

ANALYSIS OF CHANGES IN TRAFFIC RULES AND ASSESSMENT OF THEIR IMPACT ON ROAD TRAFFIC SAFETY

Łukasz Muślewski, Bogdan Landowski

*UTP University of Science and Technology
Faculty of Mechanical Engineering
Prof. S. Kaliskiego Av. 7, 85-796 Bydgoszcz, Poland
tel.: +48 52 3408208
e-mail: lukasz.muslewski@utp.edu.pl, bogdan.landowski@utp.edu.pl*

Michał Pająk

*University of Technology and Humanities in Radom
Stasieckiego Street 54, 26-600 Radom, Poland
e-mail: m.pajak@uthrad.pl*

Michał Sójka

*Cuiavian University in Włocławek
Faculty of Mechanical Engineering in Grudziądz
Czarneckiego Street 5/7, 86-300 Grudziądz, Poland
tel.: +48 502 371 603
e-mail: michal.wojciech.sojka@gmail.com*

Abstract

Road safety is an important social issue. Hence, changes in road traffic rules have a large influence on travel safety improvement. One of the major issues to be addressed is the speed limit of motor vehicles and radar speed measurements. Moreover, road traffic rules impose the obligation to wear safety belts during driving, carrying children in car safety seats and they put a ban on drink driving as well as driving under the influence of other intoxicating substances that have a negative influence on the driver's physical condition and driving skills. This study analyses changes in traffic rules and provides assessment of the way they affect road traffic safety in Poland. The study presents an analysis of the issues connected with road vehicle operation and safety of the passengers including: wearing safety seat belts, use of children car safety seats, vehicle lighting, speed limit. Such issues as the proposed changes in breathalyzer use and implementation of safety systems to provide road users with safety have been addressed.

Keywords: *transport, road transport, traffic rules, safety, vehicle operation*

1. Introduction

Road safety is one of the most significant social issues. The knowledge of road safety rules is required to move safely on public roads. Knowledge of legal acts has a positive influence on road traffic safety and traffic efficiency [20].

In comparison with other European countries – Polish roads still pose a significant threat on their users. In Poland, the risk of being killed in a road accident is three times higher than, for example, in Sweden. Despite a significant increase in the number of motor vehicles, it is possible to decrease the number of accident victims. It was possible in countries such as Great Britain, Holland and earlier mentioned Sweden. The main factor that determines road safety improvement

is familiarity with the causes of accidents, knowledge of the level of threat and research on solutions to reduce the number of accidents and their severity. The knowledge of road safety improving acts is also very important. The main factors that threaten road safety in Poland include high speed, drink driving and road users whose behaviours are improper or who lack retro-reflective elements [4].

2. Road safety rules and their amendments

The first traffic rules were formulated in ancient times and applied to vehicle parking. In 750 B.C., a ban was introduced to parking vehicles on the road in Ninawa, Assyria. The first road traffic regulation was issued in 1879, although the first series production of cars started no sooner than thirty years later. However, the first Traffic Code was issued in 1905 by J. Perrigot [13, 25].

On 27 November 1961 in Poland, ‘Public Road Traffic Safety and Order Act’ was implemented and in January 1984, another act came into force and all the previous legal rules regarding road traffic were formally annulled. However, the major traffic rules and traffic signs remained unchanged, with the exception of the regulation regarding the way of moving in traffic circles 0. Amendment of that act introduced in 1991 addressed road signals, traffic signs and traffic rules on public roads for motor vehicles and their operators [25]. The legislation concerning road traffic is provided in the Act of 20 June 1997 ‘Road Traffic Law’ and its 73 amendments. The legislation system has been completed with numerous amendments [17]. Substantial changes introduced by the Act of January 1997, included almost all road users. This act was introduced on the 1st of January 1998. The main intention of its creators was to improve road traffic safety an adjust the Polish traffic rules to the European Road Traffic Law [15].

Amendment of the Act of 1997 was announced on the 6th of September 2001. Changes provided in this act included all issues which are connected with driving license applicants as well as drivers, cyclists, road maintenance executives and workers, police, examiners and driving instructors [8].

The Act of 20 April 2004 ‘Amendment of Act – Road Traffic Safety and Road and Local Fees’ includes information on permitted speed limits for motor vehicles or sets of vehicles in a built up area. Moreover, this act specifies the width of a pavement situated along a road. Aspects connected with the import of motor vehicles from abroad and their homologation have been discussed, as well [22].

The Act announced on 7 March 2007 on ‘Amendment of Act – Road Traffic Act’ includes information connected with the obligation to use dipped headlights around the clock [23]. However, the Act of 2013, announced on 26 July on ‘Amendment of Act – Road Traffic Law’ was imposed on pedestrians (who use the road at dusk) outside the built up area to wear on them retro-reflective elements [24].

Significant changes concerning the way of transporting children are provided in the Act of 9 April 2015 on ‘Amendment of Act – Road Traffic Law’. This act does not specify the age of children who must be transported in car safety seats. The act imposes an obligation to use safety seats for children under 150 of height according to their weight and height [16].

3. Analysis of statistical data on road traffic safety and its impact on road users

Negative factors that largely increase the risk of accident occurrence include excessive speed of motor vehicles; drink driving driving under the influence of intoxicating substances. Despite occurrence of such behaviours, traffic safety on the Polish roads has significantly improved for the last few years. The number of deaths has dropped by nearly 45%. Whereas, the number of people injured in car accidents has decreased by more than 30%. It is worth noticing that despite the constantly increasing number of vehicle moving on the roads the falling tendency is still being observed [12].

3.1. Analysis of statistical data on the obligation to wear seat safety belts by drivers and passengers of motor vehicles

Seat belts play an important role in providing passengers with safety in the event of a road collision or accident. Properly fastened seat belts allow a driver to control the vehicle, especially on bumpy roads and while turning. Initially, the obligation to use safety belts was imposed only on the driver and the front seat passenger. This regulation was introduced in Poland in 1983 and applied only to roads outside the built up area. In 1991, the duty was extended onto passengers from the back seat and all kinds of roads. However, only in the last few years, the awareness of road users has significantly increased and they have responded positively to the regulation [1]. This response was however, the effect of numerous actions and social campaigns, which were addressed to drivers, and passengers of motor vehicles. The campaign 'Fasten Seatbelts, Turn on Thinking' played a significant role in changing the attitude to this obligation. The campaign was carried out for the Road Traffic Safety National Council [2].

Statistical probability for a driver wearing safety belts to be killed in a head on road accident is 2-3 times lower as compared to those who fail to comply with this rule. However, in case of a side collision it is 1.8 times lower. After overturning, it decreases as many as 5 times. In turn, as regards motor vehicle passengers, statistics are even more optimistic as in case of a head on collision the risk degree is reduced 9 times. According to data prepared by experts from Cornell University use of seatbelts reduces the risk of body injury by 62-75% [4].

According to the research on road collisions and accidents safety belts do not perform their function only when fire is involved in the accident. They can be an obstacle for a passenger to get out of the vehicle. These events, however, account only for 0.5% of accidents [3]. The research shows that among drivers who have been thrown clear from a vehicle during an accident. The death rate is ten times higher in relation to people who do not use safety belts and remain in the vehicle [4].

Although wearing seatbelts is obligatory for all passengers. in 2013 only 83% of drivers and 87% of front seat passengers complied with the rule. However, only 59% of back seat passengers observed this rule. The good news is that the percentage share of drivers who use seat belts has risen by nearly 20% as compared to 2013. Similar tendencies can be observed for passengers of the remaining cars. Whereas, the back seat passengers used safety belts less often. It is worth mentioning that the number of people who wear seat belts in motor vehicles both women and men exceed 95% of car users.

The research carried out on request of the Road Traffic Safety Council has also proven that those who move in big cities wear seat belts more often than those who travel on national roads. Basing on the obtained data it can be said that there is a significant dependence between the type of road and the degree of seat belts usage. The higher category of road the more people is who use safety belts. Vehicles, which travel at higher speeds, that people who cover long distances, are more aware of danger on the road [19].

3.2. Analysis of statistical data regarding the obligation to carry children in car safety seats

Road traffic rules, which apply to children, include mainly safety issues connected with transport of children in automobiles. In Poland, according to the act 'Road Traffic Regulations', from 13 May 2002, each child at the age below 12, shorter than 150 centimetres, must be transported in a car safety seat or in another safety device. Act of 9 April 2015 'Amendment of Act – Road Traffic Safety' implemented European Union regulations on transport of children in motor vehicles. Current rules take into consideration only the criterion of height not age. It means that also a child under 12, who does meet the criterion of height 150 cm, has to be transported in a car safety seat or another safety device. A number, of departures from the rule have been allowed. It is allowed, to carry children whose height is between 135 and 150 centimetres, in the back seat only

with the use of seatbelts. However, children cannot travel in a car without a car safety seat or another safety device in the event when their body weight or height does not allow providing them with appropriate safety device. It applies to children whose body mass exceeds 36 kilograms, hence the maximum weight designed for transporting children safety devices. Another exception from the so far binding rules, allows carrying a third child. at the age under 3 years, in the back seat of a car when two children are transported in safety devices situated in the back seat and therefore, it is not possible to install a third safety device [5].

Table 1 presents data concerning the number of children under six who sustained injuries and died in road car accidents, in 2008-2017.

Tab. 1. Number of road accidents with involvement of children under six and their consequences in the period in 2008-2017 [21]

YEAR	Accidents		Killed		Injured	
	Total	2008=100%	Total	2008=100%	Total	2008=100%
2008	5 755	100.0	146	100.0	5 753	100.0
2009	5 050	87.7	128	87.7	5 058	87.9
2010	4 239	73.7	112	76.7	4 586	79.7
2011	4 077	70.8	102	69.9	4 414	76.7
2012	3 679	63.9	89	61.0	3 945	68.6
2013	3 454	60.0	90	61.6	3 747	65.1
2014	3 210	55.8	80	54.8	3 509	61.0
2015	2 820	49.0	70	47.9	3 078	53.5
2016	2 973	51.7	72	49.3	3 260	56.7
2017	2 822	49.0	56	38.4	3 116	54.2

Basing on the analysis of road accidents with involvement of children, it can be noticed that, as compared to 2008. In 2017, the number of accidents with involvement of children dropped by nearly 51% that is, number of deaths by 61.6%, and injured by 45.8%. However, taking into account accidents with involvement of children at the age between 0-14, in 2017 in Poland, 2822 accidents were reported. In those accidents, 56 children were killed and 3116 were injured. In relation to 2016, the number decreased: number of accidents by 151 (-5.1%), number of killed by 16 (-22.2%) number of injured by 144 (-4.8%), as shown in Tab. 2.

Tab. 2. Victims of road accidents with involvement of children in 2015-2017 [21]

Age groups	Deaths			Injured		
	2015	2016	2017	2015	2016	2017
0-6	22	22	19	883	968	1 018
7-14	48	50	37	2 195	2 292	2 098
Total	70	72	56	3 078	3 260	3 116

It needs to be remembered that the above presented data shows that the number of accidents with involvement of children and their consequences were closely related to using car safety seats for children. Thus, the downward trend of the number of accidents proves that compliance with the obligation to use car safety seats has a large influence on reduction of the most fatal consequences of road accidents.

3.3. Analysis of statistical data on permitted speed limits in a built up area

In Poland, excessive speed is one of the most common causes of fatal accidents. More than 30% of this type of accidents is caused by motor vehicles moving with too high speed. Each year, in Poland more than 1600 people lose their lives in accidents caused by excessive speed. Seventy-two per cents of those accidents take place in a built-up area, whereas 54% in a built up area of towns and 18% in small towns and villages. Speed limit is exceeded usually on road sections that run through small towns or villages and in urban areas. Despite introduction of 50 km/h speed limit, the average speed at which vehicles move in towns is nearly 65 km/h. whereas in villages and small towns it is 76 km/h. These speeds pose a threat primarily to pedestrians and cyclists. In towns and villages, these pedestrians and bikers are most frequently victims of car accidents. They account for 34% and 11% of fatalities, respectively.

Even a slight speed reduction is critical to injuries that are likely to be sustained in an accident. Reduction of average speed by five per cents results in a decrease of general number of road accidents by 10%, whereas fatal accidents by 20%. 5%, higher average speed increases the number of accidents by 10%, and the number of accidents with at least one fatality – by 20% [9].

Police statistics show that unprotected road users can survive a road accident when they move with the speed not higher than 30 km. This chance decreases down to 50% for speed not higher than 50 km/h, whereas for speed higher by 10 km/h, the probability of survival practically does not exist. Therefore, the speed limit permitted in a built up area 50 km/h, is not a random choice. It enables smooth movement of motor vehicles and provides pedestrians and cyclists with relative safety [6].

In 2003 and 2004, the number of road accidents reported for a built up area was almost thirty seven thousand. After obligatory reduction of the speed limit down to 50 km/h, the number of accidents decreased by more than two thousand to reach the number of 34273 in 2005. The next year also brought a positive outcome of the introduction of new traffic rules. However, in 2007 the number of road accidents increased up to 35000. In the next years, a decreasing trend was observed until 2011. After that period, since 2012, the number of road accidents has been dropping, by a thousand each year, as compared to the previous one. The only year when an increase in the number of road accidents was reported was 2016, whereas in the next year - 2017 this value dropped again and was 23262, which accounts for 71% of all accidents that occurred on the territory of the whole country.

The number of car accident fatalities in a built up area decreased after introduction of daytime speed limit to 50 km/h. In 2001 – 2004, the average number of fatalities was 2675 whereas during the successive ten years it reached 2054. In 2004, 2755 people were killed, whereas in 2005 year there were 260 fewer. For the next five years, this number exceeded two thousand deaths yearly. In 2017, 1238 people were killed in road accidents that occurred in a built up area, which accounts for 43.7% of all accident victims in Poland.

After 2004, the number of people injured in car accidents significantly decreased. The highest number of road accidents, reaching 46480, was reported for 2001, whereas in 2004 it dropped down to 44372. In the successive year, this number was reduced by 2979. The average number of people, injured in road accidents that occurred in a built up area, in the years preceding introduction of the Act on maximal speed of motor vehicles was 45347, whereas in the years 2005 and 2014 the number was 36595. In 2017, as many as 27014 people were injured in road accidents in a built up area, which accounts for 68.4% of the total number of people injured in in road accidents [21].

Analysing presented data, it can be said that the difference in the number of people who were killed and those who were injured in road accidents is closely related to the change of traffic rules involving speed limit reduction in a built up area. At the same time, it needs to be noted that, in order to improve statistics of the number of road accident casualties, speed can be limited down to 30 km/h (such attempts were undertaken in centres of some cities), but advisability of such actions

must be considered in the context of traffic congestions in towns and analysis of the value of the major indexes of transport economics.

3.4. Analysis of legal acts including information connected with the obligation to use external lighting of motor vehicles

In Poland, since 17 April 2007, all motor vehicles moving on public roads have been obliged to use low beam headlights around the clock and throughout the year. Partial obligation to use low beam headlights was introduced in 1992 and was in force only in the period from 1 October to the last day of February. However, before 1992 there was no duty to use headlights during the day. Regulations imposing the obligation to use low beam headlights were supposed to improve general safety on the roads through enhancement of a motor vehicle visibility. An automobile with whose headlights are on is more visible on the road than a car moving without them. Use of headlights increases the chance to notice another vehicle on the road. It gives a driver an opportunity of quick reaction to a threat. In Poland, there are (2017) 29149178 registered motor vehicles (passenger cars – 22109572, trucks – 3212690 and motorcycles – 1398609), and 17 million vehicles move on the Polish roads, so appropriate lighting is very important role for road traffic safety, especially in the autumn-winter season [10].

These regulations have been also introduced in many European countries, including Italy, Czech, Norway, Russia, Lithuania and Latvia. However, in Germany, France, Spain, Austria and Great Britain there is no duty to use low beam headlights during the day [3].

The number of road accidents caused by inappropriate lighting of a vehicle exterior decreased four times between 2001 and 2014. In 2001, there were 175 road accidents, which were the result of inappropriate motor vehicle exterior lighting whereas in 2014, the number of such road accidents was 43. Beginning from 2001, the number of these type accidents kept decreasing. In 2007, after imposing a duty to use low beam headlights for 24 hours the number of accidents dropped by 22, as compared to 2006, whereas in 2017, the number was 36 (which does not confirm the declining tendency), and in consequence of these accidents 7 people died and 39 were injured [21].

Changes in road traffic rules were supposed to improve safety on the roads. Reports of the European Union Council for Energy and Transport, have proven that using low beam headlights around the clock decreases the number of road accidents with involvement of at least two vehicles by 5 to 15%, whereas the number of road accidents with involvement of motorcycles by as much as 32%. The Polish Institute of Car Transport estimates that the number of people killed in road accidents was lower by 20%. The obligation to use low beam headlights does contribute to reduction of the number of road accidents on condition that the car exterior lighting is of good quality. The results of research carried out by Hell company show that failing to notice another vehicle, despite good weather conditions, was the cause of more than 24% of road accidents. It means that the driver who caused an accident did not notice another vehicle though there was no rain or other bad weather conditions. Under certain conditions, oncoming cars or cars approaching the main road are invisible due to sunlight. Travelling against the sun or through a forest are examples of such a phenomenon. In such conditions, an automobile is visible when its driver uses low beam headlights.

From the technical point of view, driving a car using low beam headlights, does not guarantee full lighting of the road, despite significant visibility improvement. Low beam headlights illuminate the road over a short distance is directed below the horizon line [10].

In May and June 2007 that is within the two first months after imposing the obligation to use low beam headlights there were 8414 road accidents reported in Poland. However, in the same period of 2006, the police reported three less accidents. The number of deaths decreased from 812 to 831. Moreover, four hundred more people were injured and hospitalized. Only the number of small knocks has dropped. At the turn of May and June 2006, the police reported 64100 accidents,

whereas a year later, slightly more than 63700. Two first months though, was a too short time to be able to assess advisability of the introduced traffic rules.

The obligation to use low beam headlights around the clock did not result in a rapid drop in the number of accidents. The period from January to June 2007 was particularly dangerous. In those months, there was a sudden increase in the number of road accidents, despite annual, systematic road safety improvement. From January to June, almost 25% more people were killed as compared to the same time in 2006 [11].

Statistics provided by the Police show that for the first two years after introduction of the duty to use dipped headlights for 24 hours in Poland the number of accidents rose. A falling trend was observed no sooner than in 2009, however, it is far from the anticipated 20%.

It must be remembered that statistical data apply to ‘driving without required lighting’, but does not provide the information on which lights were not used and how many accidents were caused by ‘blinding’ other road users, including pedestrians and cyclists.

3.5. Analysis of statistical data concerning ban on using cell phones while driving a motor vehicle

Overtaking in forbidden places and excessive speed are still the main road offences of drivers. However, according to police statistics, each year there are more drivers who break the ban on talking on a hand held cell phone during driving. Probability of causing an accident during the first seconds of a cell phone talk increases even six times. Answering a phone a driver’s attention is distracted even for a period of five seconds. During this time, a vehicle travelling at the speed of 100 km/h covers a distance of 140 meters. Moreover, it should be noticed that dialling a number takes usually twelve seconds, during which a car moving at the speed of 100 km/h covers 330 meters. While talking on the phone the reaction time becomes longer and the field of vision shrinks. People who need to talk during driving should use a loud speaking system. This device allows a driver to make phone calls without braking traffic rules. It must be remembered that the ban on holding a microphone or a loudspeaker in hand applies also to using text messages and surfing the Internet [14].

On the request of the Secretary of the National Road Safety Council, in 2014 and 2015 research was carried out in Poland, in order to collect data on use of cell phones by drivers who hold them in hand. the research in 2014 information about 102096 drivers was collected whereas in the next year – 99 943. In Tab. 3, there is information on the number of people using cell phones during driving an automobile in 2014 and 2015, with regard to their gender.

Tab. 3. The number of persons who use cell phones during a motor vehicle in 2014 and 2015 with regard to their gender (own study on the basis of [18])

Gender	Number of analysed persons		Number of persons using cell phones			
			Absolute number		Signed number %	
	2014	2015	2014	2015	2014	2015
Women	20897	21759	994	666	4.8	3.1
Men	62001	58517	2406	1682	3.9	2.9
Total	82898	80279	3400	2348	4.1	2.9

Investigations carried out in all voivodships in the years 2014-2015 show that women more often failed to comply with the traffic rules regarding holding a cell phone in hand while driving. In 2015, 3.1% of women and 2.9% of men used a cell phone during driving. However, in the previous year, both women and men ignored the ban on using cell phones during driving a car to a higher degree.

Obviously, it needs to be emphasized that using a cell phone while driving a car increases the risk of accident, whereas analogically a ban on smoking cigarettes, eating, drinking, talking with

passengers, using multimedia etc. could be imposed. Still how to eliminate or regulate such problems as cough, runny nose, 'itching' or 'sneezing', which impair reactions of the drivers in a similar way?

3.6. Analysis of statistical data concerning the use of retro- reflective elements by pedestrians

Retro reflective elements are items, which can save life of pedestrians moving outside built up area on a dark road. The Act introduced on the 20th of June 1997, imposed the duty to wear retro reflective materials by children under 15, and therefore mainly children and young people were interested in those things. However, since the 31st of August 2014, the obligation to wear retro reflective elements was introduced for all pedestrians regardless of their age. It applied to all road users moving on the road after dusk, outside the built up area. This obligation was not imposed on pedestrians who are on the road designed only for walking on a pavement and in a built up area. The act did not specify how a retro reflective element should look. It must be visible for other road users and must perform its function. The new laws are supposed to reduce the number of road accidents with involvement of pedestrians and cyclists. A driver who notices a pedestrian fast enough has the possibility of immediate reaction. A pedestrian who moves on the road at dusk without using retro reflective elements is seen by a motor vehicle driver no sooner than over the distance of twenty meters. Whereas when pedestrians use retro reflective materials, they are seen over the distance longer than 150 m [7].

The number of road accidents caused by pedestrians from 2001 to 2014 decreased three times. In 2001 there were 9508 road accidents caused by pedestrians, whereas in 2014, the number of road accidents was 3050. In 2002, 9159 events of this type were reported that is 349 fewer than in the previous year. Over each successive, year the number of road accidents caused by pedestrians was decreasing. In 2017 they caused 2378 accidents (7.3% of all accidents), in result of which 425 persons were killed (15% of all the fatalities), and 2012 persons were injured (5.1% of all the injured). In comparison with 2016, pedestrians caused 71 fewer accidents (-2.9%), in which the number of injured was lower by 81 (-3.9%), however, 26 persons more were killed (+6.5%) [6].

It should be said that in comparison with 2001, the number of road accidents with involvement of pedestrians significantly decreased. Analysis of data from the studied period confirms rightness of the new traffic rules for using retro reflective elements by pedestrians.

4. Current solutions to be used for road safety improvement

Since April of this year, a car manufactured in the European Union must be equipped with E-Call system. It sends automatically accident related information to rescue teams. The information to be sent to an emergency operator includes the vehicle location, road direction, kind of fuel and the number of passengers. It is activated automatically after airbag deployment and is synchronized with the GPS system. Taking into consideration costs of the system operation 150 EUR it can significantly shorten the time for rescue teams to respond, which is essential in case of serious accidents when time decides about death or life.

Another solution, which is to be implemented in each car to be manufactured from 2019, is a breathalyzer. Its function will involve immobilizing the car when an alcohol level sensor shows excessive concentration of alcohol in the driver's breath. It is assumed, though that it is the driver who tries to start the car, not other 'helpful' people from his/her environment.

In 2019, new cars are to be equipped with a system for road edge crossing signalling. The system is activated after crossing a sideline of the road and its operation involves emitting a sound signal, which is supposed to alert, or even wake up the drivers. It needs to be emphasized that some luxurious cars, e.g. Mercedes class S, have already been equipped with this system for several years, and its high (over 1000 EUR) price was paid by the buyer. Statistical data from 2017 reveal that falling asleep or exhaustion was the cause of 569 accidents in consequence of which 67 people were killed and 888 sustained injuries. On the other hand, activation of a sound system

can cause a sudden, dangerous reaction including sudden uncontrolled pulling the steering wheel or rapid braking which in turn, caused 212 road accidents, in which 6 people died and 256 sustained injuries [21].

It is likely that in 2019 the system Intelligent Speed Assistant (fixed in e.g. Volvo series 90), which automatically reads speed limits from traffic signs or, through integration with the GPS system, adjusts speed to the required limits will be introduced. In the case of ISA system implementation, a question arises whether it will allow sudden momentary acceleration of the vehicle speed while overtaking another car, which may lead to a head on crash with an oncoming vehicle. Another doubt is connected with correctness of the speed limit reading from old damaged or snow covered traffic signs.

Another safety enhancing factor which, however, has not been implemented yet, is the obligation to use winter tires on the roads in Poland, in the period from November to April. Currently, the only regulation concerning tires is minimal (1.6 mm) depth of the tread. There are countries in Europe where this is obligatory however, it seems that the use of winter tires in dependence on the type of road and weather conditions (like for example in Slovakia), is a more reasonable solution, analogically to the obligation to use tire chains on some Polish roads.

5. Conclusions

Road traffic rules have undergone substantial changes for the last fifty years. Since 2001 road traffic, safety on Polish roads has significantly improved. An analysis of statistical data provides the basis for formulation of the following conclusions:

- people who travel on district roads wear safety improving seat belts least often,
- passengers who occupy the front seat next to the driver most often wear seatbelts while traveling by car,
- the number of children under six, injured in car accidents on the Polish roads, has been systematically decreasing since 2003,
- since 2001 a significant drop in the number of road accidents has been reported for built up areas,
- cell phones are still being used improperly while driving by statistically significant number of both women and men,
- due to relatively short time passed from introduction of the law imposing the obligation to use retro reflective elements, it is hard to provide its assessment in terms of road traffic safety.

At the same time it needs to be emphasized that implementation of obligatory changes and orders regarding motor vehicles, apart from road traffic safety, should also take into consideration the costs of and other limitations which car users have to comply with– after all it is possible to order production of armoured automobiles, equipped with minimum 30 airbags and safety curtains, a few additional braking systems, apart from ABS, traction control systems and impose drastic speed limit and even montage of drivers surveillance systems.

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