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## Review of Fire Statistics Data in Ukraine

Обзор статистических данных о пожарах в Украине

Przegląd danych statystycznych dotyczących pożarów na Ukrainie

### ABSTRACT

**Aim:** To perform a comparative review of global fire statistics and statistical data obtained in Ukraine as well as to identify the principal areas of analytical studies focusing on civil protection against fires.

**Introduction:** A review of global fire statistics reveals that Ukraine has an extremely low level of civil protection against fires. The number of fire deaths in Ukraine is almost 18 times higher than the average for EU Member States. In general, this is also true for other post-Soviet states, which share almost identical mechanisms of fire registration and fire services calls as well as the protection level of buildings in terms of automatic fire detection and firefighting systems. There is a need to study the available fire response mechanisms and practices and to thoroughly analyse the fire situation in Ukraine in order to increase the level of protection of population. Taking into account Ukraine's efforts to introduce the unified mechanism of civil protection available in the EU, it is purposeful to conduct appropriate studies including comparisons with the relevant statistical data from selected EU Member States.

**Methodology:** The studies were conducted using large-scale statistical monitoring, statistical generalisation and grouping of the statistical processing of generalised indices and subindices, and a thorough qualitative analysis of statistical data.

**Results:** An overview of global data on fire causes and fire-related deaths was conducted; an unsatisfactory situation with regard to civil protection against fires as compared to global and European fire statistics is continuing in Ukraine. A number of differences in compiling fire statistics in Ukraine and EU Member States were identified, and a certain lack of correspondence as well as differences can be observed; in particular in the estimation of the functioning of emergency response systems. It was revealed that there is a need for further scientific analysis of global fire statistics and for studying the emergency response mechanisms and practices available in EU Member States; the efficiency of the emergency response system operated in Ukraine is low compared to that revealed in the statistical data on the operative and tactical activities of fire services in EU Member States.

A thorough analysis of the causes of this situation should be conducted in order to identify the principal areas of analytical studies on civil protection against fires in Ukraine. In particular, we should perform a proper analysis of global fire statistics and study practices applied in the statistical registration of fires; a comprehensive estimation should be conducted of the efficiency of emergency response mechanisms and practices available in EU Member States, and the regulatory basis and principles of selecting fire department locations in settlement areas as well as the resources and means of response available in EU Member States should be studied.

**Keywords:** fire statistics, fire service, CTIF

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### АННОТАЦИЯ

**Цель:** Проведение сравнительного обзора мировой статистики и статистических данных Украины, определения на его основании основных направлений аналитических исследований по защите населения от пожаров.

**Введение:** Согласно обзору мировой статистики пожаров, Украина характеризуется крайне низким уровнем защиты населения. Количество погибших на пожарах в Украине почти в 18 раз превышает среднестатистическое значение стран ЕС. В общем, указанное касается и других стран постсоветского пространства, которые связаны между собой примерно одинаковыми механизмами учета пожаров и боевой работы, а также уровнем защиты объектов автоматическими системами обнаружения и тушения пожаров. Возникает необходимость изучения существующих механизмов и практик реагирования на пожары и основательного анализа состояния с пожарами в Украине и определение векторов направленных на повышение уровня защиты населения. Учитывая стремление Украины к введению единого механизма гражданской защиты ЕС, исследования целесообразно проводить в сравнении со статистическими данными стран ЕС.

**Методология:** исследования проводились с применением методов массового статистического наблюдения, статистической сводки и группировки статистической обработки сводных и рассредоточенных показателей, всестороннего анализа статистических материалов.

**Результаты:** Проведен обзор мировых данных о возникновении пожаров и гибели на них людей, по сравнению с мировой и европейской статистикой пожаров в Украине сохраняется неудовлетворительное положение в сфере защиты населения от пожаров. Установлены различия в ведении статистики пожаров в Украине и странах ЕС, имеют место несоответствия и расхождения в частности в оценке работы

систем реагирования на опасные события. Определена необходимость дальнейшего научного анализа мировой статистики пожаров и изучения существующих механизмов и практик реагирования на опасные события в странах ЕС, эффективность существующей системы реагирования на опасные события в Украине низкая по сравнению со статистикой оперативно-тактической работы противопожарных служб стран ЕС.

Для определения основных направлений аналитических исследований по защите населения от пожаров в Украине необходимо провести тщательный анализ причин сложившейся ситуации в этой сфере, а именно: осуществить анализ мировой статистики пожаров и исследований существующих практик статистического учета пожаров; провести комплексную оценку эффективности механизмов и практик реагирования на опасные события стран ЕС; изучить нормативные основы и принципы размещения пожарных подразделений на территориях населенных пунктов, количества сил и средств реагирования, используемые в странах-членах ЕС.

**Ключевые слова:** статистика пожаров, противопожарная служба, CTIF

**Вид статьи:** обзорная статья

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## ABSTRAKT

**Cel:** Celem artykułu jest przeprowadzenie przeglądu porównawczego światowych i ukraińskich statystyk pożarów oraz wyznaczenie na jego podstawie głównych kierunków badań analitycznych w zakresie ochrony przeciwpożarowej ludności.

**Wprowadzenie:** Zgodnie ze światową statystyką pożarów Ukraina charakteryzuje się skrajnie niskim poziomem ochrony przeciwpożarowej ludności. Liczba ofiar śmiertelnych pożarów na Ukrainie przewyższa o 18 razy średnią krajów UE. Dotyczy to także pozostałych państw postradzieckich, które cechują m.in. takie same mechanizmy ewidencji pożarów i działań ratowniczych, jak również podobny poziom ochrony obiektów za pomocą zautomatyzowanych systemów wykrywania i gaszenia pożarów. W związku z powyższym istnieje konieczność zbadania istniejących mechanizmów i praktyk reagowania na pożar. Należy przeprowadzić również dokładną analizę stanu pożarów na Ukrainie, a także określić kierunki poprawy poziomu bezpieczeństwa ludności. Biorąc pod uwagę to, że Ukraina dąży do przyjęcia wspólnego mechanizmu obrony cywilnej UE, uzasadnione jest prowadzenie badań uwzględniających dane statystyczne państw UE.

**Metodologia:** Badania przeprowadzono z wykorzystaniem metod: masowej obserwacji statystycznej, uogólnienia statystycznego i grupowania przetworzonych statystycznie wskaźników zbiorczych i rozłożonych oraz wszechstronnej analizy danych statystycznych.

**Wyniki:** W artykule przeprowadzono analizę światowych danych o pożarach i ofiarach śmiertelnych. W porównaniu do światowej i europejskiej statystyki pożarów na Ukrainie panuje niezadowalający poziom ochrony społeczeństwa przed pożarami. Wykazano różnice w prowadzeniu statystyk pożarów na Ukrainie i w UE oraz niezgodności i rozbieżności np. w ocenie pracy systemu reagowania na niebezpieczne zdarzenia. Stwierdzono, że konieczne jest prowadzenie dalszych analiz naukowych światowej statystyki pożarów oraz poznanie istniejących mechanizmów i praktyk reagowania na sytuacje niebezpieczne w państwach UE.

To bardzo ważne, ponieważ skuteczność istniejącego systemu reagowania na niebezpieczne zdarzenia na Ukrainie jest niska w porównaniu ze statystyką działań operacyjno-taktycznych służb pożarniczych w krajach UE.

W celu określenia głównych kierunków badań analitycznych w zakresie ochrony ludności przed pożarami na Ukrainie należy przeprowadzić dokładną analizę przyczyn zaistniałej sytuacji, a dokładniej przeprowadzić analizę światowej statystyki pożarów i obecnych praktyk ewidencji statystycznej pożarów oraz kompleksową ocenę skuteczności mechanizmów i praktyk w reagowaniu na niebezpieczne zdarzenia w UE, a także poznać podstawy normatywne i zasady rozmieszczania jednostek przeciwpożarowych na terenach zamieszkałych, liczby sił i środków reagowania, wykorzystywanych w państwach członkowskich UE.

**Słowa kluczowe:** statystyka pożarów, służba pożarnicza, CTIF

**Typ artykułu:** artykuł przeglądowy

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## Fire statistics review

Ukraine's attempts to join the world community and, in particular, its obligations related to the implementation of the unified mechanism of civil protection applied in EU Member States makes it necessary to review in more detail the tendencies observed in the area of ensuring the safety of the population in this country. It is also essential to address the controversies relating to the evaluation of the functioning of emergency response systems and non-conformities in compiling fire statistics as

well as to establish Ukraine's position in the global and European classification.

The fire situation in countries of the world and aspects of the activities of their fire services are studied by the Center of Fire Statistics of the International Association of Fire and Rescue Services (CTIF). Ukraine regularly submits statistical data on fires and their consequences in the country, which the Center of Fire Statistics of CTIF then uses to compile reports on this subject. Monitoring the situation related to fires and their consequences in Ukraine is carried out on the basis of

## ИССЛЕДОВАНИЯ И РАЗВИТИЕ

the statistical data coming from the territorial divisions of the State Emergency Service of Ukraine prepared according to well-known methods applied in statistical observations [1, 2].

We obtained statistical data from a review of report No. 21 prepared by the Center of Fire Statistics CTIF [3], which contains generalised data for ten years (1993 to 2014), five years (2010 to 2014), and separately for 2014, gathered from 95 countries of the world, and this allowed us to estimate the fire situation in Ukraine compared to global statistical data [3].

General fire statistics in countries of the world for the period from 1993 to 2014 show the following key indices:

- average number of fires per 1000 inhabitants equalling 1.5;

- average number of deaths in fires per 100,000 inhabitants equalling 1.7; and
- average number of deaths per 100 fires equalling 1.2.

The statistics for Ukraine for the period from 2011 to 2014 [4] show a declining tendency regarding negative consequences (see Table 1) and are characterised with the following average indices for these years:

- average number of fires per 1000 inhabitants equalling 1.3;
- average number of deaths in fires per 100,000 inhabitants equalling 5.8; and
- average number of deaths per 100 fires equalling 4.0.

**Table 1.** Fire statistics in Ukraine from 2011 to 2014\*

Item	2011	2012	2013	2014	Average value
Population size, thous.	43,311.0	43,213.0	43,094.0	42,972.0	43,148.0
Number of fires	58,450	68,445	58,711	68,879	63,621
Number of fire deaths	2,748	2,647	2,391	2,246	2,508
Average number of fires per 1000 inhabitants	1.3	1.6	0.7	1.6	1.3
Average number of deaths in fires per 100,000 inhabitants	6.3	6.1	5.5	5.2	5.8
Average number of deaths per 100 fires	4.7	3.9	4.1	3.3	4.0

\* The data submitted does not take into account statistics for the AR of Crimea and the Sevastopol city

Source: Own elaboration.

Table 2. shows generalised fire statistics data for Ukraine, selected EU Member States, generalised global fire statistics

and statistical data for separate countries bordering with Ukraine.

**Table 2.** Selected generalised statistical data on fires in 2014

Item	Global data*	EU**	Ukraine	Poland	Russia
Country's population size, thous.	1,097,675	237,900	43,001	39,492	144,000
Number of fires	2,726,787	1,072,962	68,879	145,237	150,437
Number of fire deaths	20,727	1,861	2,246	493	10,068
Average number of fires per 1000 inhabitants	2.5	4.5	1.6	3.7	1.0
Average number of fire deaths per 100,000 inhabitants	1.9	0.8	5.2	1.2	7.0
Average number of fire deaths per 100 fires	0.8	0.2	3.3	0.3	6.7

\* Global data for 2014 were generalised on the basis of statistical data from 39 countries of the world

\*\* Data from selected EU Member States for 2014 were generalised based on statistical data from 15 countries

Source: Own elaboration.

In general, a continuing negative tendency related to deaths (average number of deaths in fires per 100,000 inhabitants / average number of deaths per 100 fires), with a comparatively low number of fires, is noted for Belarus (7.8/9.8), Russia (7.0/6.7) and Ukraine (5.2/3.3). Lithuania has the worst indices (4.2/0.9) among EU Member States. High levels of fire protection, according to the statistical data, are noted in Slovenia (0.0/0.0) as well as France and the Netherlands, which are characterised by the same indices for the number of deaths in fires (0.4/0.1) among EU Member States.

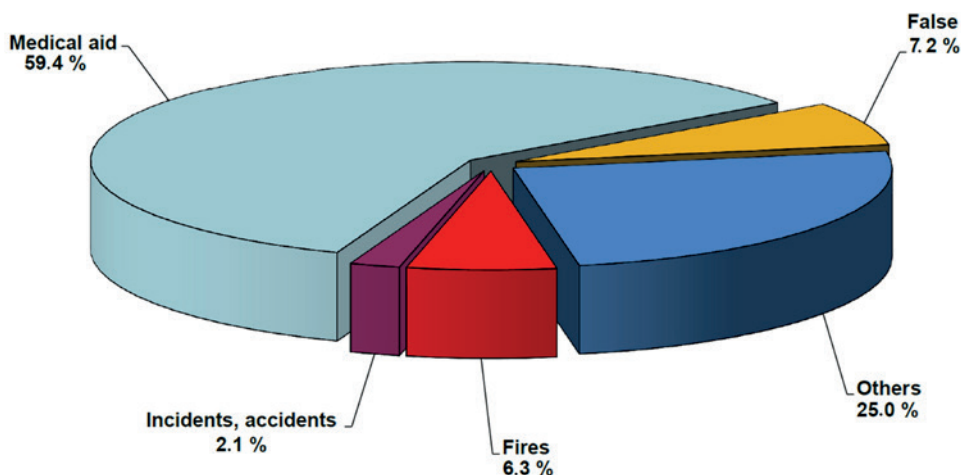
It is possible to identify the following trend: the average number of fires per 1000 inhabitants in post-Soviet states is much lower than in other countries, i.e. they have almost identical fire registration mechanisms, which are significantly different from the ones applied in other countries of the world.

According to the review of CTIF fire statistics for ten years (1993–2014) and five years (2010 to 2014) [3] a number of negative global tendencies can be observed related to fire-related deaths. This can be achieved by taking into consideration data on the registration of fires in a larger number of countries during the last years, which in turn introduces a certain dissonance in general global fire statistics. In addition, there is the impact of different procedures of accounting for fires used in individual countries. Thus, we can clearly observe discrepancies in statistical data related to fires between Poland and Russia from the data shown in table 2: the number of fires is nearly the same whereas the difference in population sizes is almost 3.6 times, and the difference in the number of deaths is striking and equals 20.5 times. The said trend applies to some other countries of the world, EU Member States, and

post-Soviet states (Russia, Belarus, Ukraine, Kazakhstan, Kyrgyzstan, Moldova, Armenia). Accordingly, there is a need for a detailed study of the said differences, which are likely to be related to various mechanisms of registration of fires, the efficiency of emergency (fire) response systems, the level of protection of facilities with automatic fire detection and fire-fighting systems [5, 6], etc.

## Review of fire services calls

A separate scientific review and verification are necessary for the study of the structure of the reasons for calling fire services in countries of the world. An illustrative example is the diagram (figure 1) shown in the Report on global fire statistics prepared by CTIF [3].



**Figure 1.** Global structure of fire department calls (2014)

Source: Own elaboration.

It seems that fire departments in the world receive calls mostly for medical assistance. 10 countries of the world account for the lion's share of the statistics. The largest number of them was recorded for the USA, equalling 20,178,000 calls (63.8% of the total number of calls in the country), Japan – 5,697,677 calls for medical assistance (67.7%), and France – 3,248,900 calls (75.7%). The number of calls for medical assistance in Serbia, the Netherlands and Latvia equals null. Yet, the numbers of calls for firefighting in these countries are the highest in the world and equal 61%, 60% and 59%, respectively. Fire departments in the mentioned countries provide

primary medical assistance as well, but this is done in the course of emergency response and is not reflected in statistical data.

As for Ukraine, table 3 shows generalised data on the number of calls for fire services, their percentage and distribution by purpose in order to compare them with the global statistics. We should note that France and the United Kingdom have completely different indicators for separate items of statistical data on fire departments calls in the statistics of calls than other EU Member States. Therefore, indices for these countries are marked separately and included in table 3.

**Table 3.** Some characteristics of fire service calls according to global fire statistics, generalised information on certain EU Member States and data of selected countries

Item	Number of fire service calls and the corresponding [%]				
	fires	accidents	medical aid	false calls	other calls
Global data*	3,144,655 (6.3%)	1,047,901 (2.1%)	29,172,834 (59.4%)	3,524,043 (7.2%)	12,284,043 (25.0%)
EU**	1,067,043 (14.1%)	915,253 (12.1%)	4,200,278 (55.7%)	363,615 (4.8%)	1,000,270 (13.3%)
France	270,900 (6.3%)	331,400 (7.7%)	3,248,900 (75.7%)	–	443,300 (10.3%)
The United Kingdom	212,500 (42.0%)	–	–	293,100 (58.0%)	–
Ukraine	68,879 (42.1%)	6,229 (7.0%)	–	14,449 (8.8%)	74,088 (45.3%)
Poland	145,237 (34.6%)	87,468 (20.9%)	13,662 (4.1%)	24,556 (5.9%)	148,341 (35.4%)

\* Global data for 2014 were generalised based on statistics from 23 countries of the world

\*\* Data from some EU Member States for 2014 were generalised based on statistical data from 13 countries

Source: Own elaboration.

## RESEARCH AND DEVELOPMENT

We can conclude from the data submitted that no generally accepted system of recording fire department calls in EU Member States or in the world is available. In France false calls are ascribed to "other calls". The fire service does not accept any calls for purposes other than firefighting such as accident clean-up or medical assistance, but registration of other calls is not performed in the United Kingdom. Moreover, emergency response systems available in specific EU Member States,

particularly in terms of functions performed by fire departments, are quite different.

We can make a conclusion from the review of statistical data on the application of various approaches to the distribution and number of responding teams in many countries. Thus, data on the number of fire stations, basic and special firefighting equipment as well as the number of firefighters are significantly different from those in Ukraine (table 4).

**Table 4.** Number of fire services according to global fire statistics, generalised information on selected EU Member States and data for selected countries

Item	Number of			Number of firefighters	
	fire stations	engines	ladders	professional	total
Global data*	193,795	231,060	18,146	1,525,300	14,458,332
EU*	82,509	103,542	7,072	331,726	2,585,616
France	7,296	8,533	1,221	53,100	246,900
Germany	33,460	41,216	2,414	44,574	1,067,919
Ukraine	894	3,601	334	55,241	211,105
Poland	16,907	19,447	717	30,154	292,666

\* Global data for 2014 were generalised based on statistics from 54 countries of the world

\*\* Data from selected EU Member States for 2014 were generalised based on statistical data from 23 countries

Source: Own elaboration.

The ratio of the number of fire stations and basic firefighting equipment units equals 1.2 for countries of the world and 1.3 for EU Member States, whereas this number equals 4.0 for Ukraine. In other words, there were at least four units of basic firefighting equipment for each fire station in Ukraine in 2014. This fact can be explained by different statistical registration or statistical errors when performing it. However, although there are some permissible statistical errors, one cannot deny the fact of the application of the principle of locating fire departments within settlements in EU Member States being different from that in Ukraine, which consists of ensuring optimum time interval before the commencement of firefighting and rescue activities. For instance, this is visible in the calculation of the fire protection needs of municipalities in Germany and France. The basis for such calculations in Ukraine is the assigned time period for the fire and rescue teams' arrival at the place of call, which can be up to 25 minutes in a rural area [7].

According to statistical data, operative emergency (fire) response is ensured by a significant number (almost 80%) of fire departments having at least a single basic firefighting equipment unit (fire tanker) in EU Member States, and this enables the expanded distribution of fire stations and operative response; moreover, this allows minimising the risk of a person's exposure to dangerous fire factors and lowers the probability of fire spreading [8].

It is possible to mention separately indices related to significant numbers of fire stations, firefighting equipment units and the total number of firefighters in Poland and Germany. At the same time, the efficiency of the functioning of fire services in Poland based on the indices of the average number of fires per 1000 inhabitants, the average number of deaths in fires per 100,000 inhabitants, and their number per 100 fires cannot

be estimated unequivocally compared to the respective indices of Slovenia, France, the Netherlands, the United Kingdom, the Czech Republic, Hungary, Serbia, Norway, Croatia, the USA and other countries due to the available material and physical potential.

According to the results of the review of the statistical data for selected EU Member States concerning the number of fires, deaths of people in fires, the scope of operations performed by fire services and their optimal number, the emergency response system of France deserves special attention. So, a need appears for a detailed study of the statistical data on operations performed by fire departments in selected EU Member States.

In view of the above we should note that it is advisable to carry out a comprehensive study of specific features of fire statistics and operations performed by fire services in Poland, the United Kingdom and France when conducting further studies in the field of fire protection based on data from global fire statistics of CTIF member states.

## Summary and conclusions

The following was established in the course of the review of global fire statistics from CTIF member states and statistical data on fires in Ukraine:

- unsatisfactory situation in the field of fire protection as compared to global and European fire statistics is still observed in Ukraine;
- a number of non-conformities and differences in compiling global fire statistics as well as statistical data in EU Member States and Ukraine are observed in particular in the estimations concerning fire response systems;

- the efficiency of the fire response system in Ukraine is low compared to the statistics of operations performed by fire services in EU Member States.

An urgent need arises to conduct scientific studies of the available mechanisms and practices referring to the statistical registration of fires and emergency response mechanisms in order to analyse thoroughly the causes of the current situation in the field of civil protection against fires in Ukraine as well as establishing the criteria of its further development. The aforementioned tasks can be implemented by means of government financing of the appropriate research work tasks such as:

- conducting scientific analyses of global fire statistics as well as studying the available practices of the statistical registration of fires and the mechanisms of their application;
- study and analysis of some statistical data indices on operations performed by fire services in EU Member States;
- carrying out an integrated assessment of the efficiency of the available mechanisms and practices of emergency response in EU Member States;
- review of the regulatory basis and principles of locating fire departments in the areas of settlements as well as the amount of powers and means of response.

A solution to the aforementioned issues is to introduce European principles and standards for the civil protection of the population and territories of Ukraine.

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