

## Factors associated with violence against children in sentinel urgent and emergency care centers in Brazilian capitals

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**Abstract** *This study explored the association between demographic characteristics (age and sex) and other variables related to violence committed against children (form of violence perpetrator, place of occurrence, and nature of injury) using a sample of 404 children taken from the 2014 Violence and Accident Surveillance System (Sistema de Vigilância de Violências e Acidentes, VIVA) survey. Correspondence analysis was used to identify variables associated with the outcome violence against children. Victims were predominantly male. The most common form of violence was neglect/abandonment, followed by physical violence and sexual violence. The most common perpetrators were parents (ages zero to one and two to five years), followed by friends (ages six to nine years). The most common place of occurrence was the home. Notable levels of violence were observed at school, particularly among children aged between six and nine years. Neglect was most common in the age group zero to one year and two to five years, while physical violence was most common between children aged between six and nine years.*

**Key words** *Violence, Children, Family, Surveillance, Epidemiology*

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## Introduction

The World Health Organization (WHO) recognizes that violence against children is a global problem that affects millions of children, families, and communities every year<sup>1</sup>. There are various forms of violence against children, including neglect, abandonment and maltreatment, as well as physical, psychological and sexual violence, which are aggravated by underreporting and victim vulnerability<sup>2-4</sup>.

Violence against children happens all around the world, in all countries and societies and has a profound impact on a child's well-being. The global economic costs of physical, psychological, and sexual violence against children can be as high as \$7 trillion, or 8% of global GDP<sup>2</sup>.

Violence suffered during childhood, even when physical injury is not always apparent, is accompanied by psychological suffering and results in deeply-rooted trauma that victims carry for the rest of their lives<sup>4</sup>. Furthermore, children involved in domestic violence are more likely to be victims of homicide<sup>5</sup>.

Violence is a complex phenomenon resulting from social inequality and cultural and historical factors<sup>4</sup> and tackling this problem requires the commitment of both governments and society. In 2015, the United Nations included targets related to violence against children in the Sustainable Development Goals (SDGs), indicating that much remains to be done in preventing violence against children and women<sup>6</sup>. Eliminating violence and doing away with the idea that violence against children is acceptable should be a key priority.

The Brazilian Ministry of Health conceptualizes violence as an event caused by actions imposed by individuals, groups, classes, and nations who cause physical, emotional, moral and/or spiritual damage to oneself or others and differentiates it from accidents in that the latter are unintentional or avoidable<sup>7</sup>. The WHO classifies violence into the following forms: physical, psychological, and sexual violence, neglect and abandonment<sup>4</sup>.

The majority of studies of violence conducted in Brazil use data obtained from the Mortality Information System (*Sistema de Informação sobre Mortalidade* - SIM) and the Hospital Information System (*Sistema de Informação Hospitalar* - SIH). SIM data for 2014 show that external causes were the main cause of mortality among children aged between one and 10 years<sup>8</sup>. A growing number of studies have reported the findings of surveys

of deaths due to external causes and reporting of violence against children<sup>3,9</sup>. The implementation of the Violence and Accident Surveillance System (*Sistema de Vigilância de Violências e Acidentes*, VIVA) by the Ministry of Health in 2006<sup>10</sup> has partially alleviated the scarcity of quality data. The system has two main components: a three-yearly survey; and continuing surveillance through compulsory notification of interpersonal and self-inflicted violence. The present article is the first to analyze the 2014 VIVA survey data on violence against children.

The assessment of violence committed against children is especially important, given their vulnerability and limited capacity to respond and denounce perpetrators. Although the specialized literature brings together information on abuse and neglect by parents and family members<sup>3,4</sup>, the level of underreporting remains high in Brazil and therefore the majority of cases remain hidden<sup>3,10</sup>. Studies are therefore needed to produce a better understanding of this phenomenon.

In light of the above, this study sought to explore the association between demographic variables and other variables related to violence against children, including forms of violence, the perpetrators, and place of occurrence.

## Methods

A cross-sectional study was conducted using the 2014 VIVA survey data. The survey was conducted in September 2014 in 86 public sentinel urgent and emergency care centers (*serviços sentinelas de urgência e emergência*) located in the Federal District and 24 state capitals. The state capitals Florianópolis (State of Santa Catarina) and Cuiabá (State of Mato Grosso) were not included in the study because the survey was not conducted in these cities due to operational problems<sup>10</sup>. The study population comprised children who had suffered an accident or had been a victim of violence and who sought treatment in these care facilities.

The sample was obtained using single-stage cluster sampling, where the primary sampling unit was 12-hour shifts. The shifts were randomly selected from a total of 60 units calculated based on a 30-day data collection period made up of two shifts per day (one day shift and night shift)<sup>10</sup>.

Prior to conducting research, a training course was provided by the Department of

Health Surveillance covering standardization of data collection, the use of data collection instruments, procedures, and flows. The teams that received capacity building replicated the training course in their municipalities, thus ensuring that data was collected in a standardized form. The municipalities received financial incentives for conducting the survey<sup>10</sup>.

A total of 55,960 interviews were conducted with respondents across all ages. However, only cases of violence against children who sought treatment at the selected urgent and emergency care services were included, totaling 404 children under the age of 10 in the period September to November 2014. The sample was divided into three age groups (zero to one year, two to five years, and six to nine years) to allow for comparison between groups.

Data was collected using a standardized form used in the previous VIVA surveys adapted for the 2014 edition<sup>10</sup>. All users who received treatment for a condition resulting from an external cause were interviewed by the trained researchers. In cases where participants were unable to respond due to their injuries, age, or because they had an intellectual disability, the accompanying person was interviewed and information taken from the patient's medical record. Violent events were classified as follows: assault (X85-Y09), maltreatment (Y05-Y07), legal intervention (Y35), voluntary self-inflicted injuries/attempted suicide (X60-X84).

An initial descriptive study of cases of violence was conducted. Correspondence analysis was used to determine possible associations between the variables. This technique allows the researcher to consider a large number of qualitative variables across a wide range of categories<sup>11,12</sup>.

Correspondence analysis is suited to the exploratory phase of research and is applied to contingency tables, also known as cross tabulations, to determine the dependence between the rows and columns of the table. This exploratory technique is used to characterize structure variability in terms of dimensions, where the number of dimensions is less than the number of variables<sup>11,12</sup>. The analysis is equivalent to that of factor analysis, except that results are presented in graph form, where the smaller the distance between the categories row and categories column the stronger the association and *vice versa*<sup>13,14</sup>.

The correspondence analysis algorithm available in statistical software assumes that data is obtained using simple random sampling. However, Souza et al.<sup>14</sup> have discussed the use of this

technique for data obtained using complex sampling designs and advise that disregarding sampling design may lead to results of questionable quality. The authors<sup>14</sup> suggest that by expanding the data set based on sampling weights the resulting graph will maintain the same population proportion. Souza et al. therefore recommend the application of sampling weights to correspondence analysis<sup>14</sup>. This procedure was used in the present study, employing different sampling weights for each capital. This procedure is described in detail elsewhere<sup>9,10</sup>.

Simple correspondence analysis (SCA) was used to determine the profile of children subjected to violence. Given that the data was obtained using a complex sampling design, we first constructed the expanded contingency tables (total number of children treated) and, subsequently, based on these tables, we constructed the matching graph. The use of the sampling weights led to the expansion of the sample  $n$  as described below.

The estimator<sup>14,15</sup> for the total number of children who received treatment due to accidents and violence in sentinel urgent and emergency care centers over the 30-day period is given by the expression:

$$\hat{Y} = \sum_{h=1}^L \sum_{i=1}^{n_h} \sum_{j=1}^{m_{hi}} w_{hij} y_{hij}$$

where:

$w_{hij}$  is the sampling weight in the  $h$ -th stratum (nces),  $i$ -th emergency care center (shift), and  $j$ -th number of elements of the  $h$ -th stratum of the  $i$ -th emergency care center

$y_{hij}$  is the observed value of the variable (1 if observed and 0 if it is missing) in the  $h$ -th stratum,  $i$ -th emergency care center and  $j$ -th number of elements of the  $h$ -th stratum of the  $i$ -th emergency care center.

Correspondence analysis was conducted using demographic variables (variables column) and variables related to the violent incident (variables row). Variables column: sex and age group (zero to one year, two to five years, six to nine years). Variables row: a) form of violence (physical or sexual, neglect/abandonment); b) relationship between victim/perpetrator (father or mother, family, friend); c) place of occurrence (the home, school, public area); d) nature of injury (bruise/sprain/joint dislocation, cut/wound, fracture/amputation/trauma). The data was analyzed using the Stata software package<sup>15</sup> (Chart 1).

The research project was approved by the National Research Ethics Committee. Given that

the survey was part of a national epidemiological surveillance initiative, the informed consent form was replaced by verbal consent recorded in a field on the data collection form. In accordance with Resolution N° 466 (12 December, 2012) of the National Health Council, participants were guaranteed privacy and anonymity and were free to withdraw their consent to participate in the interview at any time without prejudice to their interests or those of their family.

## Results

The contingency table shown in Table 1 displays the data set expanded according to the sampling weight by form of violence and age. Victims were predominantly male and aged between six and nine years, while the most common form of violence was neglect/abandonment, followed by physical violence and, finally, sexual violence. The most common place of occurrence was the home. The most common type of injury were wounds, followed by bruise/sprain/joint dislocation. The most common perpetrators of violence

were parents, followed by friends and family members.

Table 2 shows the results of the correspondence analysis. The first column shows the number of dimensions necessary to explain 100% of joint variation for form of violence. It can be noted that the two first dimensions explain 96% of total variation (first dimension 64.2% and second 32.2%). The results of the chi-square test of independence show that the null hypothesis of independence between the row and column variables can be rejected. Therefore, it can be concluded that there is an association between form of violence and demographic variables.

The correspondence analysis was conducted using demographic variables (variables column) and variables related to the incident (variables row). Variables column: sex and age group (zero to one year, two to five years, six to nine years).

Table 3 shows the demographic variables and variables related to the violent incident for each of the two dimensions. In the category “violent incident”, “place of occurrence” was the variable that contributed most to dimension 1 (57%), followed by “perpetrator” (21%) and “form of

**Chart 1.** Demographic variables (variables column) and variables related to the violent incident in 24 state capitals and the Federal District. September to November 2014.

Demographic variables		
Variables column	Value	Description
0 to 1	1 = Yes; 0 = No	Aged 0 to 1 year
2 to 5	1 = Yes; 0 = No	Aged 2 to 5 years
6 to 9	1 = Yes; 0 = No	Aged 6 to 9 years
Male	1 = Yes; 0 = No	Male
Female	1 = Yes; 0 = No	Female
Variables related to the violent event		
Variables row	Value	Description
Physical	1 = Yes; 0 = No	Form of violence
Sexual	1 = Yes; 0 = No	Form of violence
Neglect/Abandonment	1 = Yes; 0 = No	Form of violence
The home	1 = Yes; 0 = No	Place of occurrence
School	1 = Yes; 0 = No	Place of occurrence
Public area	1 = Yes; 0 = No	Place of occurrence
Without injury	1 = Yes; 0 = no	Nature of injury
Bruise/Sprain/joint dislocation	1 = Yes; 0 = No	Nature of injury
Cut/wound	1 = Yes; 0 = No	Nature of injury
Fracture/Amputation/Traumas	1 = Yes; 0 = No	Nature of injury
Father/mother	1 = Yes; 0 = No	Perpetrator
Family	1 = Yes; 0 = No	Perpetrator
Friend	1 = Yes; 0 = No	Perpetrator

**Table 1.** Contingency table of variables related to the violent incident expressed in absolute expanded frequencies (\*) stratified by age in 24 state capitals and the Federal District. September to November 2014.

Variables	Age (years)			Sex	
	0 to 1	2 to 5	6 to 9	Male	Female
Form of violence					
Physical	90	149	290	381	148
Sexual	5	28	17	20	30
Neglect/Abandonment	518	406	80	556	450
Place of occurrence					
The home	575	424	152	274	313
School	10	66	155	162	99
Public area	24	57	73	916	248
Injury					
Without injury	129	107	40	172	104
Bruise/Sprain/joint dislocation	147	83	145	210	165
Cut/wound	128	211	128	289	178
Fracture/Amputation/Traumas	137	85	48	182	88
Perpetrator					
Father/mother	487	310	74	487	384
Family	79	108	67	144	110
Friend	22	83	202	224	83

(\*) Expanded frequencies.

**Table 2.** Dimensions, proportion of explained variance in the correspondence analysis.

Dimension	Value singular	Inertia	chi <sup>2</sup>	% explained variance	% accumulated explained variance
1	0.39	0.15	1727.41	64.23	64.23
2	0.27	0.07	866.86	32.23	96.46
3	0.08	0.01	73.95	2.75	99.21
4	0.04	0.00	21.26	0.79	100.00
Total		0.23	2689.49	100.00	

violence" (20%). In the category "demographic factors", the variable that contributed most to dimension 1 was "age" (72%), followed by "sex" (38%). The violent event variable that contributed most to dimension 2, was "place of occurrence" (65%), followed by "form of violence" (17%) and "perpetrator" (16%). The demographic variable that contributed most to dimension 2 was "age" (67%), followed by "sex" (33%).

Figure 1 shows the association between demographic factors and violent event variables in relation to the two dimensions. The distance between two points is used as the measure of association. With respect to place of occurrence, it can be seen that "the home" is close to ages zero to one and two to five years, while "school" was associated with ages six to nine years and public

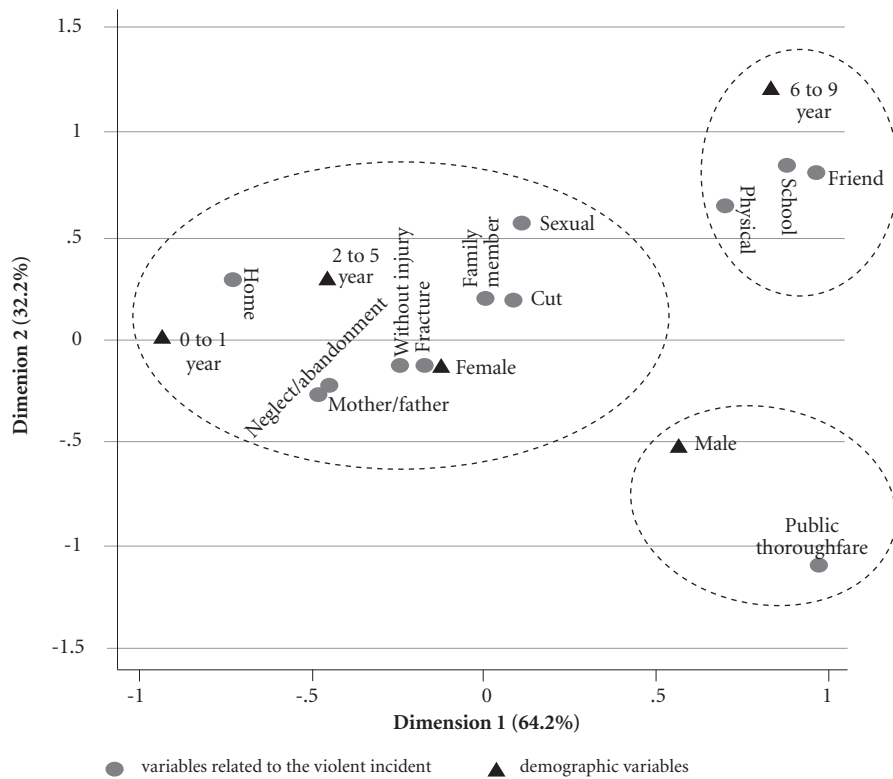
area was associated with being male. With regard to form of violence, "neglect/abandonment" was associated with ages zero to one and two to five years, while "physical violence" was associated with the age group six to nine years. With respect to perpetrator, "father/mother" was shown to be associated with the age groups zero to one and two to five years, while "friend" was associated with the age groups six to nine years. With regard to injuries, girls were more likely to suffer fractures, incidents without injury, and cuts.

## Discussion

The 2014 VIVA survey data and data from previous surveys (2006, 2007, 2009, and 2011) show

**Table 3.** Coordinates and contributions of children’s characteristics.

Category	General			Dimension 1			Dimension 2		
	mass	quality	%inertia	coord	sqcorr	contrib	coord	sqcorr	contrib
<b>Violent incident</b>									
Physical	0.091	0.982	0.120	0.699	0.615	0.115	0.641	0.367	0.137
Sexual	0.009	0.292	0.011	0.114	0.017	0.000	0.554	0.275	0.010
Neglect/Abandonment	0.173	0.977	0.068	-0.443	0.834	0.088	-0.217	0.142	0.030
The home	0.149	0.983	0.148	-0.725	0.887	0.204	0.284	0.096	0.044
School	0.042	0.966	0.094	0.886	0.588	0.086	0.845	0.378	0.111
Public area	0.113	1.000	0.339	0.976	0.532	0.280	-1.088	0.468	0.491
Without injury	0.047	0.957	0.006	-0.242	0.796	0.007	-0.130	0.161	0.003
Cut	0.080	0.384	0.012	0.090	0.088	0.002	0.195	0.296	0.011
Fracture	0.046	0.466	0.007	-0.168	0.325	0.003	-0.132	0.141	0.003
Father/mother	0.150	0.963	0.064	-0.457	0.811	0.081	-0.235	0.152	0.030
Family	0.044	0.390	0.005	0.003	0.000	0.000	0.194	0.390	0.006
Friend	0.055	0.992	0.126	0.967	0.676	0.132	0.786	0.317	0.124
<b>Demographic factors</b>									
0 to 1	0.190	0.965	0.287	-0.935	0.965	0.430	0.003	0.000	0.000
2 to 5	0.175	0.884	0.086	-0.444	0.668	0.090	0.300	0.216	0.058
6 to 9	0.114	0.996	0.331	0.828	0.393	0.203	1.217	0.603	0.619
Male	0.329	0.995	0.275	0.562	0.629	0.269	-0.509	0.366	0.312
Female	0.192	0.414	0.021	-0.126	0.241	0.008	-0.127	0.173	0.011



coordinates in symmetric normalization

**Figure 1.** Biplot of the 24 state capitals and the Federal District. September to November 2014.

some similar trends. For example, violence was more common among boys. However, a number of differences were also observed. For example, the most common form of violence against children was neglect, which accounted for around two thirds of cases and was shown to be more common among children aged between zero and one year and two and five years. Previous studies show that the most common form of violence was physical violence<sup>16,17</sup>. The findings of the 2014 survey show that physical violence was ranked second and this form of violence was more common among older children (six to nine years). The present study also showed particularly high levels of sexual violence against girls. As in the previous surveys, the most common place where violence is experienced was the home. However, the present study brought to light new information: notable levels of violence at school, particularly among children aged between six and nine years; and a notable increase in violence committed against boys in public areas. Thus, the findings of the VIVA 2014 survey reveal that children are vulnerable to violence not only in the home, but also at school and public areas. All editions of the VIVA survey, including the VIVA 2014, show that children's parents were the most common perpetrators of violence, followed by members of the family and friends, thus highlighting the vulnerability of the victims.

This is the first study of the VIVA survey to use correspondence analysis to explore the occurrence of violence against children. The use of sampling weights to expand the data set may explain some of the differences found between the 2012 survey and previous surveys. Multiple regression analysis was used to identify the variables associated with the outcome violence against children. The present study use an innovative methodology, simultaneously analyzing a range of variables and presenting the data sets in graphical form, thus facilitating the interpretation of the relationship between the data, where the distance between two points is used as the measure of association.<sup>14</sup> Future studies are likely to provide further evidence of the associations presented here.

The methodology was also particularly useful for assessing important differences related to age, sex, form of violence, and perpetrator<sup>10,17,18</sup>. A better understanding of age and gender differences is essential for designing effective prevention strategies.

### Place of occurrence

Children spend most of their time at home, and consequently violence is most common in this setting, especially among younger children in the zero to one year and two to five year age groups<sup>10,17-19</sup>. The home, that should be a locus of protection and care, has become a place of violence and child victimization. Authors have also highlighted that the fact that families are routinely subjected to structural violence leads to the perpetuation of interpersonal forms of violence within the home<sup>4,19,20</sup>. Furthermore, domestic violence should be understood not as something that is internal to families, but rather as an issue of public concern, given that it violates the rights of vulnerable people<sup>21,22</sup>.

The 2014 survey shows that there is an association between violence in public areas and being male. This could be explained by the fact that boys are given greater freedom to play outdoors and venture into other spaces, while girls are kept more at home, stimulating a culture of masculine domination<sup>17,23</sup>. This behavior means that older boys aged between six to nine years are more likely to be subjected to physical violence, a fact confirmed by the literature, but which had not been clearly shown up till now by the VIVA survey<sup>4,24,25</sup>. In addition, our study shows that the school is a common setting for violence against children aged between six and nine years, where the most common perpetrators are friends, adding new information that was not observed by earlier surveys. Other studies have described violence committed at school among younger adolescents, notably those aged between 11 and 13 years, in the form of bullying, which also includes physical violence<sup>26</sup>. Most studies on school violence address violence involving adolescents rather than young children, while studies on child violence tend to focus on domestic violence<sup>21</sup>, showing the need for further research in this area.

### Perpetrators of violence

Violence perpetrated by parents takes many forms, including being excessively authoritarian, harsh physical discipline, punishment, aggression, neglect, and abandonment<sup>27,28</sup>. Some studies have investigated the role played by the perpetrators of violence (fathers, mothers, boyfriend or mother's partner), highlighting the complexity of this issue<sup>29-32</sup>. Domestic violence and abuse

committed within the family affects the physical and emotional development of a child and must be tackled and condemned by the whole society<sup>21</sup>.

The present study also identified other perpetrators of violence other than parents, including family members and friends. There is a large body of evidence surrounding violence committed by family members that gives cause for grave concern<sup>31,32</sup>. However, few studies on violence against children committed by friends exist and, given that most studies in this area concentrate on adolescents, further research is necessary to gain a deeper understanding of this problem<sup>26</sup>.

### Forms of violence

Neglect includes abandonment, or the absence or lack of physical and emotional care<sup>4,18</sup>, and may often be a reflection of abandonment of the family itself, the erosion of family bonds<sup>18</sup>, and parental drug use<sup>29</sup>. In a study that analyzed data obtained from compulsory notifications, Rates et al.<sup>18</sup> reported that neglect and abandonment are more common among infants aged under one year and in girls, confirming the findings of the present study. These results are also consistent with the findings of a report published by the United Nations Children's Fund (UNICEF)<sup>33</sup>, which shows that girls are more exposed to risk and neglect. Studies conducted by the Child Welfare Agency (*Conselho Tutelar*) also show that neglect was the most commonly reported form of violence<sup>34</sup>.

Unlike previous editions of the VIVA survey<sup>16,19</sup>, but in accordance with other international studies<sup>4</sup>, the present study draws attention to subtle forms of violence that often go unnoticed by health professionals. This finding may be explained by the type of methodology used. In this respect, multiple regression analysis allows the simultaneous testing of multiple factors, thus broadening the level of analysis.

Other studies have also documented physical violence, focusing on acts of aggression committed against children aged between six and nine years, in accordance with previous VIVA surveys<sup>16,19</sup>.

Sexual violence was most common in girls aged between six to nine years, followed by girls in the two to five year age group, which is in accordance with the findings of other studies<sup>17,24,34</sup>. UNICEF's World Report on Violence against Children<sup>33</sup> shows that 20% of women and between 5 and 10% of men reported having been sexually abused during childhood, indicating that vulnerability is enhanced among girls<sup>17</sup>.

### Sex

Studies have shown that males are more prone to aggression as a symbol of power from childhood<sup>4,23,24</sup>. As such, they are more likely to perpetrate aggression during adolescence and adulthood, meaning that morbidity and mortality rates are ten times higher among men<sup>8,25,35</sup>. The influence of culturally enrooted gender relations on violence observed by other studies was also confirmed by the present study<sup>24,36</sup>.

### Types of injuries

The following types of injuries were observed: fractures, bruising, cuts, as well as events without injury, denoting less severe cases. Previous studies have also shown less severe cases resulting in discharge<sup>8,9,23</sup>. It is important note, however, that these findings in no way minimize the risk or extent of the problem.

The Child and Adolescent Statute (Law 8.069/1990)<sup>37</sup> provides a legal framework for the protection of children's rights, and highlights the importance of fostering effective coordination and communication between the various agencies and services involved the protection of children from all forms of violence, including abuse and neglect. The whole society is responsible for caring for and protecting children. However, it is the government that has the ultimate responsibility for leading and coordinating the implementation of public policies designed to ensure respect for the human rights of children and promote a culture of peace, thus eliminating violence, improving the situation of children across the country, and giving them special priority.

One of the limitations of this study is the use of urgent and emergency services as the primary source of data, since they do not necessarily offer a true representation of the target population. However, it should be noted that the vast majority of incidents involving external causes in these capitals are treated in public hospitals and, therefore, we believe that this source serves as a proxy for the target population. Furthermore, the fact that sentinel services are referral centers for incidents involving external causes means they ensure greater representativeness and their use in the previous VIVA surveys renders them ideal for comparative research. Another limitation may include the possible omission of information by children's parents or guardians due to the delicate nature of the issue and the involvement of family members in incidents. Furthermore, the



methodology used in this study, which is best suited to exploratory research, should be complemented by further research that is capable of providing a more accurate analysis.

## Conclusion

The present study provides a number of important new insights into the nature of violence against children in Brazil. The main findings of the study suggest the following: victims were predominantly boys aged under five years; the most common forms of violence were abandonment and neglect; the most common perpetrators of violence were children's parents; and the most common place of occurrence was the home. The results also indicate that the school is a place of risk, particularly for older children, and public areas present a risk for boys. The VIVA survey remains an important instrument for denouncing

and bringing greater visibility to this issue. The delicate nature of this issue and prevalence of violence against children show that this problem is far from being overcome, thus calling for improved coordination between society, child welfare agencies, and health professionals.

Appropriate protection and prevention measures should be taken based on the findings of this study. The inclusion of targets related to child health and violence against children in the Sustainable Development Goals reflects the signatories' true commitment to resolving this problem. However, although significant progress has been made in preventing violence against children at a global level, there is still much to be done and various factors limit the impact of preventive measures. According to the WHO, these factors include social inequality, which differentially affects rich and poor children. No violence is justifiable and all violence against children is preventable.

## Collaborations

DC Malta participated in study conception, data analysis and interpretation, carried out the literature review, and contributed to the critical revision of this manuscript and final approval of the version to be published. TRI Bernal participated in data analysis and interpretation and the final revision of this manuscript. BS Menezes, MAM Silva, and MIF Freitas contributed to the critical revision of this manuscript and final approval of the version to be published. All authors approved the final revision of this manuscript.

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