Rom J Leg Med [27] 205-212 [2019]
DOI: 10.4323/rjlm.2019.205
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Epidemiology of drowning in children in a Western region of Romania

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Abstract: Drowning is a major, but often neglected global public health problem, representing the third leading cause of death from unintentional injury, with the higher prevalence in the low- and middle-income countries (LMICs).

In this paper the authors present the results of a retrospective study which aimed at analysing the epidemiological aspects of drowning in children from the Crisana region. Our study demonstrated that the children most exposed to drowning were boys aged over 5, from rural areas, with poor socio-economic and cultural background, unattended and without the ability to swim. The results of the study also show that young males who are unsupervised in rural areas and have limited formal swimming instruction are at greatest risk of drowning in small bodies of water around their homes. The results of our study could be useful in designing the most suitable preventive methods for drowning, starting from the methods already provided in the literature.

Key Words: drowning, children, epidemiology, forensic medicine.

INTRODUCTION

Drowning is a major, but often neglected global public health problem, representing the third leading cause of death from unintentional injury. About 97% of all deaths from drowning occur in low- and middle-income countries (LMICs). In 2002, the World Congress on Drowning established a new consensus definition for drowning, defining it as a process resulting in primary respiratory impairment from submersion in a liquid medium. There are three possible outcomes of drowning: death, morbidity (injury), and no morbidity [1]. A World Health Organisation (WHO) working group established in 2017 specified that drowning outcomes are fatal and non-fatal. Any drowning related death is defined as fatal drowning, and the term "non-fatal drowning" is reserved for the victims who survived [2]. In 2004 drowning resulted in over 175 000 deaths in children and youth aged 0–19 years worldwide [1].

Drowning deaths, both in children and in adults, are classified as violent deaths. In Romania, according to the penal law, in cases involving violent death, the forensic autopsy is mandatory, the conclusions established by the autopsy expert being crucial in determining whether death was the result of homicide, suicide or accident [3 - 7].

In terms of survival after a drowning, global estimates suggest that 2-3 million children aged 0-14 years survived a drowning incident in 2004 [8].

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Assessing the epidemiological characteristics and monitoring the trends of drowning at a national level is critical in order to understand the mechanisms of the phenomenon and develop feasible solutions to reduce risk [9].

Aim

The aim of our research was to analyse the epidemiological aspects of drowning in children from the Crisana region.

MATERIAL AND METHOD

The study was both retrospective covering a period of 15 years (2003-2017), during which 86 cases aged between 0 and 19 years were registered. Of these, 62 have resulted in death, of which 61 were found dead and a death case was registered in the hospital. Deceased cases were addressed to the Bihor County Forensic Service to confirm drowning and the presence of other possible injuries. The data included in this study regarding drowning episodes involving children were collected from the forensic autopsy reports compiled at the Bihor County Forensic Service.

In these cases a forensic autopsy was performed to determine whether or not there were traumatic injuries on the body, the death mechanism, and the causal link between drowning and death [10, 11]. In these cases the forensic autopsy must clarify the main issues raised by the police investigation such as whether death was determined by drowning or a corpse was thrown into the water. The forensic post-mortem examination can also provide important details which may show that drowning was the consequence of suicide, accident or homicide [10, 12, 13].

Surviving children were treated in the Intensive Care Unit of the Oradea Pediatric Clinic. In the case of surviving victims, data was collected from the medical files.

The aspects analysed in our study can be divided into several categories:

- socio-demographic data (age, gender, ethnicity, home environment, family status),
- relevant data regarding the presence of any pathologies prior to death in the victims medical records,
- data on the different behaviours operated by the victim that could be relevant in the production of death or the appearance of other injuries (the ability to swim, alcohol or drug use),
- data regarding place and time of death (season, month of the year, weekdays, hours of the day, drowning location and circumstances).

In order to store the information entered on the study sheet in a database and to perform the statistical calculations, the medical statistics program MedCalc® version 12.5.0.0 (MedCalc® Software, Mariakerke, Belgium) was used. The results of the statistical tests in terms of probability will be represented by using the "null" hypothesis (p), its values under 0.05 demonstrating a statistically significant difference between the studied groups. The categorical variables will be described by their absolute values and percentages in brackets. The variables will be analysed with the help of the following tests: chi-square test with Yates' correction for continuity– in the cases of tables presenting frequency rate of 2x2 (categorical variables with 2 possible values between 2 study lots) and a number of cases more then 20; chi-square test, the simple version– for all the other tables presenting different frequency rates (3x2, 3x3, etc.). In order to study the implication of these variables as mortality risk factors, the relative mortality risk was determined by calculating OR (odds ratio) with a confidence interval of 95%.

RESULTS

During the studied period 86 drowned children were registered. Of these, 62 died and 24 survived.

By analysing the distribution rate over the study years a slight decrease in the number of cases can be noted. Between 2003 and 2008, the frequency of drowning related deaths was higher (6-10 / year) while in the following years the death rate was kept lower (1-5 / year).

Distribution of cases by age was as follows: 3 cases for the age group 0-1 year, 17 cases for the 1-4 year age group, and 66 for the age category over 5 years. Our results show that the age category over 5 years is by far the most exposed to the risk of drowning. Incidence of drowning increases more than 3 times in children aged 5 years and older (p <0.0001) (Table 1, Fig. 1).

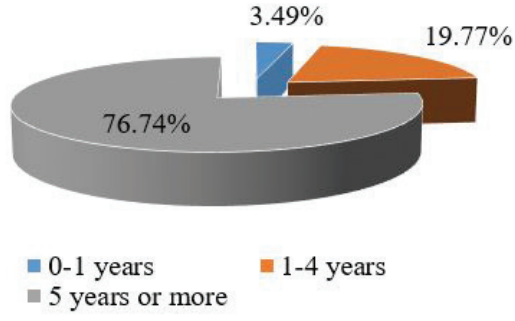


Figure 1. Distribution by age groups (percent - %).

Table 1. Distribution by age groups

Age group	Drowned patients (n=86)	Percent (%)	Statistical significance*
0-1 years	3	3.49	
1-4 years	17	19.77	p<0.0001
over 5 years	66	76.74	

* - chi-square test.

Table 2. Distribution of cases by gender

Sex	Drowned patients (n=86)	Percent (%)	Statistical significance*
Male	64	74.42	p<0.0001
Female	22	25.58	

* - chi-square test with Yates'.

Table 3. Distribution of cases by ethnicity of the victims

Nationality	Drowned patients (n=86)	Percent (%)	Statistical significance*
ROMANIAN	44	51.16	p<0.0001
HUNGARIAN	19	22.09	
GIPSY	22	25.58	
TURKISH	1	1.16	

* - chi-square test.

Table 4. Distribution of cases according to the socio-economic level

Socio-economic level	Drowned patients (n=86)	Percent (%)	Statistical significance*
Low	39	45.34	p=0.0001
Middle	37	43.02	
High	10	11.62	

* - chi-square test.

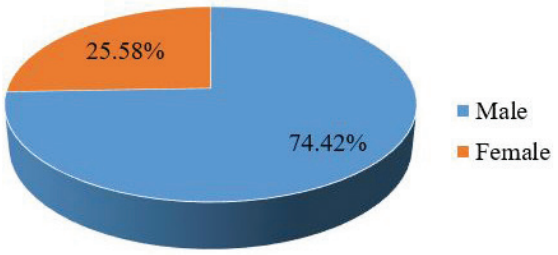


Figure 2. Distribution of cases by gender (percent -%).

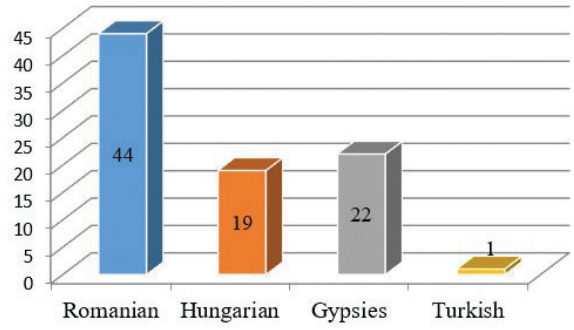


Figure 3. Distribution of cases by ethnicity of the victims (number of victims).

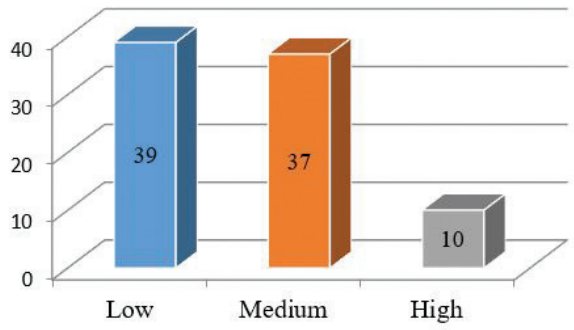


Figure 4. Distribution of cases by socio-economic level (number of victims).

The gender distribution of cases showed that drowning is more common in boys with statistically significant difference (boys/ girls = 2.9/ 1; p <0.0001) (Table 2, Fig. 2). Sixty four cases of boys and 22 girls, with a sex ratio M:F of 2.90:1.

In terms of ethnicity of the victims, the following results were recorded: Romanian nationality 44 cases, Hungarian 19 cases, Roma ethnicity 22 cases, Turkish 1 case (Table 3, Fig. 3).

The increased incidence in the children of Romanian nationality does not require additional explanations, but the number of Gipsy children exceeds those of Hungarian nationality, which means an increased prevalence of more than 5 times the drowning among the Gipsy children community compared to the Hungarian children considering the ratio of the Hungarian population to the Gipsy population in the county of Bihor (see the Bihor County Statistical Yearbook - 2017 - the Hungarian population 138.123 *vs.* the Gipsy population 34.650 persons).

The prevalence of drowning in children according to the ethnicity of the victims shows the following figures: Romanians - 0.12 case/1000 inhabitants/year, Hungarians - 0.13 cases/ 1000 inhabitants/year, Gipsy - 0.63 cases/1000 inhabitants/year.

Analysing the influence of the environment of origin, it is noted the higher prevalence of cases of drowning in children from the rural areas (54 cases representing 62.8%) compared to the urban environment (32 cases, 37.2%).

The victims belonged to families with poor socio-economic and cultural background in 39 cases (45.34%). The high socio-economic level had a reduced frequency among the children in this study (p = 0.0001) (Table 4, Fig. 4).

Table 5. Case distribution according to the type of the victim's family

Family organization	Drowned patients (n=86)	Percent (%)	Statistical significance*
Married	15	17.44	p<0.0001
Divorced	45	52.33	
Concubinage	19	22.09	
Widow	7	8.14	

* - chi-square test.

Table 6. Case distribution depending on victims' health status before drowning

Health status before drowning	Drowned patients (n=86)	Percent (%)	Statistical significance*
Clinically healthy	17	19.77	p=0.0001
Behavioral disorders	33	38.37	
Psychiatric disorders	17	19.77	
Chronic somatic disorders	13	15.12	
No medical history is known	6	6.98	

* - chi-square test.

Table 7. Distribution of cases by months of the year

Month	Drowned patients (n=86)	Percent (%)	Statistical significance*
JANUARY	6	6.98	p<0.0001
FEBRUARY	4	4.65	
MARCH	1	1.16	
APRIL	4	4.65	
MAY	11	12.79	
JUNE	24	27.91	
JULY	20	23.26	
AUGUST	12	13.95	
SEPTEMBER	2	2.33	
OCTOBER	1	1.16	
NOVEMBER	0	0.00	
DECEMBER	1	1.16	

* - chi-square test.

In only 17.44% of cases, the drowned child came from an organized family, most often the parents were divorced, and most children drowned during the study period belonged to extended families. In only 17.44% of cases, the drowned child belonged to organized families (p <0.0001) (Table 5, Fig. 5).

More than a quarter of drowned children did not attend any education institution, although most cases involved children over the age of five.

The analysis of the victims' health status before drowning showed that behavioral disorders were the most commonly encountered pathological antecedents found, as showed by their medical files (p = 0.0001) (Table 6, Fig. 6).

The distribution of cases throughout the months of the year shows that most cases occurred between May and August, with a total of 67 children (77.9%), with the highest values recorded in June and July when they were registered 24 (27.9%) and 20 observations (29.2%) respectively (Table 7, Fig. 7).

In relation to days of the week, the highest frequency was recorded on Fridays, Saturdays, Sundays and Mondays with 59 cases (68.6%), and on Tuesdays, Wednesdays and Thursday only 27 cases (31.4%), comparatively, over half of the cases of drowning occurring during the weekend (Table 8, Fig. 8).

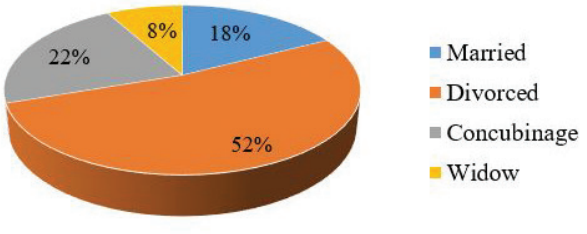


Figure 5. Case distribution according to the type of the victim's family (number of cases).

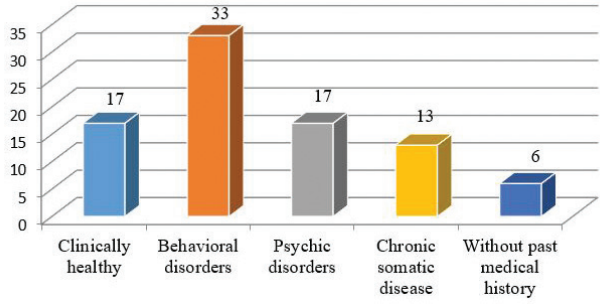


Figure 6. Case distribution depending victims' health status before drowning (number of victims).

Table 8. The distribution of cases by days of the week

Day	Drowned patients (n=86)	Percent (%)	Statistical significance*
Monday	15	17.44	
Tuesday	7	8.14	
Wednesday	8	9.30	
Thursday	12	13.95	p=0.3102
Friday	18	20.93	
Saturday	13	15.12	
Sunday	13	15.12	

* - chi-square test.

Table 9. Distribution of cases according to the time interval

Time of drowning	Drowned patients (n=86)	Percent (%)	Statistical significance*
6-14	17	19.77	
14-22	64	74.42	p<0.0001
22-6	5	5.81	

* - chi-square test.

Differences in the incidence of drowning are noticeable between days of the week (p = 0.3102).

Drowning occurred during the time interval 14:00 – 22:00 in 64 cases (74.4%), 6:00 – 14:00 in 17 cases (19.8%) and 22:00 – 6:00 in 5 cases (5.8%). The peak incidence during the daytime hours is obvious and indisputable (Table 9, Fig. 9).

The peak incidence during the day is obvious and indisputable (p <0.0001).

Drowning occurred in: Crişul Repede River (35 cases - 40.7%), dams and lakes (7 cases - 8.1%), sewers or sumps (6 cases - 7%), strand and improvised strand (9 cases - 10.5%), puddles, water pits and swamps (13 cases - 15.1%), wells, fountains (4 cases - 4.7%), bathtubs, barrels, buckets (7 cases - 8.1%), latrine, septic tanks (2 cases - 2.3%), fishery (2 cases- 2.3%), swimming pools 1 case (1.2%).

According to the age group, specific locations for drowning have been identified: for infants, the bathtub, for children up to 5 years, puddles, water pits and swamps

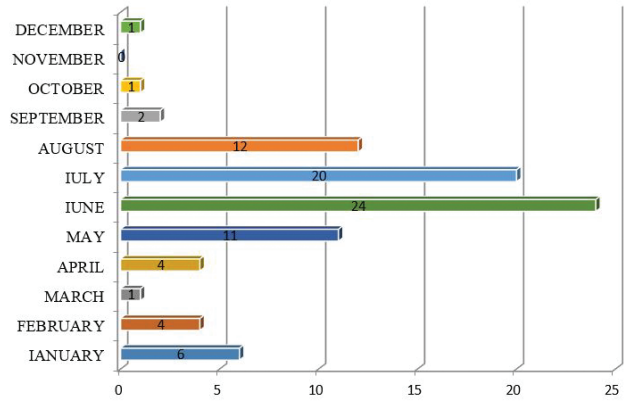
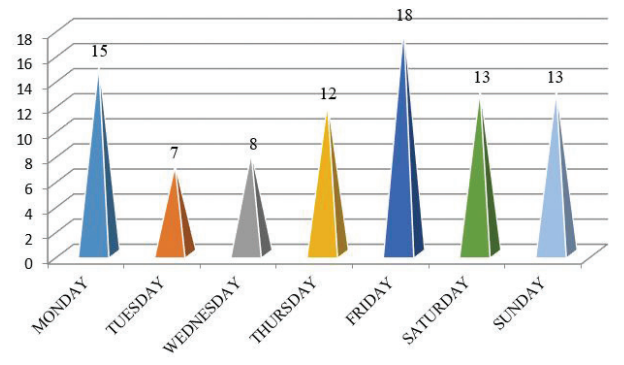


Figure 7. Distribution of cases by months of the year (number of patients).



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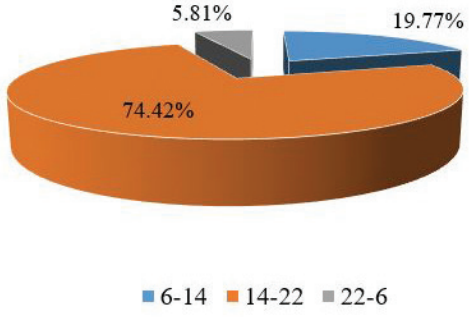

Figure 9. Distribution of cases according to the time interval (percent -%).

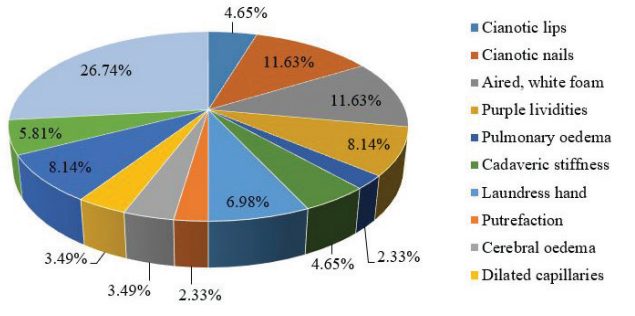

Figure 10. Presence of signs of drowning at admission (percent -%).

Table 10. Presence of signs of drowning at admission

Signs of drowning	Drowned patients (n=86)	Percent (%)	Statistical significance*
Cyanotic lips	4	4.65	p<0.0001
The cyanosis of the nail bed	10	11.63	
Sparkling white foam	10	11.63	
Livid color purple	7	8.14	
Pulmonary edema	2	2.33	
Cadaveric rigidity	4	4.65	
Wash-handed hand	6	6.98	
Putrefaction present	2	2.33	
Cerebral edema	3	3.49	
Dilated capillaries full of blood	3	3.49	
Exclamated plaques	7	8.14	
Yellowish skin	5	5.81	
No signs	23	26.74	

* - chi-square test.

predominate, and for children over 5 years, flowing waters.

Drowning occurred accidentally during bathing in 53 cases (61.6%), diving, jumping or sliding into the water in 19 cases (22.1%), intercurrent or chronic illnesses, epilepsy seizures in 2 cases (2.3%), alcohol and drugs (ethnobotanics) consumption in 6 cases (7.0%), abuse or neglect in 5 cases (5.8%), suicide in one case (1.2%).

Children were not supervised directly during the episode in 57 cases (66.3%). Most children did not know how to swim at the time of drowning (66.7%). The ability to swim increases with age but does not exceeded 51% in the 11-19 age group.

The examination of the victims showed that the signs of drowning were variable, but in over a quarter of cases no such signs were detected in the drowned child (p <0.0001) (Table 10, Fig. 10).

DISCUSSION

Drowning is a significant cause of injury-related deaths, especially in LMICs. According to the latest Global Burden of Disease (GBD) estimates, 127.577 children and young adults under the age of 20 years died from drowning in 2015 in the world, constituting over 39.4% of all-age drowning deaths [14]. The overwhelming majority (98.1%) of child drowning deaths occur in LMICs.

In our study, the frequency of drowning decreased in the latest years, this observation being consistent with data from literature review [15].

Drowning is an injury that displays epidemiological patterns that change according to age group, body of water and activity. For example, a small child can drown in a few centimeters of water at the bottom of a bucket or in the bathtub [8]. Globally, children under the age of five are at greatest risk of drowning, although adolescents (15–19 years of age) also have high rates [1, 16]. Similarly, various other studies have also reported that children <5 years of age are at highest risk of drowning [17, 18]. Our observations are in disagreement with this data indicating an increased frequency of drowning children in the age group of 5 years and older.

Increased drowning rate in males observed in this study is consistent with other reports, and the ratio is 2.90:1 [19]. In a systematic review conducted by Taylor *et al.* males were at greater risk of drowning than females and accounted for 45.240 events (75%) from 50 out of 62 articles compared to 15.295 female events (25%). Males generally exhibit riskier behaviour than their female counterparts and therefore expose themselves to more dangerous situations when around bodies of water [20], or in other situations that lead to the occurrence of a violent or suspicious death [21, 22].

In terms of ethnicity, the following results were recorded: Romanians 44 cases, Hungarians 19 cases, Roma ethnicity 22 cases, Turkish 1 case. The increased incidence in children of Romanian ethnicity is explained by the ethnic distribution of the population in Bihor County, but the number of Roma children exceeds that of Hungarian nationality, which means an increased prevalence of more than 5 times the drowning among Roma compared to Hungarian children taking into account the ratio of the Hungarian population to the Roma population in Bihor County (see the Bihor County Statistical Yearbook 2017 [23] - the Hungarian population 138.123 persons *versus* the Roma population 34.650 persons).

The higher incidence of drowning occurring in rural areas observed in our analysis is also in accordance with the reviewed data from the literature. In LMICs, especially in Asia, most drowning events involving children happen in the sea and other open bodies of water particularly in rural areas [8]. Rural areas in LMICs pose a significantly greater risk than urban areas to potential drowning victims, especially children at play [20].

Most of the cases included in our study occurred during summer, school vacation times, weekends, especially in the daytime. Majority of reviewed studies confirms this observation, suggesting that recreational

activities are at increased risk [24].

The most frequent locations for drowning events involving children over 5 years was represented by flowing waters (springs or rivers) and lakes, followed by close to home small bodies of water and only 10% of the cases happen in swimming pools or strands. Most of drowning sites had no protective measures such as fencing, floatation devices, or lifeguards. In high-income countries (HICs) most drowning events involving children happen in swimming pools. Again, similarities with reported data from other studies are noted. In LMICs most drowning events involving children happen in the sea and other open bodies of water particularly in rural areas.

Our study showed that drowning was strongly associated with poverty, particularly with regard to parents' educational level, number of children in the family. Populations most at risk are those living in low-income countries of densely populated communities with high exposure to open water [8, 20].

Alcohol or substance abuse by children or those accompanied by them was not found to be a risk factor in this study, which is in contrast to findings in literature, according to which alcohol is an important risk factor in case of drowning or other types of violent death [25, 26, 30 - 34].

It has been mentioned that children with epilepsy have 15–19 times higher risk of drowning [27]. However, in this study, no such increased risk was seen, probably because the number of children with epilepsy was low.

Swimming skills were absent in the majority of cases included in our study, being somehow consistent with data reported by other researchers [28]. Also, majority of children were not supervised directly during the drowning in 57 cases (66.3%) in our study. Previous studies established that young males who are unsupervised in rural areas and have limited formal swimming instruction are at greatest risk of drowning in bodies of water around their homes [20].

According to the literature, drowning incidents can be reduced through the use of effective prevention strategies such as: draining unnecessary close to home accumulations of water or building safe bridges and install piped water systems to reduce exposure to open bodies of water. Likewise, building fences around swimming pools, covering wells and barrels with heavy grills can be as effective. It is also important to educate parents and caregivers in first aid and basic life support skills, and to train the general community in cardiopulmonary resuscitation [29]. Public awareness regarding supervision of children and restricting unsupervised access of children to water bodies need to be emphasized [24].

Drowning is a significant cause of injury-related deaths, especially in LMICs. Data available for LMICs indicate that the burden of drowning in cases involving children is significant and is furthermore becoming a leading public health problem. The present study revealed drowning as a relevant public health problem with a high prevalence among children in Bihor County.

Based on the results of our study, we may conclude that strategies to prevent drowning among children should include covering close to home bodies of water, fencing off ditches and small ponds, providing supervision by an adult, formal swimming lessons to children, and increasing awareness of the risks of drowning [20]. However, despite the high prevalence of drowning in LMICs, preventive strategies and interventions are not well documented and implemented in these countries [32].

Conflict of interest. The authors declare that there is no conflict of interest.

References

1. van Beeck EF, Branche CM, Szpilman D, Modell JH, Bierens JJ. A new definition of drowning: towards documentation and prevention of a global public health problem. Bull World Health Organ. 2005; 83(11):853-856.
2. Beerman S, Bierens JJLM, Clemens T, Meddings D, Rahman A, Szpilman D. Clarification and categorization of non-fatal drowning. Draft Position Statement for review and input by the global drowning community. Workshop on Non-fatal Drowning, August 8–9, 2018, Toronto, Canada.
3. Mekeres F, Buhas C. Spontaneous human combustion, homicide, suicide or household accident. Rom J Leg Med. 2016; 24(1):11-13.
4. Buhaş C. Psychic family violence and pathological jealousy with tragic consequences: Homicide. Aggres Viol Behav. 2013; 18(4):434 – 435.
5. Hanganu B, Crauciuc D, Petre-Ciudin V, Velnic AA, Manoilescu I, Ioan BG. Domestic Violence in the Postmodern Society: Ethical and Forensic Aspects. Postmodern Openings. 2017; 8(3):46-58.
6. Ioan B, Alexa T, Alexa I. Do we still need the autopsy? Clinical diagnosis versus autopsy diagnosis. Rom J Leg Med. 2012; 20(4):307-312.
7. Ioan BG, Alexa T, Alexa I. A medico-legal view on the importance of the external examination of the traumatized patient. Rom J Leg Med. 2014; 22(2):127-132.
8. Peden MM, Oyegbite K, zanne-Smith J, Hyder AA, Branche C, Fazlur Rahman AKM, Rivara F, Bartolomeos K. World report on child injury prevention. WHO Library Cataloguing-in-Publication Data. 2008.
9. GBD 2015 Mortality and Causes of Death Collaborators Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016; 388:1459–1544.
10. Mihalache G, Buhaş C, Rahotă D. Medical and social implications of suicide in youth. Holistic study of cases in Bihor county 2007 – 2009. Rom J Leg Med. 2011; 19(1):69-72.
11. Judea-Pusta C, Rusu A, Camarasan A. Suicide by abdominal wounds suggesting seppuku: Case reports from Romania and an international literature review. Aggression and Violent Behavior. 2019; 47: 68-73. https://doi.org/10.1016/j.avb.2019.03.006

12. Buhas C, Mihalache G, Buhas B, Bungău S. The difficulty in establising the generating mechanism of cranial and vertebral lesions in a cadaver partially skeletonised. Rom J Leg Med. 2016; 25(4): 300 – 303.
13. Iorga M, Dondas C, Ioan BG, Toader E. Job Satisfaction among Forensic Physicians in Romania. Revista de Cercetare si Interventie Sociala. 2017; 56:5-518.
14. Institute for Health Metrics and Evaluation (IHME) GBD Compare Data Visualization. IHME, University of Washington; Seattle, WA, USA: 2016.
15. Wu Y, Huang Y, Schwebel DC, Hu G. Unintentional Child and Adolescent Drowning Mortality from 2000 to 2013 in 21 Countries: Analysis of the WHO Mortality Database. Int J Environ Res Public Health. 2017; 14(8):875
16. Bose A, George K, Joseph A. Drowning in childhood: A population based study. Indian Pediatr. 2000; 37:80–83.
17. American academy of pediatrics committee on injury and poison prevention: Drowning in infants, children, and adolescents. Pediatrics. 1993; 92:292–294.
18. Mizuta R, Fujita H, Osamura T, Kidowaki T, Kiyosawa N. Childhood drownings and near-drownings in Japan. Acta Paediatr Jpn. 1993; 35:186–192.
19. Lunetta P, Smith GS, Penttila A, Sajantila A. Unintentional drowning in Finland 1970-2000: A population-based study. Int J Epidemiol. 2004; 33:1053–1063.
20. Tyler MD, Richards DB, Reske-Nielsen C, Saghafi O, Morse EA, Carey R, Jacquet GA. The epidemiology of drowning in low- and middle-income countries: a systematic review. BMC Public Health. 2017; 17(1):413.
21. Buhas CL, Mihalache G, Judea-Pusta CT, Buhaș B, Jurcă MC, Iovan C. Lethal cranio-cerebral traumatism resulting through a very rare mechanism. Rom J Leg Med. 2018; 26(3):249-253.
22. Pusta CT, Mihalache G, Buhas C, Pop O. A rare case of cardiac fibroma in a death truck driver. Rom J Leg Med. 2015; 23(4):247-250.
23. Institutul National de Statistica. Directia Judeteana de Statistica Bihor. Anuarul statistic al Judetului Bihor. 2017; www.bihor.insse.ro
24. Veetil JN, Parambath VA, Rajanbabu B, Suresh S. An epidemiological study of drowning survivors among school children. J Family Med Prim Care. 2017; 6(4):844-847.
25. Fenner P. Drowning awareness. Prevention and treatment. Aust Fam Physician. 2000; 29:1045–1049.
26. Ioan BG, Jitaru V, Damian R, Damian SI. Study on the relationship between the concentration of ethanol in the blood, urine and the vitreous humour. Rom J Leg Med. 2015; 23(3):211-216.
27. Szpilman D, Bierens JJ, Handley AJ, Orlowski JP. Drowning. N Engl J Med. 2012; 366:2102–2110.
28. Brenner RA, Taneja GS, Haynie DL, Trumble AC, Qian C, Klinger RM, Klebanoff MA. Association between swimming lessons and drowning in childhood: a case-control study. Arch Pediatr Adolesc Med. 2009; 163(3):203-210.
29. World Health Organization. WHO Library Cataloguing-in-Publication Data: Global report on drowning: preventing a leading killer. 2014.
30. Judea-Pusta CT, Mușiu G, Pașcalău AV, Buhaș CL, Ciursaș AN, Nistor-Cseppento CD, Bodea A, Judea AS, Vicaș RM, Dobjanschi L, Pop OL. The importance of the histopathological examination in lethal acute intoxication with ethylene glycol. Case report. Rom J Morphol Embryol. 2018; 59(3):965 – 969.
31. Hyder AA, Borse NN, Blum L, Khan R, El Arifeen S, Baqui AH. Childhood drowning in low- and middle-income countries: Urgent need for intervention trials. J Paediatr Child Health. 2008; 44(4):221-227.
32. Ioan BG, Manoilescu I, Șerban DD, Neagu M, Grigoras A, Damian S. Idiopathic spontaneous rupture of the urinary bladder- A rare cause of death. Rom J Leg Med. 2015; 23(1):9-13.
33. Buhas CL, Mihalache GM, Judea-Pusta CT, Daina LD, Mutiu G, Buhas BA, Popa AR, Jurca MC, Nicoară ND, Maghiar AM. The importance of the histopathological examination in establishing the diagnosis of delayed splenic rupture. Report of a case and literature review. Rom J Morphol Embryol 2019; 60(1): in press.
34. Jurca MC, Bembea M, Iuhas OA, Kozma K, Petchesi CD, Jurca AD, Szilagyi A, Dubau DL, Sava CN, Zaha DC, Cuc EA. Double autosomal trisomy with mosaicism 47,XY(+8)/47,XY(+21). Morphological and genetic changes of a rare case. Rom J Morphol Embryol 2018; 59(3):985–988.