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МЕДИЧНА ЕКСПЕРТИЗА ВСТАНОВЛЕННЯ ПРИЧИННОГО ЗВ'ЯЗКУ ЗАХВОРЮВАНЬ, ЩО ПРИЗВОДЯТЬ ДО ВТРАТИ ЗДОРОВ'Я, ІНВАЛІДНОСТІ ТА СМЕРТІ ВНАСЛІДОК ДІЇ ІОНІЗУЮЧОГО ВИПРОМІНЮВАННЯ ТА ІНШИХ ШКІДЛИВИХ ФАКТОРІВ ЧОРНОБИЛЬСЬКОЇ КАТАСТРОФИ У ВІДДАЛЕНОМУ ПІСЛЯАВАРІЙНОМУ ПЕРІОДІ (2013–2022 рр.)

Втрата здоров'я та працездатності, а також смерть внаслідок шкідливого впливу Чорнобильської катастрофи (у тому числі радіаційного опромінення) під час виконання професійних, військових або службових обов'язків та/або проживання на радіаційно забруднених територіях, додаткового опромінення не з власної вини, а внаслідок радіаційної аварії спричинило розвиток спеціальної форми медичної експертизи в системі медико-соціального захисту цих постраждалих контингентів.

Мета: вивчити та охарактеризувати структуру категорій постраждалих (учасників ліквідації наслідків аварії та потерпілих) від Чорнобильської катастрофи за матеріалами експертних справ Центральної міжвідомчої експертної комісії (ЦМЕК) у віддалений післяаварійний період (2013–2022 рр.).

Матеріал і методи. Робота виконана в дизайні ретроспективного дослідження на основі вивчення 50 974 експертних справ, що були розглянуті ЦМЕК впродовж 2013–2022 рр. для встановлення причинно-наслідкового зв'язку між захворюванням та впливом радіаційного опромінення й інших шкідливих факторів і умов під час аварії на ЧАЕС з використанням системного аналітичного підходу до оцінки медичних і немедичних показників, представлених у медико-експертній документації.

Результати. Загальна кількість постраждалих дорослих повнолітніх громадян станом на 01.01.2022 порівняно з 2008 роком зменшилася на 477 953 особи, або на 26,05 % (з 1 834 536 до 1 354 746 осіб). Кількість ліквідаторів аварії зменшилася з 276 327 (2013 р.) до 171 725 (2022 р.), або на 104 602 особи (37,85 %), тобто за останні 10 років помер майже кожен третій учасник ліквідації наслідків аварії на Чорнобильській АЕС. Кількість дорослих постраждалих зменшилася з 1 558 209 у 2008 році до 1 183 021 у 2022 році, або на 24,08 % (375 188 осіб). Середньорічне скорочення абсолютної чисельності ліквідаторів аварії на ЧАЕС протягом 2013–2022 років становить близько 7 770 осіб на рік (9 424 протягом 2021 року), дорослих постраждалих – 27 045 осіб на рік (28 922 протягом 2021 року). У структурі медичних експертних справ протягом 2013–2022 років провідне місце як причина захворювань, інвалідності та смерті посідають онкологічні захворювання – 52,72 %, цереброваскулярні захворювання та їх ускладнення становлять 17,08 %, захворювання серцево-судинної системи – 19,6 %.

Висновки. У віддалений післяаварійний період (2013–2022 рр.) зросла потреба в експертизі причинно-наслідкового зв'язку інвалідності та причин смерті з впливом наслідків аварії на Чорнобильській АЕС для медико-соціального забезпечення. Протягом 2013–2022 років відбулося прискорене скорочення всіх категорій постраждалих внаслідок аварії на Чорнобильській АЕС. У структурі медичних експертних справ протягом 2013–2022 років провідне місце як причина хвороб що призвели до інвалідності та смерті посідають онкологічні захворювання.

Ключові слова: іонізуюче випромінювання, учасники ліквідації аварії на Чорнобильській АЕС, медична експертиза, Чорнобильська катастрофа.

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MEDICAL EXPERTISE FOR ESTABLISH CAUSATION OF DISEASE, LEADING TO LOSS OF HEALTH, DISABILITY AND DEATH WITH THE ACTION OF IONIZING RADIATION AND OTHER HARMFUL FACTORS OF THE CHORNOBYL ACCIDENT IN THE REMOTE POST-ACCIDENTAL PERIOD (2013–2022)

Loss of health and workability, as well as deaths due to harmful influence of the Chernobyl Catastrophe (including radiation exposure) during performance of professional, military or official duties and / or living on radiation-contaminated areas, additional exposure not through their own fault but due to a radiation accident, caused the development of a special form of medical expertise as part of the of medical social protection system for these suffered contingents.

Objective. To study and characterize the structure of the affected categories (clean-up workers and victims) of the Chernobyl Catastrophe based on the materials of expert cases of the Central Interdepartmental Expert Commission (CMEC) in the remote post-accidental period (2013–2022).

Material and methods. The work was performed in the design of a retrospective study that based on studying of 50,974 expert cases, which were considered by CIEC during 2013–2022 to establish a causal relationship between the disease and influence of radiation exposure and other harmful factors and conditions during ChNPP accident using a systematic analytical approach to assessing the medical and nonmedical parameters presented in medical expert documentation.

Results. The total number of affected adult citizens as on 01.01.2022, compared to 2008, decreased by 477,953 persons, or by 26.05 % (from 1,834,536 to 1,354,746 persons). The number of clean-up workers of the accident decreased from 276,327 (2013) to 171,725 (2022), or by 104,602 people (37.85 %), that means – during the last 10 years, almost every third clean-up worker who participated in the liquidation of the consequences of the accident at the Chernobyl NPP died. The number of adult victims decreased from 1,558,209 in 2008 to 1,183,021 in 2022, or by 24.08 % (375,188 persons). The average annual reduction in the absolute number of clean-up workers of ChNPP accident during 2013–2022 is about 7,770 people per year (9,424 during 2021), adult victims – 27,045 people per year (28,922 during 2021). In the structure of medical expert cases during 2013–2022 the leading place as the reason of disease, disability and death is occupied by oncological diseases – 52.72 %, cerebrovascular diseases and their complications make up 17.08 %, diseases of the cardiovascular system – 19.6 %.

Conclusion. In the remote post-accidental period (2013–2022) has increased the need of expertise of the causal relationship of disability and the causes of death with the influence of the Chernobyl NPP accident consequences for medical and social support. During 2013–2022 period quick reducing for all categories of affected due to the Chernobyl NPP accident taken place. In the structure of medical expert cases during 2013–2022 the leading place as the reason of disease, disability and death is occupied by oncological diseases.

Key words: ionizing radiation, clean-up workers of Chernobyl NPP accident, medical expertise, Chernobyl catastrophe.

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INTRODUCTION

One of the key issues to minimize the consequences of the Chernobyl NPP (ChNPP) became the problem of medical and social expertise of victims [1, 2] for determine losing of health, workability and life. According to the decision of Government Commission № 539

from August 13, 1988 in agreement with the Trade-Unions and Goskomtrud of USSR the order of Ministry of Health No 731 from September 28, 1988 was issued «On the organization of the Central Interdepartmental Expert Council to establish causa-

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tion of disease and disability with the works at the aftermath of Chornobyl accident and their professional nature at the All-Union Research Center for Radiation Medicine Academy of Medical Sciences» [3]. The basis of social protection of the Chornobyl accident victims is till our days with updating the of the Law of Ukraine «On status and social protection of citizens affected by the Chornobyl catastrophe» ratified by the Verkhovna Rada (Ukrainian Parliament) on April 1, 1991 [4]. The 12th Article of this law is dedicated to «Establishing a causal link between the disease connected to the Chornobyl disaster, partial or complete disability of citizens affected by the Chornobyl disaster and the Chornobyl disaster». Of significant influence on making decisions in this issue are also articles 2, 14, 27 of these documents.

OBJECTIVE

To study and characterize the structure of the affected categories (clean-up workers and victims) of the Chornobyl Catastrophe based on the materials of expert cases of the Central Interdepartmental Expert Commission (CMEC) in the remote post-accidental period (2013–2022).

MATERIALS AND METHODS

The work was performed in the design of a retrospective study that based on studying of 50 974 expert cases, which were considered by CIEC during 2013–2022 to establish a causal relationship between the development and progression of disease that leads to disability and death and influence of radiation exposure and other harmful factors and conditions during ChNPP accident using a systematic analytical approach to assessing the medical and nonmedical parameters presented in medical expert documentation.

In accordance with the requirements of current regulations, the materials of expert cases included documents confirming the status (category) of the victim, passport data and information about the place of residence, professional history and experience, medical documentation regarding health before and after the ChNPP accident, results of outpatient and inpatient examination and treatment (if necessary – the results of morphological examinations, in case of death – autopsies), also a certificate of permanent disability [5, 6]. The analysis of every cases was performed under the condition of the diagnosis verification by the members of the expert group, approved by the voting protocol of the CIEC members.

RESULTS AND DISCUSSION

Due to the ChNPP accident in Ukraine, 1986, the largest man-made disaster in human history, 3,259,761 citizens of Ukraine and 2,293 settlements were affected.

On 01.01.2022 the status of victims of the Chornobyl Catastrophe in Ukraine had 1 661 480 persons, including 306 734 children (Table 1).

Reducing the number of all categories of affected due to the Chornobyl accident for the period of 1986–2022 shown in Figure 1. The total number of affected adult citizens as on 01.01.2022, compared to 2008, decreased by 477,953 persons, or by 26.05 % (from 1,834,536 to 1,354,746 persons).

During this period, the number of clean-up workers of the accident decreased from 276,327 to 171,725, or by 104,602 people (37.85 %), that means – during the last 10 years, almost every third participant in the liquidation of the consequences of the accident at the Chornobyl NPP died.

The number of adult victims decreased from 1,558,209 in 2008 to 1,183,021 in 2022, or by 24.08 % (375,188 persons). The number of children affected by the ChNPP accident has decreased from 534,568 in 2008 to 306,734 in 2022, or by 227,834 (42.62 %). Regarding the reduction of the number of this category, it is necessary to take into account the loss of the status of victims by children upon reaching the age of majority according to the current legislation.

It is impossible to miss the characteristics of the victims of the ChNPP accident such a painful and socially important indicator as 42,057 people who have the status of wife / husband of the deceased citizen whose death was related to the Chornobyl catastrophe.

Expertise to establish the causal relationship of diseases, disabilities and causes of death with the action of ionizing radiation and other harmful factors of the ChNPP accident are persons who, according to current legislation, have the status of victims of the Chornobyl catastrophe [4].

The main regulatory documents governing the connection of diseases with the impact of the Chornobyl catastrophe for 1997–2011 years was the Order of MOH of Ukraine No 150 from 17.05.1997 «On approval of regulations on diseases in which causal links can be installed with the action of ionizing radiation and other harmful factors due to the Chornobyl NPP accident» [5] and joint Order of the Ministry of Health and Ministry of Emergency of Ukraine No 166/129 from 30.05.1997 «On improvement of the system of expertise to establish causation of disease, disability and death with the effect of ionizing radiation and other harmful

Table 1
The number of people who have the status of affected under the Chernobyl Catastrophe on January 1, 2022

Name of indicators	Number
total number of affected persons	1 661 480
of them:	
➤ clean-up workers of the Chernobyl NPP accident	171 725
including the following categories:	
➤ category 1A from the number of clean-up workers of the Chernobyl NPP accident (persons with disabilities (invalids))	53 560
I st group of disability	2 019
II nd group of disability	33 375
III rd group of disability	18 166
➤ category 2A from the number of clean-up workers of the Chernobyl NPP accident	93 335
➤ category 3A from the number of clean-up workers of the Chernobyl NPP accident	24 830
➤ victims of the Chernobyl Catastrophe	1 489 755
including the following categories:	
➤ category 1B from the number of victims of the Chernobyl catastrophe (persons with disabilities (invalids))	48 692
I st group of disability	2 451
II nd group of disability	25 262
III rd group of disability	20 979
➤ category 2B from the number of victims of the Chernobyl catastrophe	50 270
➤ category 3B from the number of victims of the Chernobyl catastrophe	348 225
➤ category 4B from the number of victims of the Chernobyl catastrophe	734 556
➤ category 4Г from the number of victims of the Chernobyl catastrophe (persons who worked outside the exclusion zone in particularly harmful working conditions – ionizing radiation and open sources of ionizing radiation)	1 278
➤ series category «Д» (victim children)	306 734
➤ category «Д» with disabilities (children-invalids):	1 412

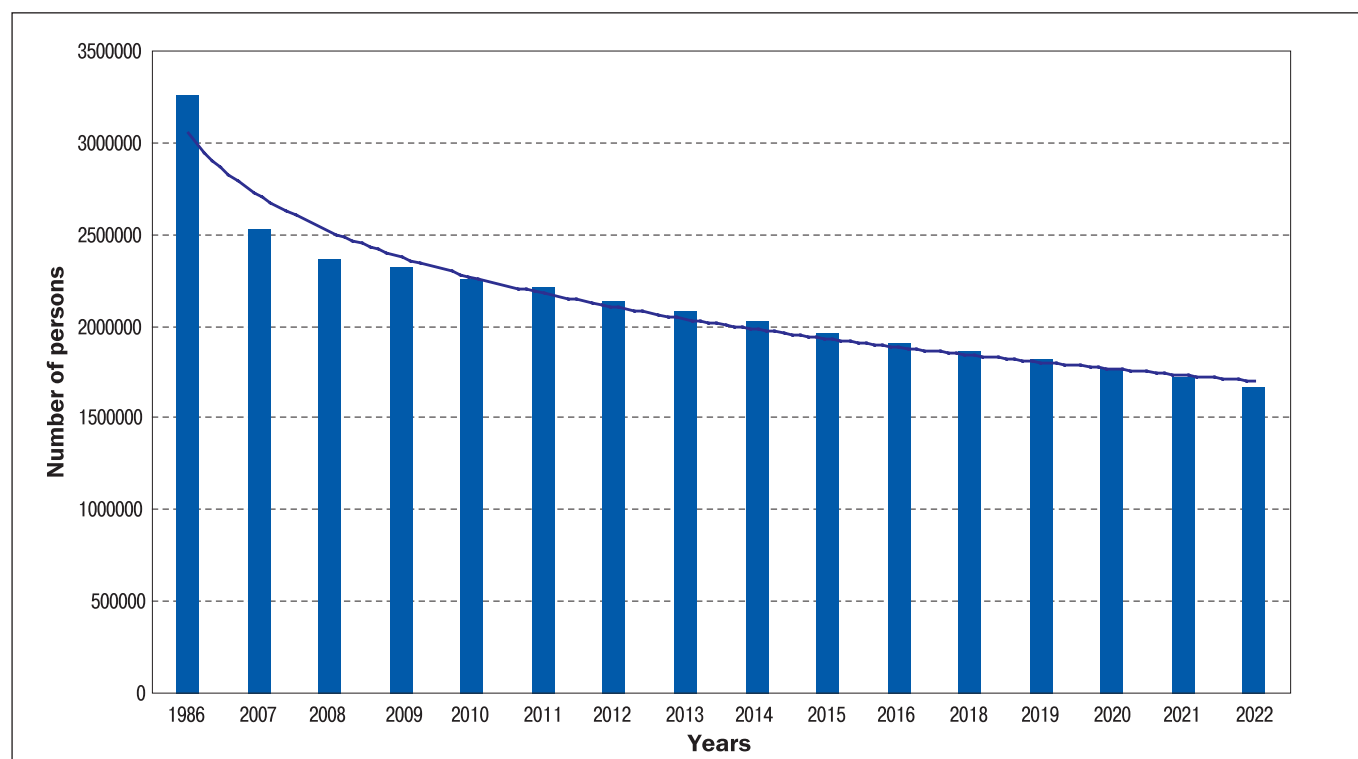


Figure 1. The number of all categories affected under the Chernobyl NPP accident reducing for the period during 1986–2022

factors due to the Chernobyl NPP accident» [6]. By p. 3 of Decree of the Cabinet of Ministers of Ukraine No 1210 from 23.11.2011 «On improvement of social protection of citizens affected by the Chernobyl catastrophe» [7] and subsequent joint Order of the Ministry

of Health and Ministry of Emergency of Ukraine No 789/1248 from 10.10.2012 «On introduction changes to the Order of the Ministry of Health of Ukraine and Ministry of Emergency of Ukraine from 30.05.1997 No 166/129» [8] regional interdepartmen-

tal expert commissions and regional medical treating expert commissions were eliminated except Central Interdepartmental Expert Commission (CIEC), Donetsk and L'viv regional commissions (Table 2), made changes to the procedure to establish causation of disease, leading to loss of health, disability and death with the action of ionizing radiation and other harmful factors of the Chernobyl catastrophe. The Order of Ministry of Health of Ukraine No 441 from 14.06.2012 «On amendments to the order of Ministry of Health of Ukraine No 150 from 17.05.1997» [9] defines the list of diseases for which can be determined relationship and instruction on its use.

Today, the components of the system of medical expertise to establish causation of disease, leading to loss of health, disability and death with the action of ionizing radiation and other harmful factors of the Chernobyl catastrophe for the adult population are the following expert commissions (Table 2): CIEC, which functions on the basis of State Institution «National Research Center for Radiation Medicine of the National Academy of Medical Sciences of Ukraine» (NRCRM), and L'viv regional interdepartmental expert commission, which has the status of a communal enterprise. CIEC provides medical expertise to establish causation of disease, leading to loss of health, disability and death with the action of ionizing radiation and other harmful factors of the Chernobyl catastrophe with the impact of the radiation and nonradiation consequences of the ChNPP accident for all citizens of Ukraine who have the status of victims of the Chernobyl catastrophe and performs the role of a conflict appeal commission.

L'viv regional interdepartmental expert commission is responsible for conducting medical examinations for residents of L'viv, Vinnitsa, Volyn, Ivano-Frankivsk, Rivne, Ternopil, Khmelnytsky and Chernivtsi regions.

Category 1 of victims of the accident at the Chernobyl NPP is the most critical in terms of loss of health and work capacity, as it consists of persons who have the status of victims of the accident at the Chernobyl NPP and

have lost work capacity due to diseases for which has been established a causal relationship with the impact of the consequences of the ChNPP accident.

During the period 1995–2014, there was a fast increase in the number of victims of category 1 (from 40,106 to 117,158). During 2015–2022, there is a gradual decrease in the number of victims of this category from 113,268 on January 1, 2015 to 102,792 on January 1, 2021 (Figure 2).

When significant decrease in the total number of clean-up workers of ChNPP accident taken place from 243,456 persons in 2013 to 171,725 in 2022 (or by 71,731 persons, 29.46 %), the number of clean-up workers who have the 1st category decreased by 13,949 persons (from 67,509 in 2013 to 53,560 in 2022, or by 20.66 %). At the same time the relative number of clean-up workers who have the 1st category was 27.73 % in 2013 and 31.19 % in 2022 (Figure 3).

The total number of adult victims also significantly decreased during 2013–2022: from 1,426,427 persons in 2013 to 1,183,021 in 2021 (or by 243,406, 17.06 %), the absolute number of victims of the 1st category decreased by 557 people (from 49,249 in 2013 to 48,692 people in 2022). The relative number of victims who have the 1st category was 3.45 % in 2013 and 4.12 % in 2022 (Figure 3).

Thus, during 2013–2022, there is a fast decrease in the total number of all categories of victims with a significant reduction in the absolute number of clean-up workers of ChNPP accident who have the 1st category and the relative stability of the number of the cohort of adult victims of category 1. It should be taken into account that this relative stability of the number of victims of adult age who have the 1st category is formed from the ratio of losses of persons of this cohort and its replenishment due to the establishment of causation of disease, leading to loss of health, disability and death with the action of ionizing radiation and other harmful factors of the Chernobyl accident in the remote post-accidental period of categories 2 A and 2 Б, 3 A and Б, 4B.

Table 2

Distribution of regions from which persons affected by the Chernobyl disaster, documents submitted to the interdepartmental expert committees (IEC)

No	Commission	Regions
1.	Central IEC	Zhytomyr, Kyiv, Cherkasy, Chernihiv region, Kyiv city and Donetsk regions that have been subordinated to Donetsk IEC – Dnipropetrovsk, Donetsk*, Zaporizhzhia, Kirovograd, Lugansk *, Mykolaiv, Odesa, Poltava, Sumy, Kharkiv and Kherson regions, the Autonomous Republic of Crimea * and Sevastopol city*, appeals and appellations from all regions
2.	L'viv IEC	L'viv, Vinnitsa, Volyn, Ivano-Frankivsk, Rivne, Ternopil, Khmelnytsky and Chernivtsi regions

Note. *Provided that the citizenship of Ukraine, residence and registration on the territory controlled by Ukraine.

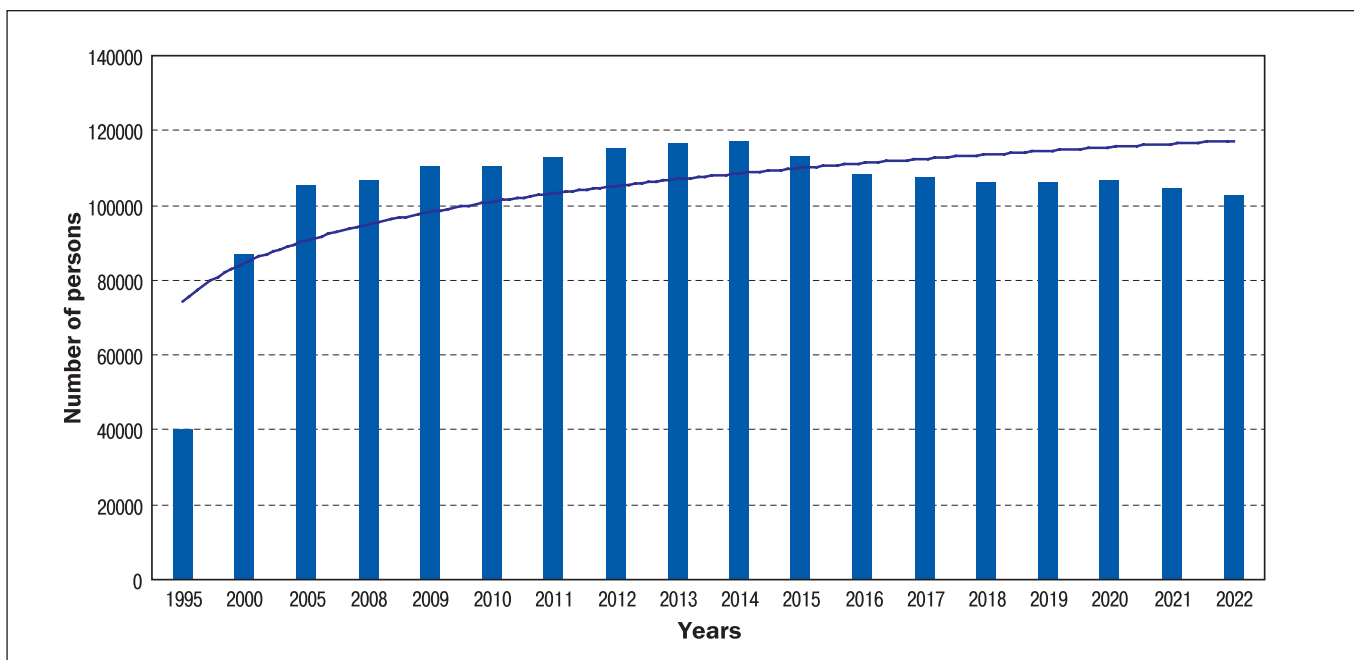


Figure 2. Dynamics of the number of ChNPP accident victims of the 1st category during 1995–2022

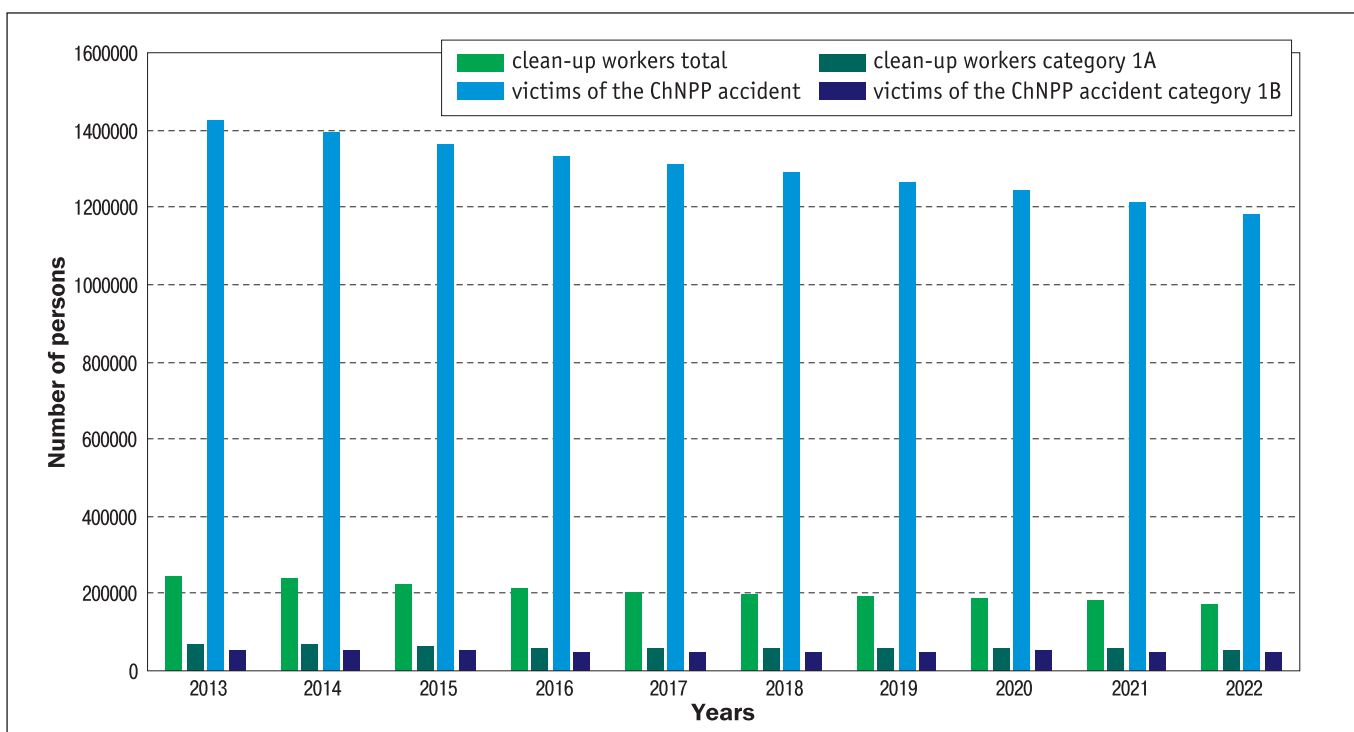


Figure 3. The structure and ratio of the number of main categories of victims and victims who have the 1st category during 2013–2022

The average annual reduction in the absolute number of clean-up workers of ChNPP accident during 2013–2022 is about 7,770 people per year (9,424 during 2021), adult victims – 27,045 people per year (28,922 during 2021).

The main reasons leading to these changes are the increase in the incidence and prevalence of severe chronic disabling diseases, which quickly lead to a decompensated course and the development of com-

plications, which, accordingly, leads to an increase in the mortality rate of the affected population [10].

As a result of the restructuring of the expert system in 2012, the volume of work of the CIEC increased three-fold, during 2013–2022, 50,974 medical expert cases of victims were considered. The detailed scope of consideration by the CIEC for the medical cases of victims (by category) regarding the establishment for causation loss of health, disability and death with the action

of ionizing radiation and other harmful factors of the Chernobyl accident in the remote post-emergency period is presented in Table 3.

In total, during 2013–2022, medical expert cases were considered: victims with disabilities – 36,845 cases, cancer patients – 26,876 cases, deceased – 17,680 cases.

The primary expertise was provided 77.81 % (39,664 cases) of the reviewed cases, including clean-up workers of ChNPP accident categories 2A and 3A – 27.38 % (13,959 cases), residents of the zone of enhanced radiological control (category 4B) – 32.10 % (16,364 cases), evacuees and residents of compulsory resettlement zone (category 2B) – 3.02 % (1537 cases), residents of the guaranteed free-will resettlement zone (category 3B) – 12.84 % (6,544 cases), victims category «D» – 2.47 % (1260 cases).

The part of medical expertise cases concerning clean-up workers and victims who have the 1st category (formed from all affected contingents) amounted to 22.19 % (11,310 cases) and in most cases it was post-mortem – 79.33 % (8,972 cases), oncological diseases in this group accounted for 42.18 % (4771 cases).

A significant number of medical expert cases of oncology patients – a total of 22,105 cases (43.37 %) – without 1st category. First of all, this applies to victims who live in the zone of guaranteed free-will resettlement (category 3B) – 69.68 % (4,560 cases). A large share of oncological cases is determined for residents of the zone of enhanced radiological control (category 4B) – 70.58 % (11,550 cases), as well as evacuees and residents of compulsory resettlement zone (category 2B) – 51.92 % (798 cases). It is difficult to ignore the high level of this indicator in relation to clean-up workers of ChNPP accident category 2A – 33.27% (4,030 cases). It should be noted that for victims of category D – 34.13 % (430 cases) are relatively young people – up to 40 years old.

Today, in the structure of medical expert cases, the leading place as the reason of disease, disability and death is occupied by oncological diseases – 52.72 %, cerebrovascular diseases and their complications make up 17.08 %, diseases of the cardiovascular system – 19.6 %, chronic diseases of the bronchopulmonary system – 1.6 %, endocrine diseases (without thyroid cancer) – 1.4 %, diseases of the digestive system – 1.1 %, other diseases in general – 6.0 %.

When analyzing the state of the medical and social expertise for establishment of causation loss of health, disability and death with the action of ionizing radiation and other harmful factors of the Chernobyl acci-

dent in the remote post-emergency period with the impact of the consequences of the ChNPP accident, it is necessary to pay attention to the fact that the normative and regulatory framework for certain issues remains incomplete and needs to be clarified and improved.

First of all, it is about making changes to the Law of Ukraine «On status and social protection of citizens affected by the Chernobyl catastrophe» [4] (Articles 4; 7, p. 7; p. 4 part 1 of article 11; p. 4. part 1 of article 14; part 1 of article 17) regarding the determination of the status of victims for children who, after reaching adulthood, lost this status and fell ill with oncological (primarily thyroid cancer) and oncohematological diseases, as well as regarding the guarantee medical care for the descendants of the victims of the second, third and subsequent generations. Insist on the clarification of this law, according to which the cancellation of the status of the territory that had a certain category of radiation contamination does not imply the cancellation or loss of the status of victims for the residents of this territory who have lived under the influence of the radiation factor for the corresponding number of years.

A separate issue is the periodic updating of the scientifically based list of diseases, according to which the causal relationship of pathology (illness), disabilities and causes of death with the influence of the consequences of the ChNPP can be established. The latter requires taking into account many years of experience in minimizing the medical consequences of the ChNPP accident, the latest knowledge in the field of general and clinical radiobiology, radiation medicine, oncology and medical and social expertise, and conducting dosimetric passporting of populated areas of Ukraine that undergone radiation contamination.

In the case of examination of the connection of the disease that led to death, causation of the cause of death with the action of ionizing radiation and other harmful factors of the Chernobyl accident in the remote post-emergency period can be considered, if the diagnosis is included in the list and confirmed by the results of pathologic-anatomical, forensic medical research or, as an exception, clinically proven during an inpatient examination during the patient's lifetime. The direct, known cause of death may be related to the action of harmful factors as a result of the accident at the ChNPP accident without conducting a pathologic-anatomical or forensic medical examination, if it is the result of a disease that is included in the list and for which a causal relationship was established during life the patient.

Table 3
Volume and structure of providing CIEC medical expertise for the interdependence of the diseases that bring to the disability and death with the impact of the Chernobyl accident consequences during 2013–2021 years

Years	Categories of victims	Category of victims (medical expert cases)												
		1 st category			clean-up workers		evacuated and residing in the zone of compulsory resettlement (category 2B)		victims living in an area of guaranteed free-will resettlement (category 3B)		victims living in the zone of enhanced radiological control (category 4B)		victims category «Д» (children)	Total
		category	2A category	3A category	category	category	category	category	category	category	category			
3	4	5	6	7	8	9	10							
2013	Total incl.	877	1168	193	117	596	2340	221	5512					
	> patients with disability	865	717	171	86	308	2101	157	4405					
	> cancer patients	776	311	59	47	487	1418	90	3188					
	> cases of death	662	281	17	15	103	514	0	1592					
2014	Total incl.	1008	1212	182	128	619	2422	181	5752					
	> patients with disability	958	728	139	90	330	1945	140	4330					
	> cancer patients	544	348	64	74	428	1586	46	3090					
	> cases of death	825	373	23	16	100	524	1	1862					
2015	Total incl.	1245	1199	194	154	736	1622	139	5289					
	> patients with disability	1135	656	129	119	345	1274	99	3757					
	> cancer patients	493	485	104	87	579	1045	42	2635					
	> cases of death	990	431	45	20	165	433	0	2084					
2016	Total incl.	1215	1433	202	162	624	1271	125	5032					
	> patients with disability	1058	742	150	120	279	920	92	3361					
	> cancer patients	474	505	89	90	495	1010	42	2705					
	> cases of death	921	481	34	18	90	303	0	1847					
2017	Total incl.	1155	1242	224	143	673	1013	107	5032					
	> patients with disability	1065	718	140	108	346	794	93	3361					
	> cancer patients	423	451	106	71	479	828	36	2705					
	> cases of death	955	351	40	20	112	285	0	1847					
2018	Total incl.	1201	1309	232	175	747	1310	100	5074					
	> patients with disability	1103	728	153	134	398	1026	89	3631					
	> cancer patients	492	466	102	94	521	1005	35	2715					
	> cases of death	974	438	36	20	126	237	0	1831					
2019	Total incl.	1184	1263	190	154	736	1874	99	5500					
	> patients with disability	1042	648	122	110	395	1415	80	3812					
	> cancer patients	457	425	78	79	482	1376	28	2925					
	> cases of death	902	461	35	15	125	323	0	1861					
2020	Total incl.	1141	1145	167	115	514	1515	94	4691					
	> patients with disability	1006	629	110	87	264	1117	83	3296					
	> cancer patients	410	369	53	66	357	1138	38	2431					
	> cases of death	857	357	28	15	90	268	1	1616					
2021	Total incl.	1355	1222	170	176	637	1634	121	5315					
	> patients with disability	1193	643	115	144	347	1237	106	3785					
	> cancer patients	394	383	62	127	399	1192	38	2595					
	> cases of death	1113	453	28	51	64	225	1	1935					
2022 (10 months)	Total incl.	929	920	92	213	662	1363	73	4252					
	> patients with disability	848	573	73	165	432	1053	60	3204					
	> cancer patients	308	287	20	63	333	952	35	1998					
	> cases of death	773	241	13	56	47	158	1	1289					
Total	11310	12113	1846	1537	6544	16364	1260	50974						

In 2012, the reorganization of the system of medical and social expertise to establish the causal relationship of diseases, disabilities and causes of death with the impact of the consequences of the ChNPP accident proved its effectiveness and expediency in relation to the medical and social protection of victims of the Chernobyl catastrophe. There are unresolved issues (thyroid cancer in persons who have lost the status of victims in adulthood) that require changes and additions to the legislative framework. It is necessary to continue clinical and epidemiological studies of the regularities of the development and course of diseases in the affected contingents of the population in the remote post-accidental period in order to develop scientifically based criteria for the causal relationship of diseases, disabilities and causes of death with the effects of ionizing radiation and other harmful factors of the Chernobyl catastrophe.

CONCLUSIONS

1. In the remote post-accidental period (2013–2022) has increased the need of expertise of the causal relationship of disability and the causes of death with the influence of the Chernobyl NPP accident consequences for medical and social support. At this time, the Central Interdepartmental Expert Commission provided 50,974 medical expertise of the causal relationship of disability and the causes of death with the

influence of the Chernobyl NPP accident consequences.

2. During 2013–2022 period quick reducing for all categories of affected due to the Chernobyl NPP accident taken place. The total number of affected adult citizens as on 01.01.2022, compared to 2008, decreased by 477,953 persons, or by 26.05 % (from 1,834,536 to 1,354,746 persons).

3. The number of clean-up workers of the accident decreased from 276,327 (2013) to 171,725 (2022), or by 104,602 people (37.85 %), that means – during the last 10 years, almost every third clean-up worker who participated in the liquidation of the consequences of the accident at the Chernobyl NPP died.

4. The number of adult victims decreased from 1,558,209 in 2008 to 1,183,021 in 2022, or by 24.08 % (375,188 persons).

5. The average annual reduction in the absolute number of clean-up workers of ChNPP accident during 2013–2022 is about 7,770 people per year (9,424 during 2021), adult victims – 27,045 people per year (28,922 during 2021).

6. In the structure of medical expert cases during 2013–2022 the leading place as the reason of disease, disability and death is occupied by oncological diseases – 52.72 %, cerebrovascular diseases and their complications make up 17.08 %, diseases of the cardiovascular system – 19.6 %.

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