

Analysis of Children's Road Crashes in Hungary

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Abstract

In the EU, more than 6,000 children died in road accidents between 2011 and 2020. Children are particularly vulnerable road users, and they need to be protected. This underlines the importance of the Safe System approach. The Safe System approach is a holistic view of road safety, which integrates the different elements of the traffic system and takes human vulnerability and fallibility into account. Children are still in the phase of developing the cognitive and physical skills necessary to travel safely in traffic. Because of their small size, children are less visible than other road users and less experienced; they can easily become innocent victims in collisions. Despite significant improvements in vehicle safety in recent years, almost half of all child road deaths occur while traveling in cars. Limited data is available on the correct use of child seats in cars across the EU, but studies have shown that misuse remains a significant problem. Several measures have been taken in recent years to make it safer for children to travel on the roads, but many more interventions are needed to further improve their safety. Our research aimed to examine the characteristics of child accidents in Hungary and to highlight the main road safety problems affecting children in Hungary.

Keywords

road safety, children, child safety, child injuries, child restraint system

1 Introduction

Within Europe, the number of child fatalities in traffic is decreasing alongside a falling birth rate. This decrease is further affected by improvements in safety for children as car passengers. While cars are becoming safer for children as car passengers, the highest risk of fatality for children is still as car passengers followed by child accidents suffered by pedestrians and cyclists (ERSO, 2018).

In the past decades, a whole series of measures have been introduced in European countries (Scurt et al., 2023; Torok and Pauer, 2022) and many awareness-raising campaigns and educational programs have been implemented to protect children's lives, physical health, and safety. As a result, our children can now travel in a much safer environment than before. The European Union's transport policy objective also identifies improving road safety for children as a priority.

Our research aim was to examine accidents involving children in Hungary to highlight the main accident issues about children's road safety. The road safety education and training programs developed under the Road Safety

Action Program, which aim to improve children's road safety, can focus more effectively on the target areas.

1.1 Child road safety in Europe

Children (0–14 years old) are among the most vulnerable people on the roads, and their vulnerability is compounded by the fact that they are typically not yet familiar with the rules of the road and have not yet developed a sense of danger and hazard awareness. They are those who participate in traffic as pedestrians or cyclists, while as passengers in vehicles, their health and safety depend on the driving style and behavior of the drivers (ERSO, 2018).

Differences in children's physical and mental abilities depend on their age and other contributing factors. Research shows that children from lower socio-economic backgrounds are more likely to be injured in traffic accidents (ERSO, 2018).

The choice of transport mode for a child is strongly defined by parents and other drivers. In most countries,

the main transport modes children use are car passenger, cycling, walking, or public transport. Children travel more often as pedestrians or cyclists (vulnerable road users) compared to other age groups (EC, 2023).

In addition, children use public roads not only for travel but also as a place to play (OECD, 2004). Unfortunately, comparable data is available on the mobility (exposure) of children in the EU, which makes it impossible to calculate relative risk across the EU (which is the number of deaths and injuries/km or time spent) (EC, 2023).

390 children died on EU roads in 2020 and more than 6,000 in the last ten years. The number of children who died in road crashes in EU countries represented 2% of all road deaths in 2020. The road fatality rate for children (deaths per million inhabitants of child age) fell by 46%, compared to 36% for all other age groups, between 2010 and 2020. A relatively steep decline was observed at the beginning of the decade, during the economic recession following the 2008 financial crisis. Another sharp decrease was seen at the end of the decade, when Covid-19 pandemic control measures severely restricted people's movement, including children, who were sometimes not allowed to go to school.

Children do not benefit from the same level of safety everywhere in Europe. The child road mortality rate in Romania is ten times higher than in Norway, Cyprus, or Sweden. Where child road mortality is relatively low, road mortality for the rest of the population also tends to be relatively low, and vice versa. Where child mortality is relatively low and mortality for the rest of the population is relatively high, it could be because children in those countries tend to be driven to school and activities rather than being allowed to travel there alone by bike or on foot (Carson et al., 2022).

In the EU, on average, for children aged 1–14 years, the cause of every 15 deaths is attributed to 1 road accident. The proportion of children killed in road accidents accounts for 6.5% of all child deaths, while for other age groups, the proportion of deaths from road accidents accounts for only 0.4% of all deaths. The road fatality rate for children is much higher than the death rate from other causes, compared to the road fatality rate and the overall death rate for other age groups. In 2017, one in every 13 child deaths in the EU was caused by a road accident. This shows that the progress in reducing road deaths among children is faster than in reducing other causes of child death. Road death numbers are higher among children aged 10–13 than among children aged 5–9, which may be explained by the fact that

children aged 10–13 are more likely to move unaccompanied by adults, especially to get to educational institutions. However, once they reach the age of 14 and gradually gain access to motorcycles and cars, their road mortality starts to rise sharply (Carson et al., 2022).

In 2020 in the EU27, 94 child pedestrians were killed in collisions involving cars, accounting for 21% of all child road deaths. Child car occupants with no other vehicle involved accounted for 18% of child road deaths and child car occupants in collisions with another car for 17.5%. Child car occupants in collisions with lorries or heavy goods vehicles accounted for 10% of all child road deaths. Child cyclists represent 11% of all child road deaths, and child moped or motorcycle riders, 5%. The remaining deaths follow collisions where the main other participant in the crash has not been identified or is not part of the categories listed above (Carson et al., 2022).

Based on current national definitions of serious road accidents, more than 6,000 children (0–14 years old) were seriously injured in 2020 in the EU20. Child victims of serious road crashes represent around 5% of all serious road accident victims in the EU.

1.2 Measures to improve child safety

Since 2010, there have been significant improvements in vehicle safety equipment, with much safer vehicles and the European Union's ongoing efforts to introduce further regulations to improve vehicle safety (e.g., EuroNCAP). Active safety features are designed to prevent accidents, while passive safety solutions can reduce the severity of injuries. Child seats can only be placed on the European market if they comply with current legislation and standards (I-Size, ECE). Since 2011, only new vehicles with ISOFIX attachment points as standard can be placed on the EU market. ISOFIX fixation makes it much easier to correctly position child seats in vehicles (EC, 2022).

Children move around on foot and by bicycle, as they are too young to drive. The best protection against head injuries in cycling is provided by a cycling helmet in collisions up to a speed of about 20 km/h (Carson et al., 2022). The wearing of a cycling helmet reduces the risk of serious head injury by more than 65%. According to ETSC data, 15 PIN countries require children to wear a bicycle helmet, and the same number of PIN countries do not require children to wear a bicycle helmet – including Hungary.

Child restraint systems are one of the most important passive safety systems for children in motor vehicles and are mandatory in EU countries (EC, 2022). For Hungary,

the KTI has published measurement results on road safety performance indicators for decades, which can be used effectively in several areas. Among these performance indicators, the use rate of occupant restraint systems (child safety seats) relates to child safety. While in the mid-nineties almost 90% of children traveling in cars were traveling unprotected (i.e., without any restraints), in 2018 and 2019 the proportion of unprotected children was only a few percent (Holló, 2016). Child seat use has been mandatory in our country since 2002, and since 2008, the failure to use child restraint systems has been sanctioned with significant penalties.

1.3 National transport policy targets

The road safety situation in Hungary – like in most of the EU Member States – has improved overall in recent years, but the rate of decrease in Hungary has not reached the average improvement at the EU level. In 2020, there were 46 road accident deaths per million inhabitants in Hungary, compared to 42 on average in the EU and 18–30 in the leading countries. This means that it is safer to travel on our roads today than at any time in the past decades. However, this trend has been far from unbroken, with periods of positive and negative development of various lengths, and of improvement and decline (Ministry of Technology and Innovation and Ministry of Interior, 2022). Following EU objectives, the relevant national organizations have also been working to reduce the number of road accidents and casualties. The statistics show that the number of fatalities and serious injuries has indeed decreased compared to 2010, while traffic performance, i.e., the number of kilometers traveled by vehicles on the road network, has increased almost continuously. However, the results have been significantly below the targets set in the strategy documents, not only in Hungary but also in most European countries.

The Road Safety Action Program, which sets out the main road safety priorities for the medium term, also includes road safety education for children as one of the key areas of action, in line with the objectives of the European road safety programs. It highlights the need to continue and develop good practice in the field of road safety education and to provide more modern road safety education, with age-specific content and methods. The role of transport education in public schools must be identified and professionals must be prepared for the task. This is ensured using e-learning materials, which make road safety education material accessible to the widest possible range of people, regardless of their geographical location.

The following tasks have been identified in the context of the development of road safety education and training for children and will be implemented by the public authorities in the framework of the Road Safety Action Program:

- Provision of a modular system of road safety training, adapted to the level of development, to establish a basis for good driving behavior in adulthood and to provide ideas for maintaining and improving this level.
- Encouraging parents and teachers to take responsibility.
- Theoretical and practical training should develop an attitude of hazard perception, individual safety, and consideration for the safety of others.
- Effective road safety education at all levels of public education (pre-school, primary, and secondary) requires both theoretical and practical road safety education in compulsory form.

2 Methodology

Our research focused on children's accidents between 2010 and 2023, involving 42,643 children. We used the data on accidents available in the WEB-BAL database (KTI, 2024) based on the data of the National Statistical Office (KSH). Child casualties are crashes where the age of the injured is between 0–14 years: in national and international statistics on road collisions, crashes involving 0–14-year-olds are considered child casualties.

In our study, we developed several indicators to describe child accidents in Hungary and their trends over time. For absolute indicators, we examined the number of children killed and injured in road accidents by year. As the Hungarian population and the number of people injured in road accidents have been steadily decreasing, it was considered important to analyze the proportion of injured children in the total number of people injured in road accidents (relative number of injured children).

For accidents involving children, we also looked at the number of road traffic crashes involving children causing personal injury, the primary causal groups of crashes involving children, the numbers of children injured and fatalities as passengers in the vehicle, the characteristics of the crash locations and the evolution of the performance indicators of children in the vehicle.

3 Results and discussion

Between 2001 and 2023, 477 children died in road accidents on Hungary's roads (Fig. 1), and 42,643 children were involved in road traffic accidents. Looking at the

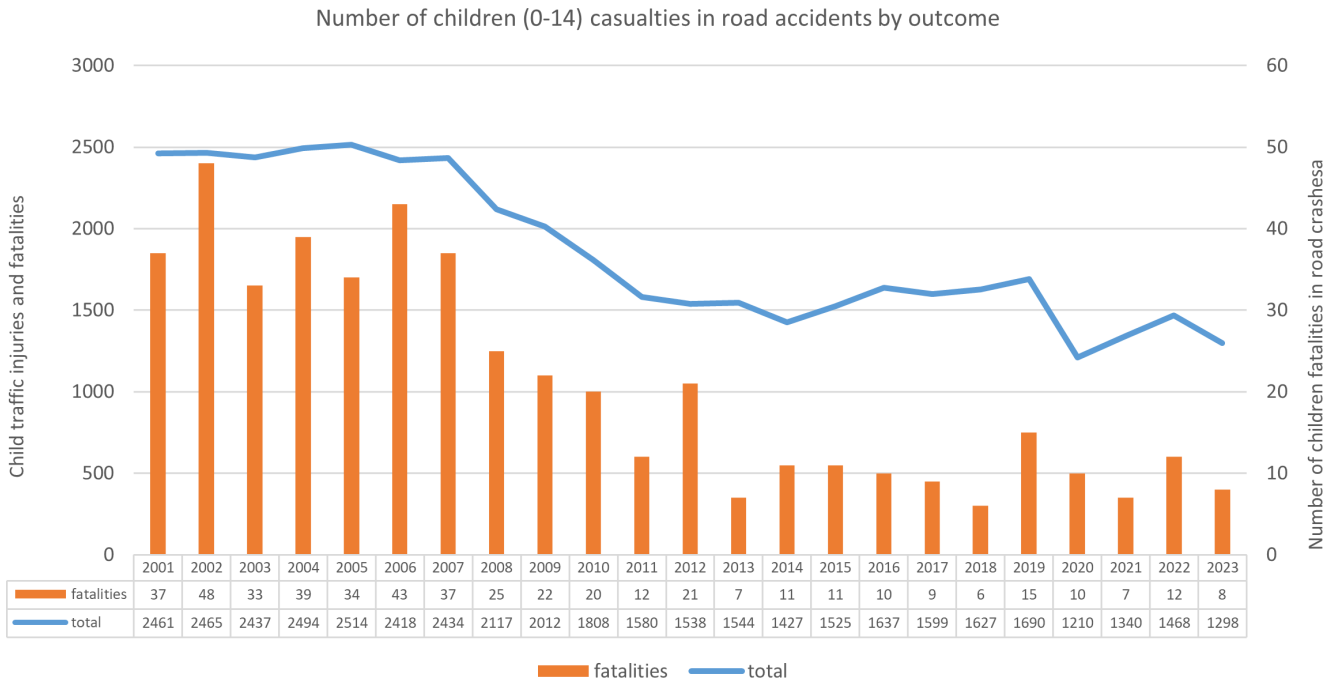


Fig. 1 Change in the number of children (0–14 years) killed or injured in road traffic accidents by outcome between 2001 and 2023 (Source: KTI, WEB-BAL)

trends in child casualties in Hungary, we can see that the safety of children in Hungary has improved significantly over the last two decades. While in 2001, 37 children died in road accidents, in 2023 only 8 children died. The number of child fatalities and injuries in road accidents has almost halved in 22 years.

Just as European trends show a decline in population and an aging society, the same trend can be seen in

Hungary. The proportion of children in the population has fallen slightly: from 16.6% in 2001 to 14.6% in 2022. At the same time, the proportion of older people in our society has increased by more than 5% over the two decades. Children injured or killed in traffic accidents accounted for just 0.09% of all children in 2021.

The number of accidents caused by children has also fallen significantly over the last 20 years (Fig. 2): from 775 road

Accidents caused by children as a percentage of all accidents involving children

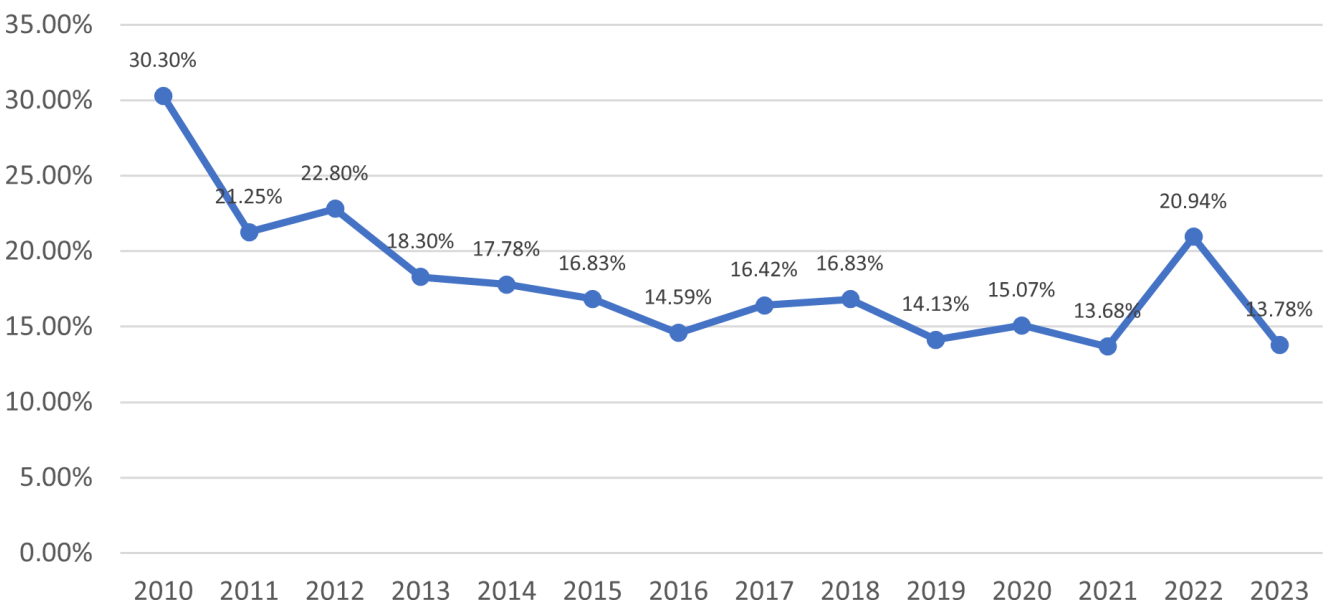


Fig. 2 Accidents caused by children as a percentage of all accidents involving children between 2001–2023 (Source: KTI, WEB-BAL)

accidents in 2001 to 232 in 2021, this figure is just under one-third. If we compare the number of accidents caused by children with the total number of accidents involving children, we see that the proportion of accidents involving children has fallen from 30% in 2010 to 13.8% in 2023.

The causes of accidents involving children show that the main groups of causes are inappropriate use of speed, failure to give way, failure to change direction, passing, and turning. The same can be observed if we look at the main groups of causes of all personal injury accidents between 2001 and 2023. Around 20% of accidents are due to inappropriate speed selection, and around 25–25% to failure to yield the right of way, and direction change or passing errors (Fig. 3). Therefore, it is clear that the groups of causes of accidents involving children show a difference about all accidents.

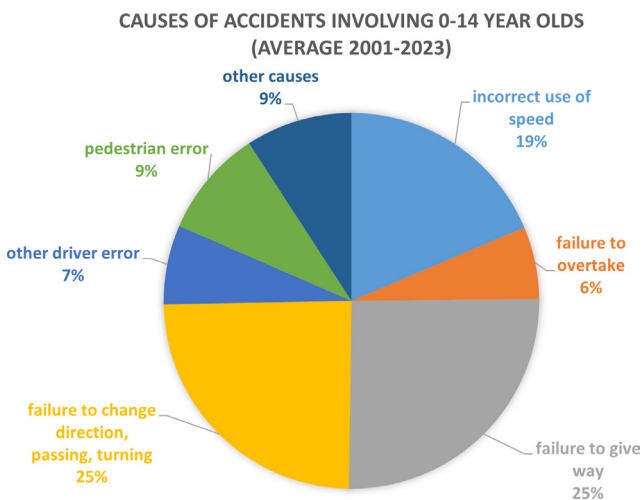


Fig. 3 Causes of accidents involving 0–14 year olds (Average 2001–2023) (Source: KTI, WEB-BAL)

Looking further at child accidents in the country, half of all children are injured as passengers in a car. Given the increasing motorization of the population, the almost steadily rising proportion of children injured and killed as passengers since 2000 is understandable to a certain extent, but by no means acceptable or even worrying. While in 1983, this figure was around 33%, in 2010 56.8% of children killed or injured in road accidents were injured as passengers in a motor vehicle, since 2011 the figure has hovered around 50.2% and has not fallen below 50%. However, the increasing trend in recent years also suggests that a not insignificant proportion of children still travel unprotected (without child safety seat or adult seat belt, i.e., without any restraint) (Ötvös and Krizsik, 2023).

The distribution of the number of children killed and injured as passengers is similar in residential and non-residential areas, with differences in severity (Table 1).

On average, more than 80% of child deaths occur and more than 60% of seriously injured children are killed or injured in accidents outside built-up areas (Fig. 4). The aggregate proportion of children killed and seriously injured as car passengers is shown in the following graph. On average, 13.3% of the involved children are seriously injured or killed in accidents outside built-up areas, and 5.8% of the involved children in built-up areas. Over the period under review, this shows that the risk of serious injury and death outside the built-up area is more than double that in the built-up area. In recent years, children's mobility patterns have also been significantly restricted in our country to accessing educational institutions and the surrounding playgrounds. This leads us to assume that in

Table 1 Number of children killed and injured as car passenger inside and outside built-up areas (Source: KTI, WEB-BAL)

Year	Built-up areas				Outside built-up areas			
	Killed	Serious injured	Slightly injured	Total	Killed	Serious injured	Slightly injured	Total
2010	1	42	493	536	8	59	424	491
2011	0	28	439	467	8	50	378	436
2012	1	32	432	465	12	57	293	362
2013	1	24	479	504	4	55	392	451
2014	2	21	439	462	6	55	347	408
2015	1	31	531	563	7	51	364	422
2016	2	33	549	584	7	56	470	533
2017	1	33	577	611	6	42	418	466
2018	3	44	574	621	2	59	441	502
2019	0	25	600	625	11	51	497	559
2020	3	23	419	445	4	57	336	397
2021	1	21	510	532	5	43	401	449
2022	1	27	491	519	4	53	475	532
2023	0	10	476	486	7	46	373	426

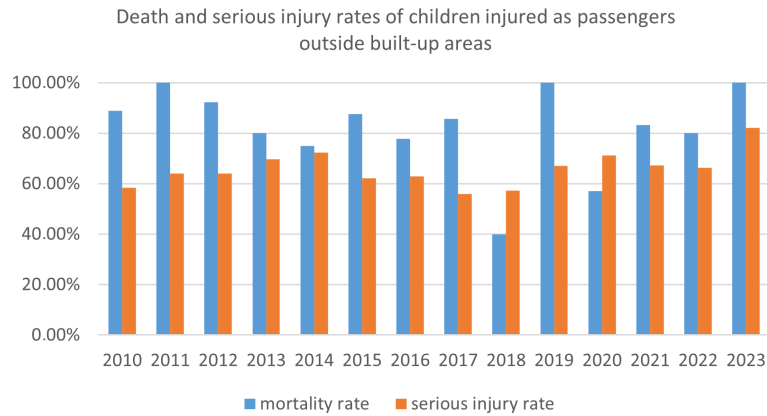


Fig. 4 Death and serious injury rates of children injured as passengers outside residential areas (Source: KTI, WEB-BAL)

most accidents involving children outside built-up areas, the children may have been traveling with their parents or adult relatives at the time of the accident. The European Commission study shows that over the last two to three decades, parents have increasingly restricted children's autonomous mobility: children nowadays most often travel by car with their parents, making it much more difficult or even impossible for them to develop the skills to behave in traffic, use public spaces or explore their environment (ERSO, 2018).

Looking at the number of accidents involving children, 88.5% of children involved in accidents in 2023 were wearing a seat belt or were traveling in a child seat (Fig. 5). However, the statistics also show that there has been no significant improvement since 2011.

However, the use of child restraint systems based on accident data is far from being at the top of the international league table. ETSC data show that the use rate of child

restraints is close to 100% in Austria and Germany, while Finland, Estonia, Poland, Slovenia, and Switzerland also have rates above 90%. In Austria, data is not only available on child restraint use rates but also on the proportion of children in cars properly restrained: this is estimated at around 40% of the Austrian population (Carson et al., 2022).

In 2023, KTI conducted an extensive national survey to determine the rate of seat belt use by children on a nationally representative sample. The measurements were conducted on 17 motorway sections, 33 suburban road sections, and 20 urban locations. A total of 4,537 children's seat belt use was recorded. The results showed that there are gaps in children's seat belt use. Only 89.9% of children were wearing seat belts in vehicles. In addition, we found that seat belt use varied by road type. On motorways, 95.3% of children were wearing their seat belts when traveling, on rural roads 88.4%, and urban roads 90.7% (Krizsik et al., 2023).

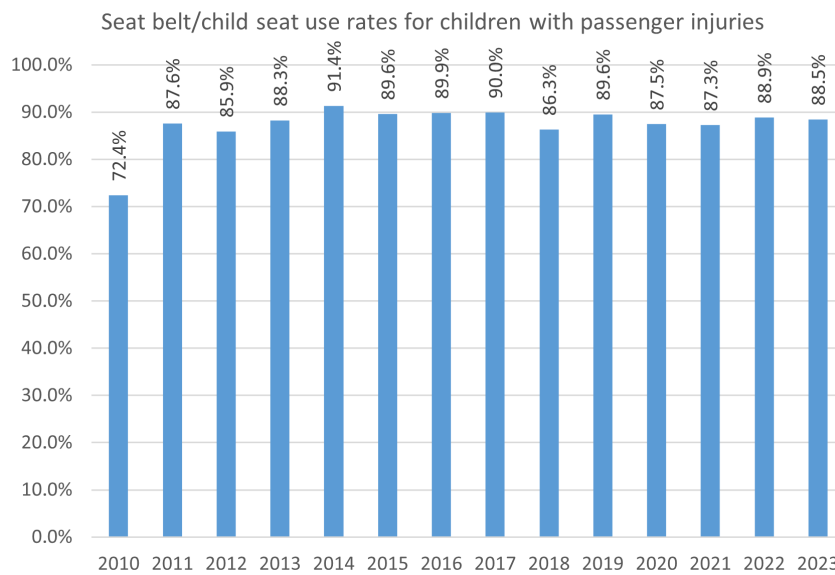


Fig. 5 Seat belt/child seat use rates for children with passenger injuries (Source: KTI, WEB-BAL)

Children up to the age of 14 years participate in transport as independent road users, mainly as cyclists and pedestrians, and have been injured mainly in accidents in built-up areas. The number of children killed and injured in cycling accidents is summarized in Table 2.

The number of children killed or injured in pedestrian accidents is summarized in Table 3.

Looking at fatal accident rates involving children, we see that since 2011, children have been victims of road accidents as passengers in more than 60% of cases, as pedestrians in less than 30%, and as cyclists in just under 10% (Fig. 6). When looking at serious injury rates (Fig. 7),

this proportion changes somewhat, with the proportion of children seriously injured as passengers hovering around 50%, children seriously injured as pedestrians at 30%, and children seriously injured as cyclists at 20% on average. A more detailed analysis of child fatalities also confirms that the causes of accidents are mainly attributable to driver error. Looking at the location of fatal accidents, no typical locations can be identified.

4 Conclusion

An examination of the statistics shows that adult drivers are primarily responsible for accidents involving children.

Table 2 Children killed and injured by cyclists inside and outside built-up areas 2010–2023 (Source: KTI, WEB-BAL)

Year	Built-up areas				Outside built-up areas			
	Fatalities	Serious injured	Slightly injured	Total	Fatalities	Serious injured	Slightly injured	Total
2010	1	59	253	313	2	4	14	20
2011	0	47	264	311	0	10	12	22
2012	0	67	256	323	2	4	10	16
2013	1	59	232	292	0	6	9	15
2014	1	42	224	267	0	2	7	9
2015	2	47	210	259	0	3	11	14
2016	0	44	182	226	0	3	7	10
2017	0	40	184	224	0	2	7	9
2018	1	33	199	233	0	1	9	10
2019	0	35	173	208	1	2	6	9
2020	1	26	174	201	0	4	5	9
2021	0	27	143	170	0	3	7	10
2022	1	19	146	166	0	3	11	14
2023	0	30	140	170	0	1	9	10

Table 3 Children killed or injured in pedestrian accidents inside and outside built-up areas 2010–2023 (Source: KTI, WEB-BAL)

Year	Built-up areas				Outside built-up areas			
	Fatalities	Serious injured	Slightly injured	Total	Fatalities	Serious injured	Slightly injured	Total
2010	8	101	331	440	0	9	9	18
2011	1	60	284	345	3	3	9	15
2012	4	69	286	359	1	7	5	13
2013	1	66	238	305	0	3	10	13
2014	1	57	237	295	0	2	6	8
2015	1	74	210	285	0	5	3	8
2016	1	52	249	302	0	5	3	8
2017	2	59	256	317	0	1	2	3
2018	1	62	213	276	0	2	1	3
2019	3	65	229	297	1	4	2	7
2020	1	32	136	169	1	5	2	8
2021	0	43	144	187	1	2	1	4
2022	5	47	166	218	1	2	0	3
2023	0	40	155	195	1	4	5	10

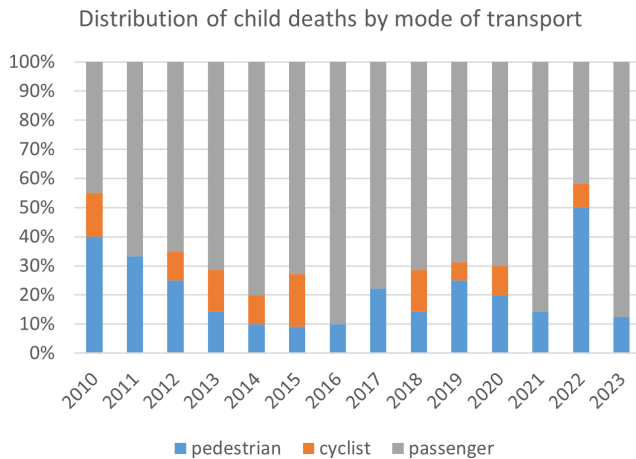


Fig. 6 Distribution of child deaths by mode of transport 2010–2023 (Source: KTI, WEB-BAL)

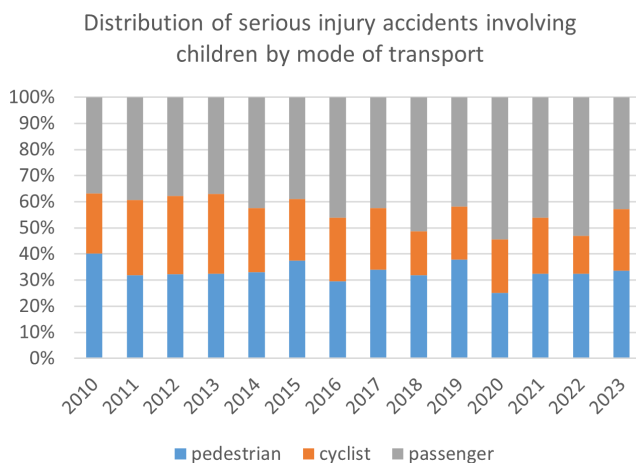


Fig. 7 Distribution of serious injury accidents involving children by mode of transport 2010–2023 (Source: KTI, WEB-BAL)

Parents have a huge responsibility to ensure that their children are provided with a child seat appropriate for their age, height, and weight when traveling in a vehicle, and that they are properly restrained.

Countries with a good performance in child safety also tend to have a good overall road safety culture characterized by a well-established and integrated approach (OECD, 2004).

References

Carson, J., Jost, G., Meinero, M. (2022) "Reducing Child Deaths on European Roads: PIN Flash Report 43", European Transport Safety Council. (ETSC), Brussels, Belgium, Rep. 43. [online] Available at: https://etsc.eu/wp-content/uploads/ETSC_PINFLASH43.pdf [Accessed: 24 July 2024]

EC (2022) "Road Safety Thematic Report – Seat belt and child restraint systems", [pdf] European Commission (EC), Brussels, Belgium, 2022. Available at: <https://road-safety.transport.ec.europa.eu/system/files/2022-01/Road%20Safety%20Thematic%20Report%20-%20Seat%20belt%20and%20child%20restraint%20systems.pdf> [Accessed: 24 July 2024]

Improving road safety for children can be achieved through a combination of measures aimed at the safety of all road users: modernizing the road environment, designing vehicles to protect both passengers and bystanders better, enforcing traffic rules, promoting the correct use of appropriate child restraint systems, training and raising awareness. A policy focused on child safety can lead to an overall improvement in road safety for all road users. Children’s behavior in their youth can determine how they will drive as adults (ETSC, 2019).

Walking and cycling help reduce carbon emissions and congestion. By walking or cycling to school, children can get to know their environment better and improve their road safety skills (Török et al., 2013). To keep children healthy, safe, and mobile, a balance is needed between encouraging and enabling free movement and maintaining a safe road environment. Measures to improve general road safety have significant benefits for children in terms of road safety (Ötvös et al., 2022). Adaptation of the safe system approach, i.e., improving vehicles, road infrastructure, and road user behaviour, will reduce the risks to children in traffic (ETSC, 2020).

Improving road safety for children is a priority not only because they are particularly vulnerable, but also because they are our future, and future road safety depends heavily on the knowledge and attitudes they acquire now.

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EC (2023) "European Road Safety Observatory: Road Safety Thematic Report - Children", [pdf] European Commission (EC), Brussels, Belgium. Available at: https://road-safety.transport.ec.europa.eu/document/download/7ef71902-930a-428d-a59f-ca89793ef9bd_en?filename=Road_Safety_Thematic_Report_Children_2023.pdf [Accessed: 24 July 2024]

ETSC (2019) "The status of traffic safety and mobility education in Europe", [pdf] European Transport Safety Council (ETSC), Brussels, Belgium. Available at: <https://etsc.eu/wp-content/uploads/ETSC-LEARN-Report-on-the-Status-of-Traffic-Safety-and-Mobility-Education-in-Europe.pdf> [Accessed: 24 July 2024]

- ETSC (2020) "Key principles for traffic safety and mobility education", [pdf] European Transport Safety Council (ETSC), Brussels, Belgium. Available at: <https://etsc.eu/wp-content/uploads/LEARN-Key-Principles.pdf> [Accessed: 24 July 2024]
- ERSO (2018) "Children 2018: 2018 edition of Traffic Safety Synthesis on Children in Road Safety", [pdf] European Road Safety Observatory (ERSO), European Commission, Brussels, Belgium, 2018. Available at: https://road-safety.transport.ec.europa.eu/document/download/be30d118-1a0d-46d1-a5cb-6c1ee6cf6e65_en?filename=ersosynthesis2018-children.pdf [Accessed: 24 July 2024]
- Holló, P. (2016) "Gyermekek közúti biztonsága hazánkban" (Road safety for children in our country), Közlekedéstudományi Szemle, 66(6), pp. 62–70. (in Hungarian)
- Ministry of Technology and Innovation and Ministry of Interior "Hungarian Road Safety Action Program 2023-2025", Ministry of Technology and Innovation and Ministry of Interior, Budapest, Hungary, 2022.
- Krizsik, N., Hamza, Z., Berta, T. (2023) "Személygépjárművekben utazók biztonsági öv használata" (Seat belt use for passengers in cars), Közlekedéstudományi Szemle, 74(3), pp. 44–52, 2024. (in Hungarian)
- KTI "WEB-BAL", [online] Available at: <https://webbal.kozut.hu/> [Accessed: 24 July 2024]
- OECD (2004) "Keeping Children Safe in Traffic", OECD Publishing. ISBN 92-64-10629-4
<https://doi.org/10.1787/9789264106314-en>
- Ötvös, V., Krizsik, N. (2023) "Hazai gyermekbalesetek elemzése" (Analysis of domestic child accidents), In: XIII. International Conference on Transport Sciences, Győr: Multimodality and sustainability, Győr, Hungary, pp. 551–560. ISBN 9786156443175 (in Hungarian)
- Ötvös, V., Barna, É., Krizsik, N., Kelemen-Winkler, N. (2022) "Közlekedésre felkészítés az óvodákban" (Traffic training in kindergartens), Közlekedéstudományi Szemle, 72(3), pp. 42–51. (in Hungarian)
<https://doi.org/10.24228/KTSZ.2022.3.4>
- Scurt, F. B., Beles, H., Vesselenyi, T., Lehel, C. (2023) "Driver alertness monitoring system in the context of safety increasing and sustainable energy use", Cognitive Sustainability, 2(1).
<https://doi.org/10.55343/cogsust.49>
- Torok, A., Pauer, G. (2022) "Safety aspects of critical scenario identification for autonomous transport", Cognitive Sustainability, 1(3).
<https://doi.org/10.55343/cogsust.23>
- Török, Á., Sipos, T., Tánczos, K. (2013) "Passive Safety Development Of Passenger Cars", In: MOSATT 2013: Contribution to Proceedings of the International Scientific Conference, Kosice, Slovakia, pp. 271–274. ISBN 978-80-971432-0-6