

## ORIGINAL ARTICLE

# MORTALITY AND INJURY IN UKRAINE AS A RESULT OF TRAFFIC ACCIDENTS IN MEASURING OF PUBLIC HEALTH: TO THE ANALYSIS OF SOCIAL-LEGAL AND CRIMINOLOGICAL PROBLEM

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**ABSTRACT**

**The aim:** Based on the statistics study of the consequences of road accidents for human potential of Ukraine and quantitative indicators of criminal offenses in the field of road safety for the period 2016-2021, as well as assessing the risks to public health of Ukrainian society to carry out socio-legal and criminological analysis of the problem and identify key areas of the national approach to the implementation of the tasks of the Second Decade of Action to ensure road safety (2021-2030).

**Materials and methods:** The study is based on the results of a survey of ordinary citizens of Ukraine on the state of road safety on the roads of Ukraine; information posted on the WHO website for 2009-2020; statistical reports of Ukrainian law enforcement agencies, specialized literature on law, etc. The methodological basis of the research is dialectical, comparative, logical, analytical, synthetic, statistical, and concrete-sociological research methods.

**Results:** In Ukraine, among adolescents and young people at the age of 15-24, the first and main cause of death from external circumstances is death in an accident. Among young people aged 25-29 years, this is the second leading cause of death (after suicide). Every third child, being in the status of passengers, dies due to the fault of relatives and friends. One-third of all victims are pedestrians. It is estimated that Ukraine lost more than USD 308 million in GDP as a result of the deaths of road accident victims in 2020.

**Conclusions:** In Ukraine, road accidents are a significant cause of death and disability due to external circumstances, and therefore pose a threat to the public health of the population. The death and disability of people as a result of road accidents cause huge material and human losses to Ukraine. An unsatisfactory state of legal awareness of Ukrainian citizens is a direct threat to public health and a source of the perpetuation of the generally unfavorable trend with the level of criminally punished violations of traffic rules. An important task of the Ukrainian state is to create a service of emergency specialized care according to world standards of so-called disaster medicine.

**KEY WORDS:** road injuries, disabilities, road deaths, road safety, years of life lost in Ukraine

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**INTRODUCTION**

The annual increase in the vehicle fleet and the constant intensification and complication of traffic in Ukraine determine the fact that traffic accidents, including criminal offenses, are becoming a real disaster. And although the roots of this problem, which even acquires the character of an epidemic [1], are largely common to any country in which complex technical systems, devices, mechanisms, devices, etc. are designed to move people, goods, etc., however, the international community is concerned about the high rate of road deaths and injuries, especially in those regions of the world where the situation is close to critical. Therefore, the international community pays considerable attention to finding the most effective ways to gradually reduce offenses with serious consequences in the field of traffic. This is highlighted in UN General Assembly Resolution "Improving Road Safety Worldwide" № 74/299 of 31 August 2020, which states in paragraph 3 that in 2021-2030 the goal is to reduce mortality and injuries as a result of a road accident.

In Ukraine, the unsatisfactory state of road safety, as a result of which road accidents are a visible cause of death

and disability, is a serious problem in maintaining the public health of the country's population, becoming a threat on a national scale. Therefore, it is not in vain that the analysis of bills submitted and registered in recent years in the legislative body of Ukraine shows that among the priority areas of criminal law policy of the state such areas as, in particular, ensuring life and health on the roads by strengthening criminal liability for violations road safety and transport operation. At the same time, in order to reduce the level of accidents in Ukraine and the severity of road accidents' consequences, the State Program for Improving Road Safety in Ukraine until 2020 [2] and the Strategy for Improving Road Safety in Ukraine for 2020 was adopted. [3]. Starting from 2021, Ukraine has a Strategy to increase the level of road safety in Ukraine until 2024 [4].

Nevertheless, the rates of accidents, deaths, injuries, delinquency, and socio-economic costs associated, firstly, with prejudice and, secondly, with the elimination of these phenomena, continue to deteriorate due to an ineffective response system to those threats which permanently lead to a statement of the crisis in this area.

## THE AIM

Based on an in-depth study of the consequences of road accidents as a threat to the preservation of human potential of Ukraine, quantitative indicators of criminal offenses in the field of road safety for the period 2016-2021, as well as assessing the risks of leaving the situation unchanged criminological analysis of the problem in order to identify key areas of the national approach to the implementation of the Second Decade of Road Safety (2021-2030) by the UN General Assembly Resolution "Improving road safety worldwide" № 74/299 of 31 August 2020

## MATERIALS AND METHODS

The study was conducted in the second half of 2020 – first half of 2021 and is based on the survey's results of ordinary citizens of Ukraine on the state of road safety; information posted on the WHO website for 2009-2021; statistical reports of Ukrainian law enforcement agencies, specialized literature on law and others. The study is based on dialectical, comparative, logical, analytical, synthetic, statistical, and sociological research methods used to present various indicators that characterize the level of road injuries and deaths, as well as to visualize the damage to the national economy. The obtained empirical material was processed using, in particular, the tools of descriptive statistics, as well as methods of potential demography. The calculations were done using Microsoft Excel 2016 and Microsoft Word 2016.

## RESULTS

Every 23 seconds in the world one person (!) dies in an accident [5]. Road traffic injuries are currently the leading cause of death for children and young adults at the age of 5–29 years [6, p. 3]. In this regard, the situation of road injuries in Ukraine should be defined as critical, because, in addition to the fact that in our country the first and main cause of death of adolescents and young people at the age of 15-24 is death in road accidents [7], in addition, every third a child among the victims of an accident dies while in the status of passengers. This means that most often the cause of their death is the fault of relatives and friends. In some other age categories, accidents also occupy leading positions among unnatural causes of death or deaths from external causes. Thus, among young people at the age of 25-29, this is the second leading cause of death [7].

It is interesting to trace the dynamics of road traffic injuries according to the WHO, which covers the period from 2009 to the present. Thus, in terms of deaths due to road traffic injuries in Europe in 2009, the top ten countries in this area were nine post-Soviet countries, among which Ukraine ranked fifth, behind Kazakhstan, Russia, Kyrgyzstan, and Lithuania. [8, p. 23]. Thus, if the countries of Northern Europe were characterized by one of the lowest mortality rates in the region and the world (on average 5.7 per 100,000 people), the average accident mortality rate in the above countries was almost four times higher (21.8 per 100,000 people). It was highest in Kazakhstan (30.6

per 100,000 people), followed by Russia (25.2 per 100,000 people), Kyrgyzstan (22.8 per 100,000 people), Lithuania (22.4 per 100,000 people) and Ukraine (21.4 per 100,000 people) [8, p. 12]. In 2018-2019, the WHO noted a significant reduction in mortality on European roads. However, as before, Ukraine ranks sixth among dysfunctional countries, behind Armenia, Georgia, Kazakhstan, Moldova, and Russia [9]. At the same time, if we compare the indicators of human losses during road accidents in Ukraine and the average in the European Union per 100,000 people in 2019, in these countries this figure is 5 deaths, while in Ukraine the war reaches 12.9 people per 100,000 people [10, 11]. A purely Ukrainian problem today is the frequent deaths of road accident victims at improperly equipped railway crossings. As a result, the WHO describes the situation in these countries as very unfavorable.

If it has resorted to specific losses of road accidents in terms of public health, every year in Ukraine there are about 160-170 such cases, in which 24-27 thousand people suffer. Thus, in 2019, a total of 160,675 such cases were recorded. At the same time, 26,052 accidents were not without fatalities and/or injuries (3,454 people died and 32,736 were injured). Pedestrians made up one-third of the deaths. 168,107 road accidents were registered during 2020. Of these, 26,140 road accidents were with fatalities and injuries. (3,541 and 31,974 people, respectively) [12]. However, according to the analysis of the National Police, the main types of non-compliance with traffic rules in Ukraine have remained unchanged for years, leading to mortality and injuries, such as violation of maneuvering rules - 22%, speeding - 34%, non-compliance with the distance - 8%, violation of the intersection rules, pedestrian crossings - 8%, violation of pedestrian crossings' rules - 6%, driving while intoxicated up to 4%, etc. [4]. In total, they accumulate for more than 80% of accidents.

The authors of the paper conducted a survey of the population of Ukraine on the state of compliance with traffic rules found that more than a quarter of respondents (25.7%) during 2016 – the first half of 2021 were involved in road accidents, often in the status of a driver (54.2%) or passenger (16.7%).

Given the significant proportion of accidents involving passengers, the survey asked about the use of seat belts by such road users in a vehicle. The fact that 20.4% of people use such means of security from time to time is threatening, and 7.5% do not use it at all. Such behavior is evidence of a lack of legal awareness, which even borders on legal nihilism, manifestations of which are especially dangerous in situations when in a vehicle there is also a child next to such an adult. Such reckless behavior probably has its explanation, if we compare this respondents' answer about the importance of legal awareness of citizens in road safety. Thus, 72.1% emphasized that the role of legal awareness is the most important for road safety. However, 19.9% of respondents noted that its role in this process is insignificant; another 8% believe that legal awareness does not matter at all. In our opinion, without a doubt, the unsatisfactory level of legal awareness correlates with the general state

of road safety in Ukraine and is a significant socio-legal problem, the existence of which in the Ukrainian state is a direct threat to public health and a constant source of deterioration maintaining an unfavorable trend with the level of criminally punishable violations of traffic rules.

In this regard, it is interesting to analyze the risks that, in the opinion of the respondents, including those with insufficient legal awareness, threaten them when they are in the status of road users. Among these are speeding (72.1%); driving while intoxicated (72.7%); violation of the rules of the intersection, pedestrian crossings (51.3%); violation of maneuvering rules (49.3%); distractions for drivers (mobile devices, road advertising, etc.) (40.7%); fake driver's licenses (19.3%); failure to ensure the safety of passengers of the vehicle (4.7%), etc. In this regard, we should agree with the opinion that most of these reasons are related to the disregard of drivers and other road users of the established traffic rules [13, p. 132]. In exchange, this situation on the roads leads to the need to analyze the level of traffic crime in Ukraine.

Analysis of criminal law statistics of motor vehicle crimes shows a huge jump in these offenses in 2014 (by 113.13% compared to the previous year) (from 11,589 to 24,700 crimes). In 2016, their number reached a maximum of 26,170. In 2017, there is a decrease in them (2018 – 17,485; 2019 – 17,210; 2020 – 15,795). At the same time, 20–22% of victims die as a result of these offenses [14].

Returning to the results of our survey regarding the respondents' assessment of the situation of possible risks that may threaten them on the roads, it is very surprising that none of the respondents mentioned the quality of pre-hospital care in case of an accident, as well as the state of medical care and social assistance in the event of disability due to an accident or loss of a breadwinner. According to experts, the cost of medical care and rehabilitation is so significant that the damage to society can reach 3% of gross domestic product [15; 16]. Together in the literature, it has been repeatedly emphasized that it is essential to provide access to immediate health services due to a threat to health or life and to provide specialist rehabilitation for road accidents casualties in the post-accident phase [1; 20; 21].

This aspect is especially important because in Ukraine many road accident victims die due to the lack of medical staff skills to provide emergency care according to the standards of so-called disaster medicine. This situation is a reflection of the state of social, legal, and moral-psychological anomie of Ukrainian society, in connection with which this problem attracts the attention of the public, scientific community, and the state and forces the state to take permanent measures to protect road users. It is aimed, in particular, at the Strategy to increase road safety in Ukraine until 2024, which aims to reduce high mortality, injuries, material costs due to accidents by at least 30% by 2024, reducing the severity of their consequences for road users and reducing socio-economic costs; and introducing an effective road safety management system to protect the lives and health of the population.

Similarly, none of the respondents considers as a risk for themselves and other cases of leaving victims without

assistance from the perpetrators of the accident. However, criminal law statistics show that during 2019, under Article 135 of the Criminal Code (Leaving in danger), 221 proceedings were initiated, in 2020 – 217. Moreover, the vast majority of these criminally punishable offenses are related to leaving the driver, injured in an accident, without the necessary assistance.

The phenomenon of road injuries must be analyzed not only in retrospect but also given the huge socio-economic damage caused to society due to premature mortality of employable people who died or became disabled as an accident's result. Damage to human resources from accidents has its own dimension, its own price. This "price" can be determined based on a universal international system of calculating the years of lost potential life due to premature death (Years of Potential Life Lost, hereinafter – YPLL [22, pp. 3-33]) and non-compliance with society and the state in the form of domestic gross product (hereinafter – GDP).

By the way, this system of calculations has proved itself well in determining the corresponding losses from premature death due to suicidal behavior, drug use, and any accidents. Concerning road accidents, the WHO states that relevant information on losses in monetary terms is not provided to Ukraine [8, p. 156], although in fairness it should be noted that Ukraine refers to the calculations of the World Bank, according to which the socio-economic losses of our country from road traffic injuries are estimated at almost 70 billion UAH per year, which is about 2% of GDP [23]. Therefore, to clarify these data using the YPLL method, we will determine at least the losses for the state and society from the deaths of road accident victims in 2020.

Our calculations showed that the total number of YPLLs for men who died in road accidents in Ukraine in 2020 is 73,660.82 years, and the working-age – 68,158.5. As for women, the corresponding figures are 24,378.4 and 14,518.5 years, respectively. In general, the quantity of YPLLs for men and women killed in road accidents in Ukraine is 98,039.22, and amount of working years is 82,677 (Table I).

The volume of the gross domestic product due to the premature death of road accident victims was determined by calculating the number of years under retirement age and the value of annual income per capita. In 2020, the value of the latter indicator was 3,725.6 USD per person [17]. Our calculations show that if there were no premature death, then during the relevant part of working life, men who died in road accidents only in 2020 could produce a gross domestic product in the amount of 253,931,308 USD. In turn, the shortfall of the state and society's GDP due to the death of women in road accidents (during their working life) reaches 54,224,245.2 USD. And in total, these losses for Ukraine from death in 2020 in road accidents of all persons are equal 308 155 553 USD (Table II).

To this should be added the costs borne by the state and society due to the need to maintain the disabled, orphans, elderly parents left without care, cost of burial, treatment, social rehabilitation and prosthetics, and so on. We empha-

Table I. Calculation of lost years of life (including working years) for persons who died from traffic accidents in 2020

Parameters	Distribution of persons by age groups and number of lost years of life													
	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Number of men who died from traffic accidents	12	13	29	159	273	277	324	303	281	304	247	251	198	157
The average value of unlivd years for a certain age group of men	64,42	59,42	54,42	49,42	44,42	39,42	34,42	29,42	24,42	19,42	14,42	9,42	4,42	-
The actual number of lost years of life for a particular age group of men	773,04	772,46	1578,18	7857,78	12126,66	10919,34	11152,08	8914,26	6862,02	5903,68	3561,74	2364,42	875,16	
	The total number of lost years of life in all age groups of men											<b>73 660,82</b>		
The average value of working age for a particular age group of men	49	49	49	47,5	42,5	37,5	32,5	27,5	22,5	17,5	12,5	7,5	2,5	-
The actual number of lost years of ability to work for a particular age group of men	588	637	1421	7552,5	11602,5	10387,5	10530	8332,5	6322,5	5320	3087,5	1882,5	495	-
	The total number of lost years of ability to work for all age groups of men											<b>68 158,5</b>		
Number of women who died from traffic accidents	12	7	24	50	40	53	61	63	60	73	52	63	72	75
The average value of unlivd years for a certain age group of women	74,48	69,48	64,48	59,48	54,48	49,48	44,48	39,48	34,48	29,48	24,48	19,48	14,48	9,48
The number of lost years of life for a certain age group of women	893,76	486,36	1547,52	2974	2179,2	2622,44	2713,28	2487,24	2068,8	2152,04	1272,96	1227,24	1042,56	711
	The total number of lost years of life for all age groups of women											<b>24 378,4</b>		
The average value of working age for a particular age group of women	47	47	47	45,5	40,5	35,5	30,5	25,5	20,5	15,5	10,5	5,5	-	-
The actual number of lost years of ability to work for a particular age group of women	564	329	1128	2275	1620	1881,5	1860,5	1606,5	1230	1131,5	546	346,5	-	
	The total number of lost years of working capacity for all age groups of women											<b>14 518,5</b>		
	The total number of lost years of life for all age groups of persons who died from traffic accidents in 2020											<b>98 039,22</b>		
	The total number of years of incapacity for work lost for all age groups of persons who died from traffic accidents in 2020											<b>82 677</b>		

**Table II.** Unearned GDP for all unlivd working life of persons who died from traffic accidents in 2020

Parameters	Distribution of persons by age groups and unearned GDP for unlivd working life												
	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
Unearned GDP for all unlivd working life for a certain age group of men	2190652,8	2373207,2	5294077,6	28137594	43226274	38699670	39230568	31043562	23555106	19820192	11502790	7013442	1844172
Unearned GDP for all unlivd working life for all age groups of men (USD) 253 931 308													
Unearned GDP for all unlivd working life for all unlivd working life for a certain age group of women	2101238,4	1225722,4	4202476,8	8475740	6035472	7009716,4	6931478,8	5985176,4	4582488	4215516,4	2034177,6	1290920,4	134121,6
Unearned GDP for all unlivd working life for all age groups of women (USD) 54 224 245,2													
Unearned GDP for all unlivd working life for all age groups of persons who died from traffic accidents (USD) 308 155 553													

size once again that this also leads to an annual loss of GDP, as indicated by foreign scholars [18, pp. 25-34; 19]. By the way, when we applied to the Ministry of Health of Ukraine, we were unable to obtain information on the number of people who received a disability due to an accident.

## DISCUSSION

The problem of differences in the statistical accounting of persons injured in road accidents, which exists both in Ukraine and in the world as a whole, needs further study. For example, in Ukraine, at least three government agencies maintain similar statistics, namely the State Statistics Service of Ukraine, the Office of the Prosecutor General, and the National Police of Ukraine. Due to the specifics of accounting for road accidents and victims, this information may differ too much, which was pointed out by Ukrainian scientists N. Gutorova and O. Rudneva. However, such differences exist in other countries. Therefore, we should agree with the conclusion of experts that the development of measures to combat mortality and injury resulting from traffic accidents should be based on statistical information provided by WHO experts [24, p. 2]. Therefore, one of the urgent tasks in solving the problem of reducing mortality and injuries on the roads of the European space should be the development of a unified methodology for calculating accidents.

To stop the negative dynamics of road accidents and improve the situation with road injuries in Ukraine can prevent action, the measures of which would have a positive impact on legal nihilism, morally impaired consciousness, will, and emotions of potential offenders, forcing them to strictly follow traffic rules. Thus, in the Ukrainian realities such should be the culturological precautionary direction, restraining potential of which consists of measures and means of normative-legal, modern technical, organizational-administrative, etc. character [25]. In addition, the hypothesis is that a significant restriction of personal benefits for the vast majority of drivers is the permanent or long-term deprivation of the right to drive a vehicle, which will force these road users to change radically their attitude to traffic rules. Therefore, there is an urgent need to develop as soon as possible both theoretical issues and applied aspects of culturological direction of road injury prevention with the accompanying solution of problems to make appropriate changes and additions to current legislation in the field of road safety, improvement of disaster medicine personnel, etc. It is these ideas that should underpin the national approach to improving the catastrophic situation on Ukraine's roads.

## CONCLUSIONS

The goals declared in international and national documents, the statement of which follows from the analysis of the catastrophic situation in this area in some regions of the world and countries, put the use of decisive and radical action to prevent both the offense and the consequences of road accidents on the agenda. What has been said directly applies to Ukraine as

well. After all, in Ukraine, road accidents, being a significant cause of death and disability, are a significant threat to public health, which forces us to define this situation as a serious socio-legal and criminological problem of Ukrainian society. This is because today the first and main threat to the human potential of Ukraine, represented at the age of 15-24, is death in an accident. In the age group of 25-29, death from such cases also occupies a leading position among the external causes of death, second only to intentional self-harm (suicide). Every third child among the victims of the accident dies in the status of passengers, which indicates the guilt of relatives and friends in their deaths. The statistics of criminally punishable offenses have not yet shown a tendency to a steady decline in the number of such offenses. In addition, there are often cases when persons injured in an accident from the driver are left without the necessary assistance.

The death of people as a result of road accidents causes huge material and human losses to Ukraine. Thus, the amount of YPLLs due to premature death in 2020 is 98,039.22 years, and the number of working years – 82,677. In material terms, the loss of un-lived life is almost 308,155,553 US dollars. This damage is caused primarily by the death of men of working age.

An unsatisfactory state of legal awareness of Ukrainian citizens is a direct threat to public health and a source of the perpetuation of the generally unfavorable trend with the level of criminally punished violations of traffic rules. In this regard, the national approach to improving road safety needs to be reconsidered.

One of the key directions of the national approach to the implementation of the tasks of the Second Decade of Action to ensure road safety (2021-2030), and therefore an important task of the Ukrainian state is to create a service of specialized emergency care according to world standards of so-called disaster medicine and ensure rehabilitation victims of road accidents from the stage of the accident to the restoration of health to the extent possible.

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