

## ORIGINAL PAPERS

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<https://doi.org/10.33573/ujoh2023.01.003>**ACCIDENTS AT WORK IN WARTIME: DIFFERENCES OF INVESTIGATION, ACCOUNTING AND REGISTRATION****Nagorna A. M.<sup>1</sup>, Radionov M. O.<sup>2</sup>, Bocharova O. B.<sup>3</sup>****<sup>1</sup>State Institution «Kundiiev Institute of Occupational Health of National Academy of Medical Sciences of Ukraine», Kyiv****<sup>2</sup>State Labor Service of Ukraine, Kyiv****<sup>3</sup>District state administration, Kyiv**

*Introduction.* Occupational health reflects socio-economic changes in society, the formation of the country's labor potential, the quality of life and working conditions of the population. All over the world, occupational diseases, occupational accidents (OA) are the main cause of work-related mortality. According to ILO estimates, about 2.3 million people die each year as a result of workplace accidents or work-related diseases – an average of 6,000 people every day. Worldwide, more than 340 million accidents at work are registered annually. In recent years, a gradual decrease in occupational injuries (OI) has been noted in Ukraine, but an in-depth analysis of it shows that statistical indicators do not fully reveal the complexity of the existing situation regarding the formation of the number of injuries at work and the quality of their accounting and registration, especially when it concerns changes in the legislation on Covid-19 cases, cases of sudden death in the workplace, which are recognized as related to production. This is especially true in wartime, when there is population migration, relocation of enterprises, and changes in the conditions of the investigation of OA cases during hostilities.

*The aim of the research* is to identify patterns in the formation of indicators of industrial injuries in Ukraine during martial law based on the example of Kyiv.

*Materials and methods of the research.* Of the study of the prevalence of industrial injuries was carried out on the basis of a continuous statistical processing of primary documents compiled for all cases of accidents at work first detected and registered in Ukraine in the form of Act N-1 for 2020–2022. The analysis of industrial injuries was carried out according to the types of economic activity, the causes of occurrence, and the ways of improvement were determined in relation to OI cases.

*Results.* In the disease structure of the working-age population of Kyiv in 2022, there is a decrease in the number of OA, compared to the same period last year, by 37 %. The number of Covid-19 cases has decreased compared to 2020–2021. Most of the accidents were recorded among workers during hostilities in such fields as energy, railway transport, military facilities, oil and gas facilities, heating networks.

*Conclusions.* 1. In addition to legislative regulation, the indicators of labor productivity in industry are formed taking into account a significant decrease in the number of residents due to migration; relocation of enterprises or their closure; changes in the conditions of investigation of accidents at work during hostilities. 2. In 2022, 946 accident reports were registered in Kyiv (405 of which were COVID-19), as a result of which 1,051 people were injured, including 152 fatal, which is 139 % fewer than in 2021; there is a 116 % decrease in the number of OA compared to the same period last year. 3. Among the causes of OA prevail organizational reasons (42.94 %), psychophysiological reasons (10.45 %), technical reasons – 2.54 %, techno-genic, natural, environmental and social reasons (31.36 %), other reasons (12.71 %). 4. The largest number of accidents occurred in the Health care sector – 18.4 %, Transport, warehousing, postal and courier activities – 18.9 %, Motor vehicles and motorcycles repair – 16.9 %, Electricity, gas, steam and air conditioning supply – 9.3 %. 5. The greatest number of accidents were observed at DP «Antonov», JSC «Ukrzaliznytsia», PrJSC «Ukrenergo», JSC «Ukrtransnafta», LLC «Kyiv. bronetank.zavod», DP «Naftogazbezpeka», KP «Kyivteploenergo», KO «Kyivmedspetstrans», JSC «Ukrposhta».

**Key words:** industrial injuries, martial law, types of economic activity, hostilities

## Introduction

Professional health reflects socioeconomic changes in society, the formation of the country's labor potential, the quality of life, and working conditions of the population. Worldwide, occupational diseases (ODs) and accidents (ACs) are the leading cause of work-related mortality [1, 2]. According to the ILO, approximately 2.3 million men and women die annually from work-related accidents or illnesses, which is an average of 6,000 people per day. Worldwide, over 340 million accidents occur annually in production [3–7]. In Ukraine, there has been a gradual decrease in industrial injuries (IIs) in recent years [8, 9]. A detailed analysis shows that statistical indicators do not fully reveal the complexity of the existing situation regarding the formation of the number of injuries in production and the quality of their accounting and registration, especially when it comes to changes in legislation regarding COVID-19 cases and cases of sudden death in the workplace recognized as work-related (Cabinet of Ministers resolution of April 17, 2019, No. 337, «Procedure for Investigating and Accounting for Accidents, Occupational Diseases and Accidents in Production», {amended by Cabinet of Ministers resolution No. 59 of January 20, 2023} [10]. The most difficult issues during the investigation, accounting, and registration of accidents in production arose in 2022 during the period of Russia's large-scale war against Ukraine. On one hand, unfortunate incidents that occur to workers while carrying out their work duties in connection with conducting military operations, regardless of the presence of dangerous, harmful or other production factors, must be investigated in accordance with the requirements of the Procedure for investigation and accounting of accidents, occupational diseases, and accidents at production facilities approved by the Cabinet of Ministers of Ukraine on April 17, 2019, No. 337, and subse-

quently, ensuring by the state guarantees of insured persons' implementation of their constitutional rights to social protection.

On the other hand, questions arise about how the employer should act if an employee is injured or killed as a result of military action? How to investigate accidents if they occur in temporarily occupied territories? [11].

The war and its consequences have affected all spheres of our country's social life, and the labor sphere is no exception. Thus, since the beginning of the armed aggression of the Russian Federation, 571 workers have been injured as a result of injuries received while performing work duties, of whom 221 have died. This happened as a result of bombing, rocket and artillery shelling, mining of territories and premises, capture in captivity, and other unlawful actions of the aggressor country.

The previous procedure for investigating accidents did not allow for the prompt formation of commissions and investigation of accidents that occurred, including those under these circumstances.

Therefore, in order to ensure timely and high-quality investigation of accidents caused by the military aggression of the Russian Federation against Ukraine, relevant changes were introduced. These changes were adopted by the Cabinet of Ministers of Ukraine in Resolution No. 59 of January 20, 2023, «On Amendments to the Procedure for Investigating and Accounting for Accidents, Occupational Diseases and Accidents in Production» (Table 1).

The indicators of occupational injuries (using Kyiv as an example, but the patterns are similar for all regions) are influenced by various socio-economic circumstances in addition to legislative regulation, such as:

- significant reduction in the population due to migration to safer areas by (a) working-age

**Table 1**

The changes aimed to simplify, regulate, and improve the procedure for investigating accidents during the period of martial law (state of emergency) in Ukraine

Investigation of industrial accidents	
General procedure	Simplified mechanism (resulting from military operations)
– The employer is obliged to report information about the accident within two hours using communication tools and provide a paper notification no later than the next working day	– The employer must submit information about the accident in writing or by email within one day
– The number of documents belonging to the investigation materials is 26	– The number of documents belonging to the investigation materials is 11
– The commission consists of 7 members	– The commission consists of 3 members
– Investigations to determine the presence of alcohol in the victim's body, expert conclusions, documents on the victim's training, instructions on labor protection, and medical examinations are required	– Investigations to determine the presence of alcohol in the victim's body, expert conclusions, documents on the victim's training, instructions on labor protection, and medical examinations are not required
– The inspection protocol is drawn up according to the established form based on the inspection by the commission directly at the scene	– The inspection protocol is drawn up based on the act formed in any form
– Remote commission meetings using conference communication and signing protocols with an electronic digital signature are not allowed	– Remote commission meetings using any means of communication and signing protocols with an electronic digital signature are allowed
– The suspension of the investigation is not provided	– The mechanism for suspending the investigation is introduced based on the active military operations until the situation normalizes

- women and (b) men who joined territorial defense or the armed forces;
- relocation or closure of enterprises;
  - changes in the conditions of investigating occupational injuries (difficulties in the work of commissions, displacement of experts, communication issues, disruptions in transportation, etc.);
  - investigation of accidents at production facilities that occurred in connection with military operations.

*The aim of the research* is to identify patterns in the formation of indicators of industrial injuries in Ukraine during a state of war (using the example of the city of Kyiv).

## Materials and methods of the research

The prevalence of industrial injuries was studied using the principle of a comprehensive statistical sample of primary documents drawn up for all cases of industrial accidents detected and registered in Ukraine for the period from 2020 to 2022, based on Form N-1. The analysis of industrial injuries was conducted by types of economic activity, causes of occurrence, and ways to improve the accounting of incidents of industrial injuries. The data were processed using classical methods of descriptive epidemiology.

## Results of the research and their discussion

Analysis of industrial injuries (IIs) indicates a 37 % decrease in the number of registered insurance accidents in Kyiv in 2022 compared to the same period last year (from 567 victims in 2021 to 354 victims in 2022). Acts of IIs related to production, in the form of N-1/P, were drawn up for the victims of accidents that occurred during the reporting period of the current year, including 36 with fatal consequences.

With the participation of insurance experts in the work of commissions investigating IIs that occurred in previous years and whose investigations were completed during the reporting period, an additional 225 victims (including 22 with fatal consequences) were recognized as eligible for insurance and acts were drawn up using the N-1/P form.

In 2022, the executive directorate of the Social Insurance Fund of Ukraine in Kyiv received 946 reports of accidents (including 405 COVID-19 cases), resulting in 1051 people losing their ability to work, including 152 fatalities. This is 139 % less reported accidents than in 2021. These data confirm that the factors influencing the number of IIs, as well as the features of their investigation, accounting, and registration during times of war, are as described in the Introduction to the article.

Among the causes of accidents, organizational factors prevail (42.94 %). 10.45 % of accidents were caused by psycho-physiological factors, 2.54 % by technical factors, 31.36 % by technogenic, natural, ecological, and social factors, and 12.71 % by other causes (Figure).

In 2022, the most common organizational cause was non-compliance with labor protection instructions, accounting for 23.45 % of the total number of injured persons. The most common psycho-physiological cause was personal negligence of the victim, accounting for 7.63 % of the total number of injured persons in Kyiv.

The main events leading to accidents (excluding COVID-19 cases) include: events in public life, falls of the victim while moving, actions of moving and rotating equipment, machines, and mechanisms, and falls of the victim from a height (Table 2).

In 2022, the frequency of COVID-19 cases decreased from 3941 in 2020 to 405 (Table 3).

This can be attributed to several factors: population vaccination, decreased migration, a shift to a less severe strain of the virus, and decreased attention to registration during wartime (fewer people with mild symptoms sought medical attention, while more severe cases requiring hospitalization were registered).

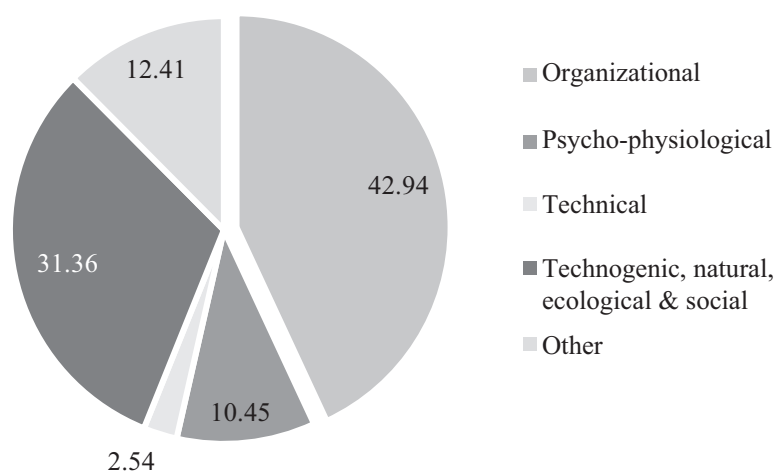


Figure. Causes of accidents

**Table 2****Main events that led to accidents**

Events	Percentage
1. Events of public life	31.07 ± 2.46*
2. Falling of the victim during movement	16.95 ± 2.0*
3. Action of moving and rotating parts of equipment, machines and mechanisms	5.65 ± 1.23*
4. Falling of the victim from height	3.67 ± 11.0

Note. \*Difference of means by *t*-Student criterion at  $p < 0.05$  level.

In 2022, the following distribution of injuries in the most hazardous sectors of the economy was observed (Table 4): «Healthcare» had the highest number of accidents at 18.4 %, followed by «Transportation, Warehousing, Postal and Courier Activities» at 18.9 %, «Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles» at 16.9 %, and «Electricity, Gas, Steam and Air Conditioning Supply» at 9.3 %.

During wartime, particular attention is given to cases of injury and death among workers performing their duties in combat or during rocket attacks. Statistical indicators for reporting, investigation, and registration of injuries, including fatal ones, are presented in Table 5.

During the conduct of military operations, the highest number of casualties were observed in

critical infrastructure objects in the city such as DP «Antonov», JSC «Ukrzaliznytsia», PrJSC «Ukrenergo», JSC «Ukrtransnafta», LLC «Kyiv.bronetank.zavod», DP «Naftogazbezpeka», KP «Kyivteploenergo», KO «Kyivmedspetstrans», JSC «Ukrposhta».

## Conclusions

1. The indicators of industrial injuries are influenced by legislative regulation, significant decrease in population due to migration, relocation or closure of enterprises, changes in the conditions of investigating accidents in production that occurred as a result of military operations.
2. In 2022, 946 notifications of accidents were reported by the economic entities in the city of Kyiv to the relevant authorities (405 of which were related to COVID-19), resulting in 1051 persons becoming disabled, including 152 deaths. Compared to the previous year, the number of reported accidents decreased by 139 % and the number of injured decreased by 116 %.
3. The majority of accidents are caused by organizational factors – 42.94 %, psycho-physiological factors – 10.45 %, technical reasons – 2.54 %, technogenic, natural, environmental, and social factors – 31.36 %, and other reasons – 12.71 %.

**Table 3****Number of COVID-19 cases reported and registered in 2020–2022**

2020				2021				2022			
Reports		Fatal		Reports		Fatal		Reports		Fatal	
3941		29		1473		42		4050		0	
N-1/P	N-1/NP	N-1/P	N-1/NP	N-1/P	N-1/NP	N-1/P	N-1/NP	N-1/P	N-1/NP		
1652	2442	3	12	577	1094	13	35	220	287		

**Table 4**

Distribution of victims by types of economic activity of the enterprise where an occupational injury occurred

Type of economic activity of the enterprise where an occupational injury occurred	Number of reports compiled on occupational injuries in 2022	Number of reports compiled on occupational injuries in 2021	+/- 2022/2021
<b>TOTAL</b>	<b>354</b>	<b>567</b>	<b>-213</b>
Agriculture, forestry and fishing		2	-2
Manufacture of electrical equipment		1	-1
Real estate activities		2	-2
Other professional, scientific and technical activities		2	-2
Other service activities		1	-1
<b>Mining and quarrying</b>	<b>14</b>	<b>7</b>	<b>+7</b>
Manufacture of food products, beverages and tobacco products	12	19	-7
Manufacture of wood and paper products and printing activity	1	6	-5
Manufacture of chemical substances and chemical products	1		+1
Manufacture of basic pharmaceutical products and pharmaceutical preparations	1	2	-1
Manufacture of rubber and plastic products, and other non-metallic mineral products	5	7	-2
Manufacture of basic metals, fabricated metal products, except machinery and equipment	1	3	-2
Manufacture of machinery and equipment n.e.c.	2		+2
<b>Manufacture of transport equipment</b>	<b>10</b>	<b>1</b>	<b>+9</b>
Other types of manufacturing, repair and installation of machinery and equipment	4	5	-1
<b>Supply of electricity, gas, steam and air conditioning</b>	<b>33</b>	<b>3</b>	<b>+30</b>
Water supply; sewerage, waste management	6	3	+3
<b>Construction</b>	<b>16</b>	<b>21</b>	<b>-5</b>
<b>Wholesale and retail trade; repair of motor vehicles and motorcycles</b>	<b>60</b>	<b>88</b>	<b>-28</b>
<b>Transport, warehousing, postal and courier activities</b>	<b>67</b>	<b>72</b>	<b>-5</b>
<b>Temporary accommodation and food service activities</b>	<b>7</b>	<b>20</b>	<b>-13</b>
Telecommunications (electronic communication)	2		+2
Financial and insurance activities	5	4	+1
Activities in the fields of law, accounting, architecture and engineering, technical testing and research	3	4	-1
Scientific research and development	6	5	+1
Activities in the field of administrative and support services	17	13	+4
<b>Public administration and defense; compulsory social security</b>	<b>7</b>	<b>14</b>	<b>-7</b>
<b>Education</b>	<b>2</b>	<b>4</b>	<b>-2</b>
<b>Human health and social work activities</b>	<b>65</b>	<b>249</b>	<b>-184</b>
Provision of care and social assistance services	2	2	-
Arts, entertainment and recreation	5	7	-2



Table 5

**Number of Messages and Approved Acts According to Form N-1/P, N-1/NP  
due to Combat Operations in 2022 in Kyiv City**

Number of received messages		Number of victims		Number of approved acts according to Form N-1/P		Number of approved acts according to Form N-1/NP	
Total	Fatal	Total	Fatal	Total	Fatal	Total	Fatal
84	30	161	42	113	26	1	1

- The highest number of accidents were recorded in the fields of «Healthcare» – 18.4 %, «Transport, storage, postal and courier activities» – 18.9 %, «Wholesale and retail trade: repair of motor vehicles and motorcycles» – 16.9 %, and «Supply of electricity, gas, steam, and conditioned air» – 9.3 %.
- The highest number of industrial injuries during the conduct of work operations in conditions of military operations were observed in critical infrastructure objects in the city such as DP «Antonov», JSC «Ukrzaliznytsia», PrJSC «Ukrenergo», JSC «Ukrtransnafta», LLC «Kyiv.bronetank.zavod», DP «Naftogazbezpeka», KP «Kyivteploenergo», KO «Kyivmedspetstrans», JSC «Ukrposhta».

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