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ORIGINAL ARTICLE

Main Causes of Death in Children and Adolescents in Brazil:
Analysis From 2011 To 2020

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Highlights:

(1) It was found that adolescents are more exposed to the risk of mortality due to external causes, which are classified as: aggressions and accidents. These externally caused factors can be considered preventable, due to the adolescent's own protection, which should not be neglected.

(2) The stratification of deaths due to external causes, in numbers, aggressions totaling 96,207 in the age groups of 1 to 4, 5 to 9, 10 to 14 and 15 to 19, the latter having 88,296 deaths due to this factor. Also including transport accidents with a total of 43,518 within the same age groups, with 15 to 19 years old having 30,284 deaths. In other words, high numbers include only deaths of adolescents due to preventable external causes, in most cases.

(3) Male children and adolescents have more deaths in all age groups, this is because issues such as cultural and gender aspects can also influence the greater freedom of males, who are more exposed to risky situations.

ABSTRACT

Childhood and adolescence are unique stages in human development. However, many children and adolescents are exposed to morbimortality risks, which leads to early deaths. The present study aims to analyze the main causes of death in children and adolescents, aged 1 to 19 years, in Brazil, reported between 2011 and 2020. This is a quantitative, descriptive study, carried out from the secondary data obtained from the DataSUS platform. The period from 2011 to 2020 was used, with a geographical coverage of all regions of Brazil stratified by age group, sex and causes of deaths. The data were submitted to simple statistical analysis through Excel. The four age groups analyzed presented "external causes" and "neoplasms" as the main causes of death. Moreover, males are predominant in deaths of all age groups, with an emphasis on adolescence. Thus, it is emphasized that the mortality rates of children and adolescents can be reduced. In this perspective, the importance of developing public policies on disease prevention, health promotion, access to health services, reduction of social inequalities and public security is pointed out.

Keywords: child; adolescent; death; nursing.

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INTRODUCTION

According to the World Health Organization (WHO), children are considered those individuals between zero and ten years of age and adolescents those between the ages of ten and 19[1]. This population experiences an intense process of biopsychosocial growth and development, which implies health care, public policies and protection. Childhood and adolescence are defined as phases of human development in which vitality is at its peak. However, in this phase, children and adolescents are also exposed to the risk of morbidity and mortality that can lead to early death[2].

Mortality data for the period of childhood and adolescence are an important instrument to evaluate the population health situation, since these deaths have a social, behavioral and biological character. Issues related to living conditions, social vulnerability, access to health services, maternal and child health status and access to basic sanitation are closely related to risk factors for mortality[3-4].

Between the 1990s and 2000, there was progress in reducing mortality among children and adolescents worldwide, representing a decrease of approximately 51% of deaths during this period[5]. Nevertheless, despite this decline, it is possible to intensify this reduction, since, in most cases, these deaths are related to preventable causes. Therefore, those that can be prevented through qualified health care, health promotion services and ideal socioeconomic conditions to meet the basic needs of human beings are considered avoidable causes[6].

The mortality of children under five years is closely related to the neglect of access to health services. In 2015, at least 16,000 children died daily from diseases such as pneumonia, diarrhea and malaria[7]. In the Brazilian health context, deaths among adolescents are also linked to preventable issues, as presented in the classification of the List of Causes of Avoidable Deaths (ages 5 to 74 years) by interventions of the Unified Health System (UHS)[8]. Between 2009 and 2020, about 800,000 Brazilians under 20 years of age died, in which approximately 12% of the total number of deaths among the population aged 5 to 14 corresponded to deaths classified as preventable[8]. Furthermore, deaths in the country were predominantly male, due to external and preventable causes, with emphasis on traffic accidents and aggressions among individuals aged 10-14 years when compared to individuals aged 5-9 years[2].

Thus, there is a need for the development of public policies and action by health teams to reduce mortality in childhood and adolescence. In this perspective, the reduction of infant mortality among children under five years old is one of the global goals since 1990 from the development of the document on Millennium Development Goals (MDGs)[9]. In addition, the Sustainable Development Goals (SDGs), formulated by the United Nations (UN) maintains this goal until 2030, given its relevance as an indicator of population health, aiming at reducing social disparities and promoting equity in health services[9-10].

Moreover, regarding the adolescent perspective, the SDG included these as a priority audience for planning actions on poverty eradication, gender equality, access to safe water and sanitation, peace and justice[11]. These aspects can directly affect the health and survival of this population, as well as actions for health promotion and protection.

Therefore, it is important to know the causes that lead to mortality in order to develop individual and collective interventions. In view of the above, the following question arises: What were the main causes of deaths, in the Brazilian context, of children and adolescents between 2011 and 2020?

The study aims to analyze the main causes of death in children and adolescents, aged 1 to 19 years, in Brazil, reported between 2011 and 2020.

METHODOLOGY

This is a descriptive epidemiological study, of quantitative type, which includes mortality data of children and adolescents from the entire Brazilian territory and was conducted from a secondary database in the public domain. The information was collected in the Department of Informatics of the Unified Health System (Datasus), through the virtual platform of the Notifiable Diseases Information System (Sinan) during the period from October to December 2022.

The search followed the sequence of available tabs on the Datasus website, using the strategy: "Vital Statistics (Tabnet)", "Mortality - since 1996 by ICD", with emphasis on "General Mortality > Coverage > Brazil by FU region". The following variables were also used to compose this study: chapter ICD-10, deaths by occurrence, year of notification (2011 to 2020), "age group'' (1 to 4 years, 5 to 9 years, 10 to 14 years and 15 to 19 years) and sex (female, male and/or ignored). After the data collection, they were distributed, organized and tabulated in Microsoft Excel 2019 for analysis.

The data were analyzed by descriptive and inferential statistics. Descriptive statistics allowed the description of the observed data, distributing these variables in a clear, organized and objective way through measures of absolute, relative frequency, mean, median, fashion and standard deviation. The data from inferential analysis are presented in the form of linear regression and correlation.

In the present study, the following parameters and descriptions were used: the tables generated by Sinan were analyzed regarding the annual number of deaths among children and adolescents throughout the country during the period of the study; the Sinan tables were evaluated by Chapter ICD-10 and the frequency of involvement in each year was analyzed, by sex and age group; time trends were used to present variations in relation to the number of cases in the period of the research, being described the absolute frequency of cases in the period from 2011 to 2020 in the country.

Furthermore, the profile of cases was described by means of absolute (n) and relative (%) frequencies according to sex, age. The relative frequencies were calculated based on the total number of cases in each cause of death and some of them may not add up to 100% due to ignored or missing values. The data for deaths in 2021 and 2022 were calculated from a linear regression equation, represented by the equation Y =39533.8667 – 933.1212x.

Considering that the data originate from a public access tool and that it does not allow the identification of individuals, the absence of research submission to the Research Ethics Committee (REC), as provided by Resolution 510 of April 2016[12], is justified.

RESULTS

The data extracted about deaths reported in the period from 2011 to 2020 showed that 344,017 children and adolescents between 1 and 19 years died in Brazil due to various causes, including external, preventable causes and diseases. Thus, Figure 1 presents the high rates. The graph that composes the figure (Figure 1) below represents the relationship of time with the number of deaths recorded in the period from 2011 to 2020.

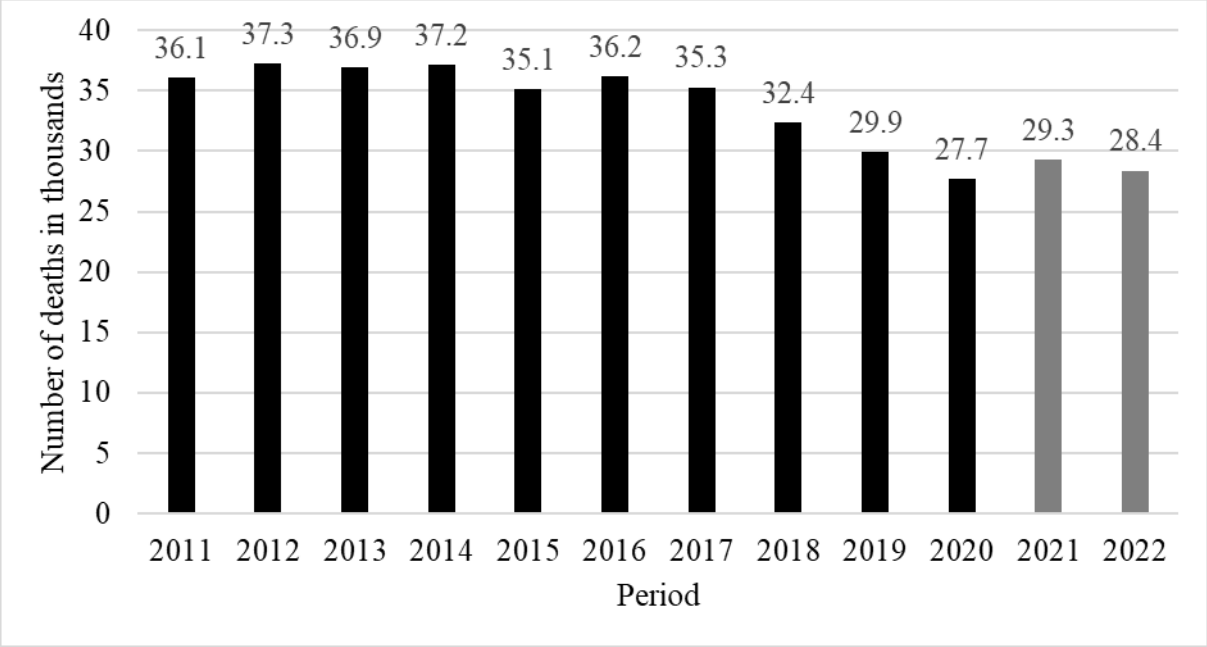

Figure 1 – Deaths registered in Brazil in children and adolescents aged 1 to 19 years in the period from 2011 to 2020, applying a regression equation in the last two years.

Source: Created by the authors, 2022.

Regarding the 2021 and 2022 periods, these are presented in the graph in a different color from the other periods, since the data were not obtained directly from the Datasus platform. Based on the calculation and the results found in the chart, an annual average of 34.402 deaths for 2021-2022 is observed with a standard deviation of 3311.13 and correlation of 72.80%. In Figure 2, the deaths that occurred in the Brazilian scenario during the period from 2011 to 2020 are represented by stratification by sex and age group of 1 to 19 years.

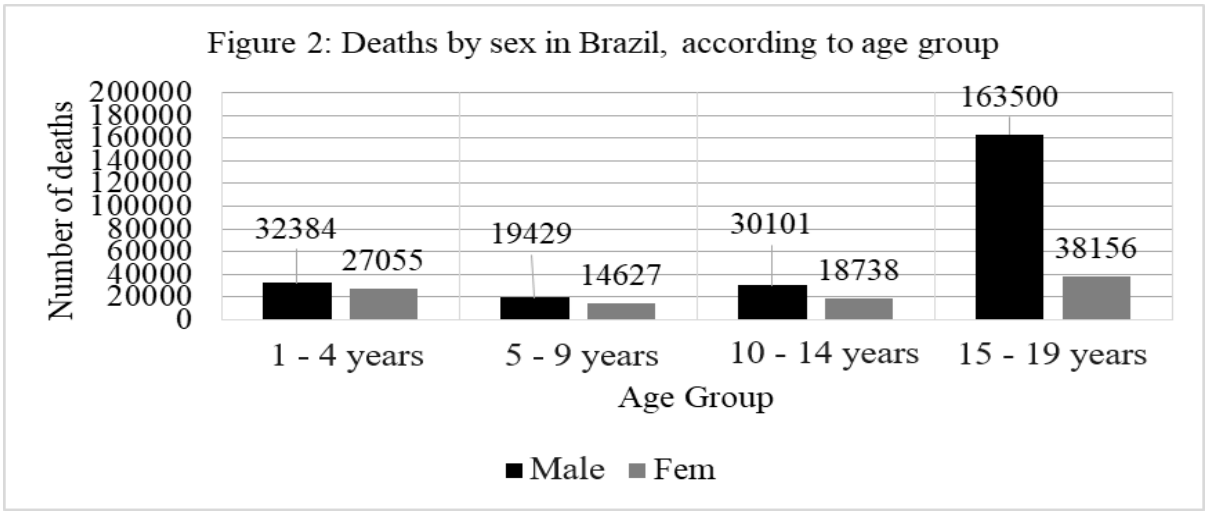

Figure 2 – Deaths by sex and age group, Brazil 2011 to 2020.

Source: Created by the authors, 2022.

The total percentage of male and female deaths by sex, from 1 to 19 years old is 71.33% for boys and 28.65% for girls. Moreover, 0.0078% were ignored, because it is a very low representative value that is not represented in the graph above.

The total percentage of deaths by sex, divided by age groups, was also analyzed (Figure 2). The following percentages were presented: from 1 to 4 years with 54.5% male and 45.5% female; from 5 to 9 years with 57% male and 43% female; from 10 to 14 years with 62% male and 38% female. The age group of 15 to 19 years is the most affected by death, with 81% of deaths reported to boys and 19% to girls.

Among the reasons that led children and adolescents to early deaths, the notifications were classified into 19 causes, according to Table 1 below.

Table 1 – Causes of deaths in children and adolescents in Brazil from 2011 to 2020

Chapter ICD-10	**Deaths by occurrence**	**Percentage**
External causes of morbidity and mortality	192,862	56.06%
Neoplasms (tumors)	26,665	7.75%
Nervous system diseases	21,214	6.17%
Respiratory system diseases	20,675	6%
Symptoms, signs and abnormal clinical and laboratory examination findings	15,801	4.59%
Some infectious and parasitic diseases	15,357	4.46%
Congenital malformations, deformities and chromosomal anomalies	12,861	3.74%
Diseases of the circulatory system	12,624	3.67%
Endocrine, nutritional and metabolic diseases	5,878	1.71%
Diseases of the digestive system	5,677	1.65%
Diseases of the blood and hematopoietic organs and some immune disorders	4,807	1.40%
Diseases of the genitourinary system	3,128	0.91%
Pregnancy, childbirth and postpartum	2,346	0.68%
Diseases of the musculoskeletal system and connective tissue	1,744	0.51%
Mental and behavioral disorders	922	0.27%
Skin and subcutaneous tissue diseases	648	0.19%
Some conditions originating in the perinatal period	586	0.17%
Diseases of the ear and mastoid process	199	0.06%
Diseases of the eye and appendages	23	0.007%
Total	**344,017**	**100%**

Source: Created by the authors.

Table 1 shows the causes of death in children and adolescents from 2011 to 2020. More than half of the deaths recorded were due to external causes, and 43.94% indicate all other 18 causes of death. This reinforces the fact that the causes of death in these age groups are not related solely to diseases.

Figure 3 shows the percentages of deaths related to the age group from 1 to 4 years in Brazil, between 2011 and 2020, as well as the main causes.

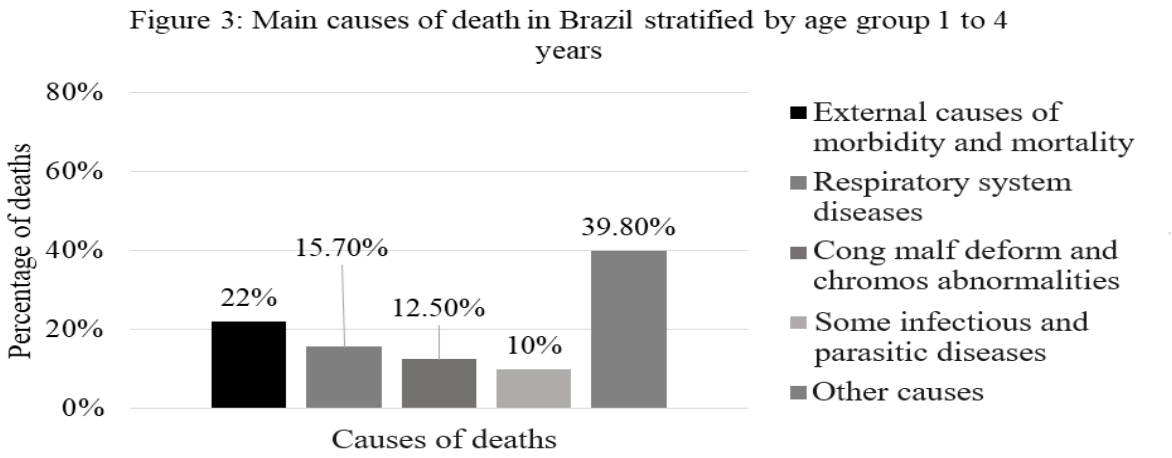

Figure 3 – Main causes of death in Brazil stratified by age group 1 to 4 years, 2011-2020.

Source: Created by the authors.

The deaths related to age group 5-9 years in Brazil, between the years of 2011 to 2020, has as main cause “External causes of morbidity and mortality (29.4%)”, followed by “Neoplasms (17.4%)”, “Diseases of the Nervous System (11.8%)”, “Respiratory System Diseases (8.5%)”. The other causes are 33%, all with relative frequency below 7%.

The deaths in the 10-14 years age group in Brazil, between 2011 and 2020, have the same four main causes, however with different percentages. The most frequent causes are “External causes of morbidity and mortality (42.0%)”, followed by “Neoplasms (13.0%)”, “Diseases of the Nervous System (10.6%)”, “Diseases of the Respiratory System (6.1%)”. The other causes are 29.2%, all with a relative frequency below 6%.

Figure 4 shows the percentage of deaths in the 15-19 year age group in Brazil, from 2011 to 2020, as well as the four main causes.

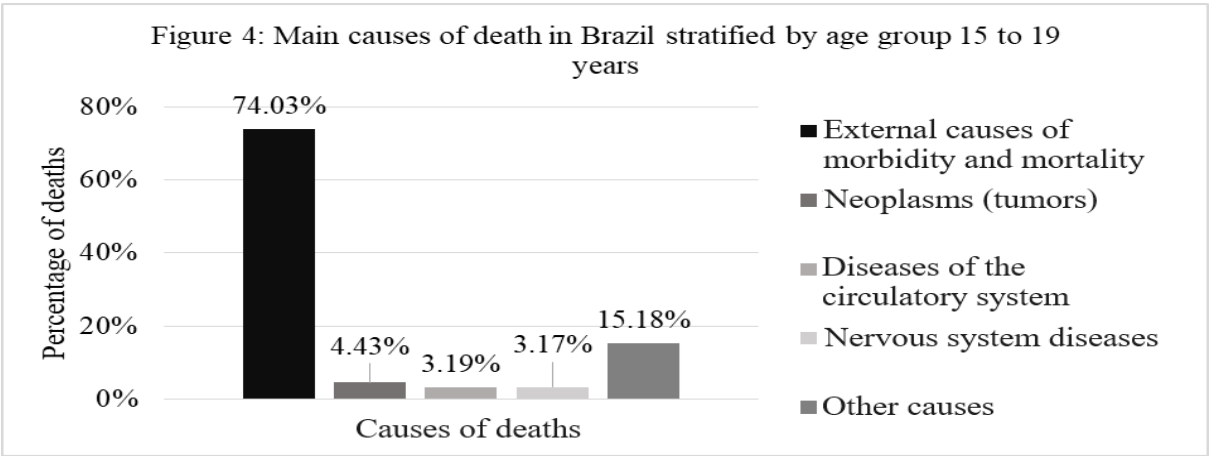

Figure 4 – Main causes of death in Brazil stratified by age group 15 to 19 years, 2011-2020.

Source: Created by the authors

In addition, the data of causes of deaths among children and adolescents from 1 to 19 years old were analyzed, in the period from 2011 to 2020, presenting the four major death rates. Concerning the 19 causes, the four most frequent in each age group were stratified, with the others grouped as “other causes of death”. This reveals neglect about the protection of this group.

In contrast to the high death rate due to external causes, these are presented in a stratified way in Table 2.

Table 2 – Stratification of deaths by external causes and age group, Brazil, 2011-2020

ICD10	1 - 4 years	5 - 9 years	10 - 14 years	15 - 19 years	Total	Percentage
Aggressions	994	947	5970	88296	96207	49.9%
Traffic accidents	3250	3987	5997	30284	43518	22.6%
Other external causes of accidental injuries	7818	4398	5671	12428	30315	15.7%
Voluntary self-harm	1	40	1448	7902	9391	4.87%
Events whose intent is undetermined	908	562	1136	6556	9162	4.75%
Legal interventions and war operations	1	1	106	3596	3704	1.92%
Complications - medical and surgical assistance	124	61	74	130	389	0.20%
Sequelae of external causes	28	17	16	115	176	0.09%
Total	**13124**	**10013**	**20418**	**149307**	**192862**	**100%**

Source: Created by the authors

The analysis of the table shows that 49.9% of deaths due to external causes were caused by aggressions. Followed by deaths due to traffic accidents 22.6% and 15.7% due to other accidental injuries. Furthermore, children and adolescents continue to suffer and die because of the violence.

DISCUSSION

The death rates were continuous from 2011 to 2014. Between 2015 and 2016, there was a variation. Between the years 2017 and 2020, there was a decrease in the number of reported deaths. This reduction correlates with the implementation of the National Policy for Comprehensive Child Health Care (PNAISC - *Política Nacional de Atenção Integral à Saúde da Criança* in Portuguese) in the UHS, which occurred in August 2015 and aims to promote and protect children's health, consequently acting on surveillance and prevention of deaths[13].

Boys die more in all age groups, but it is significantly intensified during adolescence (15 to 19 years). That is, four out of five adolescents who die at this age are male. The prevalence of male deaths is influenced by cultural and gender aspects, since the female sex is more protected by parents and caregivers and, due to the greater freedom of the male sex, they are more exposed to risk situations[14].

The prevalence of deaths of children and adolescents due to external causes present in this analysis of the Brazilian scenario is consistent with the analyses carried out on the causes of mortality in this age group in the global context[15].

All age groups presented, in common, the "external causes of morbidity and mortality". These aspects corroborate a study conducted from the analysis of mortality data of children and adolescents in the world scenario, in which the external/avoidable causes, such as aggression and accidents, are also present as the main mortality factors for adolescents[15]. In the same sense, mortality due to diseases and nutritional issues decreases significantly in adolescence when compared to deaths in childhood[15].

In the age group of 1 to 4 years, besides external causes, respiratory diseases stand out, such as: pneumonia, other respiratory tract diseases, chronic lower airway diseases, asthma, influenza and bronchiolitis. The occurrence of respiratory disorders is more frequent in children under five years

old, and this fact is related to maternal and birth conditions, adherence to the vaccination schedule, breastfeeding and presence of previous comorbidities that influence immunity[16].

Considering only the diseases that were causes of death, the most prevalent among the age groups from five to 19 years old was neoplasms, presenting in different percentages between the groups. Despite the increase in cancer survival rates, it is still the main cause of death in developed countries[17], being the second most important in Chile[18]. Although there is evidence of a reduction in the incidence of childhood cancer over the last 30 years, these numbers remain high in developing countries[19]. The trends in the reduction of infant mortality in Latin American countries were less favorable when compared to developed countries[20].

Cancer is a traumatic experience and can cause anguish, pain and negative experiences to both the patient and family members. The diagnosis directly affects the perception of life and psychosocial aspects of patients and caregivers, requiring actions that seek to balance treatment with routine outside the hospital[21,18].

Furthermore, diseases that affect the cardiac, nervous and circulatory systems are also the main causes of death for children and adolescents. The diseases that affect these systems relate to biological, social, economic, genetic and congenital aspects, which can be caused by malformation or complications during the development in the embryonary period[22].

Although the literature and data analyzed point to the occurrence of a reduction in infant mortality in Brazil, the mortality rates among adolescents and young people still maintain high numbers, since most of them are due to causes that could be avoided[23].

Mortality due to aggression in adolescents may be related to marginality, use of illicit drugs, alcohol and psychoactive substances, as well as the impulsiveness characteristic of this public[24]. In childhood, children are more vulnerable and may be constantly exposed to situations of violence and unable to identify and/or intervene. In this sense, it is important to monitor health services to children and adolescents, acting strategically on violence surveillance, morbimortality risks and health education actions about the identification of violence[25].

Therefore, knowledge and understanding of the distribution and trend of the main causes of death are indispensable for health managers to plan public actions and policies aimed at improving the population's health conditions. In addition, they allow the present gaps to be identified to develop health interventions[26].

In view of the above, mortality of children and adolescents in Brazil deserves attention, especially regarding the causes that could be avoided through prevention and health promotion. Moreover, the need for public policies that contemplate the care and attention needs of children and adolescents is highlighted.

FINAL THOUGHTS

The analyzed data showed how mortality of children and adolescents occurs, especially concerning the causes of deaths that could be avoided, as well as the association of deaths by external causes. Similarly, it was found that adolescents are more exposed to the risks of mortality due to external causes and male children and adolescents have more deaths in all age groups.

To transform this scenario, it is necessary to promote the training of professionals who work with this public to act strategically in the causes of deaths, aiming at reducing these rates. Thus, it is of paramount importance to develop actions regarding the prevention of violence, public security, guarantee of children's and adolescents' rights as well as access to health services. In addition, there is a need for strategies and behaviors to promote maternal and neonatal health to reduce deaths in childhood.

Finally, there should be a broad investment in public and health policies, so that investments are made in research and science, as well as in the quality of health care offered to the population. The limitations of the study concern that there were no data on deaths for 2021 and 2022 available on the platform, so it was not possible to analyze the indexes of these years in a reliable way.

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