

**Center for Emergency Situations and Disaster Risk Reduction
M. Gabdullin Academy of Civil Protection of the Ministry for Emergency Situations of the
Republic of Kazakhstan**

Analysis of Technological Accidents and Natural Disasters in Central Asia

Analytical Report №1

Almaty, 2022

Table of Contents

Introduction	3
1. Analysis of Emergency Situations in the Countries of Central Asia	4
2. Analysis of the Risk of Technological Accidents and Natural Disasters in the Countries of Central Asia	10
Conclusion	21
References	22

Introduction

Natural disasters and technological accidents cause significant socio-economic and environmental damage, hindering sustainable development in the countries of Central Asia. While emergencies are inevitable, their adverse impacts can be minimized through the timely implementation of preventive measures, including the application of risk management methodologies.

Emergency risk management constitutes an integral component of the prevention of natural disasters and technological accidents. A key element of such management is risk analysis.

Risk analysis of emergency situations is necessary to ensure effective preparedness for potential threats and challenges, including:

- the development and improvement of the regulatory and legal framework for the prevention and response to emergency situations;
- the establishment and strengthening of management systems, including monitoring and forecasting services for natural and technological risks;
- the training of specialists, as well as public education and awareness-raising;
- the provision of material and technical resources and the establishment of national and local reserves; ensuring engineering and technical protection of territories, facilities and settlements;
- the monitoring and regulation of the use of hazardous land areas and water bodies;
- the substantiation of financing requirements in the planning of risk-reduction measures; and other related activities.

Risk analysis at both national and local levels constitutes a fundamental and primary activity in the management of risks associated with natural disasters and technological accidents. The importance and necessity of such analysis have been repeatedly emphasized at various World Conferences held under the auspices of the United Nations and other international organizations.

For the purpose of analyzing the risks of natural disasters and technological accidents, the Center for Emergency Situations and Disaster Risk Reduction, in cooperation with the M. Gabdullin Academy of Civil Protection of the Ministry of Emergency Situations of the Republic of Kazakhstan, conducted a study on risk analysis of natural disasters and technological accidents in Central Asia. Based on the results of this study, the present analytical report has been prepared.

The analytical report examines the trends in technological accidents, natural disasters, and their consequences in the countries of Central Asia during the period from 1997 to 2020.

The statistical data presented in the report were obtained officially from the emergency management authorities of the countries of Central Asia.

When comparing statistical data across the countries of Central Asia, it should be taken into account that each country applies its own methodologies and regulations for recording emergency situations, fatalities and injuries resulting from hazardous natural processes, accidents and fires.

1. Analysis of Emergency Situations in the Countries of Central Asia

In 2020, the population of the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan) amounted to 69,233 thousand people. The population dynamics of the countries of Central Asia (hereinafter referred to as CA) are presented in Figure 1.

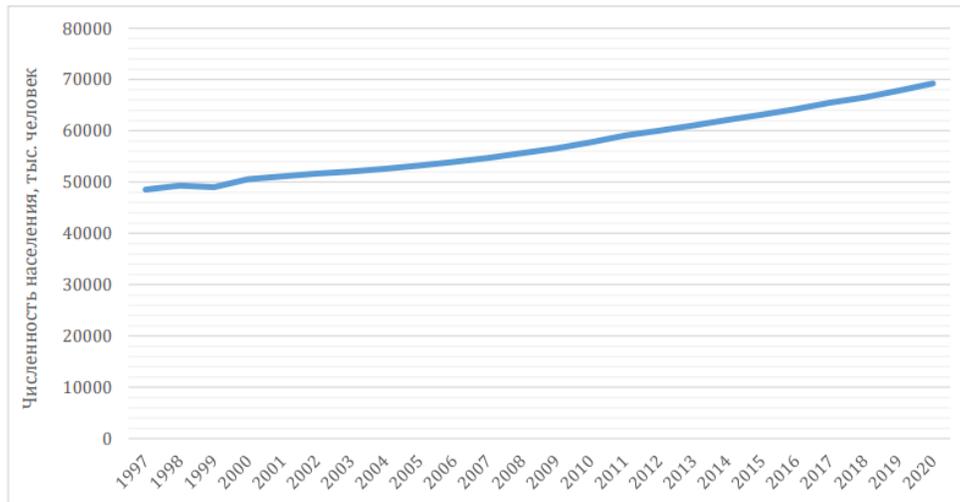


Figure 1 – Population Dynamics of the Countries of Central Asia, 1997–2020

Figure 1 indicates that during the period from 1997 to 2020 the countries of Central Asia experienced a gradual increase in population.

Figure 2 illustrates the population dynamics disaggregated by the countries of Central Asia.

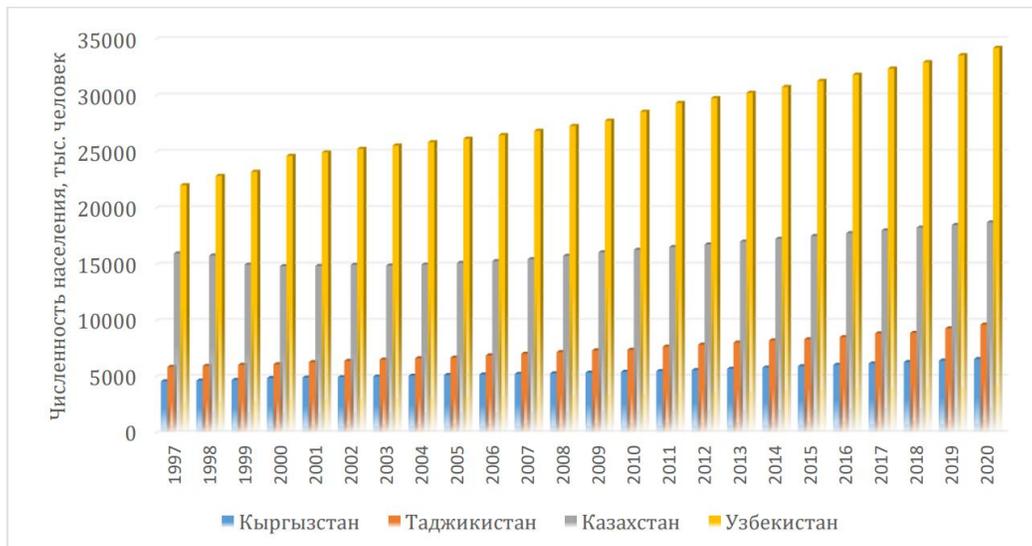


Figure 2 – Population Dynamics by Country in Central Asia, 1997–2020

Thus, according to Figure 2, a positive trend in population growth was observed in the countries of Central Asia during the period under review.

Taking into account population size, an analysis of the vulnerability of the countries of Central Asia to technological accidents and natural disasters has been conducted.

The analysis indicates that more than 151,000 technological accidents and natural disasters occurred in the countries of Central Asia between 1997 and 2020. The average annual number of emergency situations amounted to approximately 6,300.

The dynamics of emergency situations that occurred in the countries of Central Asia during the period from 1997 to 2020 are presented in Figure 3.

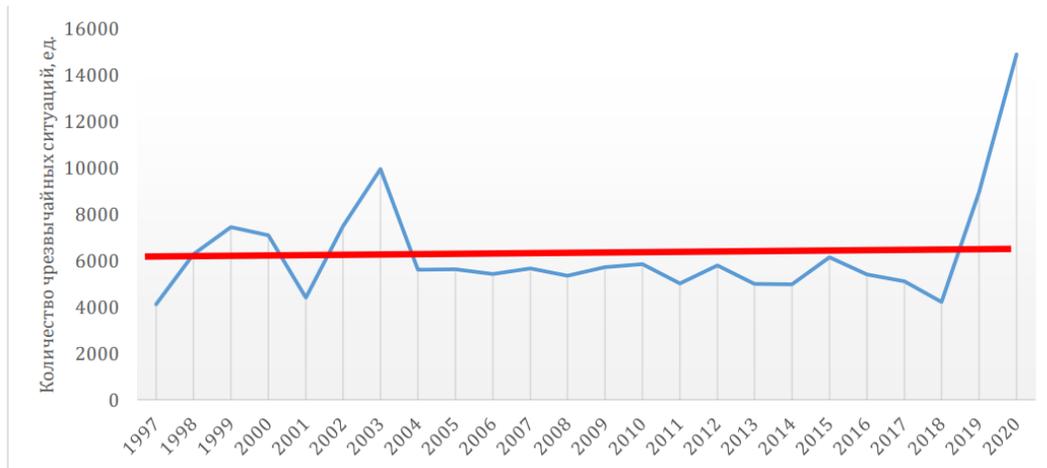


Figure 3 – Dynamics of Emergency Situations in the Countries of Central Asia, 1997–2020

Figure 4 presents the dynamics of emergency situations disaggregated by the countries of Central Asia.

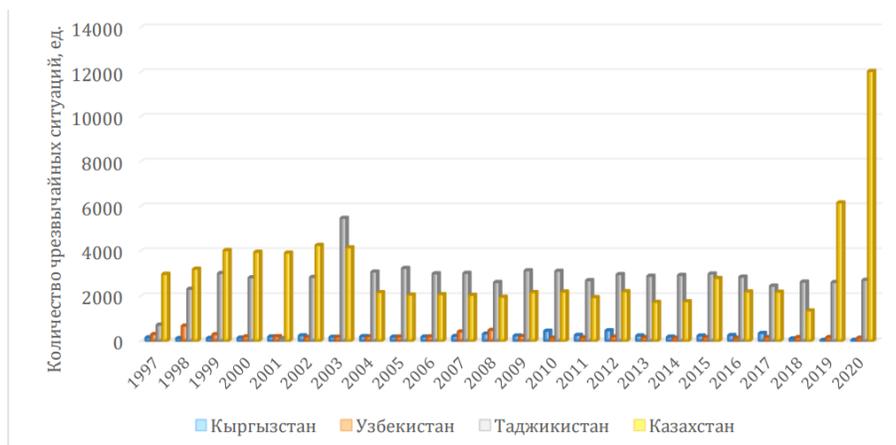


Figure 4 – Dynamics of Emergency Situations by Country in Central Asia, 1997–2020

According to Figure 4, the largest number of emergency situations occurring in the countries of Central Asia is recorded in the Republic of Kazakhstan and the Republic of Tajikistan.

Of all emergency situations occurring in the region, up to 84.2 per cent are attributable to technological accidents, i.e. those caused by human activity (Figure 5).

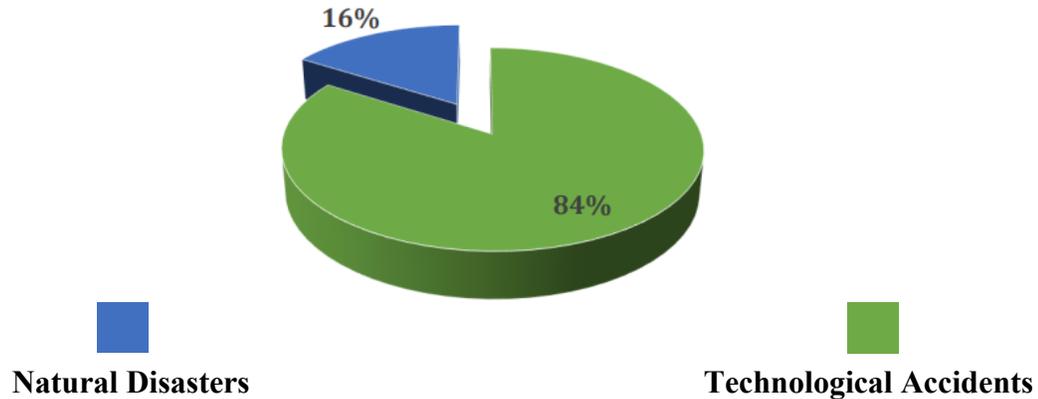


Figure 5 – Proportion of Technological Accidents and Natural Disasters in the Countries of Central Asia, 1997–2020

The distribution of technological accidents and natural disasters by country in Central Asia is presented in Figures 6–9.

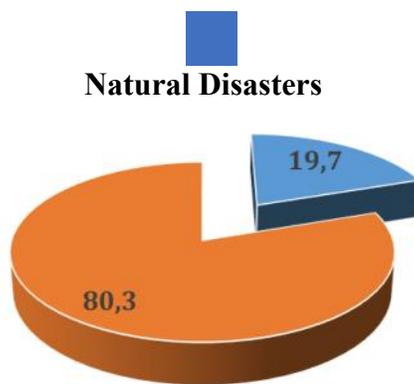


Figure 6 – Proportion of Technological Accidents and Natural Disasters in the Republic of Kazakhstan

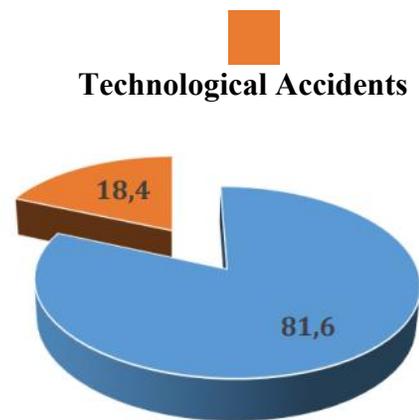


Figure 7 – Proportion of Technological Accidents and Natural Disasters in the Kyrgyz Republic

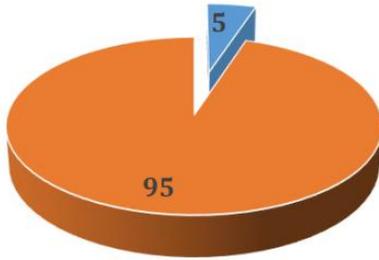


Figure 8 – Proportion of Technological Accidents and Natural Disasters in the Republic of Tajikistan

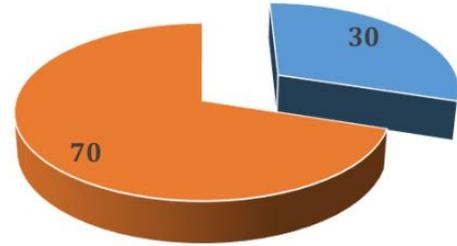


Figure 9 – Proportion of Technological Accidents and Natural Disasters in the Republic of Uzbekistan

As shown in Figures 6–9, the majority of emergency situations in the countries of Central Asia are caused by technological accidents, with the exception of the Kyrgyz Republic, where more than 81 per cent of emergency situations are attributable to natural disasters.

The dynamics of technological accidents are presented in Figure 10.

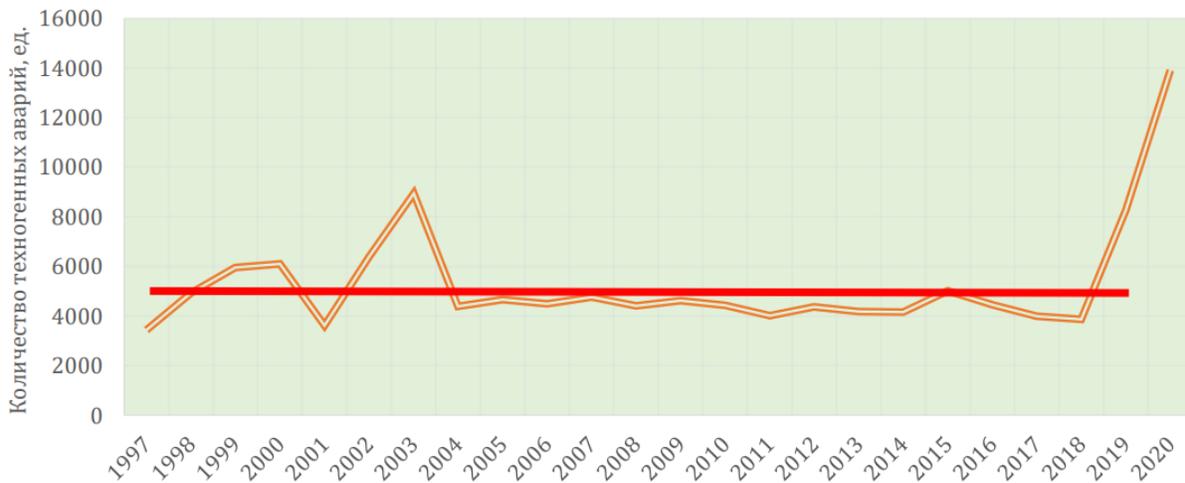


Figure 10 – Dynamics of Technological Accidents in the Countries of Central Asia, 1997–2020

Figure 10 indicates that, on average, approximately 5,300 technological accidents occur annually in the countries of Central Asia.

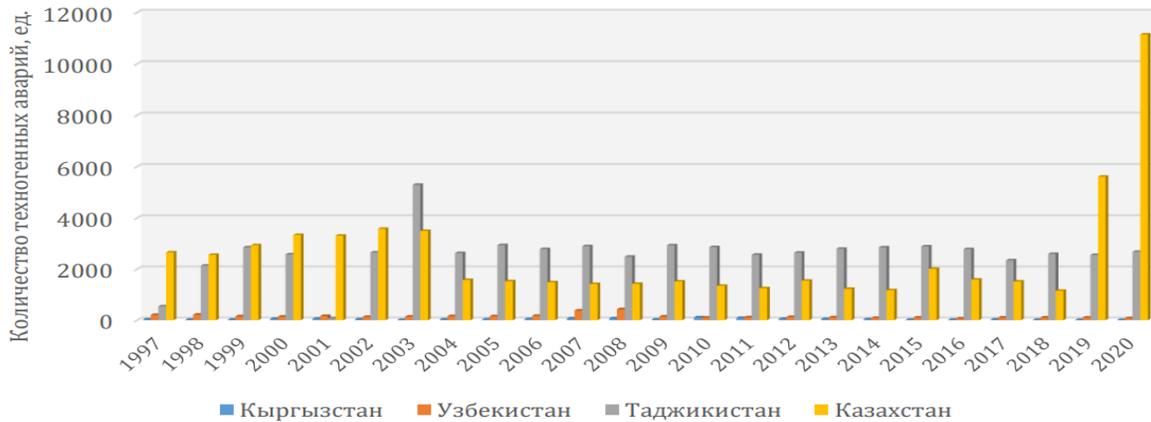


Figure 11 – Dynamics of Technological Accidents by Country in Central Asia, 1997–2020

Figure 11 illustrates the dynamics of technological accidents disaggregated by country in Central Asia during the period from 1997 to 2020.

Figure 11 shows that in recent years there has been an increase in technological accidents in the Republic of Kazakhstan.

Figure 12 presents the dynamics of natural disasters in the countries of Central Asia.

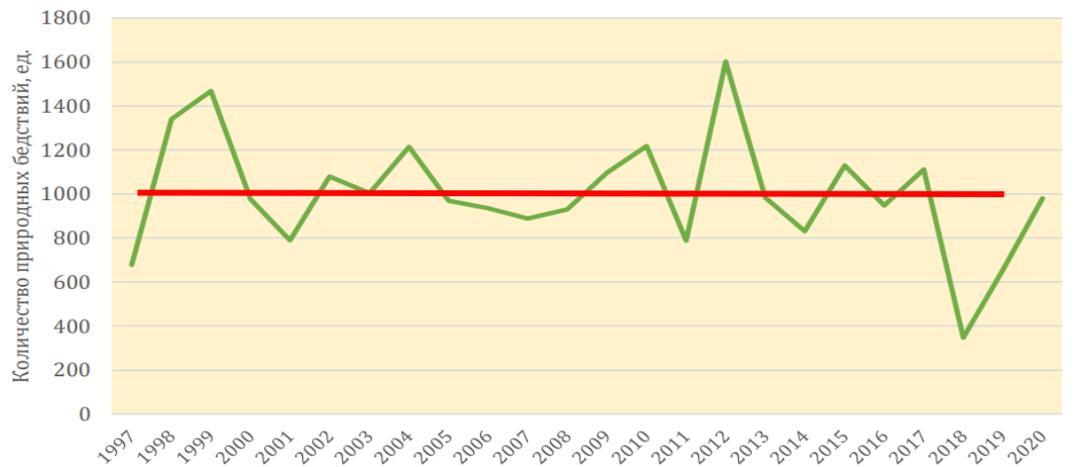


Figure 12 – Dynamics of Natural Disasters in the Countries of Central Asia, 1997–2020

Figure 12 indicates that, on average, approximately 1,000 natural disasters occur annually in the countries of Central Asia.

Figure 13 presents the dynamics of natural disasters disaggregated by country in Central Asia.

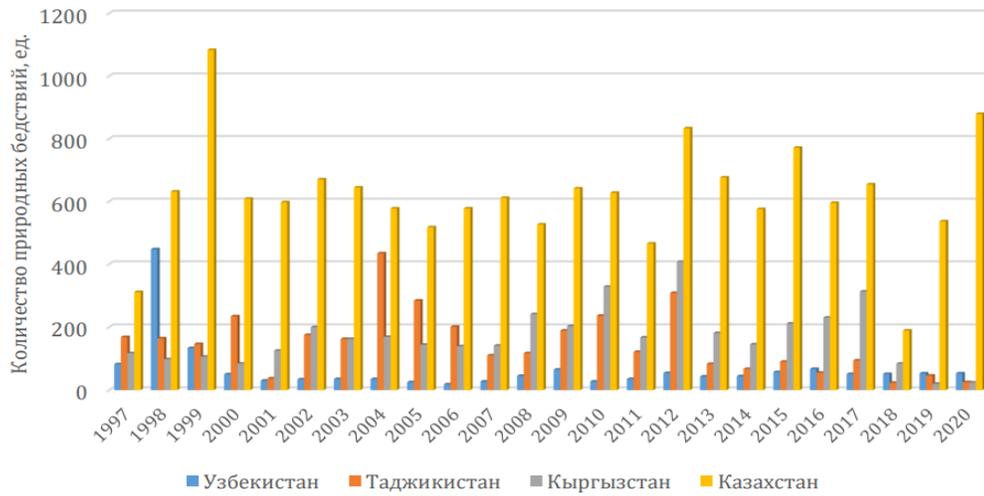


Figure 13 – Dynamics of Natural Disasters by Country in Central Asia, 1997–2020

According to Figure 13, natural disasters in the countries of Central Asia occurred in a wave-like pattern during the period under review, with the highest number of disasters recorded in the Republic of Kazakhstan.

2. Analysis of the Risk of Technological Accidents and Natural Disasters in the Countries of Central Asia

The dynamics of emergency situations per 1,000 inhabitants in the countries of Central Asia during the period from 1997 to 2020 are presented in Figure 14.

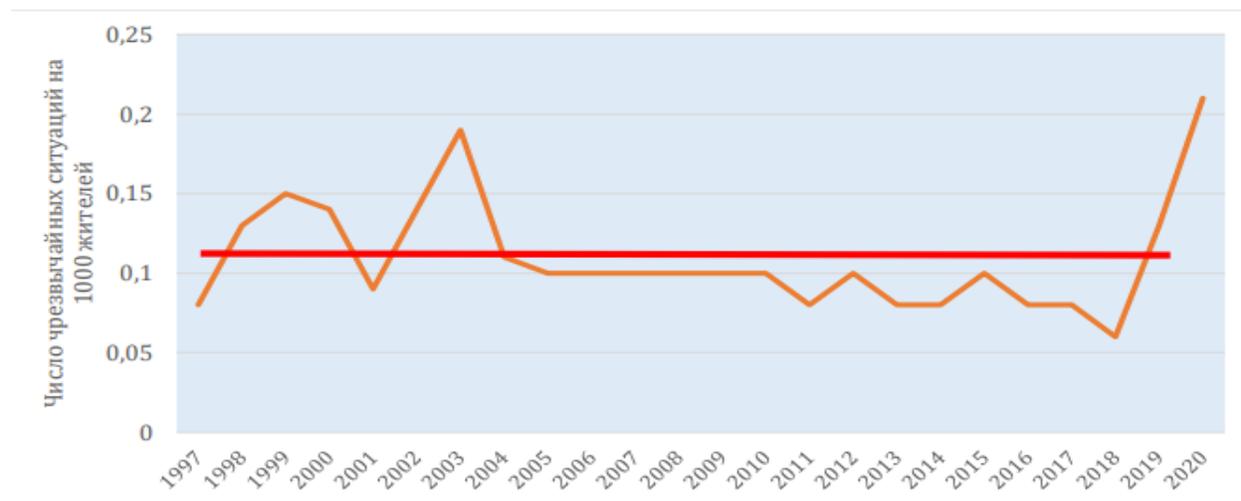


Figure 14 – Dynamics of Emergency Situations per 1,000 Inhabitants in the Countries of Central Asia, 1997–2020

Figure 14 shows that, on average, approximately 0.11 emergency situations per year occurred for every 1,000 inhabitants of Central Asia during the period from 1997 to 2020.

Figure 15 presents the dynamics of emergency situations per 1,000 inhabitants disaggregated by country in Central Asia for the same period.



Figure 15 – Dynamics of Emergency Situations per 1,000 Inhabitants by Country in Central Asia, 1997–2020

According to Figure 15, the highest risk of experiencing emergency situations in the countries of Central Asia during the period under review was observed in the Republics of Kazakhstan and Tajikistan.

Figure 16 presents the dynamics of technological accidents per 1,000 inhabitants in the countries of Central Asia from 1997 to 2020.

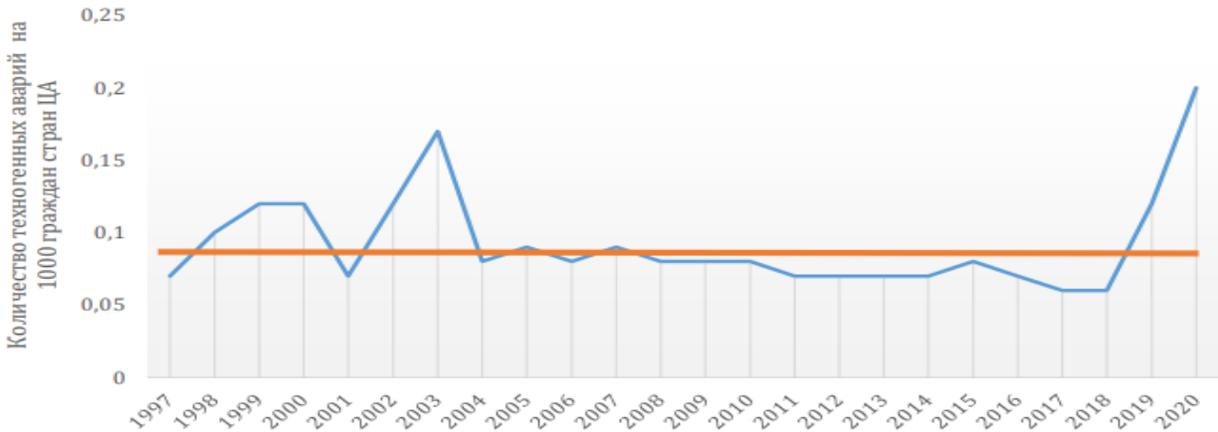


Figure 16 – Dynamics of Technological Accidents per 1,000 Inhabitants in the Countries of Central Asia, 1997–2020

Figure 16 indicates that, on average, approximately 0.09 technological accidents per year occurred for every 1,000 inhabitants of Central Asia during the period from 1997 to 2020.

Figure 17 presents the dynamics of technological accidents per 1,000 inhabitants disaggregated by country in Central Asia for the same period.



Figure 17 – Dynamics of Technological Accidents per 1,000 Inhabitants by Country in Central Asia, 1997–2020

Figure 17 shows that during the period under review, the highest risk of experiencing a technological accident in the countries of Central Asia was observed in the Republic of Tajikistan, where an average of 3.5 technological accidents occurred per 10,000 inhabitants.

Figure 18 presents the dynamics of natural disasters per 1,000 inhabitants disaggregated by country in Central Asia during the period from 1997 to 2020.

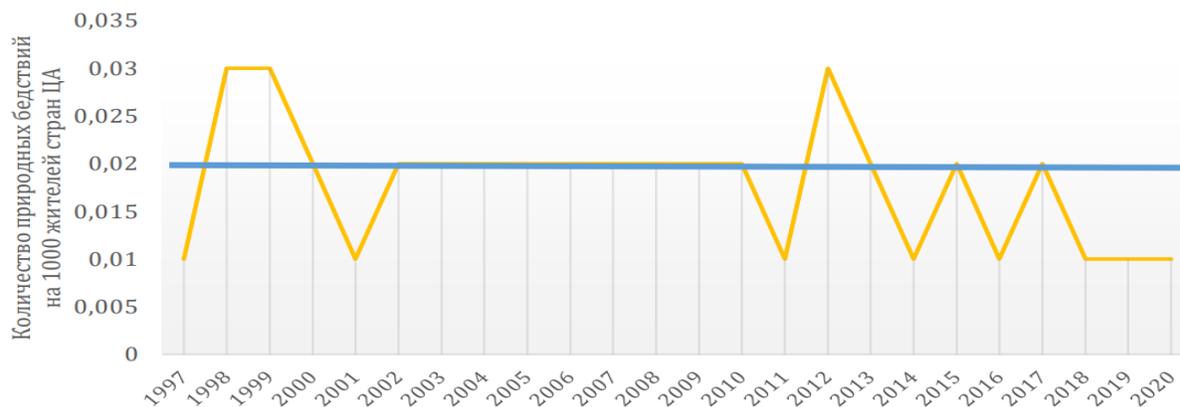


Figure 18 – Dynamics of Natural Disasters per 1,000 Inhabitants in the Countries of Central Asia, 1997–2020

Figure 18 shows that, on average, approximately 2 natural disasters per year occurred for every 100,000 inhabitants of Central Asia during the period from 1997 to 2020.

Figure 19 presents the dynamics of natural disasters per 1,000 inhabitants disaggregated by country in Central Asia for the same period.

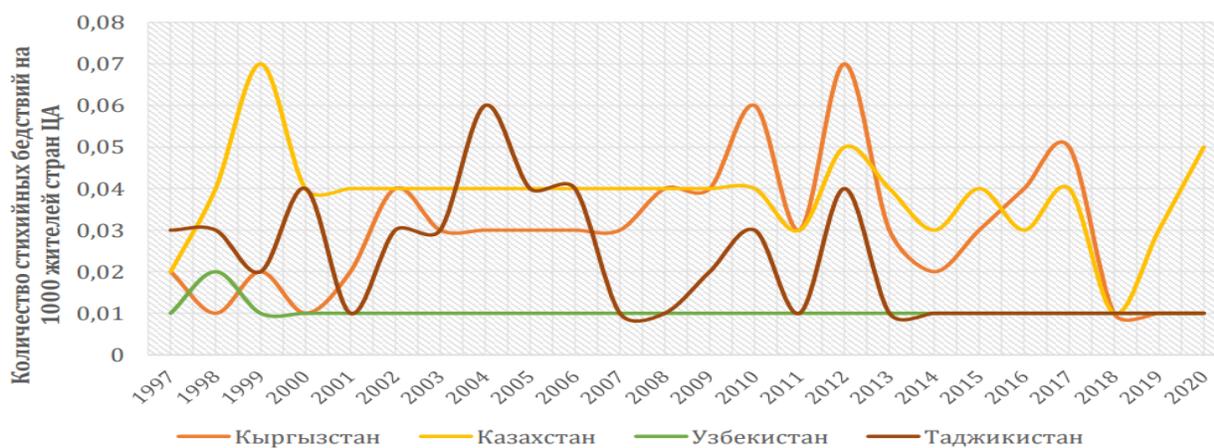


Figure 19 – Dynamics of Natural Disasters per 1,000 Inhabitants by Country in Central Asia, 1997–2020

Figure 19 indicates that during the period under review, the highest risk of experiencing natural disasters in the countries of Central Asia was observed in the Republic of Kazakhstan and the Kyrgyz Republic, where an average of 4 and 3 natural disasters per 100,000 inhabitants occurred, respectively.

Figure 20 illustrates the dynamics of casualties resulting from emergency situations in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020.

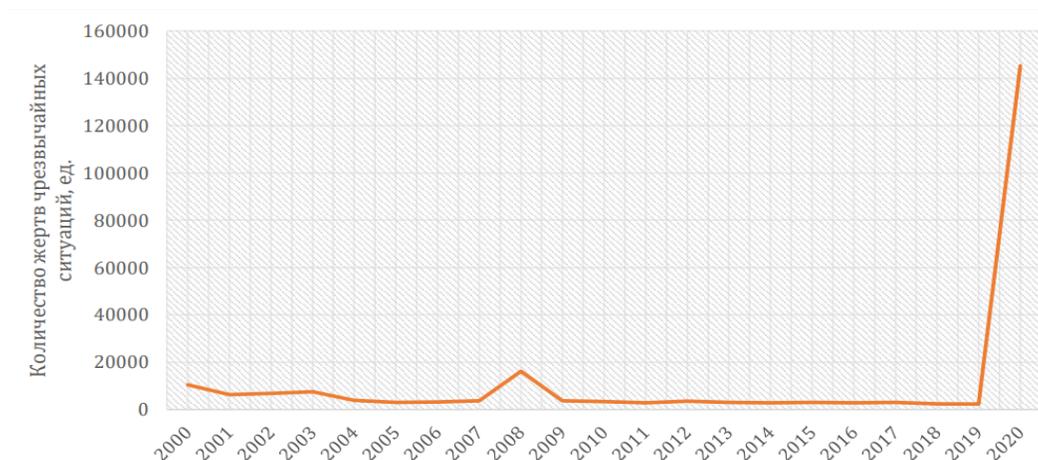


Figure 20 – Dynamics of Casualties from Emergency Situations in the Countries of Central Asia, 2000–2020

According to Figure 20, more than 239,000 citizens of Central Asia became casualties of emergency situations during the period from 2000 to 2020. The highest number of casualties occurred in 2020, primarily due to the coronavirus infection (COVID-19).

Approximately 75% of casualties from emergency situations in the countries of Central Asia are attributable to natural disasters (Figure 21).

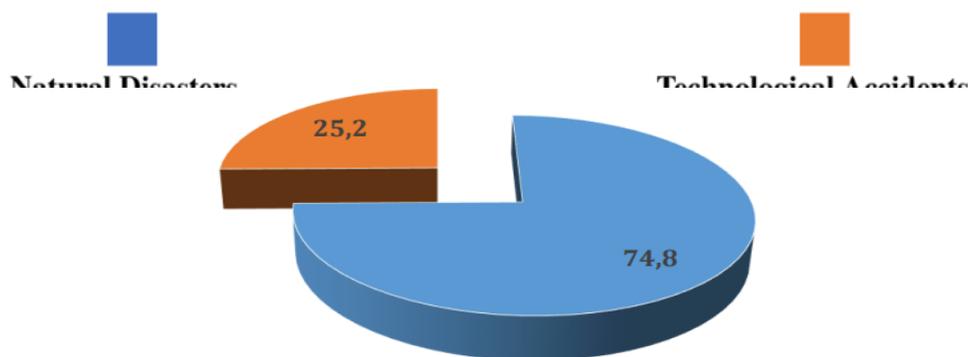


Figure 21 – Proportion of Casualties from Technological Accidents and Natural Disasters in the Countries of Central Asia, 2000–2020

Figure 22 presents the dynamics of casualties from technological accidents in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020.

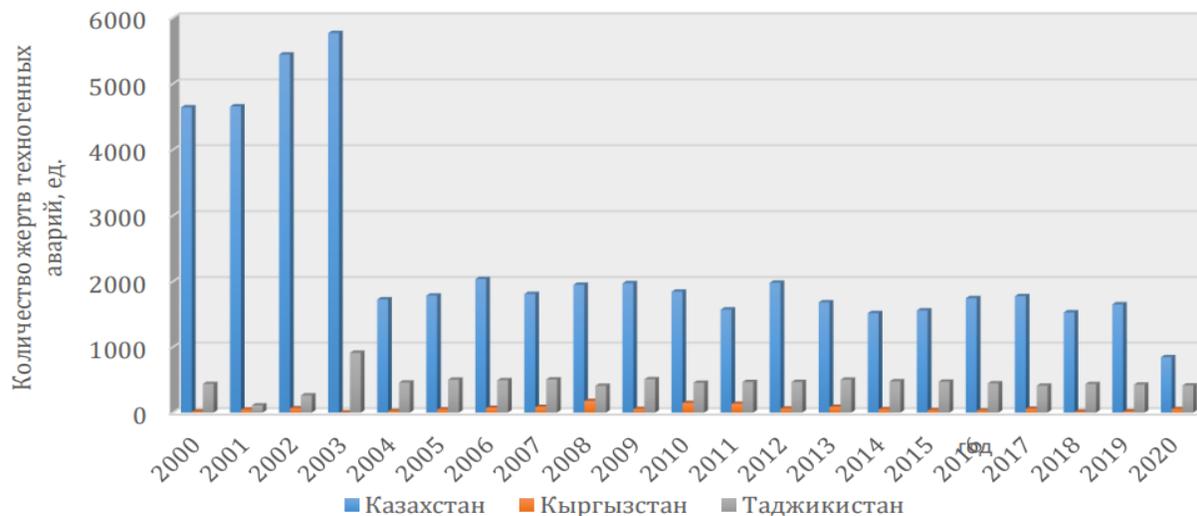


Figure 22 – Dynamics of Casualties from Technological Accidents in the Countries of Central Asia, 2000–2020

Figure 22 shows that during the period under review, the highest number of casualties from technological accidents in the region occurred in the Republic of Kazakhstan.

Figure 23 presents the dynamics of casualties from natural disasters in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020.



Figure 23 – Dynamics of Casualties from Natural Disasters in the Countries of Central Asia, 2000–2020

According to Figure 23, during the period under review, the highest number of casualties from natural disasters in the countries of Central Asia occurred in the Republic of Kazakhstan.

The number of casualties from emergency situations per 100,000 inhabitants in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020 is presented in Figure 24.

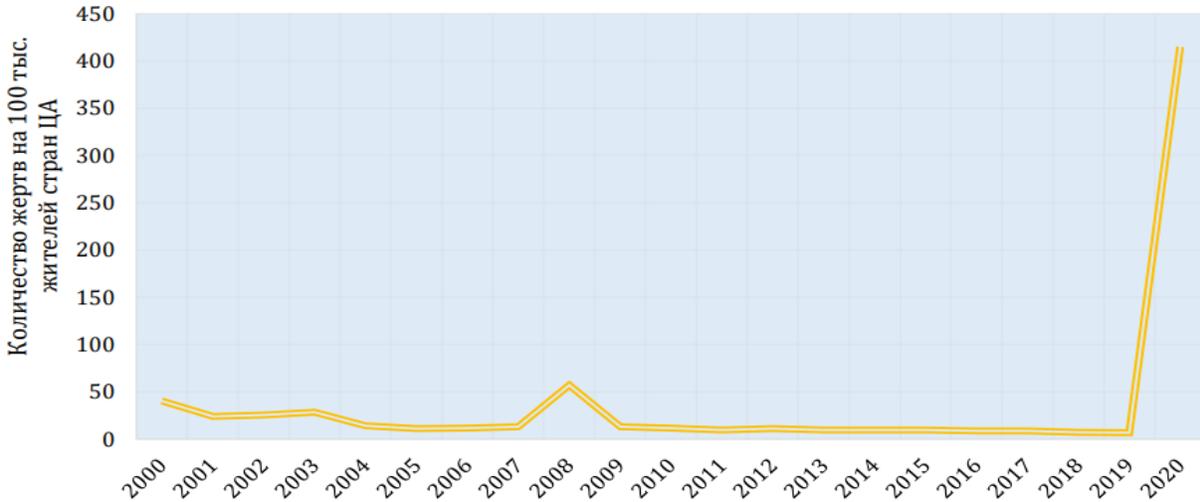


Figure 24 – Average Number of Casualties from Emergency Situations per 100,000 Inhabitants in the Countries of Central Asia, 2000–2020

The number of casualties from emergency situations per 100,000 inhabitants, disaggregated by country in Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020, is presented in Figure 25.

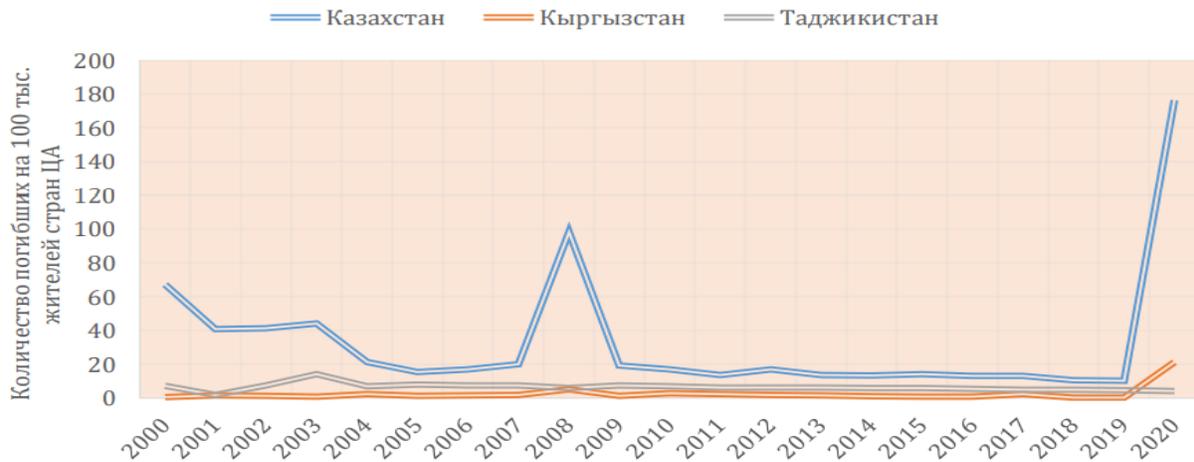


Figure 25 – Average Number of Casualties from Emergency Situations per 100,000 Inhabitants by Country in Central Asia

Figure 25 shows that the highest number of casualties per 100,000 inhabitants occurred in the Republic of Kazakhstan.

The number of casualties per 100 emergency situations in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) is presented in Figure 26.

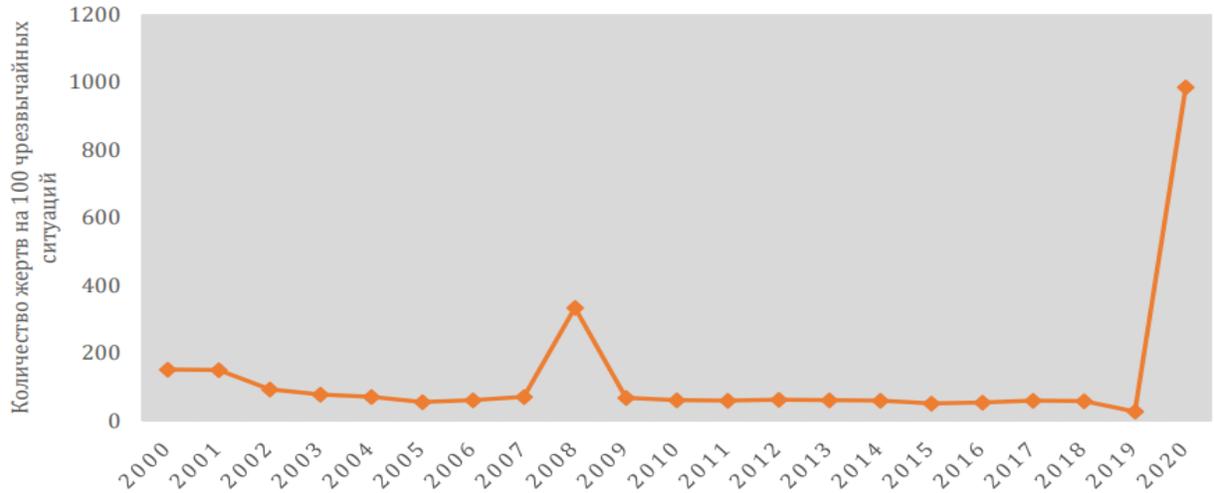


Figure 24 – Average Number of Casualties from Emergency Situations per 100,000 Inhabitants in the Countries of Central Asia, 2000–2020

The number of casualties from emergency situations per 100,000 inhabitants, disaggregated by country in Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020, is presented in Figure 25. Figure 25 shows that the highest number of casualties per 100,000 inhabitants occurred in the Republic of Kazakhstan.

The number of casualties per 100 emergency situations in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) is presented in Figure 26.

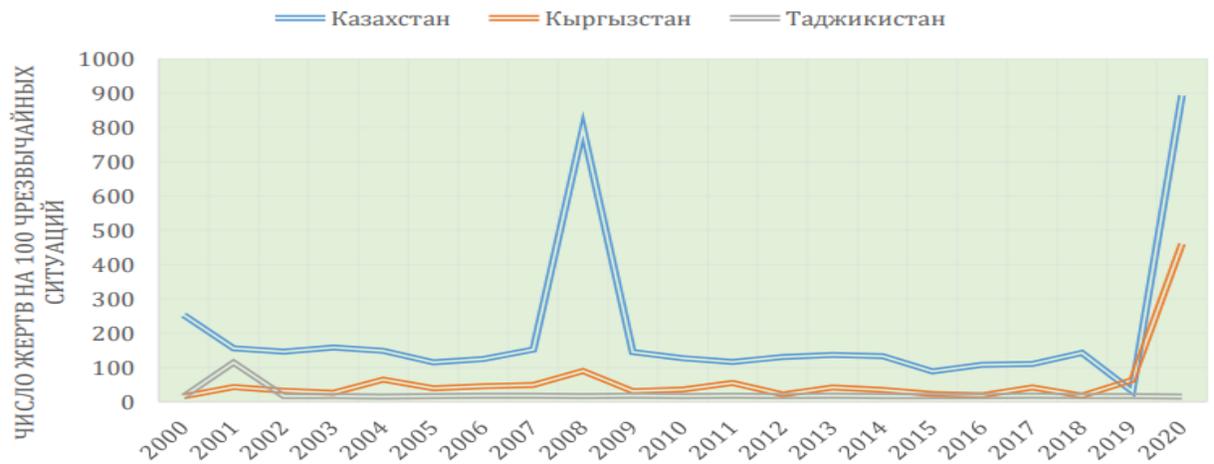


Figure 27 – Number of Casualties per 100 Emergency Situations by Country in Central Asia, 2000–2020

According to Figure 27, the highest number of casualties per 100 emergency situations in the region occurred in the Republic of Kazakhstan.

The number of casualties from technological accidents per 100,000 inhabitants in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020 is presented in Figure 28.

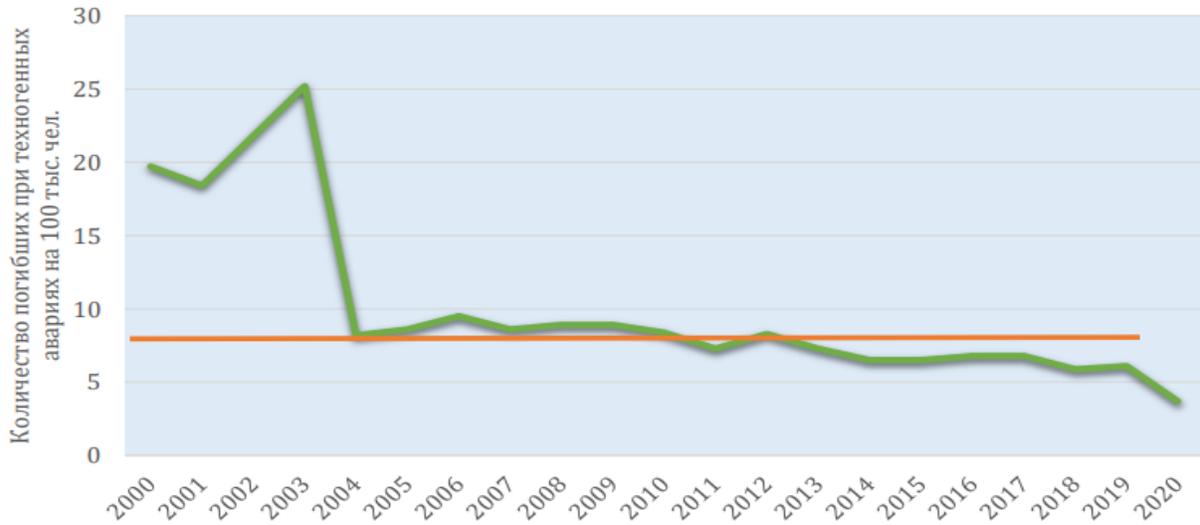


Figure 28 – Number of Casualties from Technological Accidents per 100,000 Inhabitants in the Countries of Central Asia, 2000–2020

According to Figure 28, on average, 8.6 people per 100,000 inhabitants of the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) became casualties of technological accidents each year. In recent years, the region has observed a declining trend in the number of casualties from technological accidents.

Figure 29 presents the number of casualties from technological accidents per 100,000 inhabitants disaggregated by country in Central Asia.



Figure 29 – Number of Casualties from Technological Accidents per 100,000 Inhabitants by Country in Central Asia, 2000–2020

Figure 29 indicates that the highest risk of becoming a casualty of a technological accident is observed in the Republic of Kazakhstan.

The number of casualties per 100 technological accidents in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020 is presented in Figure 30.

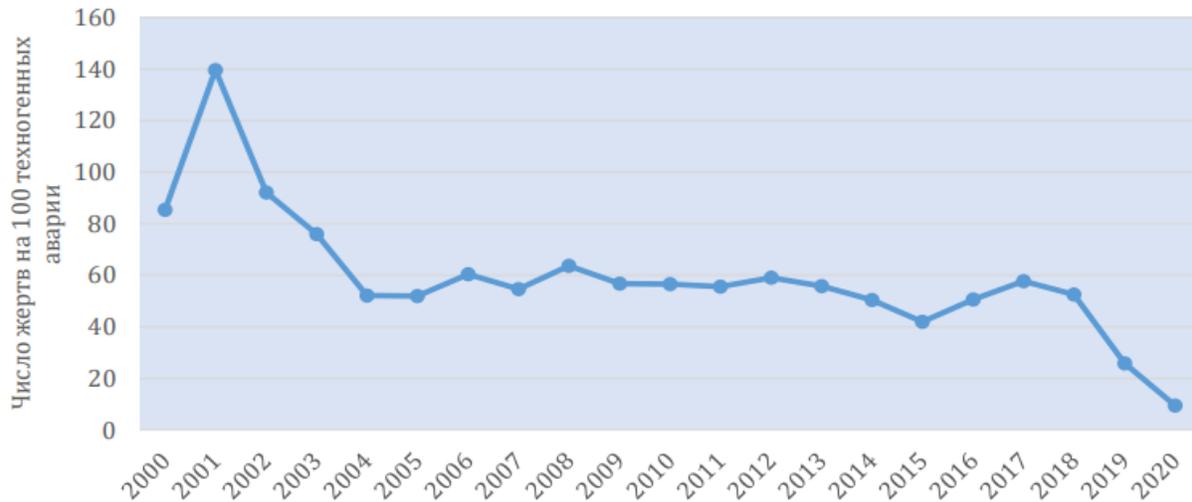


Figure 30 – Number of Casualties per 100 Technological Accidents in the Countries of Central Asia, 2000–2020

Figure 30 shows that the number of casualties per 100 technological accidents in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) has been gradually decreasing.

The number of casualties per 100 technological accidents disaggregated by country in Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) is presented in Figure 31.



Figure 31 – Number of Casualties per 100 Technological Accidents by Country in Central Asia, 2000–2020

According to Figure 31, the highest number of casualties per 100 technological accidents occurred in the Kyrgyz Republic.

The number of casualties from natural disasters per 100,000 inhabitants in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020 is presented in Figure 32.

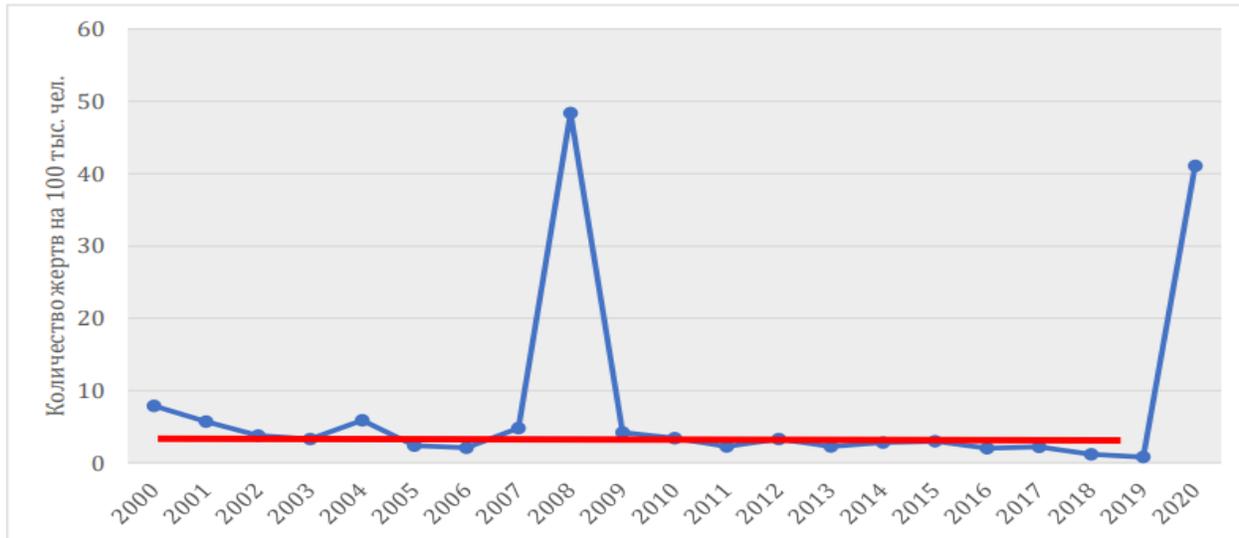


Figure 32 – Number of Casualties from Natural Disasters per 100,000 Inhabitants in the Countries of Central Asia, 2000–2020

Figure 32 indicates that, on average, 3.2 people per 100,000 inhabitants of the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) became casualties of natural disasters each year.

The number of casualties from natural disasters per 100,000 inhabitants disaggregated by country in Central Asia is presented in Figure 33.

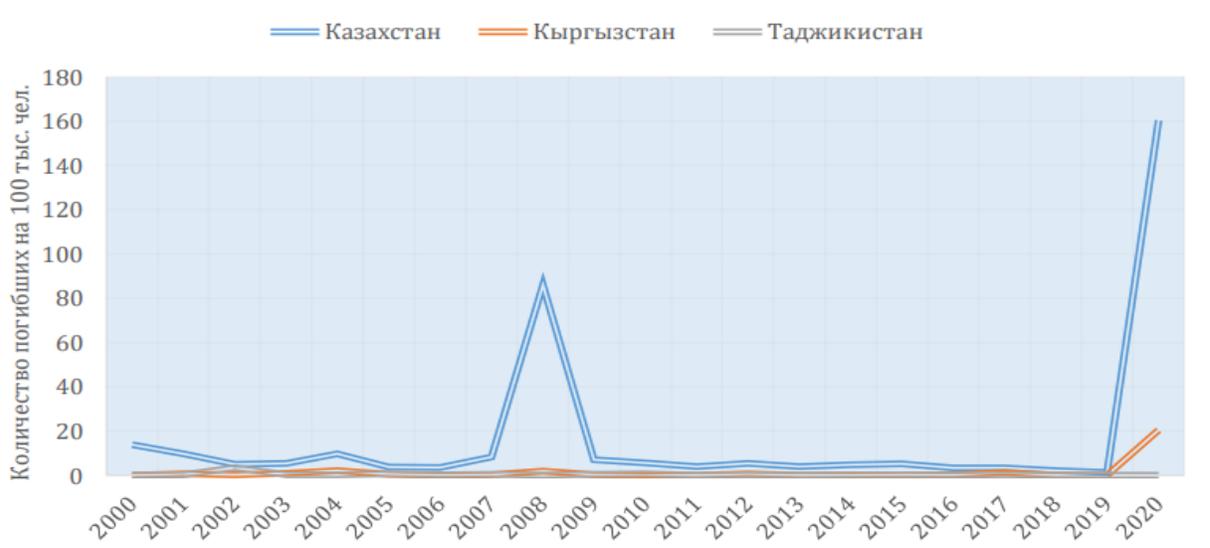


Figure 33 – Number of Casualties from Natural Disasters per 100,000 Inhabitants by Country in Central Asia, 2000–2020

According to Figure 33, the highest number of casualties from natural disasters per 100,000 inhabitants occurred in the Republic of Kazakhstan.

The number of casualties per 100 natural disasters in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) during the period from 2000 to 2020 is presented in Figure 34.



Figure 34 – Number of Casualties per 100 Natural Disasters in the Countries of Central Asia, 2000–2020

Figure 34 indicates that the number of casualties per 100 natural disasters in the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) increased sharply in 2020. As noted earlier, this is related to the coronavirus infection (COVID-19).

The number of casualties per 100 natural disasters disaggregated by country in Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan) is presented in Figure 35.

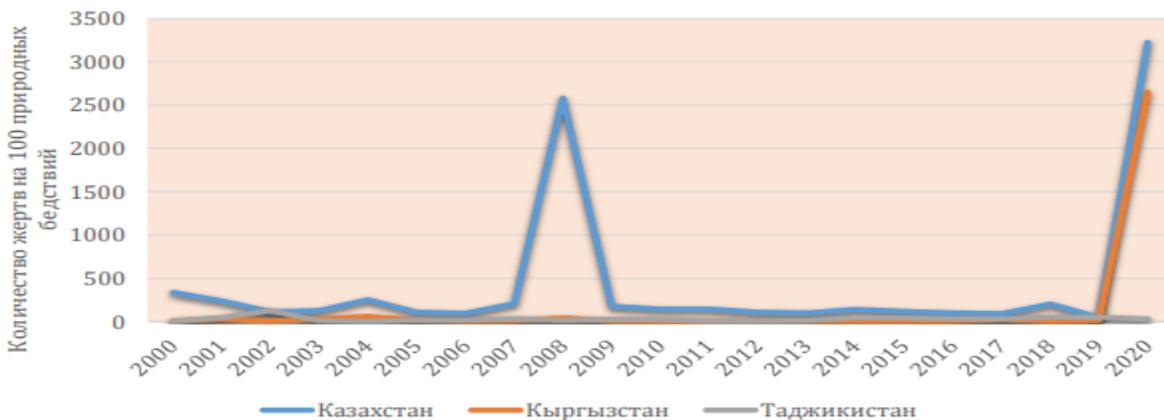


Figure 35 – Number of Casualties per 100 Natural Disasters by Country in Central Asia, 2000–2020

According to Figure 35, the highest number of casualties per 100 natural disasters occurred in the Republic of Kazakhstan and the Kyrgyz Republic.

Conclusion

This publication represents the first issue (No. 1) of the analytical report on technological accidents and natural disasters that have occurred in the countries of Central Asia.

Future editions will aim to expand the analysis of the vulnerability of Central Asian countries with respect to various types of emergency situations.

The authors of the report express their gratitude to the emergency management authorities of the countries of Central Asia for providing statistical data on emergency situations for processing and analysis.

The authors welcome suggestions for improving the quality of the analytical report.

References

1. Ministry of Emergency Situations of the Republic of Kazakhstan. <http://www.emercom.kz>
2. Ministry of Emergency Situations of the Kyrgyz Republic. <http://mes.kg>
3. Committee for Emergency Situations and Civil Defense under the Government of the Republic of Tajikistan. <https://kchs.tj>
4. Ministry of Emergency Situations of the Republic of Uzbekistan. <https://www.fvv.uz/ru>
5. Brushlinsky, N.N., Sokolov, S.V., Klepko, E.A. Fundamentals of Fire Risk Theory and Its Application [Text]. Moscow: Academy of Civil Protection of the Ministry of Emergency Situations of Russia, 2011. 82 p.
6. Brushlinsky, N.N., et al. Fundamentals of Fire Risk Theory and Its Applications: Monograph [Text]. Moscow: Academy of Civil Protection of the Ministry of Emergency Situations of Russia, 2012. 192 p.