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Traffic injury as a medical and sanitary consequence of an emergency of man-made nature in Ukraine. Report three: analysis and characterization of victims depending on the sign of participation in the traffic

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Abstract. ***Background.*** *Road traffic injury remains a significant medical and social problem for all humanity at any time. The aim of the research: to determine the characteristics of the victims of traffic accidents depending on the sign of their participation in traffic and living conditions.* ***Materials and methods.*** *This article is a continuation of previous publications in the journal "Emergency medicine (Ukraine)", that is, this component of the comprehensive study was conducted using a single factual material. The actual material of the study is 1,696 cases of traffic injuries, which were selected by the method of irreversible randomization. Model 1 of the real-life type was chosen to be a metropolis with a volume of actual material of 1,139 victims with traffic injuries, model 2 (rural area) — 315 cases, model 3 (regional city) — 242 cases. The study of the actual material was carried out using the methods of parametric and non-parametric statistics, the law of formal logic and fractal analysis.* ***Results.*** *The study found that the properties of the research models have a significant impact on the occurrence of injuries depending on the sign of participation in traffic. The largest specific weight of drivers was recorded in the metropolis (40.65 %), the smallest — in rural areas (16.19 %). The specific weight of passengers was the highest in the regional city (36.36 %), rural areas (23.49 %), and the lowest in the metropolis (22.43 %). The highest specific weight of pedestrians was observed in rural areas (60.32 %), in the metropolis this figure is 36.88 %, and the lowest specific weight is in the regional city (27.28 %). In addition, the influence of the characteristics of the models on the formation of the research array was found depending on the sign of participation in traffic and the victim's gender. Attention is drawn to the very low share of female drivers (4.55 %) in rural areas, while in a regional city, this figure is 24.39 %. The influence of the properties of the models and signs of participation in traffic on the occurrence of a negative outcome of the traumatic process in the victims of traffic accidents has also been proven. As a result of the analysis, the impact of research models on the emergence and formation of the array of victims with a negative outcome of the traumatic process was determined, depending on their age and participation in the traffic.* ***Conclusions.*** *Probable and direct influence of living conditions and signs of participation in the traffic on the formation of an array of victims of traffic accidents has been found. Gender has a significant impact in all research models, and it is most pronounced in the conditions of a metropolis in male victims. The sign of participation in traffic has a significant effect on the outcome of the traumatic process in victims of traffic accidents. This effect is especially pronounced in those who were injured in rural areas. The highest fatality rate among all road users is observed among pedestrians in rural areas (37.37 %), and the lowest among drivers in metropolitan areas (3.02 %).*

Keywords: *traffic accident; traffic injury; participation in the traffic; victims; comparative analysis*

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Introduction

Road traffic injury remains a significant medical and social problem for all mankind at any time [1–5]. However, the study of the problem of road traffic injuries as a medical and social consequence of an emergency situation of man-made nature remains insufficient, especially this concerns the origin of medical and sanitary consequences of road traffic accidents [6, 7]. It is also important to study such consequences in different medical-geographical and socio-economic conditions, which is especially relevant for Ukraine. This is due to the variety of natural conditions, in particular the country's landscape and infrastructure [8]. An important component is the sign of participation in the traffic of the victims, which was pointed out by many researchers [9–14], but such comprehensive studies were not conducted on the territory of Ukraine, especially in a comparative aspect depending on the medical and geographical conditions.

The above determined the direction, expediency and necessity of this research. Its results will be a fundamental basis for the formation of adequate and effective clinical routes and protocols for the provision of medical assistance to the victims of road accidents.

The aim of the research: to determine the characteristics of the victims of traffic accidents depending on the sign of participation in traffic and living conditions of the victims.

Materials and methods

Object of the research

This article is a continuation of previous publications in the journal "Emergency medicine (Ukraine)", i.e. this component of the comprehensive study was conducted using a single factual material [15]. The actual material of the study is 1,696 cases of traffic injuries, which were selected by the method of irreversible randomization from the total array of 21,000 victims using the methodology of random numbers. The material was selected in the period of 2019–2020. The resulting array was distributed according to the conditions of an epidemiological experiment on a natural type model, formed in accordance with the requirements and criteria of the law of large numbers. The volume of the study array for each model exceeded the necessary and sufficient, and this made it possible to conduct a full-fledged and high-quality analysis of the actual material and obtain reliable results. Model 1 of the natural type was chosen to be a metropolis with an actual material of 1,139 victims with traffic injuries, model 2 — rural area (315 cases), model 3 — regional city (242 victims).

The research was carried out in accordance with the plan of the dissertation work on the topic "Traffic injury (clinical-epidemiological, clinical-nosological characteristics, clinical features of the course of the traumatic process, principles of providing medical care)", approved by the Scientific Council of the Ukrainian Scientific and Practical Center for Emergency Medical Care and Disaster Medicine of the Ministry of Health of Ukraine (protocol of the meeting of the Scientific Council No. 6 of December 15, 2020) in compliance with the terms of the Declaration of Helsinki and by the bioethics commission of the Ukrainian Scientific and Practical Center for Emergency Medical Care and Disaster Medicine of the Ministry of Health of Ukraine (protocol No. 10 of December 8, 2020).

Research methods

The analysis of the actual material was carried out using the methods of parametric and non-parametric statistics, the law of formal logic and fractal analysis.

The probability of regularity and connection was assessed by calculating the polychoric correlation and Pearson's test (χ^2), followed by a comparison of the obtained data with the indicator according to Snedecor's tables.

The comparison was made according to the clinical and epidemiological characteristics of participation in traffic in gender groups, in groups by age and the outcome of the traumatic process.

The Statistica computer program was used to calculate the data.

Results

The sign of participation is one of the most important clinical and epidemiological signs that characterizes a traffic collision as a phenomenon as a whole. In order to study the structure of accidents based on traffic participation and the influence of the properties of the research model on such distribution, an analysis of specific traffic participants in the research models was carried out. Its results are shown in Table 1.

As a result of data analysis in Table 1, it was found that the drivers of model 1 (metropolis) are in the first place — 40.65 %, and the drivers of model 2 (rural area) are in the last place — 16.19 %. The ratio of the maximum and the minimum indicators in the array of drivers according to the research models is 2.51, which indicates a high dissipation of the distribution.

Passive road users (passengers) take the first place in model 3 (regional city) — 36.36 %, and the lowest specific weight (third place) was in model 1 (22.47 %). The difference in the specific weight of passengers in models 1 (22.47 %) and 2 (23.49 %) is only 1.02 %, which is within the statistical margin of error. The ratio of the maximum and the minimum indicators in the array of passengers according to the research

Table 1. Comparative structural analysis of arrays of victims based on participation in traffic in research models

Models	Drivers		Passengers		Pedestrians	
	%	rank	%	rank	%	rank
1	40.65	1	22.47	3	36.88	2
2	16.19	3	23.49	2	60.32	1
3	36.36	2	36.36	1	27.28	3

models is 1.62, which indicates a moderate dissipation of the distribution.

Among pedestrians, the first ranking place belongs to model 2 — 60.32 %, and the lowest specific weight (third place) is observed in model 3 — 27.28 %. The ratio of the maximum and the minimum indicators in the array of pedestrians according to the research models is 2.21, which indicates a high dissipation of the distribution.

Summarizing the above data, it should be noted that research models definitely have a direct impact on the occurrence of traffic injuries in all road users, but such an impact is most pronounced in drivers and pedestrians.

As a result of the conducted polychoric analysis, a positive ($\varphi^2 = 0.0606$), strong ($C = 0.2390$) and highly probable relationship ($\chi^2 = 102.72$) was found, and the above provisions are contained within the field of probability.

To establish a more detailed impact of research models on the occurrence of traffic injuries, we conducted an integrated comparative analysis of research models based on gender and traffic participation. Its results are shown in Table 2.

Male drivers have the highest specific weight (first rank) in model 1 — 55.18 %, the lowest specific weight is observed in model 2 — 19.28 %. The ratio of the maximum and the minimum indicators in the array of male drivers is 2.86. Female drivers have the highest specific weight in model 3 — 24.39 %, the lowest specific weight is recorded in model 2 — 4.55 %. The ratio of the maximum and the minimum indicators in the array of female drivers is 5.36.

Male passengers occupy the first place in model 3 — 32.50 %, and the last ranking place is recorded in model 1 — 12.92 %. The ratio of the maximum and the minimum indicators in the array of male passengers is 2.52. Female passengers also take the first place in model 3 — 43.90 %, and the last (third) rank is recorded in model 2 — 31.82 %. The ratio of the maximum and the minimum indicators in the array of female passengers is 1.38.

Male pedestrians have the highest specific weight in model 2 — 59.44 %, in the second ranking place, there are the victims of model 1 — 31.90 %, in the last ranking place — of model 3 (25.00 %). The ratio of the maximum and the minimum indicators in the array of male pedestrians is 2.38. Female pedestrians occupy the first rank in model 2 — 63.63 %, and the last rank — in model 3 (31.71 %). The ratio of the maximum and the minimum indicators in the array of female pedestrians is 2.01.

Summarizing the above, we can conclude that the characteristics of the research models have a direct impact on the formation of the array of victims of road accidents, namely, the properties of model 1 in women have the greatest impact on drivers and pedestrians, and in men, they have a much smaller impact on all road users. In addition, the very low specific weight of female drivers of 4.55 % in the formation of the research array in model 2 (rural area) draws attention.

The above points to a significant influence of the characteristics of the research models on the formation of the array of road accident victims, depending on the sign of participation in traffic and gender.

As a result of the conducted polychoric analysis, a positive ($\varphi^2 = 0.1061$), strong ($C = 0.3097$) and highly probable relationship ($\chi^2 = 179.93$) was found, and the above provisions are contained within the field of probability.

An important characteristic of any injury is the result of the traumatic process. In order to verify the influence of the characteristics of the research models on the outcome of the traumatic process and the formation of the array of victims in the resulting groups, we conducted an integrated comparative analysis based on the sign of participation in traffic and the outcome of the traumatic process in the study models. Its results are shown in Table 3.

Data in Table 3 indicate that among all traffic participants, there is a difference in specific weight in the effective groups of study models.

Table 2. Integrated comparative analysis of arrays of victims based on participation in traffic and gender in research models

Models	Drivers				Passengers				Pedestrians			
	Men		Women		Men		Women		Men		Women	
	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank
1	55.18	1	13.39	2	12.92	3	40.40	2	31.90	2	46.21	2
2	19.28	3	4.55	3	21.28	2	31.82	3	59.44	1	63.63	1
3	42.50	2	24.39	1	32.50	1	43.90	1	25.00	3	31.71	3

Table 3. Integrated comparative structural analysis based on participation in traffic according to research models in effective groups

Models	Drivers				Passengers				Pedestrians			
	Survived		Dead		Survived		Dead		Survived		Dead	
	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank
1	41.23	1	28.00	1	23.14	3	8.00	3	35.63	2	64.00	2
2	18.27	3	12.15	3	24.52	2	21.49	2	57.21	1	66.36	1
3	37.80	2	27.27	2	36.84	1	33.33	1	25.36	3	39.40	3

Among the victims in model 1 who survived, drivers have the highest specific weight (41.23 %), passengers are in the last place (23.14 %). The ratio of the maximum to the minimum indicators in model 1 is 1.78. Among the victims in model 2 who survived, pedestrians have the highest specific weight (57.21 %), and drivers are in the last place (18.27 %). The ratio of the maximum to the minimum indicators in model 2 is 3.13. Among the model 3 victims who survived, the highest specific weight was recorded among drivers (37.80 %), and the lowest among pedestrians (25.36 %). The ratio of the maximum to the minimum indicators in model 3 is 1.49.

In the mass of the dead in model 1, pedestrians have the highest specific weight (64.00 %), and passengers (8.0 %) are in the last place. The ratio of the maximum to the minimum indicators in the deceased of model 1 is 8.0. Among the dead victims in model 2, pedestrians have the highest percentage (66.36 %), drivers have the lowest (12.15 %). The ratio of the maximum to the minimum indicators in model 2 among the dead is 5.46. Among the deceased victims in model 3, pedestrians have the highest specific weight (39.40 %), drivers have the lowest specific weight (27.27 %). The ratio of the maximum to the minimum indicators in model 3 among the dead is 1.44. Therefore, in all research models, pedestrians have the highest specific weight among the dead victims.

On the other hand, the structural characteristics of the array of those who survived and those who died do not coincide in any research model, and this confirms the influence of the properties of study models on the occurrence of a negative outcome of the traumatic process depending on the victim's participation in traffic.

At the same time, drivers survive most often in model 1 (metropolis) — 41.23 %, and least often in model 3 (regional city) — 18.27 %. The peak-to-minimum ratio of surviving drivers is 2.26. In the array of deceased drivers, the highest specific weight is observed in model 1 — 28.00 %, and the lowest specific weight is observed in model 2 — 12.15 %. The ratio of the maximum to the minimum indicators in the array of deceased drivers is 2.30.

In the array of passengers who survived, the highest specific weight was recorded in model 3 — 36.84 %, and the lowest in model 1 — 23.14 %. The ratio of the maximum to the minimum indicators for passengers who survived is 1.59. The highest specific weight of deceased passengers is observed in model 3 — 33.33 %, and the lowest in model 1 — 8.00 %. The ratio of the maximum to the minimum indicators in the array of deceased passengers is 4.17.

In the array of pedestrians who survived, the highest specific weight of victims is observed in model 2 — 57.21 %, and the lowest in model 3 (25.36 %). The ratio of the maximum to the minimum indicators in the array of pedestrians who survived is 2.26. In the array of dead pedestrians, the highest indicator is found in model 2 (66.36 %), and the lowest specific weight was in model 3 — 39.40 %. The ratio of the maximum to the minimum indicators in the array of dead pedestrians is 1.68.

The data presented above confirm the fact that the properties of the models have a direct impact on the formation of the research array in both result groups depending on participation in traffic. It should also be noted that the properties of the models have a negative impact on the occurrence of a negative outcome of the traumatic process, especially in passive road users.

As a result of the conducted polychoric analysis, a positive ($\varphi^2 = 0.2219$), strong ($C = 0.4262$) and highly probable relationship was found between the sign of participation in traffic, the outcome of the traumatic process, and the properties of research models in road accident victims ($\chi^2 = 376.39$), and the above-mentioned provisions are within the limits of the probability field.

In order to verify in detail the influence of the characteristics of the research models on the occurrence of mortality in road accident victims, we conducted a comparative analysis of the mortality indicators in traffic participants. Its results are shown in Table 4.

The comparative analysis of the data in Table 4 demonstrated that among all traffic participants, the lowest mortality was detected for model 1 (metropolis), and the highest for model 2 (rural area). The fact that pedestrians have the highest mortality rate compared to other road users is also noteworthy. The ratio of the maximum and the minimum mortality rates in the group of drivers is 8.44, for passengers — 19.92, for pedestrians — 4.90.

Therefore, it can be asserted that the properties of research models have an impact on the occurrence not only of traffic injuries, but also of a negative outcome of the traumatic process. This influence is especially pronounced among passengers. Such data indicate the effect of the infrastructural characteristics of the models on the outcome of the traumatic process.

From a scientific and practical point of view, a comparative analysis on the impact of research models on a negative outcome of the traumatic process in different age groups is of particular interest. From a didactic point of view, such an analysis was conducted in groups by age separately for each array of traffic participants.

A comparative analysis of drivers by age in research models based on the outcome of the traumatic process is given in Table 5.

When analyzing the data of Table 5, it was found that in all age groups, there was a difference in mortality rates, but of different degrees. In the group under 20 years, the highest

Table 4. Comparative analysis of mortality rates in traffic participants according to research models

Models	Drivers		Passengers		Pedestrians	
	%	rank	%	rank	%	rank
1	3.02	3	1.56	3	7.62	3
2	25.49	1	31.08	1	37.37	1
3	10.23	2	12.50	2	19.70	2

specific weight of the deceased is observed in model 3 — 15.91 %, and the lowest in model 1 (4.97 %). The ratio of the maximum to the minimum indicators in this age group is 3.2. In the group of 21–30 years, the specific weight of deceased drivers was the highest in model 1 (28.29 %), and the lowest in model 2 (23.53 %); the difference is not large enough. The ratio of the maximum to the minimum indicators in this age group is 1.2. In the group of 31–40 years, the highest specific weight of deceased victims was recorded in model 1 — 30.89 %, and the lowest in model 3 (15.91 %). The ratio of the maximum to the minimum indicators in this age group is 1.94. The highest specific weight in the group of 41–50 years is observed in model 2 — 31.38 %, and the lowest in model 3 (15.91 %). The ratio of the maximum to the minimum indicators in this age group is 1.97. In the group of 51–60 years, the highest specific weight of the deceased was recorded in model 3 — 15.91 %, and the lowest in model 2 (5.88 %). The ratio of the maximum to the minimum indicators in this age group is 2.71. The highest specific weight of victims in the group of 61–70 years was recorded in model 3 — 6.82 %, the lowest in model 2 (3.92 %). The ratio of the maximum to the minimum indicators in this age group is 1.74. Among those older than 71 years, the highest number of victims was recorded in model 3 — 3.41 %, and the lo-west — in model 1 (1.73 %). The ratio of the maximum to the minimum indicators in the age group is 1.97.

On the other hand, the ratio of the maximum to the minimum indicators in model 1 is 17.86, which indicates a high dissipation of the distribution, in model 2, this parameter is 8.01, in model 3 — 7.66.

Therefore, taking into account the above data, it can be stated that the properties of research models have a direct impact on a negative outcome of the traumatic process in drivers. This influence is especially pronounced in model 1, and in models 2 and 3, it is smaller and almost similar. On the other hand, the properties of research models have a pronounced effect on mortality in the age groups of up to 20 and 51–60 years, a little less — in victims aged 31–50 years. Analysis of the cases proved that it was due to the violation of the speed limit by the drivers.

Data of the comparative analysis of passengers in age groups according to research models are given in Table 6.

When analyzing the data of Table 6, a difference was found in the distribution of specific weight in all age groups, but such indicators vary of spe according to research models. In the group under 20 years, the highest specific weight of dead passengers was recorded in model 3 (regional city) — 32.96 %, the lowest was in model 1 (metropolis) — 8.21 %. The ratio of the maximum to the minimum indicator in this age group is 4.01. The highest specific weight of deceased passengers in the group of 21–30 years is observed in model

Table 5. Comparative analysis of the distribution of the array of dead drivers according to research models in age groups

Models	Age, years													
	Under 20		21–30		31–40		41–50		51–60		61–70		Over 71	
	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank
1	4.97	3	28.29	1	30.89	1	19.00	2	10.80	2	4.32	2	1.73	2
2	9.80	2	23.53	3	25.49	2	31.38	1	5.88	3	3.92	3	–	3
3	15.91	1	26.13	2	15.91	3	15.91	3	15.91	1	6.82	1	3.41	1

Table 6. Comparative analysis of the distribution of the array of dead passengers according to research models in age groups

Models	Age, years													
	Under 20		21–30		31–40		41–50		51–60		61–70		Over 71	
	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank
1	8.21	3	24.61	2	20.31	1	13.28	2	12.11	1	14.45	1	7.03	1
2	20.27	2	28.38	1	20.27	2	16.22	1	2.70	3	8.11	3	4.05	2
3	32.96	1	22.73	3	11.36	3	11.36	3	11.36	2	9.09	2	1.14	3

Table 7. Comparative analysis of the distribution of the array of dead pedestrians according to research models in age groups

Models	Age, years													
	Under 20		21–30		31–40		41–50		51–60		61–70		Over 71	
	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank	%	rank
1	7.15	3	19.76	2	19.52	1	20.24	2	10.71	2	12.86	2	9.76	1
2	11.58	2	18.95	3	16.32	2	14.21	3	20.00	1	11.05	3	7.89	3
3	15.15	1	21.21	1	15.15	3	21.21	1	3.03	3	15.15	1	9.10	2

2 — 28.38 %, the lowest specific weight is recorded in model 3 — 22.73 %. The ratio of the maximum to the minimum indicator in this age group is 1.25. The highest specific weight of victims in the group of 31–40 years is noted in model 1 — 20.31 %, and the lowest in model 3 (11.36 %). The ratio of the maximum to the minimum indicator in this age group is 1.79. In the group of 41–50 years, the highest specific weight is in model 2 — 16.22 %, and the lowest — in model 3 (11.36 %). The ratio of the maximum to the minimum indicator in this age group is 1.43. The highest specific weight of dead passengers in the age group of 51–60 years is observed in model 1 — 12.11 %, and the lowest — in model 2 (2.70 %). The ratio of the maximum to the minimum indicator in this age group is 4.49. In the age group of 61–70 years, the highest specific weight of passengers who died was recorded in model 1 — 14.45 %, and the lowest in model 2 (8.11 %). The ratio of the maximum to the minimum indicator in this age group is 1.78. The highest specific weight of dead passengers over the age of 71 was recorded in model 1 — 7.03 %, and the lowest in model 3 — 1.14 %. The ratio of the maximum to the minimum indicator in this age group is 6.17.

At the same time, there is a mismatch of distribution indicators in the array of deceased according to models in age groups with a simultaneous mismatch of ratio coefficients. The ratio of the maximum to the minimum indicator in model 1 is 3.50, in model 2 — 7.01, in model 3 — 28.91.

Table 7 provides an analysis of pedestrians by age in research models based on the outcome of the traumatic process.

When analyzing the data of Table 7, it was found that pedestrians have the same uneven distribution in groups by age in research models, as other traffic participants. In the group under 20 years, the highest specific weight of dead pedestrians is observed in model 3 — 15.15 %, and the lowest in model 1 — 7.15 %. The ratio of the maximum to the minimum indicator in deceased pedestrians under the age of 20 is 2.12. The highest specific weight of dead pedestrians in the group of 21–30 years is noted in model 3 (21.21 %), and the lowest in model 2 — 18.95 %. The ratio of the maximum to the minimum indicator in this age group is 1.12. In the 31–40 years group, the highest specific weight was recorded in model 1 — 19.52 %, and the lowest in model 3 (15.15 %). The ratio of the maximum to the minimum indicator in this age group is 1.29. The highest specific weight of dead pedestrians in the age group of 41–50 years is observed in model 3 — 21.21 %, and the lowest is recorded in model 2 — 14.21 %. The ratio of the maximum to the minimum indicator in this age group is 1.49. In the group of 51–60-year-olds, the highest specific weight of dead pedestrians was recorded in model 2 — 20.00 %, and the lowest specific weight was in model 3 — 3.03 %. The ratio of the maximum to the minimum indicator in this age group is 6.60. In the group of 61–70 years, the highest specific weight of dead pedestrians is noted in model 3 — 15.15 %, the lowest in model 2 — 11.05 %. The ratio of the maximum to the minimum indicator in this age group is 1.37. The highest specific weight in the group older than 71 years is recorded in model 1 — 9.76 %, and the lowest indicator in model 2 — 7.89 %. The ratio of the maximum to the minimum indicator in this age group is 1.24.

At the same time, as with other road users, there is a discrepancy in the distribution of deceased victims according to models in age groups, with a simultaneous discrepancy in the ratio coefficients. The ratio of the maximum to the minimum indicator in model 1 is 2.83, in model 2 — 2.53, in model 3, it is 3.0. Therefore, in all research models, there is a moderate dissipation of the distribution of the mass of dead pedestrians in age groups, that is, the properties of the research models have an almost uniform effect on pedestrians.

As a result of the conducted polychoric analysis, it was found that there is a positive ($\varphi^2 = 0.2054$), strong ($C = 0.4128$) and highly probable relationship between the signs of participation in traffic, age, the outcome of the traumatic process, and the properties of research models in road accident victims ($\chi^2 = 348.37$), and the above-mentioned provisions are within the limits of the probability field.

Summarizing the above data, it should be noted that the greatest influence of the model property (taking into account age groups) on a negative outcome of the traumatic process is observed in passengers, to a lesser extent in drivers and insignificant in pedestrians. The greatest influence of the model properties is noted in the age groups under 20 and 51–60 years among all traffic participants. This is related to the psychophysiological characteristics of a person at a certain age. It is worth noting that, in general, the difference by age groups is more pronounced in passive road users (passengers).

Discussion

The results of the study make it possible to reveal the likely influence of the sign of participation in traffic of victims of road accidents both on the formation of road traffic trauma, as a medical and sanitary consequence of an emergency, and on the course of the traumatic process. It has been found that this sign, which causes damage and a negative outcome of the traumatic process, is the most dangerous for pedestrians. The relationship was also noted between the influence of the living conditions of the victims (metropolis, rural area, regional city) and signs of participation in traffic on the formation of injuries as a consequence of an emergency and on the outcome of the traumatic process. Such a study, as evidenced by the analysis of open and accessible sources of scientific information, has not been found and is unique. It is this combination that determines the role and place of the sign of participation in traffic by victims in the origin of a traffic injury as a medical and sanitary consequence of an emergency of a man-made nature.

The comparative analysis proved that the combination of living conditions and signs of participation in traffic of victims in rural areas has the greatest impact. This leads to a more frequent occurrence of trauma as a result of road accidents and a more likely negative outcome of the traumatic process in them. As the analysis of the cases proved, this is primarily due to the infrastructural imperfection of rural areas, including the infrastructure of the health care system. Such imperfection is characteristic of many countries of the world [5, 16–20].

Regarding the signs of participation in traffic, it is worth noting that the largest specific weight of drivers among the

victims is observed in the metropolis (40.65 %), and the smallest in rural areas — 16.19 %, which indicates non-observance of road safety rules, in particular, the speed limit in the metropolis compared to the countryside. Among passengers, victims in the conditions of the regional center have the highest specific weight — 36.36 %, while the specific weight of passengers in rural areas and the metropolis is very close (22.47 and 23.49 %, respectively). Analysis of the cases proved that this is due to the neglect to wear seat belts at a fairly high speed. A very significant share of victims-pedestrians (60.32 %) is observed in rural areas, which is significantly higher than the indicators of the metropolis and the regional center (36.88 and 27.28 %, respectively). As the analysis of the cases proved, this is due to poor road infrastructure in rural areas.

The dependence of the influence of gender on all traffic participants in all research models was also detected, which is most pronounced in the metropolis and in rural areas.

This study demonstrated the influence of models on the emergence and formation of the array of victims with a negative outcome of the traumatic process, depending on the age and participation in traffic. For drivers, this impact is most pronounced in model 1 (metropolis), for passengers in model 3 (regional city), and for pedestrians in all models this influence is approximately similar.

It was found that the above-mentioned combination has an impact on a negative outcome of the traumatic process and the formation of an array of victims as a whole.

Research limitations

Certain limitations of the study are related to the large number of people who are injured due to road accidents — up to 45,000 every year. Therefore, it is practically impossible to conduct research in the scope of the general population of the phenomenon. In addition, the exclusion criterion was two-wheel and rail injury.

Conclusions

1. Probable and direct interdependence between living conditions and signs of participation in traffic in victims of traffic accidents was found. Although active road users (drivers and pedestrians) prevail in all models, this indicator is the largest in the metropolis, and the smallest in the countryside.

2. The gender feature has a significant impact in all research models and is most pronounced in the conditions of the metropolis in male victims.

3. The sign of participation in traffic has a significant impact on the outcome of the traumatic process. This effect is especially pronounced in victims who were injured in rural areas.

4. The highest fatality rate among all road users is observed among pedestrians in rural areas — 37.37 %, and the lowest among drivers in metropolitan areas — 3.02 %.

5. In general, the largest number of victims is observed among all participants of the traffic aged 21–50 years, and this tendency is also expressed in pedestrians who were injured in rural areas.

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Дорожньо-транспортна травма як медико-санітарний наслідок надзвичайної ситуації техногенного характеру в Україні. Повідомлення третє: аналіз та характеристика масиву постраждалих залежно від ознаки участі в русі

Резюме. ***Актуальність.*** Дорожньо-транспортна травма залишається значною медико-соціальною проблемою для всього людства в будь-який час. ***Мета дослідження:*** визначити характеристику постраждалих унаслідок дорожньо-транспортних пригод залежно від ознаки їхньої участі в русі та умов життєдіяльності. ***Матеріали та методи.*** Стаття є продовженням попередніх публікацій у журналі «Медицина невідкладних станів». Цей компонент комплексного дослідження проведено із використанням єдиного фактичного матеріалу (1696 випадків дорожньо-транспортної травми), що був обраний методом безповоротної рандомізації. Моделлю 1 реального типу став мегаполіс із обсягом матеріалу 1139 постраждалих із дорожньо-транспортною травмою, модель 2 (сільська місцевість) — це 315 осіб, модель 3 (обласне місто) — 242 постраждалих. Вивчення фактичного матеріалу проводилося із використанням методів параметричної та непараметричної статистики, закону формальної логіки та фрактального аналізу. ***Результати.*** Установлено, що властивості моделей дослідження мають суттєвий вплив на виникнення дорожньо-транспортної травми залежно від ознаки участі в русі. Найбільша питома вага водіїв зафіксована в мегаполісі (40,65 %), найменша — в сільській місцевості (16,19 %). Питома вага пасажирів була найбільшою в обласному місті (36,36 %), сільській місцевості (23,49 %), а найменшою — в мегаполісі (22,43 %). Найбільшу питому вагу пішоходів зареєстровано в сільській місцевості — 60,32 %, у мегаполісі показник становить 36,88 %, а найменшим він є в обласному місті (27,28 %). Крім того, встановлено вплив характеристик моделей на формування масиву дослідження залежно від ознаки участі в русі та статі постраждалих. Привертає увагу дуже низька питома вага жінок-водіїв (4,55 %) у сільській місцевості, в обласному місті цей показник становить 24,39 %. Також доведено вплив властивостей моделей та ознаки участі в русі на виникнення негативного результату травматичного процесу в постраждалих унаслідок дорожньо-транспортних пригод. У результаті аналізу встановлено дію моделей дослідження на виникнення та формування масиву постраждалих із негативним результатом травматичного процесу залежно від їхнього віку та участі в русі. ***Висновки.*** Виявлено достовірний та прямий вплив умов життєдіяльності та ознаки участі в русі на формування масиву постраждалих унаслідок дорожньо-транспортних пригод. Стать відіграє суттєву роль в усіх моделях дослідження, це найбільш виражено в умовах мегаполісу серед осіб чоловічої статі. Ознака участі в русі має достовірний вплив на результат перебігу травматичного процесу в постраждалих унаслідок дорожньо-транспортних пригод. Особливо такий вплив виражений у тих, кого було травмовано в умовах сільської місцевості. Найвища летальність серед усіх учасників руху спостерігається в пішоходів, які отримали дорожньо-транспортну травму в сільській місцевості (37,37 %), а найменша — у водіїв в мегаполісі (3,02 %).

Ключові слова: дорожньо-транспортна пригода; дорожньо-транспортна травма; участь у русі; постраждалі; порівняльний аналіз