

## Analysis of occupational diseases at work in Ukraine

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**Abstract.** The study of occupational and industrial diseases is one of the important tools for developing mechanisms for their prevention and injury avoidance. Occupational diseases are a significant part of the general morbidity rates of the population, the cause of large-scale social and economic losses. It includes categories of diseases that occurred on the basis of an individual's professional activity and are mostly caused by the negative flow of production factors and specific types of work. Occupational diseases include diseases caused by the direct effect on people of harmful production factors and certain types of work. In addition, occupational diseases pose a great threat to workers in various fields, both in Ukraine and throughout the world. Thus, the purpose of the article is to study the level of occupational morbidity at work in various regions and branches of the economy of Ukrainian enterprises, to establish the reasons for the occurrence of acute occupational diseases (poisoning), as well as to recommend preventive measures for their prevention. The level of occupational disease at work by region and by economic sector of Ukrainian enterprises was analyzed. It was established that the number of victims of cases of chronic occupational disease (poisoning) at work during the last five years remains high. Most occupational diseases occurred in the extractive industry and quarrying. In 2020, the number of victims of acute occupational disease COVID-19 increased significantly, especially in the health care sector. The practical value of the work consists in establishing the causes of the appearance of occupational diseases, and, as a result, in helping to solve them, as well as providing recommendations on preventive measures that will help prevent the appearance of occupational diseases

**Keywords:** industrial activity, chronic occupational disease, acute occupational disease, the field of enterprise economy, occupational safety

## INTRODUCTION

The analysis of occupational diseases (poisoning) at the factories of Ukraine is one of the main and necessary ways of developing mechanisms for the prophylaxis and prevention of injuries.

Occupational morbidity is an integral part of the general morbidity of the population, the cause of the

largest socio-economic costs. It unites the categories of diseases that arose as a result of human professional activity and are caused exclusively or mainly by the influence of harmful production factors and certain types of work. Occupational diseases include, first of all, diseases that arise as a result of the direct effect on

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people of industrial harmful factors, as well as those that, under certain industrial conditions, develop much more often than usual. Also, it is impossible not to pay attention to the fact that occupational diseases pose a threat to workers in a wide variety of fields, not only in Ukraine, but all over the world.

An occupational disease is a chronic or acute disease caused by prolonged exposure to harmful industrial factors.

Chronic occupational disease (poisoning) – a disease that arose as a result of the employee's professional activity exclusively or mainly due to the influence of harmful factors of the industrial environment and work process related to work.

An acute occupational disease (poisoning) is an illness (or death) that occurred after a single (during no more than one work shift) exposure of an employee to harmful factors of a physical, biological, and chemical nature (including infectious, parasitic, allergic diseases).

Despite the improvement of the level of occupational safety through the implementation of preventive measures, the development and implementation of modern and safer innovative technologies, new types of individual and collective protection, etc., the issue of occupational morbidity does not lose its relevance today.

The European Agency for Safety and Health at Work notes that although the number of accidents at work has decreased by 25% over the past 10 years, work-related diseases still account for 2.4 million deaths worldwide [1].

The increase in the number of occupational diseases, as well as the increase in public awareness of their consequences, draw the attention of researchers to various aspects of diseases and the importance of improving the state of occupational health and safety. Therefore, there is a need for appropriate information management tools to recognize disease patterns and then make decisions about prevention, early detection, and treatment [2].

According to O.A. Tryukhan [3], occupational diseases cannot be considered as arising as a result of a random coincidence of circumstances, because occupational diseases are always covered by a violation of safety requirements. In order to prevent occupational diseases, it is necessary, first of all, to know and eliminate the causes that cause them, because under this condition, preventive measures can have the desired effect.

The results of the analysis of the labor market at the end of 2020, according to Grafton Recruitment in Slovakia, show that more than half of the employed consider their workload excessive. About 60% of Slovaks feel stressed at work. According to statistics from Everest College in the USA, up to 83% of employ-

ees feel stressed at the workplace. In the UK, 79% of workers experience work-related stress [4; 5].

The study of the patterns of the formation of the risk of occupational disease of the working population in the coal, metallurgical and mechanical engineering industries of Ukraine showed that the most dangerous regions for the formation of occupational pathology remain where large enterprises of the leading branches of the national economy (coal, metallurgical, mechanical engineering) are located and where a significant number of workers are concentrated in harmful conditions (Donetsk, Luhansk, Dnipropetrovsk and other regions). The greatest risk of developing occupational pathology was observed in the mining industry (coal, metallurgical, including iron ore), which is associated with a complex of unfavorable production factors (dust, noise, vibration, etc.) during underground mining of minerals [6].

Recently, there has been ongoing controversy over whether or not COVID-19 is an occupational disease. The virus spreads through community spread as well as workplaces and certain work environments. This issue is especially important in those places where there are large cases of infection of workers with the virus, especially in health care facilities [7; 8].

The development of occupational diseases in the world was monitored and evaluated by a large number of authors [9-12]. In their works, they presented retrospective studies that analyzed the structure, causes, occurrence and development trends of occupational diseases during a certain period of time in a certain country.

In Ukraine, among the authors who addressed the study of certain legal aspects of the issue of creating safe and harmless working conditions and made a significant contribution to their development, it is necessary to note such scientists as N.B. Bolotin, P.I. Zhigalkina, A.R. Matsyuk, K.Yu Melnyka, Yu.P. Orlovsky, S.M. Prylypko, V.I. Prokopenko, O.M. Yaroshenko and others. [13-16]. The method of calculating the forecasting of accidents and occupational diseases, their prevention is presented in the works of M.P. Handziuk, E.P. Zhelyby, V.Ts. Zhydetskyi, O.I. Zaporizhia, O.O. Oleinyk [17-20].

*The purpose of the article* is to investigate the level of occupational morbidity at work by region and by economic sector of Ukrainian enterprises, to establish the circumstances that caused chronic/acute occupational diseases (poisoning) and to propose preventive measures for their prevention.

## RESULTS AND DISCUSSION

***Characteristics of the phenomenon of occupational diseases at factories.*** An occupational disease, like any disease, is associated with a certain profession or industry. Such diseases arise as a result of a variety

of biological, chemical, physical and psychological factors that are present in the work environment or are encountered in other ways during work activities. Scientific and technical progress, fundamentally changing the nature of work, creates new factors of the production environment that adversely affect workers. In this regard, occupational morbidity is one of the problem areas at Ukrainian enterprises [21].

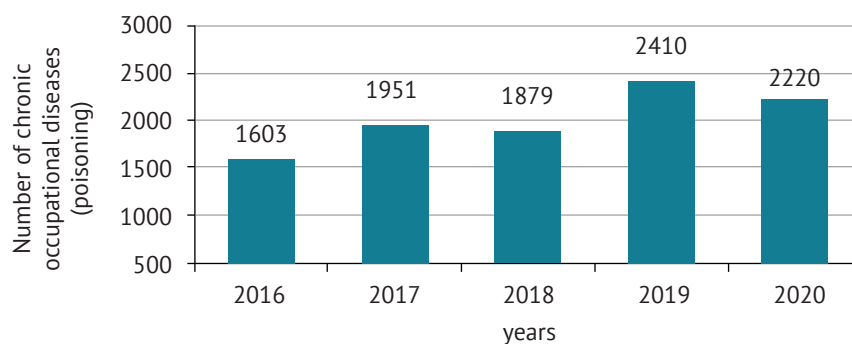
In any enterprise, organization or institution where a person works, there will always be a threat of illness caused by working conditions. The degree of this threat depends on the specifics of work, the profile of the enterprise, the level of job security and other reasons. Therefore, the detection of occupational diseases contributes to the improvement of occupational safety and hygiene and increases awareness of the harmful effects of work.

The study of chronic/acute occupational diseases (poisoning) at the enterprises of Ukraine was carried out using the statistical method based on official data

of the working bodies of the executive directorate of the Social Insurance Fund of Ukraine [22]. For the distribution of chronic/acute occupational diseases (poisoning), indicators of the number of victims at work were used according to these acts in form P-4 and form H-1/P in the cross-section of regions and branches of the economy of enterprises of Ukraine.

During the study, occupational diseases (poisoning) that occurred at enterprises located in populated areas, on the territory of which state authorities temporarily do not or do not fully exercise their powers in accordance with the Decree of the Cabinet of Ministers of Ukraine dated November 7, 2014, were not taken into account. No. 1085.

Studies of the dynamics of the level of occupational morbidity in Ukraine during 2016-2020 indicate that the number of cases of chronic occupational diseases (poisoning) at work, according to acts P-4 [22], remains at a high level (Fig. 1).



**Figure 1.** Dynamics of the number of cases of chronic occupational diseases (poisoning) at work in Ukraine according to the data of Acts P-4 for 2016-2020

**Source:** [22]

Figure 1 shows that the number of victims of chronic occupational diseases (poisoning) at work in 2017 compared to 2016 increased by 348 people, or by 21.7%. In 2018, compared to 2017, the number of chronic occupational diseases (poisoning) decreased by 72 cases, or 3.7%. In 2020, the number of chronic occupational diseases (poisoning) compared to 2016 increased by 617 cases, or by 38.5%. The highest level of occupational disease at work in Ukraine was observed in 2019 – 2,410 cases, which is 1.5 times more than the number in 2016.

In 2020, the working bodies of the executive directorate of the Social Insurance Fund of Ukraine received and registered 2,242 reports of chronic occupational diseases (poisoning), which is 6.8% less than in 2019. A significant increase in the number of reports of chronic occupational diseases (poisoning) occurred in: Zaporizhzhia region – by 1.6 times and Donetsk

region – by 21.2%. A decrease in the number of reports of chronic occupational diseases (poisoning) was observed in Lviv Region, Dnipropetrovsk Region, Sumy Region, Kirovohrad Region, and Volyn Region.

For clarity, we will display the distribution of the number of cases of chronic occupational diseases (poisoning) at work by regions of Ukraine in Table 1. It has been investigated that a significant increase in the number of victims of chronic occupational diseases (poisoning) at work in 2020 compared to 2016 occurred in: Donetsk Region – by 307 cases, or 2.9 times, Dnipropetrovsk Region – by 206 cases, or 28.6%, Kirovohrad Region – by 77 cases, or 2.2 times, Zaporizhzhia Region – by 69 cases, or 2.6 times, Luhansk region – in 36 cases, or 1.7 times. In 2019, the largest number of chronic occupational diseases (poisoning) was registered in the Dnipropetrovsk region – 1,015 cases.

A decrease in the number of victims of chronic occupational diseases (poisoning) at work is noted in: Volyn region – by 25 cases, or 28.1%, Sumy region – by 21 cases, or 2.6 times, Kharkiv region – by 12 cases, or 29.3%, Cherkasy Region – six times, or 6 times, Vinnytsia Region – in four cases, or 3 times, in Zhytomyr region –

in four cases, or 25%, and in the city of Kyiv – in two cases, or 33.3%. The number of victims who received chronic occupational diseases (poisoning) in these regions is, on average, 78.7% of the total number of victims in Ukraine who have occupational diseases during the relevant research period.

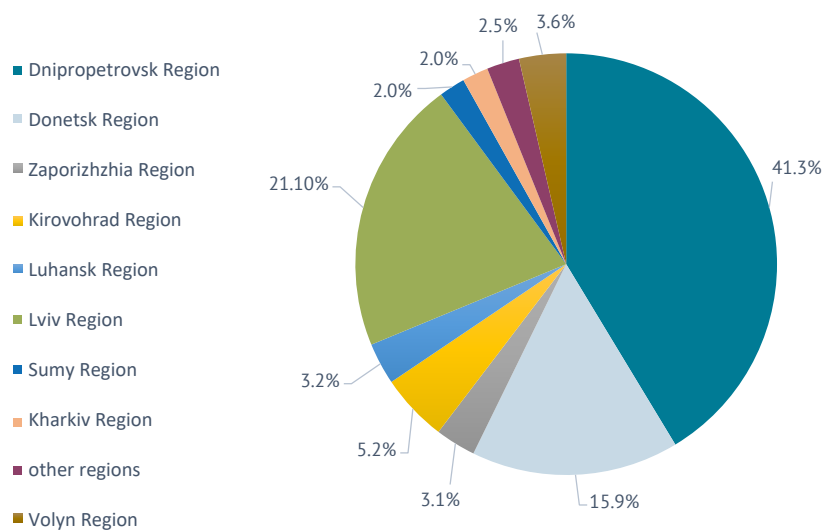
**Table 1.** Distribution of chronic occupational diseases (poisoning) by regions of Ukraine according to the data of acts P-4 for 2016-2020

Regions	Years				
	2016	2017	2018	2019	2020
city of Kyiv	6	9	11	2	4
Vinnytsia Region	6	5	4	3	2
Volyn Region	89	50	69	86	64
Dnipropetrovsk region	720	674	811	1015	926
Donetsk Region	156	319	316	382	463
Zhytomyr region	16	13	18	15	12
Zaporizhzhia Region	43	47	44	76	112
Kirovohrad Region	64	74	77	187	141
Luhansk region	48	31	68	91	84
Lviv Region	358	595	347	436	359
Sumy region	34	47	45	66	13
Kharkiv region	41	51	46	26	29
Cherkasy Region	7	9	4	8	1
Others Regions	15	27	19	17	10

Source: [22]

It was established that the most injury-prone regions of Ukraine in terms of the number of victims of chronic occupational diseases (poisoning) at work, on average for 2016-2020, are Dnipropetrovsk Region (43.1%), Lviv Region (21.1%), Donetsk Region (15.9%),

Kirovohrad Region (5.2%), Volyn Region (3.6%), Luhansk Region (3.2%), Zaporizhzhia Region – (3.1%), Sumy Region (2%) and Kharkiv Region (2%) of the region. The number of victims of occupational diseases in these regions is 97.5% of the total number in Ukraine (Fig. 2).



**Figure 2.** Distribution of the most injury-prone regions of Ukraine by the number of chronic occupational diseases (poisoning) in 2016-2020, % of the total number in Ukraine

Occupational diseases threaten workers in a wide variety of industries not only in Ukraine, but all over the world. Any favorite and desired work is not immune to certain risks and troubles. Any profession can be associated with danger and harm to health. Economic losses caused by work-related diseases and accidents amount to 4.0-6.0% of the gross domestic product of the respective countries and regions in the world. The problem of occupational health and safety is present all over the world, but in China a much larger number of workers are at risk due to the

relatively larger number of the working population in the country [23].

**Analysis of indicators of morbidity due to professional activity.** The study of occupational diseases at work is one of the main and necessary ways of developing prevention mechanisms and their prevention at this or that production facility or at production as a whole. Considering the socio-economic situation in Ukraine, the distribution of the number of occupational diseases (poisoning) is closely related to the state of individual sectors of the economy of enterprises (Table 2).

**Table 2.** Distribution of chronic occupational diseases (poisoning) by economic sector of Ukrainian enterprises according to the data of acts P-4 for 2016-2020

Branches of the economy	Years				
	2016	2017	2018	2019	2020
Mining and quarrying	1311	1612	1580	2038	1913
Production of machines and equipment	67	97	98	98	50
Metallurgical production, production of finished metal products, except for machines and equipment	68	65	57	79	105
Other types of processing industry, repair and installation of machines and equipment	33	38	33	43	48
Health care	29	29	-	-	-
Production of coking coal and oil refining products	31	25	23	55	32
Construction	-	-	22	31	27
Other industries	64	85	66	66	45

Source: [22]

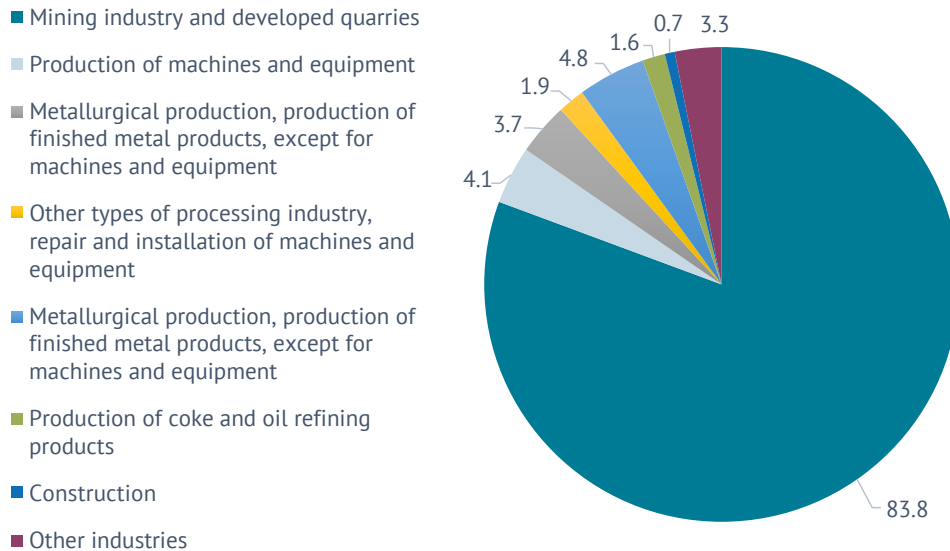
From the data of Table 2, it can be seen that an increase in the number of cases of chronic occupational diseases (poisoning) at work in 2020, compared to 2016, was observed at enterprises of such branches of the economy as: extractive industry and quarry development – by 602 cases, or 45.9%; metallurgical production, production of finished metal products, except for machines and equipment – in 37 cases, or 54.4%; construction – in 27 cases; other types of processing industry, repair and installation of machines and equipment – in 15 cases, or 45.5%; production of coke and oil refining products – for one case, or 3.2%.

A decrease in the number of victims of chronic occupational diseases (poisoning) at work is noted in such sectors of the economy as: health care – by 29 cases, other industries – by 19 cases, or 29.7%, and the production of machinery and equipment – by 17 cases, or 25.4%.

The distribution of the most trauma-hazardous sectors of the economy of Ukrainian enterprises by the number of victims of chronic occupational diseases (poisoning) is shown in fig. 3. It was established that among the most trauma-hazardous sectors of the economy of Ukrainian enterprises in terms of the number of

chronic occupational diseases (poisoning), on average for 2016-2020., include: mining and quarrying (83.8%), production of machinery and equipment (4.1%), metallurgical production, production of finished metal products, except for machinery and equipment (3.7%), other types of processing industry, repair and installation of machines and equipment (1.9%), production of coke and oil refining products (1.6%), health care and construction (0.7%, respectively). The number of victims of occupational diseases in these sectors of the economy is 96.7% of the total number in Ukraine.

The main circumstances that caused chronic occupational diseases (poisoning) at work were: imperfection of the technological process – 24.5%, imperfection of mechanisms and work tools – 18.7%, and failure to use personal protective equipment – 11.6% of their total number. In the structure of occupational diseases (poisoning), the first place belongs to respiratory diseases – 40.2% of the total number of diagnoses in Ukraine. In second place are diseases of the musculoskeletal system (radiculopathy, osteochondrosis, arthritis, arthrosis) – 27.7%. The third place for hearing diseases – 17.4%, the fourth in terms of vibration disease – 6.6%.

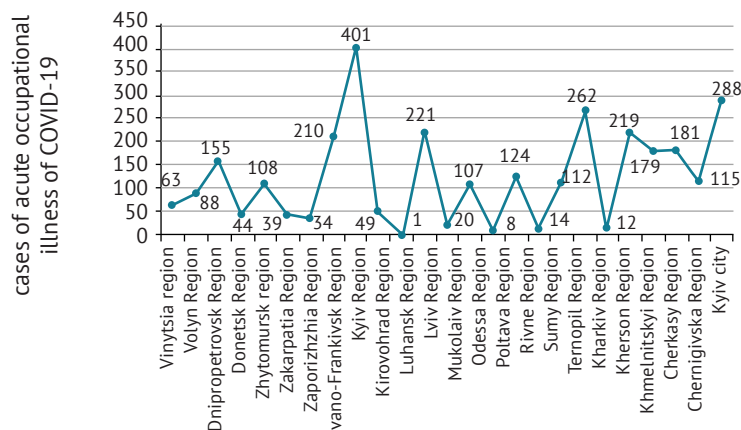


**Figure 3.** Distribution of the most injury-prone sectors of the economy of Ukrainian enterprises by the number of chronic occupational diseases (poisoning) in 2016-2020,% of the total amount in Ukraine.

Based on the results of research, it was established that due to the coronavirus pandemic in Ukraine, the number of victims of acute occupational disease (poisoning) at work has increased significantly. Thus, in 2020, 3,054 victims of cases of acute occupational disease with a diagnosis of COVID-19 were registered in Ukraine, for which an act in the form of H-1/П, related to production [22] was drawn up, which is 46% of the total number victims during this period. A significant part of the victims are health care workers, which is caused by cases of infection of medical and other workers with COVID-19, whose work is related to the performance of professional duties in conditions of increased risk of infection. From fig. 4 shows that the largest number of cases of acute occupational disease diagnosed with COVID-19 were registered in: Kyiv region – 401 cases, or 13.1%, Kyiv city – 288 cases, or 9.4%, Kharkiv region – 262 cases, or 8.6%, Lviv region – 221 cases, or 7.2%, Khmelnytskyi region – 219

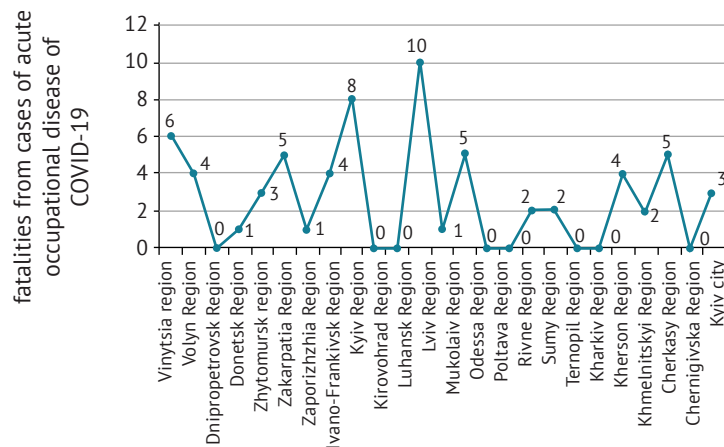
cases, or 7.2% and Ivano-Frankivsk region – 210 cases, or 6.9%. The number of cases of acute occupational disease with a diagnosis of COVID-19 in these regions is 52.4% of the total number of injured people in Ukraine.

It was established that in 2020, 66 fatalities from cases of acute occupational disease (poisoning) with a diagnosis of COVID-19 were registered in the regions of Ukraine (Fig. 5), for which an act in the form of H-1/P related to production was drawn up, which is 16.8% of the total number of victims during this period. From the data of fig.5 shows that the largest number of fatal cases of acute occupational disease (poisoning) diagnosed with COVID-19 were registered in: Lviv region – 10 cases, or 15.1%, Kyiv region – eight cases, or 12.1%, Vinnytsia region – six cases, or 9.1%, Zakarpattia, Odessa, and Chernivtsi regions – five cases, or 7.6%, respectively. The number of fatal cases of acute occupational disease with a diagnosis of COVID-19 in these regions is 59.1% of the total number of injured people in Ukraine.



**Figure 4.** Number of victims of cases of acute occupational illness of COVID-19 by regions of Ukraine in 2020, persons

Source: [22]



**Figure 5.** Number of fatalities from cases of acute occupational disease of COVID-19 by regions of Ukraine in 2020, persons

Source: [22]

The largest number of victims of cases of acute occupational disease of COVID-19 was observed among workers of the following professions: medical nurse (medical brother), junior medical nurse (junior medical brother) for patient care, junior medical nurse (sanitary cleaner, sanitary barista, etc.), a general practitioner – a family doctor and a medical nurse (medical brother) of a hospital.

### CONCLUSIONS

The study of occupational morbidity by region and economic sector of Ukrainian enterprises indicates that over the past five years, the number of victims of chronic occupational disease (poisoning) at work has increased by 38.5%. The main reasons for the occurrence of chronic occupational diseases (poisoning) are the imperfection of the technological process, the imperfection of mechanisms and working tools, as well as the failure to use personal protective equipment. In the structure of occupational diseases, a significant share belongs to diseases of the respiratory organs, diseases of the musculoskeletal system, hearing diseases, and vibration diseases.

It has been established that the most traumatic regions of Ukraine in terms of the number of cases of chronic occupational disease (poisoning) are Dnipropetrovsk Region, Lviv Region, Donetsk Region, Kirovohrad Region, Volyn Region, Luhansk Region, Zaporizhzhia Region, Sumy Region, and Kharkiv Region, which accounts for 97.5% of the total number of vic-

tims. The mining industry and quarry development remains the most dangerous branch of the economy of Ukrainian enterprises in terms of the number of chronic occupational diseases (poisoning) at work – 83.8%. As a result of the spread of the coronavirus disease, there was a sharp increase in the number of victims of cases of acute occupational disease COVID-19 at work, which is 46% of their total number. A significant part of the victims are medical and other workers whose work is related to the performance of professional duties in conditions of increased risk of infection with COVID-19.

Therefore, in order to reduce the level of occupational disease and preserve the health of workers, employers must ensure the implementation and compliance by all employees of the following preventive measures: conducting training on occupational safety and industrial sanitation, reducing the working time of workers in harmful working conditions, implementing automatic and remote control of production equipment, providing employees with means of individual and collective protection, carrying out medical and preventive measures, strengthening the responsibility of employers and key specialists for the state of working conditions and its safety.

Prospects for further research. One of the priority tasks of the state is the creation of safe and healthy working conditions aimed at reducing the risks of occupational diseases at work, and therefore it remains one of the promising areas of research.

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## Аналіз професійних захворювань на виробництві в Україні

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**Анотація.** Проаналізовано рівень професійної захворюваності на виробництві по регіонах і за галузями економіки підприємств України. Встановлено, що кількість потерпілих від випадків хронічного професійного захворювання (отруєння) на виробництві протягом останніх п'яти років залишається високою. Найбільше професійних захворювань сталося в галузі добувної промисловості і розробленні кар'єрів. У 2020 році значно збільшилася кількість потерпілих від випадків гострого професійного захворювання COVID-19, особливо в галузі охорони здоров'я

**Ключові слова:** виробнича діяльність, хронічне профзахворювання, гостре профзахворювання, галузь економіки підприємств, безпека праці

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