



Epidemiology of Self-Inflicted Injuries in Brazil From 2009 to 2021: A Retrospective Ecological Study

Epidemiologia das Lesões Autoprovocadas no Brasil de 2009 a 2021: Um Estudo Ecológico Retrospectivo

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Abstract: Background: Self-inflicted violence encompasses suicidal behaviour and self-harm carried out without conscious suicidal intent. It is a growing public health problem in Brazil, yet its distribution across the country's federative units remains unevenly described. Objectives: To describe the territorial distribution of notifications of self-inflicted injury in Brazil between 2009 and 2021, quantify each federative unit's contribution to the national burden, and examine the relationship between sex, race/skin colour and the mechanism of self-harm. Methods: Retrospective ecological study reported in accordance with the STROBE statement. Records notified between 2009 and 2021 were retrieved from the Notifiable Diseases Information System (SINAN) through the DATASUS platform of the Brazilian Ministry of Health, with the federative unit as the unit of analysis. Annual means, standard deviations, and variances were computed for the 27 federative units; each unit's share of the national caseload was expressed as a probability, and its burden-weighted contribution to the national expected value was calculated. Pearson correlation coefficients were estimated between annual national counts and mechanism-specific counts, stratified by sex. Results: A total of 634,219 notifications were recorded. São Paulo showed the highest annual mean (11,714.9) and Amapá the lowest (70.0). São Paulo and Minas Gerais together accounted for 40.1% of notifications, and the Southeast and South regions for 72.6%. Correlation coefficients ranged from 0.442 to 0.979; poisoning was the only mechanism departing appreciably from the overall trend, most markedly among women. Brown (parda) predominated in 23 federative units, although race was unspecified in 55.43% of records in the Federal District. The Southeast concentrated 46.68% of male and 49.60% of female notifications. Final Considerations: Notifications are heavily concentrated in the most populous and best-served regions and predominate among women. Surveillance completeness, rather than incidence alone, shapes the observed picture and should be an immediate target of policy.

Keywords: self-injurious behavior; suicide; attempted; epidemiology; descriptive; health information systems; Brazil; ecological studies.

Resumo: Contexto: A violência autoprovocada abrange comportamentos suicidas e autolesões praticadas sem intenção suicida consciente. Trata-se de um problema crescente de saúde pública no Brasil, embora sua distribuição entre as unidades federativas do país ainda seja descrita de forma desigual. Objetivos: Descrever a distribuição territorial das notificações de lesões autoprovocadas no Brasil entre 2009 e 2021, quantificar a contribuição de cada unidade federativa para a carga nacional e examinar a relação entre sexo, raça/cor da pele e o mecanismo de autolesão. Métodos: Estudo ecológico retrospectivo, relatado em conformidade com a declaração STROBE. Foram recuperados, por meio da plataforma DATASUS do Ministério da Saúde do Brasil, registros notificados entre 2009 e 2021 no Sistema de Informação de Agravos de Notificação (SINAN), tendo como unidade de análise as unidades federativas. Foram calculadas médias anuais, desvios-padrão e variâncias para as 27 unidades federativas; a participação de cada unidade no total nacional de casos foi

expressa como probabilidade, e sua contribuição ponderada pela carga para o valor esperado nacional foi calculada. Foram estimados coeficientes de correlação de Pearson entre as contagens nacionais anuais e as contagens específicas por mecanismo, estratificadas por sexo. Resultados: Foram registradas 634.219 notificações. São Paulo apresentou a maior média anual (11.714,9) e o Amapá, a menor (70,0). São Paulo e Minas Gerais, em conjunto, responderam por 40,1% das notificações, enquanto as regiões Sudeste e Sul concentraram 72,6%. Os coeficientes de correlação variaram de 0,442 a 0,979; o envenenamento foi o único mecanismo que apresentou desvio expressivo em relação à tendência geral, de forma mais acentuada entre as mulheres. A raça/cor parda predominou em 23 unidades federativas, embora a informação sobre raça/cor não tenha sido especificada em 55,43% dos registros no Distrito Federal. A região Sudeste concentrou 46,68% das notificações entre homens e 49,60% entre mulheres. Considerações finais: As notificações estão fortemente concentradas nas regiões mais populosas e com maior cobertura de serviços, com predominância entre as mulheres. A completude da vigilância, e não apenas a incidência, influencia o panorama observado e deve constituir um alvo imediato das políticas públicas.

Palavras-chave: comportamento autolesivo; tentativa de suicídio; epidemiologia descritiva; sistemas de informação em saúde; Brasil; estudos ecológicos.

INTRODUCTION

Self-inflicted violence is an umbrella term that covers two overlapping but distinguishable domains: suicidal behaviour, which ranges from ideation and planning through attempt to death by suicide, and self-harm, understood as the deliberate infliction of damage on one's own body without conscious suicidal intent [1,5]. Both constitute a serious public health problem, and both have become more visible in health services over the past two decades¹.

The burden of mental ill health is reflected in social circles, family relationships and academic settings alike. Conditions such as depression, attention-deficit/hyperactivity disorder and anxiety affect a growing number of people worldwide, and often begin in adolescence, the same period in which self-injurious behaviour typically emerges^{2,3}.

Previously regarded as little more than a symptom of a range of mental disorders, self-harm has attracted increasing attention in recent years because of its rising frequency⁴. It may be defined as damage deliberately produced on one's own body in the absence of conscious suicidal intent⁵, although the boundary between self-harm and suicide attempt is neither sharp nor stable over time.

Acts of self-harm are not limited to cutting, burning, hair-pulling, inserting objects under the skin, and scraping the skin; they are also associated with a range of mental disorders and socioeconomic problems, including depression, anxiety, alcohol or drug misuse, bulimia or anorexia, childhood maltreatment and social isolation^{3,5,6,7,8,15}.

Morbidity and mortality from violent or accidental causes are a major concern for health managers and professionals worldwide. In Brazil, such causes were the third leading cause of death in the general population and the leading cause among

people aged 1 to 39 years in 2009 [9]. Suicide is among the three leading causes of death in the population aged 15 to 44 years in both developed and developing countries, and one of the largest causes of death among young people aged 15 to 24 years in several countries^{3,10,11,12}.

Self-injurious behaviour and suicide attempts substantially outnumber deaths by suicide, indicating that populations are far more exposed to self-inflicted injury than to its fatal outcome^{13,17,23}. In Brazil, the Violence and Accident Surveillance System (VIVA) uses individual notification and investigation forms for domestic, sexual, and other forms of violence, generating data that support epidemiological surveillance of compulsorily notifiable injuries, characterise the most affected populations, and inform the analysis of morbidity profiles¹³. Nevertheless, stigma surrounding mental illness and the persistent taboo around suicide among children and adolescents continue to depress recognition and recording of these events^{14,16}.

Suicidal phenomena, including suicide attempts, deliberate self-harm, plans, threats and suicidal thoughts, are common in certain segments of the population, and the identification of factors associated with them is crucial for prevention programmes and for mental health promotion³. Despite the relevance of the topic, obtaining reliable data on suicide attempts and self-injurious behaviour remains difficult, because these events are systematically under-notified and because the completeness of the available records varies widely between services and regions^{13,20}.

Against this background, the present study aimed to describe the epidemiological profile and the territorial distribution of notifications of self-inflicted injury in Brazil between 2009 and 2021, to quantify the contribution of each federative unit to the national burden, and to examine the relationship between sex, race/skin colour and the mechanism of self-harm.

MATERIALS AND METHODS

Study Design

This is a retrospective, ecological epidemiological study of notifications of self-inflicted injury occurring among residents of Brazil, reported in accordance with the recommendations of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement¹⁸. The unit of analysis was the federative unit and not the individual; accordingly, all inferences reported below refer to populations and not to persons.

Study Area

The investigation covered the whole of the Brazilian territory, comprising 26 states and the Federal District, with an area of 8,510,345.538 km² and an estimated population of 214,289,251 inhabitants (as of 28 February 2022), a population density of 25.17 inhabitants per km² and a Human Development Index of 0.765¹⁹.

Study Population and Data Source

Data were obtained from the Notifiable Diseases Information System (SINAN) of the Brazilian Ministry of Health through the Department of Informatics of the Unified Health System (DATASUS), under the heading “Epidemiological and Morbidity”, section “Notifiable Diseases and Injuries – 2007 onwards”, selecting the record field for self-inflicted injury for the period from 2009 to 2021.

The SINAN database is publicly accessible through DATASUS. The platform aggregates information on cases of diseases and injuries included in the national list of compulsorily notifiable conditions under Ordinance No. 264 of 17 February 2020, and is intended to support managers in decision-making, to define intervention priorities and to allow comparison of the interventions implemented.

Variables and Eligibility Criteria

The variables analysed were: mechanism of self-harm (blunt object, sharp or piercing object, hot object or substance, poisoning, hanging and firearm), alcohol use in connection with the event, sex, race/skin colour according to the categories used by the Brazilian Institute of Geography and Statistics (white, black, yellow, brown and indigenous, together with the unspecified/missing category), region and federative unit.

Records dated before 2009 or after 2021, and epidemiological data not corresponding to the topic under investigation, were excluded.

Statistical Analysis

Data were extracted as absolute frequencies and analysed descriptively. For each federative unit, the mean, standard deviation and variance of the annual number of notifications across the 13 years were calculated. Two further summary measures were derived. The probability assigned to a federative unit corresponds to its share of the national caseload, that is, the total number of notifications recorded in that unit divided by the national total; by construction, these probabilities sum to 100%. The expected value attributed to a federative unit corresponds to the product of its total caseload and its own probability, so that the sum of the column represents the expected number of notifications when a record is drawn at random from the national pool and attributed to the unit in which it occurred. This measure therefore expresses burden-weighted concentration rather than a forecast of future cases.

Pearson correlation coefficients were estimated between the annual national number of notifications of self-inflicted injury and the annual number of events attributed to each mechanism, stratified by sex, over the 13 available time points. Because all series share a common upward temporal trend, coefficients close to unity are expected for every mechanism; consequently, the analysis was interpreted as identifying mechanisms whose temporal behaviour departs from the overall trend, and not as a test of association between sex and method. No formal hypothesis testing, adjustment for population size, or multiple-comparison correction was

performed. Data storage, tabulation, and graphical output were carried out in Microsoft Excel® and Microsoft Word®.

Ethical Approval

This research did not require approval by a Research Ethics Committee. It complies with Resolution No. 510 of the Brazilian National Health Council, of 7 April 2016, Article 1, item III, which exempts from registration with the CEP/CONEP system research that uses publicly available information in the Humanities and Social Sciences. All data analysed were aggregated, publicly accessible, and contained no information allowing the identification of individual participants; informed consent was therefore not applicable.

RESULTS

Between 2009 and 2021, 634,219 notifications of self-inflicted injury were recorded across the 27 Brazilian federative units. Table 1 presents the mean, standard deviation, variance, probability, and expected value for each unit over the period.

Table 1 - Annual number of notifications of self-inflicted injury by federative unit, Brazil, 2009–2021: mean, standard deviation, variance, share of the national caseload (probability) and burden-weighted expected value.

Federative unit	Mean	Standard deviation	Variance	Probability	Expected value
Rondônia	213.5	229.4	52,631.1	0.44%	12.1
Acre	299.6	275.3	75,799.4	0.61%	23.9
Amazonas	291.2	200.6	40,235.2	0.60%	22.6
Roraima	214.5	174.3	30,389.4	0.44%	12.3
Pará	266.0	260.3	67,750.2	0.55%	18.9
Amapá	70.0	42.6	1,817.5	0.14%	1.3
Tocantins	640.2	416.2	173,227.5	1.31%	109.2
Maranhão	380.8	389.6	151,814.5	0.78%	38.6
Piauí	702.9	512.1	262,216.7	1.44%	131.7
Ceará	1,207.5	1,367.8	1,870,769.1	2.48%	388.6
Rio Grande do Norte	573.5	568.8	323,540.8	1.18%	87.7
Paraíba	534.3	496.7	246,752.6	1.10%	76.1
Pernambuco	1,736.3	1,563.7	2,445,240.6	3.56%	803.3
Alagoas	1,097.9	550.6	303,195.2	2.25%	321.2
Sergipe	146.4	195.1	38,066.6	0.30%	5.7
Bahia	779.4	622.3	387,292.4	1.60%	161.9

Federative unit	Mean	Standard deviation	Variance	Probability	Expected value
Minas Gerais	7,863.4	5,179.2	26,824,273.4	16.12%	16,476.6
Espírito Santo	1,099.8	1,422.5	2,023,630.0	2.25%	322.3
Rio de Janeiro	2,417.2	2,195.7	4,821,269.0	4.95%	1,556.9
São Paulo	11,714.9	8,921.6	79,595,471.1	24.01%	36,570.1
Paraná	4,743.6	4,269.5	18,228,320.3	9.72%	5,996.1
Santa Catarina	3,233.1	2,353.2	5,537,591.9	6.63%	2,785.3
Rio Grande do Sul	4,346.6	3,478.0	12,096,667.4	8.91%	5,034.4
Mato Grosso do Sul	1,387.3	762.5	581,451.1	2.84%	512.9
Mato Grosso	416.3	410.0	168,104.4	0.85%	46.2
Goiás	1,356.6	1,270.1	1,613,122.1	2.78%	490.4
Distrito Federal	1,053.2	1,327.8	1,763,159.5	2.16%	295.6
Total	—	—	—	100.00%	72,302.0

Source: Ministry of Health – Notifiable Diseases Information System (SINAN). Probability = total notifications in the unit / national total. Expected value = total notifications in the unit × probability; the column sums to the national expected value.

The mean shown is a standardised value corresponding to the years 2009 to 2021. São Paulo recorded the highest annual mean, with 11,714.9 notifications, followed by Minas Gerais with 7,863.4; Amapá recorded the lowest, with 70.0 notifications per year.

The standard deviation indicates that Amapá presented the most stable series over the period (SD 42.6), whereas São Paulo presented the widest fluctuation (SD 8,921.6). The correspondingly low variance reinforces the stability of the Amapá series relative to its own mean, while the very large variances observed in the most populous units reflect both the magnitude of their caseload and the progressive expansion of notification over the period.

The highest probability of a notification of self-inflicted injury being recorded in a given federative unit was observed in São Paulo (24.01%) and the lowest in Amapá (0.14%), followed by Sergipe (0.30%). São Paulo and Minas Gerais together accounted for 40.1% of all notifications in the country, and the Southeast and South regions together for 72.6%. The units with the greatest burden-weighted expected value were São Paulo (36,570.1), Minas Gerais (16,476.6), Paraná (5,996.1) and Rio Grande do Sul (5,034.4); the sum of the column, 72,302, corresponds to the national expected value.

Variation between federative units is therefore wide. The most populous units present the highest means and expected values, consistent with their larger populations and denser health service networks rather than necessarily with a higher individual-level risk.

Table 2 - Pearson correlation coefficients between the annual national number of notifications of self-inflicted injury and the annual number of events by mechanism, according to sex, Brazil, 2009–2021.

Mechanism / associated factor	Male	Female
Hot object or substance	0.967	0.964
Blunt object	0.967	0.964
Sharp or piercing object	0.974	0.979
Hanging	0.976	0.969
Firearm	0.968	0.963
Poisoning	0.696	0.442
Alcohol use	0.708	0.807

Source: Ministry of Health – Notifiable Diseases Information System (SINAN). Coefficients calculated over 13 annual time points; all series share a common temporal trend, so values close to unity are expected throughout.

Table 2 shows the Pearson correlation coefficients between the annual national number of notifications and the annual counts for each mechanism of self-harm, by sex. Coefficients ranged from 0.442 to 0.979, and were above 0.96 for every mechanism except alcohol use and poisoning, reflecting the strong common temporal trend shared by all series.

Within this narrow range, the highest coefficients were observed for hanging among men (0.976) and for sharp or piercing objects among women (0.979), but the differences between the sexes are small in absolute terms and should not be read as evidence of a sex-specific preference.

Poisoning was the one mechanism whose temporal behaviour departed appreciably from the overall trend, and it did so most markedly among women (0.442 for women against 0.696 for men). Alcohol use also showed weaker coefficients (0.708 for men and 0.807 for women), indicating that the recording of this variable followed a different trajectory from that of the mechanisms of injury themselves.

Table 3 - Percentage distribution of notifications of self-inflicted injury by race/skin colour within each federative unit, Brazil, 2009–2021.

Federative unit	Unspecified	White	Black	Yellow	Brown	Indigenous
Rondônia	3.14	24.83	4.83	1.12	65.08	1.01
Acre	3.18	10.63	4.80	0.56	79.97	0.85
Amazonas	3.78	6.05	2.40	0.74	56.31	30.72
Roraima	5.06	9.65	1.90	0.07	77.91	5.41
Pará	4.31	15.10	8.21	0.84	70.45	1.10
Amapá	3.85	13.96	7.03	0.99	73.30	0.88
Tocantins	0.91	11.12	4.55	2.39	79.15	1.87
Maranhão	1.35	15.98	9.33	0.71	71.94	0.69

Federative unit	Unspecified	White	Black	Yellow	Brown	Indigenous
Piauí	22.40	11.28	6.68	0.89	58.56	0.20
Ceará	11.94	14.57	4.67	0.52	67.91	0.39
Rio Grande do Norte	21.53	24.48	3.66	0.39	49.79	0.16
Paraíba	7.34	13.17	2.74	0.69	75.71	0.35
Pernambuco	6.75	16.06	6.62	1.17	68.74	0.66
Alagoas	34.74	11.67	3.34	0.67	49.16	0.43
Sergipe	19.71	12.66	7.20	0.63	59.59	0.21
Bahia	26.56	8.83	11.55	0.71	51.52	0.83
Minas Gerais	9.75	38.82	9.45	0.72	40.93	0.32
Espírito Santo	13.51	31.29	8.86	0.60	45.44	0.29
Rio de Janeiro	22.23	32.45	11.52	0.62	33.01	0.17
São Paulo	8.99	58.55	6.31	0.57	25.40	0.17
Paraná	4.24	73.58	3.43	0.75	17.76	0.23
Santa Catarina	1.67	87.36	3.32	0.36	6.80	0.50
Rio Grande do Sul	4.37	80.63	5.66	0.32	8.72	0.29
Mato Grosso do Sul	7.91	38.45	4.67	1.96	44.12	2.89
Mato Grosso	5.60	32.72	6.98	1.33	52.01	1.35
Goiás	7.89	26.22	6.60	1.42	57.62	0.26
Distrito Federal	55.43	11.36	2.99	0.47	29.63	0.12

Source: Ministry of Health – Notifiable Diseases Information System (SINAN). Values are row percentages and may not total exactly 100% owing to rounding. “Unspecified” corresponds to blank or ignored records.

Table 3 presents the distribution of notifications by race/skin colour within each federative unit. Brown (parda) was the predominant category in 23 of the 27 units, reaching 79.97% in Acre, 79.15% in Tocantins, and 77.91% in Roraima. White was the predominant category in Santa Catarina (87.36%), Rio Grande do Sul (80.63%), Paraná (73.58%), and São Paulo (58.55%); in Minas Gerais, the two categories were nearly balanced (brown 40.93% against white 38.82%).

The highest proportions among people self-declared as black were recorded in Bahia (11.55%) and Rio de Janeiro (11.52%), and the indigenous category reached 30.72% in Amazonas and 5.41% in Roraima, well above values observed elsewhere.

A substantial proportion of records did not specify race/skin colour. This was the case for 55.43% of notifications in the Federal District, 34.74% in Alagoas, 26.56% in Bahia, 22.40% in Piauí, 22.23% in Rio de Janeiro, 21.53% in Rio Grande

do Norte and 19.71% in Sergipe. In these units, the observed racial composition must be read with corresponding caution.

Table 4 - Percentage distribution of notifications of self-inflicted injury by region of Brazil, according to sex, 2009–2021.

Region	Male	Female
North	5.26%	6.60%
Northeast	17.86%	16.14%
Southeast	46.68%	49.60%
South	21.45%	20.06%
Centre-West	8.74%	7.59%
Total	100.00%	100.00%

Source: Ministry of Health – Notifiable Diseases Information System (SINAN). Percentages are calculated within each sex, so each column totals 100%.

Table 4 shows the distribution of notifications by region and sex. The Southeast concentrated the largest share of notifications for both sexes, with 46.68% of male and 49.60% of female records, followed by the South (21.45% and 20.06%), the Northeast (17.86% and 16.14%), the Centre-West (8.74% and 7.59%) and the North (5.26% and 6.60%).

Within the Southeast, women accounted for 72.02% of notifications and men for 27.93%. Taken together with the regional distribution, these figures imply a national female-to-male ratio of approximately 2.4 to 1.

DISCUSSION

This epidemiological study of notifications of self-inflicted violence in Brazil identified a wide range of self-harm mechanisms across all regions of the country, together with a marked increase in notification rates relative to the earliest years of the series. These findings are in line with previous studies reporting high rates of self-harm among adolescents worldwide [20].

The concentration of notifications in the Southeast and South, which together accounted for 72.6% of all records, is the most conspicuous feature of the distribution. It should not, however, be read directly as a gradient of risk. These regions hold the largest share of the national population and the densest network of emergency and mental health services, and they also implemented the notification of interpersonal and self-inflicted violence earlier and more completely than the North and Northeast. The measure reported here is the volume of notifications, not incidence per inhabitant, and the ecological design precludes any inference about individual-level risk.

The findings concerning the sex of the affected population are consistent with global statistics on the subject, which identify a female predominance as a defining characteristic of the profile of people who self-injure, even when compared with

other forms of violence^{2,23}. Several studies have shown that women are more likely to engage in self-harm and suicide attempts, in part because of the rising prevalence of mental health problems in this group, whereas men more often choose more lethal methods²⁰. Our correlation analysis offers only weak support for a sex-specific specialisation by method: because all series share a strong temporal trend, the coefficients were uniformly high, and only poisoning departed materially from that pattern, most notably among women. This is compatible with the literature reporting poisoning as a predominantly female method²², but it does not establish it, and the present design cannot do so.

With respect to race and skin colour, brown was the predominant category in 23 of the 27 federative units, which mirrors the demographic composition of the country, where most of the population self-declares as black or brown. This finding may also be related to socioeconomic factors, since this racial group is disproportionately exposed to social and economic vulnerability^{3,20,21,22}. The exceptions form a coherent geographical pattern: the three southern states and São Paulo, where the white population predominates in the general population as well.

A finding of at least equal importance concerns the completeness of the records rather than their content. In the Federal District, more than half of all notifications (55.43%) did not specify race or skin colour, and the proportion exceeded one fifth in six further units. Where the missing category is larger than several of the substantive categories combined, the observed racial distribution cannot be treated as a reliable description of the affected population. This limitation compounds the well-documented under-recognition of self-inflicted injury associated with the stigma attached to mental illness and with the taboo that still surrounds suicide among children and adolescents^{14,16}.

Educational attainment was among the variables originally retrieved. Previous Brazilian studies report a concentration of notifications among people with incomplete primary education, raising the hypothesis that schooling conditions social inclusion in a labour market demanding high qualification²¹. In the present dataset, the proportion of records with unspecified schooling was such that no stable distribution could be reported, and the variable was not carried through to the results.

Alcohol consumption warrants mention as a risk factor, since intoxication acts as a disinhibitor and lowers the threshold for impulsive acts^{17,22}. Here, the temporal pattern of alcohol-related records diverged from that of the injury mechanisms, which more plausibly reflects inconsistent completion of this field than a genuine change in the role of alcohol.

Limitations

This study has important limitations that must be taken into account. The most fundamental is inherent to its design: because the unit of analysis is the federative unit, associations observed at the aggregate level cannot be transferred to individuals without incurring the ecological fallacy. The variables are, in addition, cross-sectional in nature, so no cause-and-effect relationship can be established between them.

A likely source of selection bias is that not all cases occurring in the period will have reached emergency and urgent care services. People who sustained minor injuries may not have sought medical attention at all, and these events are absent from the system by construction.

Analyses were based on absolute counts of notifications rather than on rates per 100,000 inhabitants, and no adjustment was made for population size or age structure. Comparisons between federative units therefore reflect differences in volume, and in the capacity of each network to detect and record events, at least as much as differences in the underlying occurrence of self-harm. Future analyses using population-standardised rates and formal trend testing would allow this distinction to be made.

Important factors associated with suicide attempts, such as the presence of mental disorders or social problems, were not assessed owing to the limited scope of the data sources, and the use of secondary data prevented deeper analyses and comparisons.

Finally, VIVA may still be considered incipient for capturing information on violence in the country, which restricts investigation of the phenomenon to a limited period. The progressive expansion of the notification network also means that part of the observed increase reflects improved case ascertainment rather than a true rise in occurrence.

FINAL CONSIDERATIONS

Notifications of self-inflicted injury in Brazil between 2009 and 2021 were heavily concentrated in the most populous and best-served federative units, predominated among women. They occurred most often among people who self-declare as brown, in keeping with the demographic composition of the country. These results provide a scientific basis for health professionals to implement targeted actions and support the funding of suicide protection and prevention programmes.

The findings must be understood in light of their limitations. Because the analysis is ecological and the variables are cross-sectional, it is not possible to establish cause-and-effect relationships between them, and the study period is short for the purpose of handling secondary data drawn from health information systems in which a large proportion of fields remain unspecified.

That incompleteness is itself a principal finding. Concerted effort is needed to improve the completeness of the records held in the instruments available to health services, so that the true magnitude of this problem can be established and specific public policies aimed at the prevention of self-harm and suicide can be developed on a sound evidential basis. This research therefore emphasises the importance of measures to improve the notification of self-harm and the registration of deaths by suicide, to guarantee access to accurate data without information gaps.

The results further highlight the need to advance knowledge of suicidal behaviour and to involve managers and health specialists in the planning of integrated

health actions and in the development of preventive interventions.

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