. Anjos FH, Silva TC, Costa MJP. Estrutura produtiva de Minas Gerais (MG): uma análise microrregional para os anos de 2007 e 2014. In: *Blucher Engineering Proceedings*. São Paulo: Editora Blucher; 2016. p. 497-518.
16. Andrade-Barbosa TL, Xavier-Gomes LM, Barbosa VA, Caldeira AP. Mortalidade masculina por causas externas em Minas Gerais, Brasil. *Cien Saude Colet* 2013; 18(3):711-719.
17. Brasil. Ministério da Saúde (MS). Óbitos por causas externas - Minas Gerais. *Sistema de Informações sobre Mortalidade – SIM* [Internet]. [acessado 2024 maio 21]. Disponível em: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sim/cnv/ext10mg.def.
18. Gomes LMX, Barbosa TLA, Caldeira AP. Mortalidade por causas externas em idosos em Minas Gerais, Brasil. *Esc Anna Nery* 2010; 14:779-786.
19. Campos-Silva T, Oliveira RC, Abreu DMX. Análise da qualidade das informações sobre a mortalidade por causas externas em Minas Gerais, 1997 a 2005. *Cad Saude Colet* 18.
20. Moraes MX, Souza J, Passarelli-Araujo H. O impacto da mortalidade por causas externas na esperança de vida dos municípios produtores de petróleo da Bacia de Campos/RJ. *Rev Bras Estud Popul* 2023; 40:e0248.
21. Souza LG, Siviero PCL. Diferenciais de mortalidade entre homens e mulheres: Sul de Minas Gerais, 2002 e 2012. *Cad Saude Colet* 2015; 23(1):25-31.
22. Araujo RHO, Barboni AR, Silva D RP, Gomes TNQ, Sampaio RAC, Miranda JJ, Silva RJS. Como a redução de algumas doenças cardiovasculares pode afetar a expectativa de vida da população brasileira? *Rev Bras Estud Popul* 2021; 38:1-14.
23. Grupo de Foz. *Métodos demográficos: uma visão desde os países de língua portuguesa*. 1ª ed. São Paulo: Edgard Blücher; 2021.
24. Preston SH, Heuveline P, Guillot M. *Demography: measuring and modeling population process*. 1ª ed. Oxford: Blackwell Publishing; 2001.
25. R Core Team. R: A Language and Environment for Statistical Computing [Internet]. 2023 [cited 2024 maio 19]. Available from: https://www.r-project.org/.
26. Aidar T. As Causas Externas e o Perfil de Mortalidade da População Residente no Município de Campinas entre 1980 e 2000. *Rev Bras Estud Popul* 2003; 20(2):281-302.
27. Cardona D, Peláez E, Aidar T, Ribotta B, Alvarez MF. Mortalidad por causas externas en tres ciudades latinoamericanas: Córdoba (Argentina), Campinas (Brasil) y Medellín (Colombia), 1980-2005. *Rev Bras Estud Popul* 2008; 25(2):335-352.
28. Streatfield PK, Khan WA, Bhuiya A, Hanifi SM, Alam N, Diboulo E, Niamba L, Sié A, Lankoandé B, Millogo R, Soura AB, Bonfoh B, Kone S, Ngoran EK, Utzinger J, Ashebir Y, Melaku YA, Weldearegawi B, Gomez P, Jasseh M, Azongo D, Oduro A, Wak G, Wontuo P, Attaa-Pomaa M, Gyapong M, Manyeh AK, Kant S, Misra P, Rai SK, Juvekar S, Patil R, Wahab A, Wilopo S, Bauni E, Mochamah G, Ndila C, Williams TN, Khaggayi C, Nyaguara A, Obor D, Odhiambo FO, Ezeh A, Oti S, Wamukoya M, Chihana M, Crampin A, Collinson MA, Kabudula CW, Wagner R, Herbst K, Mossong J, Emina JB, Sankoh OA, Byass P. Mortality from external causes in Africa and Asia: evidence from INDEPTH Health and Demographic Surveillance System Sites. *Glob Health Action* 2014; 7:25366.

29. Waldron I. Recent trends in sex mortality ratios for adults in developed countries. *Soc Sci Med* 1993; 36(4):451-462.
30. Brasil. Sistema de Informações sobre Mortalidade (SIM). *Óbitos por causas externas nos anos 2000 e 2018* [Internet]. [acessado 2024 maio 22]. Disponível em: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?-sim/cnv/ext10uf.def.
31. Calazans JA, Queiroz BL. The adult mortality profile by cause of death in 10 Latin American countries (2000-2016). *Rev Panam Salud Pública* 2020; 44:e1.
32. Siviero PCL. *Níveis e padrões do diferencial de mortalidade por sexo no município de São Paulo, 1920 - 2005*. Belo Horizonte; Universidade Federal de Minas Gerais; 2009.
33. Siviero PCL, Turra CM, Rodrigues RN. Diferenciais de mortalidade: níveis e padrões segundo o sexo no município de São Paulo de 1920 a 2005. *Rev Bras Estud Popul* 2011; 28(2):283-301.
34. Glei DA. The Sex Gap in Mortality: Historical Patterns Across Twenty-Four Countries. In: *IUSSP 2005*. France, 2005, p. 1-24.
35. Beltrão KI, Camarano AA, Kanso S. *Dinâmica populacional brasileira na virada do século XX*. Rio de Janeiro: Ipea; 2004.
36. Copenhaver MM, Lash SJ, Eisler RM. Masculine gender-role stress, anger, and male intimate abusiveness: Implications for men's relationships. *Sex Roles A J Res* 2000; 42:405-414.
37. Kindlon D, Thompson M. *Raising Cain: Protecting the Emotional Life of Boys*. New York: Random House Publishing Group; 2009.
38. Kruger DJ, Nesse RM. An evolutionary life-history framework for understanding sex differences in human mortality rates. *Hum Nat* 2006; 17:74-97.
39. Cohn A, Zeichner A. Effects of masculine identity and gender role stress on aggression in men. *Psychol Men Masc* 2006; 7:179-190.
40. Segura-Cardona A, Cardona-Arango D. Mortalidad y años potenciales de vida perdidos por causas externas: Colombia 1998-2015. *Univ y Salud* 2018; 20:149.
41. Backhans M, Burström B, Leon AP, Marklund S. Is gender policy related to the gender gap in external cause and circulatory disease mortality? A mixed effects model of 22 OECD countries 1973-2008. *BMC Public Health* 2012; 12:969.
42. Casey EA, Ihrig A, Roman M, Hoxmeier JC, Carlson J, Greer K. Life Course and Socioecological Influences on Gender-Equitable Attitudes Among Men: A Scoping Review. *Trauma Violence Abuse* 2022; 23(3):764-777.
43. Creighton G, Oliffe JL. Theorising masculinities and men's health: A brief history with a view to practice. *Heal Sociol Rev* 2010; 19:409-418.
44. Cooper D, Tabana H. Women, men, and health. In: Detels R, Karim QA, Baum F, Li L, Leyland AH, editors. *Oxford Textbook of Global Public Health*. Oxford: Oxford University Press; 2021. p. 415-430.
45. Garrison-Desany HM, Wilson E, Munos M, Sawadogo-Lewis T, Maïga A, Ako O, Mkuwa S, Hobbs AJ, Morgan R. The role of gender power relations on women's health outcomes: evidence from a maternal health coverage survey in Simiyu region, Tanzania. *BMC Public Health* 2021; 21(1):909.
46. Lindberg B, Rerucha C, Givens M. Occupational and Environmental Challenges for Women. *Curr Sports Med Rep* 2023; 22(4):120-125.
47. Gai Tobe R, Izumida N. Gender disparity in the individual attitude toward longevity among Japanese population: Findings from a national survey. *PLoS One* 2021; 16(8):e0254779.
48. Zhao W, Chang M, Yu L, Sohail MT. Health and Human Wellbeing in China: do Environmental Issues and Social Change Matter? *Front Psychol* 2022; 13:860321.
49. Haslam C, Haslam SA, Jetten J, Cruwys T, Steffens NK. Life Change, Social Identity, and Health. *Annu Rev Psychol* 2021; 72:635-661.

Article submitted 27/05/2024
Approved 06/01/2025
Final version submitted 08/01/2025