LEADING CAUSES OF DEATH IN CHILDREN AND ADOLESCENTS IN PLOVDIV MUNICIPALITY OF REPUBLIC OF BULGARIA

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Abstract

The aim of the study is to research child mortality in Plovdiv municipality of the Republic of Bulgaria for the period 2012-2021. The subject of the study are children aged 0 to18 years old, who were autopsied in the Department of Forensic Medicine at the University Multiprofile Hospital for Active Treatment "St. George" Plovdiv for the period 2012-2021 selected by the method of retrospective cohort study. 188 autopsies of children 0-18 years old were processed. Of these 188 cases, 58 (30.85%) were children under 1-year-old, 31 (16.49%) were children 1-5 years old, 15 (7.98%) were 6-9 years old, 21 (11.17%) were 10-14 years old and 63 (33, 51%) were 15-18 years old. During the studied period 12 cases of child homicides (6.38%), 119 (63.3%) accidents, 41 (21.81%) cases of sudden death, 15 (7.98%) suicides and 1 (0.53%) case of medical malpractice were registered. During the studied ten-year period, a decrease of 0.18% in child and adolescent mortality was reported. Accidents are the most common and a leading cause of death in all age groups except for the age group 1-6 months old, in which the leading causes of death are non-violent (sudden death). Road-traffic accidents are the most common accidents in childhood, followed by drowning. Males are more likely to be affected by accidents (70.59%) than females. Respiratory diseases are the most common cause of non-violent death in childhood and adolescence (79.31%).

Keywords: *child, adolescent, causes of death, homicide, mortality*

Introduction

Reducing the relative share of child mortality is considered one of the most significant successes in health care [5]. Deaths of children under the age of 5 were reduced from 12.5 million per year in 1990 up to 5.3 million per year in 2018. (UNICEF 2019). Globally, 48 million children under the age of 1, 16 million children aged 1-4 years, 6 million children aged 5-9 years, 4.2 million children aged 10-14 years and 6.9 million aged 15-19 years have died in the last 10 years. [12]. For the period 2012-2021, in the Republic of Bulgaria, a total of 1.1 million people died, of whom 7,677 were between the ages of 0 and 19. 744 of these 7677 were registered in the Plovdiv region. [1].

The aim of this study is to study child mortality in the region of Plovdiv of the Republic of Bulgaria for the period 2012-2021.

Materials and methods

The current study is based on retrospective selection, covering a ten-year period between 2012 and 2021. The subject of the study are children aged 0 to 18 years who have died on the territory of Plovdiv District and have been autopsied in the Department of Forensic Medicine at the University Hospital "St. Georgi" EAD, town of Plovdiv.

Results

For the period 2012 – 2021 in the Department of Forensic Medicine at the University Hospital "St. Georgi" EAD town of Plovdiv 3318 autopsies were performed, of which 188 (5.67%) were autopsies of children aged 0-18 years. Of these 188 cases, 58 (30.85%) were children under the age of 1 year. Of these, children under the age of 1 month were 22 (11.7%), from 1-6 months – 29 (15.43%), 7-12 months – 7 (3.72%). 31 (16.49%) were the children aged 1 to 5 years, 15 (7.98%)

were aged 6-9 years, 21 (11.17%) were aged 10-14 years and 63 (33.51%) were aged 15-18 years (Fig. 1).

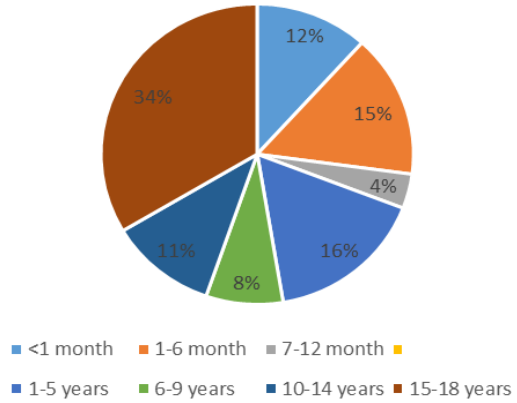

Figure 1 Percentage distribution of child deaths by age

Registered for 2012 were a total of 25 autopsies of children (5.88% of the total number for the year). In 2013, the autopsies of children were 17 (4.4%), for 2014 – 20 (5.59%), for 2015 – 26 (6.81%), for 2016. – 15 (4.85%), for 2017 – 18 (5.59%), for 2018 – 18 (5.59%), for 2019 – 19 (6.69%), for 2020 – 15 (5.62%) and for 2021. – 15 (5.7%) (Fig.2).

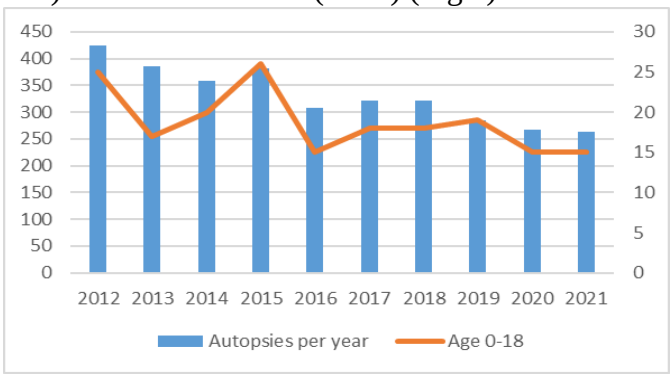

Figure 2 Distribution by year versus total number of autopsies performed

A total of 123 (65.43%) were male and 65 (34.57%) were female of the 188 cases studied. 60 (31.91%) of the children were from a non-urbanized area (village) and 128 (68.09%) were from an urbanized area (city). Registered for the studied period were 12 cases of child homicide (6.38%), 119 (63.3%) accidents, 41 (21.81%) cases of sudden death and 15 (7.98%) suicides among children, and 1 (0.53%) case of medical negligence was registered (Fig. 3).

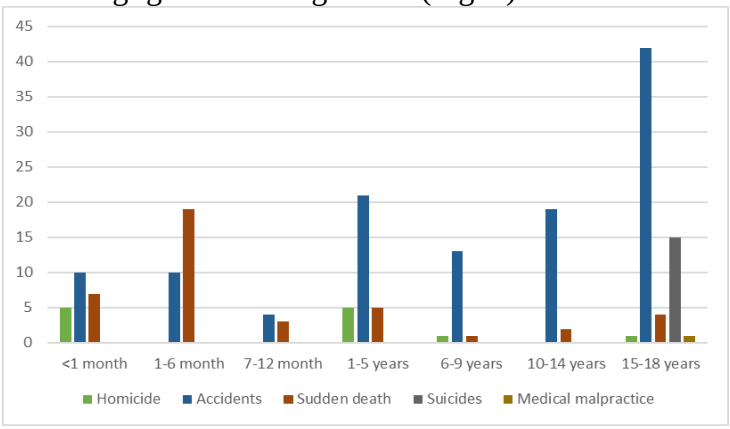

Figure 3 Distribution of the gender of death by age group

Among children up to 1 month of age, there were 5 (22.73%) homicides, 10 (45.45%) accidents and 7 (31.82%) cases of sudden death. Among children aged 1-6 months, there were 10 (34.48%) accidents and 19 (65.52%) cases of sudden death. Among children aged 7-12 months, there were 4 (57.14%) accidents and 3 (42.86%) cases of sudden death. Among children aged 1-5, there were 5 (16.13%) homicides, 21 (67.74%) accidents and 5 (16.13%) cases of sudden death. Among children aged 6-9, there were 1 (6.67%) homicides, 13 (86.67%) accidents and 1 (6.67%) sudden death. Among children aged 10-14, there were 19 (90.48%) accidents and 2 (9.52%) cases of sudden death. Among children aged 15-18, there was 1 (1.59%) case of homicide, 43 (68.25%) accidents, 4 (6.35%) cases of sudden death, 15 (23.81%) suicides, 1 (1.59%) case of medical negligence (Table 1).

Age	Count	Sex		Region		Types of manner of death				
		M	F	Rural	Urban	Homicide	Accidents	Sudden death	Suicides	Medical malpractice
<1 month	22	9	13	5	17	5	10	7	0	0
1-6 month	29	17	12	17	12	0	10	19	0	0
7-12 month	7	4	3	5	2	0	4	3	0	0
1-5 years	31	25	6	4	27	5	21	5	0	0
6-9 years	15	11	4	7	8	1	13	1	0	0
10-14 years	21	14	7	7	14	0	19	2	0	0
15-18 years	63	43	20	15	48	1	42	4	15	1
Total	**188**	**123**	**65**	**60**	**128**	**12**	**119**	**41**	**15**	**1**

Tab.1 Distribution of cases by sex, age, area and gender of death

7 (58.33%) of the child homicide cases studied were male and 5 (41.67%) were female. All were committed in urban areas. The perpetrator in 4 (33.33%) of the cases was the mother. The father was the perpetrator in 4 (33.33%) of the studied cases. In 2 (16.67%) of the homicides, the perpetrator was not a relative of the victim, and in 2 (16.67%) of the cases, the perpetrator was unknown (Fig. 4). The methods used to commit the homicide vary: drowning – 1 case, asphyxia from squeezing the breathing holes – 4 cases, blow with a hard blunt object (beating) – 4 cases, firearm – 3 cases (Tab.2).

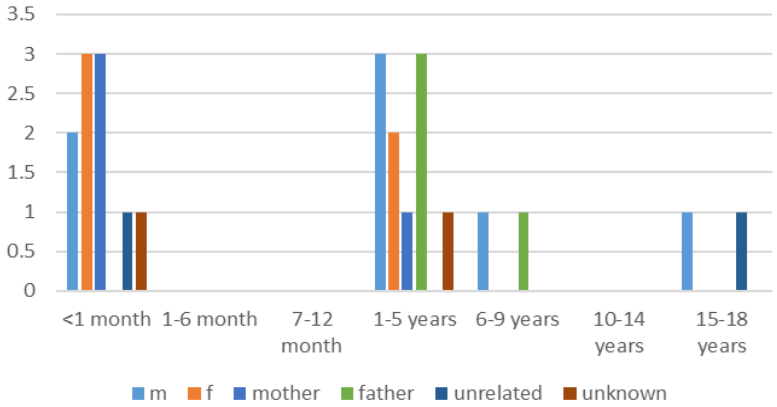

Figure 4 Distribution of child killings by sex, age and perpetrator

	drowning	smothering	beating	firearms
<1 month	1	3	1	0
1-6 month	0	0	0	0
7-12 month	0	0	0	0
1-5 years	0	1	2	2
6-9 years	0	0	0	1
10-14 years	0	0	0	0
15-18 years	0	0	1	0

Tab. 2 Methods of killing children by age group

The distribution of child homicides by year is as follows: 2012 – 2, for 2013 – 3, for 2014 – 2, for 2015 – 0, for 2016 – 1, for 2017 – 1, for 2018 – 0, for 2019 – 1, for 2020 – 1, for 2021 – 1 (Fig.5).

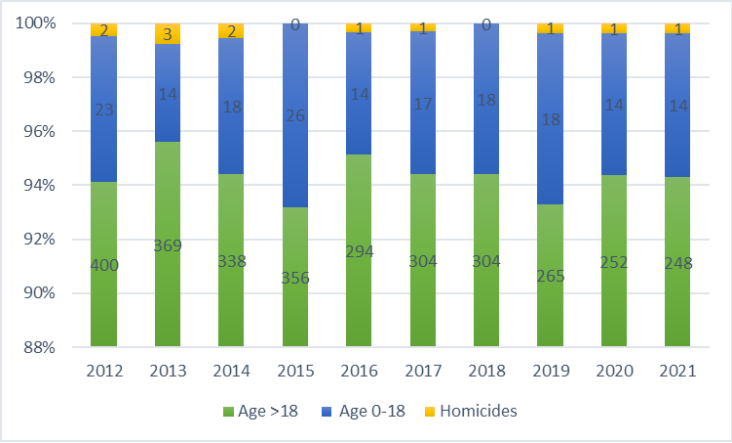

Figure 5 Distribution of child killings in total autopsies and child autopsies for the year

Of the cases studied, suicides are 15, and they are only in the age group 15-18 years old. For 2012, there were four suicides, for 2013 – 0, for 2014 – 2, for 2015 and 2016 – 0, for 2017 – 3, for 2018 – 2, for 2019 – 2, for 2020 – 1 and for 2021 – 1. (Fig.6)

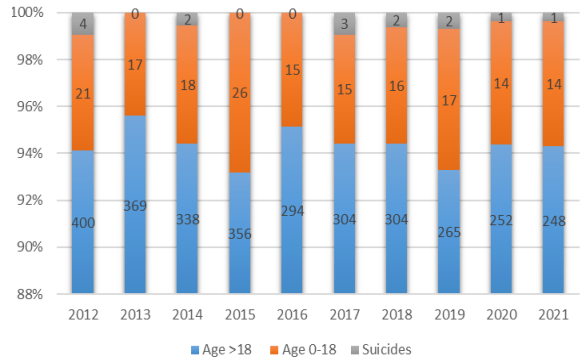

Figure 6 Distribution of child and adolescent suicides by year

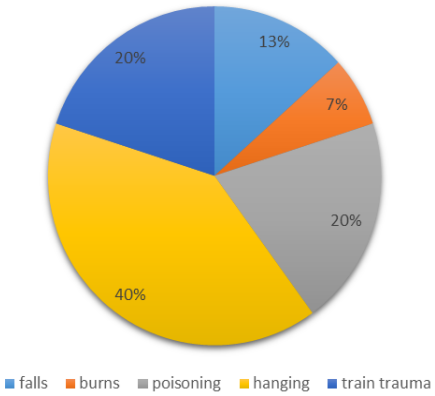

Figure 7 Percentage distribution of suicide performance methods

Of the 15 childhood suicides, 9 (60%) were committed by the male sex and 6 (40%) by the female sex. 14 (93.33%) of the cases were from urbanized and only 1 (6.67%) from non-urbanized area. Methods used to commit suicide include falling (jumping) from a height - 2 (13.33%), thermal trauma (burning oneself to death) – 1 (6.67%) case, poisoning – 3 (20%), hanging – 6 (40%) and railway trauma – in 3 (20%) of the cases (Fig. 7)

The number of accidents was 119 (63.3%) of the 188 autopsies of children studied. 84 (70.59%) of these were male and 36 (30.25%) female. 84 (70.59%) are from an urbanized area and from a non-urbanized area – 36 (30.25%). The most numerous are road accidents – 48 (40.34%) (Fig.9), followed by drowning – 20 (16.81%), asphyxia from blockage of the respiratory tract with a foreign body – 15 (12.61%), poisoning – 10 (8.4%), fall – 9 (7.56%), asphyxia at birth – 7 (5.88%), electric power effect – 5 (4.2%), burns – 1 (0.84%), hard blunt injury – 1 (0.84%), hypothermia – 1 (0.84%), positional asphyxia – 1 (0.84%), throating – 1 (0.84%). The distribution of accidents by year is as follows: for 2012 - 15, for 2013 – 11, for 2014 – 14, for 2015 – 18, for 2016 – 11, for 2017 – 10, for 2018 – 11, for 2019 – 10, for 2020 – 11, for 2021 – 8. (Fig. 8)

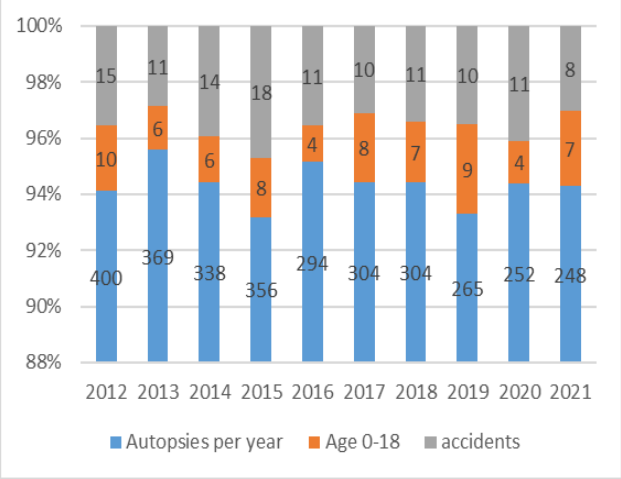

Figure 8 Distribution of accidents with children and adolescents by year

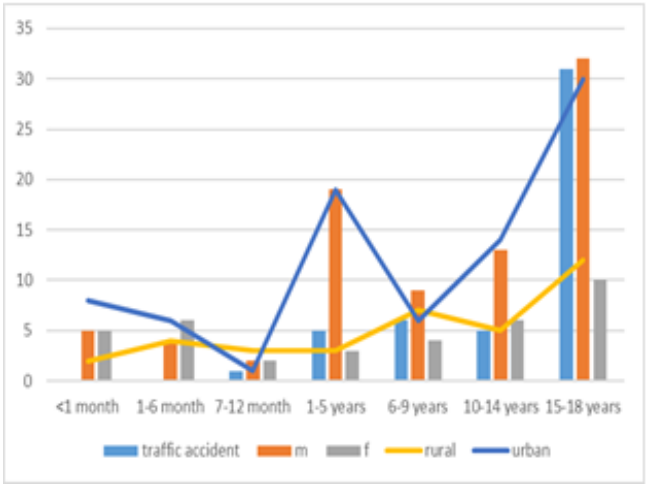

Figure 9 Distribution of crashes versus sex, age and locality

Age	Sex		Region		Causes of death						
	M	F	Rural	Urban	asphyxia during birth	asphyxia by obstruction of the airways	falls	poisoning	drowning	traffic accident	electricity
<1 month	5	5	2	8	7	2	1	0	0	0	0
1-6 month	4	6	4	6	0	9	0	1	0	0	0
7-12 month	2	2	3	1	0	1	1	1	0	1	0
1-5 years	19	3	3	19	0	0	4	4	6	5	1
6-9 years	9	4	7	6	0	1	2	1	3	6	0
10-14 years	13	6	5	14	0	0	1	0	7	5	3
15-18 years	32	10	12	30	0	2	0	3	4	31	1
Total	**84**	**36**	**36**	**84**	**7**	**15**	**9**	**10**	**20**	**48**	**5**

Tab. 3 Common causes of death among accidents with children and adolescents

Among the different age groups, the most frequent victims of accidents are 15-18 years old – 42 (35.29%) cases, followed by the group 1-5 years old – 21 (17.65%), 10-14 years old – 19 (15.97%), 6-9 years old – 13 (10.92%), children up to 1 month – 10 (8.4%), 1-6 months – 10 (8.4%), 7-12 months – 4 (3.36%) (Table 3).

24 (58.54%) of the 41 sudden deaths of children were male and 17 (41.46%) female. 23 (56.1%) of them were from a non-urbanized area and 18 (43.9%) from an urbanized one. Of these, 29 (70.73%) were associated with diseases of the respiratory system (Fig.10) – 23 (79.31%) cases of pneumonia, 5 (17.24%) cases of bronchiolitis and 1 (3.45%) case of asthmatic status. In 6 (14.63%) of the cases it was cardiovascular disease – 3 (50%) cases of myocardiopathy, 2 (33.33%) cases of myocardial infarction and 1 (16.67%) case of congenital heart disease. Among the other causes of death were 1 (2.44%) meningococcal septicaemia, 1 (2.44%) peritonitis, 1 (2.44%) sepsis, 1 (2.44%) epileptic status, 1 (2.44%) gastrointestinal infection, 1 (2.44%) thrombosis of cavernous

sinuses. For children up to 1 month, 5 cases of pneumonia, 1 bronchiolitis, 1 congenital heart defect were registered. For children from 1 to 6 months, 15 cases of pneumonia, 2 of bronchiolitis, 1 meningococcal septicemia, 1 peritonitis were recorded. For children from 7 to 12 months, 1 case of pneumonia, 1 bronchiolitis, 1 case of sepsis were recorded. For the age of 1-5 years, the following causes of sudden death were recorded: pneumonia – 1, bronchiolitis – 1, cardiomyopathy – 1, gastrointestinal infection – 1, thrombosis of the cavernous sinuses – 1. For the age of 6-9 years: cardiomyopathy – 1. For the age of 10-14 years: myocardial infarction – 1, epileptic status – 1. For the age 15-18 years: pneumonia – 1, cardiomyopathy – 1, myocardial infarction – 1, asthmatic status – 1. In 2 (33.33%) of cases at the onset of death from heart disease there is evidence of physical overload (running, sports), and in 1 (16.67%) - overweight. In 11 (37.93%) of the cases of respiratory infections, the child's weight was lower than normal for the age. In 4 (9.76%) of all cases of sudden death, congenital disease was found.

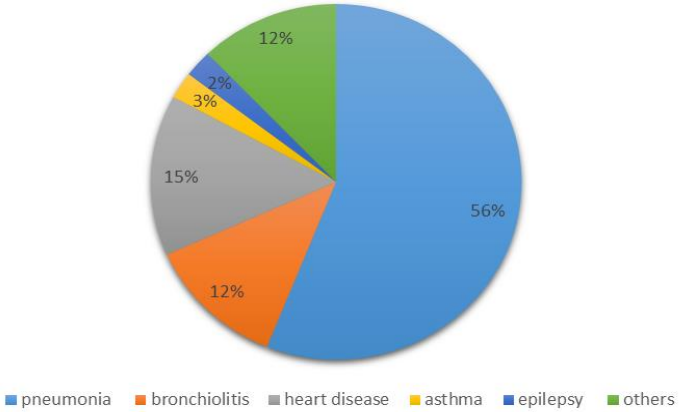

Figure 10 Distribution of causes of sudden death in children and adolescents

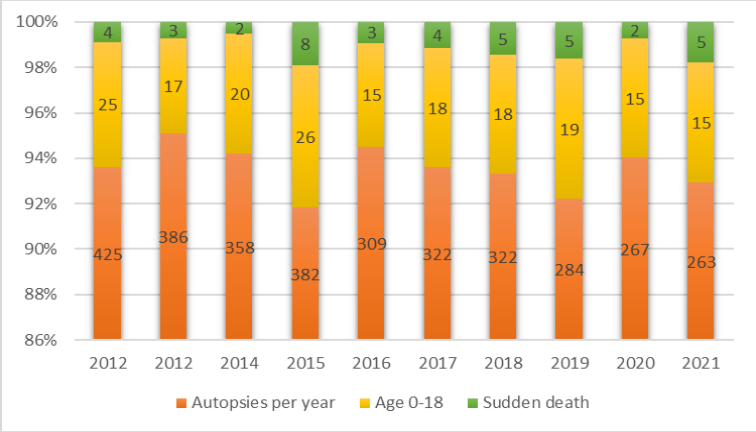

Figure 11 Distribution of sudden deaths in children and adolescents by year

The distribution of sudden deaths of children by year is as follows: 2012 – 4, for 2013 – 3, for 2014 – 2, for 2015 – 8, for 2016 – 3, for 2017 – 4, for 2018 – 5, for 2019 – 5, for 2020 – 2, for 2021. – 5 (Fig. 11).

Conclusions

Over the 10-year period, there is a decrease in the relative share of deaths in the age of 0-18 by 0.18%.

The largest share of deaths is reported in the 15-18 years' age group (33.51%), followed by 1-5 years (16.49%) and 1-6 months (15.43%).

Accidents are the most common, as they are the leading causes of death in all age groups except for the 1-6 months' age group, in which the leading causes of death are nonviolent (sudden death).

Homicides are most common in children under 1 month of age and 1 to 5 years, with residents of an urban area being a risk group. The majority of child homicides were committed by a parent (66.67%). The most commonly used methods include blowing with a hard blunt object (beating) and squeezing the breathing holes, which corresponds to literature data [11].

Suicides are reported only in the age group 15-18 years old, 60% of whom are male. The majority of suicides take place in urban areas. A preferred method is hanging (40%), followed by poisoning and railway trauma.

Road accidents are the most common childhood accidents, which corresponds to other similar studies [3], followed by drowning. The male sex is more commonly affected by accidents (70.59%).

Diseases of the respiratory system are the most common cause of nonviolent (sudden) death in childhood (79.31%), which corresponds to the literature data [6,10], the most affected age group being from 1-6 months. In 37.93% of cases of respiratory infections, a child's weight is lower than normal for age, which is often seen as a sign of neglect by parents [8]. In 33.33% of deaths from heart disease, there is evidence of physical overload (running, sports) immediately before death, which corresponds to other similar studies [2, 4, 7, 9].

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