

Environmental and Social Impacts of the COVID-19 Pandemic in Almaty, Republic of Kazakhstan

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Abstract: This study focuses on the social and environmental situation in the city of Almaty in terms of the COVID-19 pandemic. The increased interest in this problem is caused by the rapid spread of the coronavirus infection, which has caused the death of many people and affected the whole world. The pandemic caused considerable damage to the socio-economic development of all states, but at the same time caused a change in the environmental situation in the world. Consideration of the socio-ecological situation during the pandemic will help to identify its consequences for the city's population and highlight the positive and negative sides. As a result, an assessment and analysis of atmospheric air pollution in 2019 and during the pandemic period, an assessment of the socio-economic consequences of the COVID-19 pandemic, the problems of waste disposal are considered, and an analysis is made of the perception of the environmental situation by residents of the city of Almaty in a pandemic.

Key words: the COVID-19 pandemic, coronavirus infection, environmental and social impacts, atmospheric air, medical waste

1. Introduction

The term "epidemic" in the modern world is understood as such diseases that occur in a certain area in a specific period of time, spread to larger or smaller areas, affecting a large number of people, and, having stopped, do not resume again for a long period [1].

Coronaviruses are a family of viruses that infect mammals. To date, 43 types of coronaviruses are known, 7 of which are dangerous to humans, one of them is COVID-19 [2]. The impact of the pandemic on the social and environmental aspects of the development of regions, as well as individual sectors of the economy, was noted in their works by N. V. Zubarevich, I. S. Tikhotskaya, A. G. Sarafanova and A. A. Sarafanov.

To date, 13,660 people have died from COVID-19 in Kazakhstan, with a total of 983,294 cases [3]. The number of infected people in Almaty is currently 238,072, and the number of recovered people is

235,255 [4].

2. Results and Discussion

During the study, a hypothesis was put forward that during the pandemic, the ecological situation in the city improved due to the introduction of quarantine and restrictive measures; reduced emissions of pollutants.

In the formation of an unfavorable environmental situation in the city of Almaty, an important role is played by increased emissions of pollutants into the atmosphere, as well as the organization of the collection and removal of consumer waste for disposal or disposal. To identify the impact of the pandemic on the environmental and social situation in the city, an analysis of statistical data for 2019 and 2020 was carried out, as well as a sociological survey.

Considering the average concentrations of pollutants by months, it can be seen that for almost all major pollutants, there is a decrease in the average concentration during the introduction of tough quarantine, namely in April, May and July (Fig. 1). What is connected with the ban on the movement of

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vehicles. The gradual increase in average concentrations is due to the easing of quarantine and the beginning of the heating season, and the decrease in the period from October to December is due to the gasification project for the private sector and public transport.

The pandemic has also had an impact on the socio-economic sphere. First of all, coronavirus became the cause of a 20% increase in mortality in

Kazakhstan (Fig. 2a). In the city of Almaty, the overall mortality rate during the pandemic increased by 14%. In Nur-Sultan, this indicator increased by 36%. In addition, the pandemic affected the GRP values, as it is formed as a result of summing up the cost of all end-use goods and services produced in the region, and in connection with the introduction of quarantine, the activities of many industries were temporarily frozen, which affected the amount of output (Fig. 2b).



Fig. 1 Average concentration of the main pollutants in Almaty by months for 2019-2020 (compiled by the authors according to the RSE "Kazgidromet").



Fig. 2 Dynamics of socio-economic indicators in Almaty: a) crude mortality rate; b) real GRP (compiled by the author according to the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan).

In 2020, the volume of investments in fixed assets that go to the purchase of new equipment, the introduction and development of new technologies has increased (Fig. 3a). This is due to the growing demand for local recreational resources, as well as the development of the IT infrastructure, within which banking services were improved due to quarantine restrictions. However, in other areas, investment growth is not observed, which leads to an increase in the unemployment rate, which in 2020 exceeded the values of the previous year already in the first quarter and this trend continued for 9 months (Fig. 3b). What is connected with the suspension of the production activities of enterprises, because of which part of the population lost their jobs.



Fig. 3 Dynamics of socio-economic indicators in Almaty: a) the volume of investments in fixed assets; b) unemployment rate (compiled by the author according to the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan).

During the study, a sociological survey was conducted, in which 302 people took part. The questionnaire is devoted to assessing the environmental situation in Almaty before and during the pandemic.

According to the survey, more than half of the respondents rated the environmental situation as rather unfavorable, a quarter of the respondents as unfavorable.

The degree of noise pollution, according to residents, has slightly decreased (Fig. 4a). The proportion of respondents who rated the degree of noise pollution as low during the pandemic increased due to a temporary ban on road transport, as well as a subsequent decrease in the number of road transport due to the transition to distance learning and remote work. The degree of littering, according to half of the respondents, before the pandemic can be assessed as medium (Fig. 4b). However, during the pandemic, the number of respondents who noted a high degree of littering increased by 2 times. This is due to the increase in medical waste due to the nature of the transmission of the virus and their appearance on the streets of the city. The volume of packaging waste has also increased as a result of the widespread use of delivery services.

Considering the degree of atmospheric pollution, it can be said that during the pandemic, respondents more often chose the option of a low degree of pollution compared to the period before the pandemic (Fig. 5). This is due to a decrease in the number of transport due to the introduction of a distance learning and work format and the abolition of public transport on Sundays. But with the easing of quarantine, transport links and the work of enterprises were resumed.

At the same time, the pandemic has caused an increase in the generation of medical waste and packaging waste due to the widespread use of delivery services. However, according to the data for 2019 and 2020, there is a decrease in the volume of class B and C

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medical waste, i.e., epidemiologically hazardous and extremely hazardous waste, which is associated with increased control of the process of proper waste disposal and training of personnel in this (Fig. 6). It is also possible for class B and C waste to end up at the MSW landfill along with consumer waste, since personal protective equipment used by the population also belongs to these waste classes, which could lead to incorrect accounting and documented reduction in the volume of medical waste.



Fig. 4 Assessment of the degree of a) noise pollution; b) littering in Almaty before and during the pandemic (compiled by the author based on sociological survey data).



Fig. 5 Assessment of the degree of atmospheric pollution in Almaty before and during the pandemic (compiled by the author based on sociological survey data).



Fig. 6 The volume of class B and C medical waste for the period from 2019 to 2020 (compiled by the author based on the information review of the Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan).

3. Conclusion

The COVID-19 pandemic that erupted in late 2019 has had both environmental and social impacts. Despite the world experience in combating pandemics, preventing an outbreak of coronavirus infection turned out to be impossible for the world community. Thus, the spread of the COVID-19 pandemic on a global scale remains one of the main problems to this day. Coronavirus infection has caused considerable damage to the socio-economic development of all states in a short period of time. But at the same time, the pandemic has led to a change in the environmental situation in the world.

The decrease in the concentration of harmful substances in the atmospheric air of Almaty is short-term and is maintained only for the period of strict quarantine. Due to the transition to a remote format, the energy consumption of the city's residents has increased, which has increased fuel consumption at thermal power plants, which are the main sources of pollution in the city. But due to the implementation of the gasification project for individual houses and public transport, emissions are slightly reduced. Also, as a result of the shutdown of production due to quarantine, the value of GRP decreased, which led to an increase in the unemployment rate by 0.1%. However, the influx of investments in fixed capital has grown, which is associated with an increase in demand for the city's recreational resources. However, the perception of the environmental situation by citizens has improved, even despite the increase in the amount of medical waste of classes B and C and the growth of packaging waste, which has led to a high degree of littering of cities and, in particular, park areas, the demand for which has increased due to the lack of alternatives, which has led to a high anthropogenic load on the green frame.

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