

Temporal trend of adolescent intentional self-harm notifications in the school environment, Brazil, 2011-2018

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ABSTRACT

Objective: To analyze the trend of adolescent intentional self-harm notifications in the school environment, Brazil, 2011 to 2018. **Methods:** This was an ecological time series study, with data from the Notifiable Health Conditions Information System, using the Prais-Winsten linear regression model. **Results:** A total of 1,989 cases were notified. Notification rates ranged from 0.09 to 2.75/100,000 inhabitants, with an increasing trend, both in females (APC = 66.0%; 95%CI 39.0;98.3) and male (APC = 55.2%; 95%CI 29.9;85.4). The North region showed a stationary trend, while the Southeast and South regions showed an increasing trend, especially Rio de Janeiro (APC = 85.5%; 95%CI 58.0;117.8) and Paraná (APC = 73.6%; 95%CI 41.9;112.3). In the Midwest region, only the state of Mato Grosso do Sul showed a rising trend (APC = 54.5%; 95%CI 16.9;104.2). **Conclusion:** There was an increasing trend in adolescent intentional self-harm notifications in the school environment in Brazil, during the study period.

Keywords: Suicide, Attempt; Violence; Adolescent; Time Series Studies; Health Information System.

INTRODUCTION

According to the World Health Organization (WHO), violence is the intentional use of physical force, threatened or actual, against oneself, another person, group or community, resulting in injury, psychological harm or death.¹ Violence can be classified into three groups: self-harm or self-inflicted violence (against oneself); interpersonal violence (domestic and community); and collective violence (political groups, terrorist organizations, militias).² Thus, suicide attempt, suicide, self-harm, self-punishment and self-injury are considered as intentional self-harm violence.³

Self-injurious behaviors are considered a public health problem due to the physical and psychological damage caused to the victim, their family and friends. These behaviors occur in different socioeconomic and cultural contexts. However, there are still several taboos in society on the subject.⁴

In general, dealing with individuals who perform intentional self-harm is a challenge for mental health and education professionals, given the physical and psychological consequences for the individual and people close to him.⁵ According to a study on intentional self-harm among adolescents in Brazil, 67,388 cases of this type of violence were recorded in health services between 2011 to 2014, accounting for 14% of all recorded violence in the country.⁶

Although the literature indicates that there has been an increasing frequency of intentional self-harm among adolescents in Brazil, in recent years,^{7,8} data on this population are scarce, especially in the school environment.

The increase in cases of intentional self-harm and the consequent need to investigate the trend of notifications, in addition to providing evidence on the subject aiming at improving actions to prevent self-injurious behavior and promoting adolescent mental health can justify this study.

The objective of this study was to analyze the trend of adolescent intentional self-harm notifications in the school environment in Brazil, between 2011 and 2018.

Study contributions	
Main results	There was an increasing trend in adolescent intentional self-harm notifications in the school environment in Brazil, between 2011 and 2018. Most victims were female, aged 10 to 14 years, living in the urban area.
Implications for services	The results point to the recognition of the school environment as a potential scenario for the occurrence of intentional self-harm and also as an important space for social interaction, discussion on the subject and adoption of preventive measures among adolescents.
Perspectives	It is necessary to monitor the occurrence of the event and articulate health, education and social assistance sectors in order to develop priority actions to prevent intentional self-harm among adolescents, both inside and outside the school environment.

METHODS

This was an ecological time series study. Its units of analysis corresponded to the 26 Federative Units (FUs), the Federal District and the five macro-regions of Brazil.

The Violence and Accident Surveillance System (VIVA), implemented by the Ministry of Health in 2006, has two components: i) VIVA Continuous, which provides data on interpersonal/intentional self-harm violence treated in health services; and ii) VIVA Survey, aimed at information on violence treated in emergency services, resulting from specific surveys. Notifications of violence became compulsory in 2011, in all health services in Brazil.⁹

Data are obtained in the routine of the reporting units, through the Individual Notification Form - Interpersonal/Self-inflicted Violence, and input into the Notifiable Health Conditions Information System (SINAN), which contains the records of the reporting units of all municipalities in the country. This form is used to report suspected or confirmed cases of domestic/intrafamily, sexual, self-inflicted violence, human trafficking, slave labor, child labor, torture, legal intervention and homophobic violence against women and men of all ages.⁹

Intentional self-harm notifications among adolescents aged 10 to 19 years in the school environment, registered on SINAN throughout the national territory, from 2011 (when the universal notification of violence on SINAN started) to 2018 (last year with data available at the time of study) were approached. As such, we selected records whose variable 'Was it a self-inflicted injury?' presented the item filled out as 'yes', and the fields 'Data on the probable perpetrator of violence' and 'Place of occurrence' were filled in, respectively, with the following information 'the Person themselves' and 'School' (Figure 1).

The following variables were analyzed: sex (female; male); age group (in years: 10 to 14; 15 to 19); self-reported race/skin color (White; Black/Brown; Asian/Indigenous); zone of residence (urban; peri-urban/rural); FUs and the national macro-region of residence (North; Northeast; South; Southeast; Midwest).

The crude notification rate of intentional self-harm cases among adolescents aged 10 to 19 years that occurred in the school environment, was obtained by the ratio between the absolute number of these notifications and the population in the same age group, multiplied by 100,000, disaggregated by regions and FU, for each year of the series.

In order to calculate the rates, estimates of the adolescent population were used, calculated by the Instituto Brasileiro de Geografia e Estatística (IBGE). The data were obtained by the authors themselves, from the website of the Brazilian

National Health System Information Technology Department, DATASUS (<http://www.datasus.gov.br>), on July 15, 2021. A descriptive and comparative analysis between the variables was performed, using Pearson's chi-square test, with a significance level of 5%.

The characterization of the study population was based on the calculation of the simple and relative frequency distribution of the variables, 'sex', 'age group', 'race/skin color' and 'zone of residence'. The temporal trend of notifications was checked using the Prais-Winsten linear regression model to quantify the annual percent change (APC) and their respective 95% confidence intervals (95%CI). Rate trends were classified as follows: 'increasing' ($p < 0.05$ and positive regression coefficient); 'decreasing' ($p < 0.05$ and negative regression coefficient); or 'stationary' ($p > 0.05$).⁹ The percentage change and trend in notification rates, between the first and last years of the series, were calculated according to sex and age group.

Database organization and the calculation of rates were performed using Microsoft Excel 2016. Statistical analyzes were performed using Stata® version 14.

As it is a study that uses publicly available data, and guarantees privacy and confidentiality of those involved, it was exempt from submission to a Research Ethics Committee.

RESULTS

Between 2011 and 2018, 1,989 cases of intentional self-harm among adolescents in the school environment in Brazil were notified (Figure 1). Most victims were female (77.1%), aged between 10 and 14 years (57.3%), of White race/skin color (54.9%) and residing in the urban area (88.7%), as shown in Table 1.

Figure 2 shows the number and annual notification rates (per 100,000 inhabitants) of intentional self-harm among adolescents. There was a progressive increase in the number and notification rates, with a greater intensity of the rising trend as of 2016.

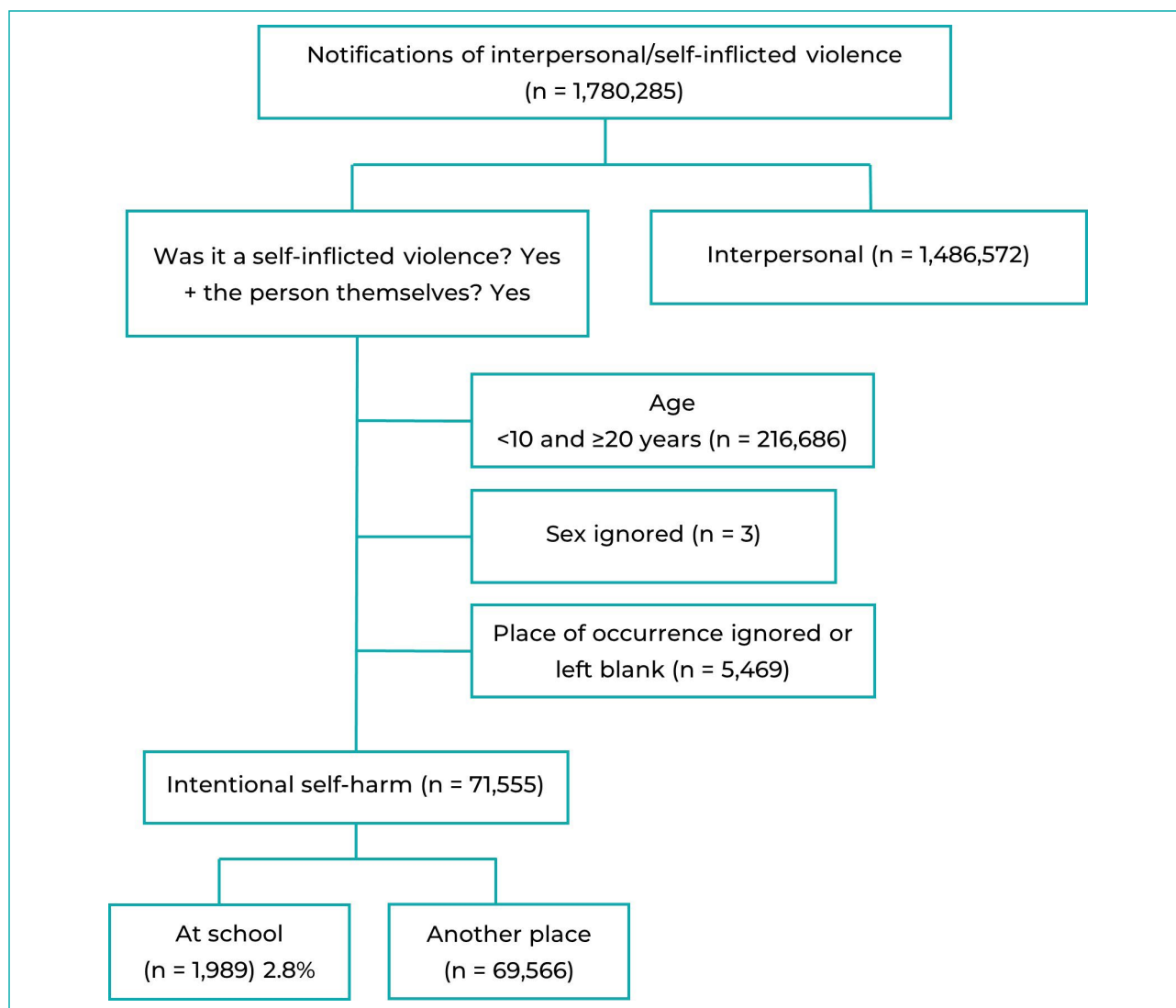


Figure 1 – Flowchart of selection of records of adolescent intentional self-harm notifications in the school environment, Brazil, 2011-2018

Table 2 describes the percentage change in notification rates according to sex and age group, between the first and last years of series studied. There was an increasing trend in intentional self-harm notification rates, both in females (APC = 66.0%; 95%CI 39.0;98.3) and males (APC = 55.2%; 95%CI 29.9;85.4). There was also a rising trend in notification rates according to age, with a greater increase in the age group 10 to 14 years (APC = 66.3%; 95%CI 37.2;101.6).

Table 3 shows the percentage change and trend in notification rates according to the national

macro-region and FU. There was an increasing trend in these rates in the country (APC = 62.7%; 95%CI 36.1;94.6), with variations between states and macro-regions. The North region, as a whole, showed a stationary trend. However, in the analysis by state, an increase in these rates was found in Acre (APC = 32.8%; 95%CI 1.1;74.4) and in Amapá (APC = 4.5%; 95%CI 0.3;9.0), and a decreasing trend in Amazonas (APC = -23.0%; 95%CI -31.8;-13.1). Although the Northeast region have shown an upward trend, the analysis by FU in this region revealed a stationary trend in all states.

Table 1 – Distribution of adolescent intentional self-harm notifications in the school environment (n = 1,989), according to victims’ characteristics, Brazil, 2011-2018

Características	n (%)
Sex (n = 1,989)	
Female	1,533 (77.1)
Male	456 (22.9)
Age group (in years) (n = 1,989)	
10-14	1,140 (57.3)
15-19	849 (42.7)
Self-reported race/skin color (n = 1,830)^a	
White	1,004 (54.9)
Black/brown	798 (43.6)
Asian/indigenous	28 (1.5)
Zone of residence (n = 1,941)^a	
Urban	1,721 (88.7)
Peri-urban/rural	220 (11.3)

a) Values related to missing data (left blank or ignored) of the variables 'self-reported race/skin color' (n = 159; 8.0%) and 'zone of residence' (n = 48; 2.4%) were excluded from the analyses.

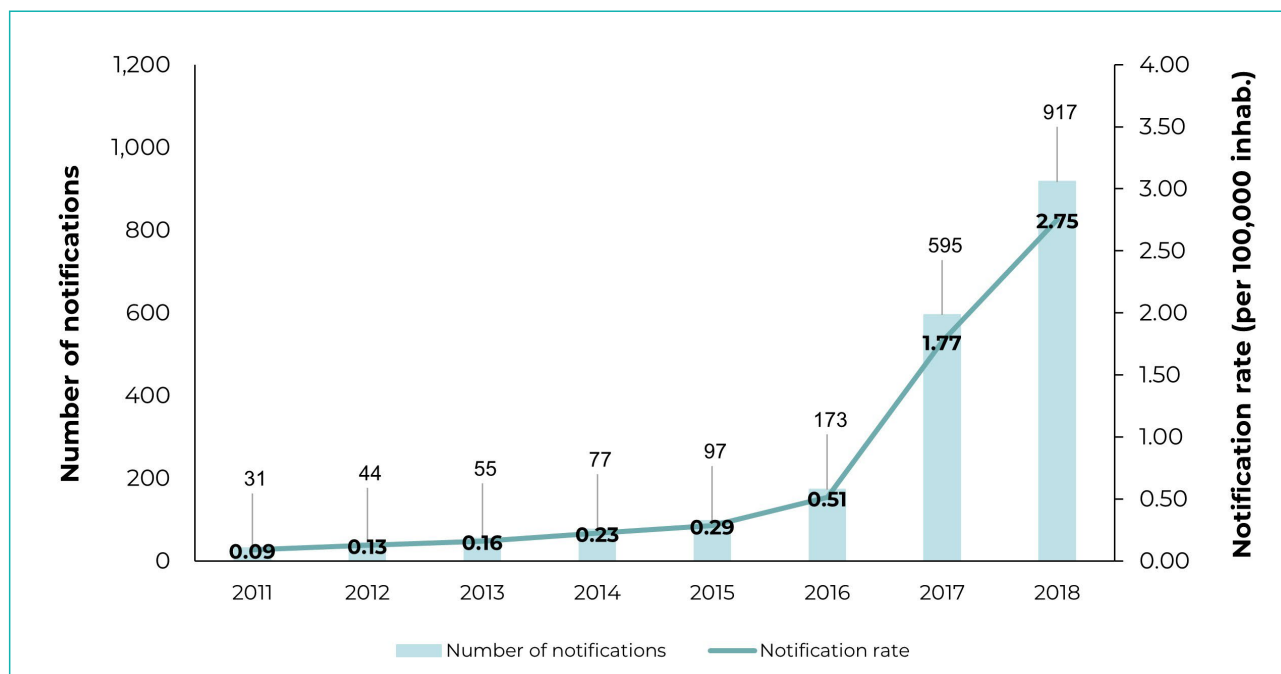


Figure 2 – Absolute number and notification rates of intentional self-harm among adolescents in the school environment (per 100,000 inhabitants), Brazil, 2011-2018

Table 2 – Percentage change and trend in notification rates of intentional self-harm among adolescents in the school environment (per 100,000 inhabitants), according to sex and age group, Brazil, 2011-2018

Characteristics	Notification rate		APC ^a (%)	95%CI ^b	p-value	Trend
	2011	2018				
Sex						
Female	0.12	4.50	66.0	39.0;98.3	0.001	Increasing
Male	0.06	1.07	55.2	29.9;85.4	0.001	Increasing
Age group (in years)						
10-14	0.09	3.32	66.3	37.2;101.6	0.001	Increasing
15-19	0.09	2.21	58.6	34.6;86.8	0.001	Increasing

a) APC: Annual percentage change; b) 95%CI: 95% Confidence interval.

Table 3 – Percentage change and trend in notification rates of intentional self-harm among adolescents in the school environment (per 100,000 inhabitants), according to region and Federative Unit, Brazil, 2011-2018

Region/FU ^a	Notification rate		APC ^a (%)	95%CI ^b	p-value	Trend
	2011	2018				
North	0.00	1.30	4.3	-51.7;125.2	0.897	Stable
Rondônia	0.00	3.47	18.0	-1.3;41.0	0.064	Stable
Acre	0.00	6.81	32.8	1.1;74.4	0.044	Increasing
Amazonas	0.00	0.48	-23.0	-31.8;-13.1	0.002	Decreasing
Roraima	0.00	2.71	15.0	-1.0;33.6	0.062	Stable
Pará	0.00	0.49	-10.6	-34.4;21.8	0.409	Stable
Amapá	0.00	0.00	4.5	0.3;9.0	0.039	Increasing
Tocantins	0.00	2.76	18.3	-22.1;79.6	0.363	Stable
Northeast	0.03	1.08	65.0	32.3;105.9	0.001	Increasing
Maranhão	0.00	0.36	-10.6	-33.6;20.5	0.394	Stable
Piauí	0.00	0.85	-0.3	-2.3;22.5	0.970	Stable
Ceará	0.06	1.40	29.5	-27.3;131.0	0.315	Stable
Rio Grande do Norte	0.17	2.19	5.0	-17.3;33.4	0.633	Stable
Paraíba	0.15	1.03	4.7	-18.9;35.1	0.678	Stable
Pernambuco	0.00	2.01	23.0	-11.7;71.3	0.177	Stable
Alagoas	0.00	1.56	-1.8	-21.3;22.5	0.846	Stable
Sergipe	0.00	0.48	-3.8	-8.6;1.1	0.107	Stable
Bahia	0.00	0.47	-15.5	-49.2;40.6	0.449	Stable

To be continued

Continuation

Table 3 – Percentage change and trend in notification rates of intentional self-harm among adolescents in the school environment (per 100,000 inhabitants), according to region and Federative Unit, Brazil, 2011-2018

Region/FU ^a	Notification rate		APC ^a (%)	95%CI ^b	p-value	Trend
	2011	2018				
Southeast	0.14	3.17	57.3	32.2;87.2	0.001	Increasing
Minas Gerais	0.18	3.32	47.3	27.4;70.3	0.001	Increasing
Espírito Santo	0.00	12.05	55.1	5.0;129.2	0.033	Increasing
Rio de Janeiro	0.04	1.33	85.5	58.0;117.8	0.001	Increasing
São Paulo	0.18	2.92	60.9	32.8;94.9	0.001	Increasing
South	0.17	6.53	68.1	42.7;98.0	0.001	Increasing
Paraná	0.22	9.40	73.6	41.9;112.3	0.001	Increasing
Santa Catarina	0.00	3.42	43.9	11.0;86.6	0.014	Increasing
Rio Grande do Sul	0.23	5.43	55.9	28.1;89.9	0.001	Increasing
Midwest	0.04	2.92	62.6	34.7;96.3	0.001	Increasing
Mato Grosso do Sul	0.22	7.43	54.5	16.9;104.2	0.009	Increasing
Mato Grosso	0.00	1.07	-2.8	-26.5;19.8	0.546	Stable
Goiás	0.00	1.81	20.8	-15.9;73.4	0.249	Stable
Distrito Federal	0.00	3.50	29.4	-5.7;77.6	0.094	Stable
Brazil	0.09	2.75	62.7	36.1;94.6	0.001	Increasing

a) APC: Annual percentage change; b) 95%CI: 95% Confidence interval.

The Southeast and South regions, on the other hand, showed an increasing trend in all states. Rio de Janeiro (APC = 85.5%; 95%CI 58.0;117.8) and Paraná (APC = 73.6%; 95%CI 41.9;112.3) presented the highest increase in their respective regions. In the Midwest region, only Mato Grosso do Sul showed an increasing trend (APC = 54.5%; 95%CI 16.9;104.2), while in Mato Grosso, Goiás and the Federal District notification rates remained stable (Table 3).

DISCUSSION

The study showed an increase in notifications of cases of intentional self-harm among adolescents in the school environment, in Brazil, between 2011 and 2018, both for female and male adolescents, especially in the Southeast and South regions of the country. The increase in the notification rate was more evident as of 2016.

This increase in notification rates may be related to the publication of the Ministry of Health Ordinance GM/MS No. 1,271, on June 6, 2014,¹⁰ by which violence has been included on the compulsory notification list. With the publication of the 'Guideline for the notification of interpersonal/self-inflicted violence'¹³ in 2016, both documents have contributed to the highest quality of notifications.

The increasing trend in notifications can also indicate improvement in the detection of cases of self-inflicted violence by the surveillance system, although there is still a need to improve the quality of the data provided by this system, taking into consideration that the better the quality, the greater the ability to use it and, therefore, to expand and strengthen health policies and actions.¹¹

A study on school health during high school, conducted in Peru in 2014, showed that females

were statistically associated with suicidal behavior and/or ideation.¹² A global survey, carried out in Bhutan in 2016, showed that females, sexual violence, bullying, feeling of loneliness and drug use were associated with this behavior.¹³

There has been an increase in adolescent intentional self-harm notifications in the school environment. These cases often happen, among this age group, due to factors identified as facilitators: impulsive behavior, perfectionist personality and low ability to make difficult decisions; life history and environmental factors; antisocial behavior and low frustration tolerance; very high or low expectations parents have for their children; being separated from friends or loved ones; and sexual orientation issues.¹⁴

Given the current scenario, it is essential that professionals working directly with this public are attentive and willing to understand the act of self-harm in younger age groups, aiming at early intervention. It is equally important for them to be aware of the use of social media by young people and its impact on their lives (not only the negative impacts, but also the preventive actions aimed at information and communication), in addition to detecting possible repetitive behaviors and their consequences, especially when they use psychoactive substances (drugs). Therefore, it is necessary to combine theoretical, psychological and contextual models in this approach.¹⁵⁻¹⁷

The school environment is an important social space for the exchange of experiences and knowledge. The support from friends, qualified listening and support from teachers and/or other professionals at the institution contribute to strengthen the emotional resilience of adolescents. Therefore, the multidisciplinary team should be able to identify situations and psychosocial processes capable of interfering with the health-disease process, in order to implement educational and participatory actions to promote mental health.¹⁸

With regard to health, education, mental health promotion and psychosocial development of

young people, the school plays an important role in promoting the well-being of students of all ages, through awareness-raising actions, dissemination of information and training activities for parents, students and education professionals¹⁹ aimed to the prevent and cope with cases of intentional self-harm, in addition to the correct notification of cases on the information system.

In relation to the trend in notification rates among the regions of the country, the North showed stability, which can be considered as a consequence of the effectiveness of the actions to prevent self-injurious behavior that are encouraged and supported by the WHO, and established as a priority on the global public health agenda;²⁰ and greater awareness of the subject on the part of education and health professionals.⁶ Study on intentional self-harm among adolescents in the state of Pernambuco, between 2013 and 2017, showed an increase in cases over the years, and 2017 was considered as the year with the highest growth of this type of violence.²¹ This difference between the aforementioned study and this study can be justified by the different samples and methodologies used.

The highest notification rates were found in the states of Rio de Janeiro, São Paulo and Paraná, although it is worth highlighting that the highest numbers do not necessarily mean the highest occurrence of intentional self-harm among the study population; they may reflect improvement in epidemiological surveillance actions, and in the detection and notification of cases on SINAN.²²

Regarding Rio de Janeiro, state of Rio de Janeiro, according to an epidemiological bulletin, in 2018,²³ the Metropolitan region I (Belford Roxo, Duque de Caxias, Japeri, Magé, Mesquita, Nova Iguaçu and Rio de Janeiro) presented the highest proportion of notifications of intentional self-harm in the state recorded on SINAN, 65.0% of the total number. Rio de Janeiro state has provided training about the importance of notifications and the qualified filling of data, for managers and health professionals, highlighting

the immediate notification of the condition on screen.²³ However, there is a need to improve notification strategies in the state of Rio de Janeiro, where there are “silent” municipalities, whose prevention measures may be non-existent or ineffective, either due to lack of knowledge or due to discontinuity of actions.²³

The distribution profile of intentional self-harm rates and its notification in Brazil reflect a combination of sociocultural, economic and psychobiological factors that may explain, for example, the high notification rates observed in the South region. The region has a predominant German culture, bringing with it the self-harm rate from the country of origin, low schooling, patriarchal tradition, cases of mental disorder and generational history of suicide, which raises an important reflection on the increasing trend in notifications in the region, found in this study.²⁴

It could be seen stability in the event notification rates in the majority of the states in the Midwest region. Only Mato Grosso do Sul showed an increasing trend. This result differs from the findings of a study on intentional self-harm, conducted in the state of Goiás, where a gradual increase was found, from 2010 to 2019, although this research highlights the occurrence of underreporting.²⁵ The present study shows similarity with the international standard, given that, according to the WHO, only 25% of intentional self-harm cases are notified, that is, only the most serious ones,²⁶ a fact that may have justified the stability in the notification rates found here, taking into consideration the persistence of the problem of underreporting of cases.

Among the limitations of this study, the potential underreporting of cases occurring in a school environment stands out, especially regarding less serious events on SINAN. Another limitation is the fact that there are few studies that specifically analyze the temporal trend of intentional self-harm among adolescents in the school environment, in addition to comparisons between populations

who are different from that one used in this work, which may lead to selection bias; hence, great caution is required when analyzing the data. Finally, the last limitation of the study is the wide range of confidence intervals, revealing possible fragility of the estimates. Despite these limitations, this research fulfills its role in warning and recommending intentional self-harm notification monitoring in the school environment, based on official data available in the public domain, contributing to the development of public policies aimed at preventing the problem.

In conclusion, it could be seen an increasing trend in adolescent intentional self-harm notifications in the school environment in Brazil. The results presented in this study contribute to a better knowledge of the situation of intentional self-harm in the school context, in different regions of the country, taking into consideration the underreported cases. As the school is an important space for social interaction, the subject should be further explored and disseminated, in order to be notified and prevented with greater effectiveness.

Government coordination between health, education and social assistance sectors is necessary in order to strengthen actions to prevent intentional self-harm and suicide. The school can contribute to the identification, notification and management of cases, in addition to making referrals, promoting the articulation between the educational institution and the municipal network and supporting students and their families. The complexity of the problem demands individual and prolonged attention to adolescents.

This study corroborates the relevance of the theme as a public health problem, and as a phenomenon to be better understood and identified in the school environment. This understanding is necessary for the elaboration of intervention strategies aimed at disseminating risks, developing prevention programs and analyzing their impact on suicidal behavior among adolescents, both inside and outside schools.

AUTHORS' CONTRIBUTION

Aragão CMC collaborated with the study conception and design, data analysis and interpretation, and drafting of the manuscript. Mascarenhas MDM collaborated with the study conception and design, data analysis and interpretation, drafting of the manuscript and critical reviewing of its content. The authors have approved the final version of the manuscript and declared themselves to be responsible for all aspects of the work, including ensuring its accuracy and integrity.

CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

ASSOCIATED ACADEMIC WORK

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