

Pneumonia in the Republic of Kazakhstan: Epidemiological Analysis (2019–2023).

Abstract

This article presents a comprehensive analysis of pneumonia morbidity and mortality in the Republic of Kazakhstan for 2019–2023. Official data from the Ministry of Health of the Republic of Kazakhstan and the results of relevant scientific research (2019–2023) are used. Age and regional differences, as well as the impact of the COVID-19 pandemic, are examined. Over the analyzed period, a clear correlation between mortality dynamics and the impact of the COVID-19 pandemic and the subsequent restoration of the healthcare system is observed. Particular attention is paid to post-pandemic changes in the morbidity structure and the need for a regionally differentiated approach to organizing pulmonary care.

Key words: pneumonia, Kazakhstan, COVID-19, morbidity, mortality.

Introduction

According to the WHO, pneumonia claims approximately 2.5 million lives annually. In Kazakhstan, pneumonia also occupies a significant place among respiratory diseases.[1,2] The period 2019–2023 was indicative for Kazakhstan: it spanned the pre-pandemic stage, the peak of the 2020 pandemic, and post-pandemic recovery. The aim of this paper is to summarize the current literature on the etiology and consequences of the COVID-19 pandemic and analyze the epidemiological indicators of pneumonia in the Republic of Kazakhstan for 2019–2023.

Materials and Methods

The materials used were official statistical data from the Ministry of Health of the Republic of Kazakhstan for the period 2019–2023. The study methods included a comparative analysis of pneumonia incidence among adults, adolescents, and children, regional differences, and pneumonia-related mortality.

Results

Figure 1 shows pneumonia incidence rates in the Republic of Kazakhstan according to the Ministry of Health. Data for the period from 2019 to 2023 is presented. A sharp spike in incidence was observed in 2020, when incidence rates exceeded 2,500 per 100,000 population, which was recorded among adults. Rates began to decline sharply in 2021 and 2022, to 1,500

31 and 500 per 100,000 population. However, the situation among children was fundamentally
32 different. In 2020, incidence rates among children were below 1,000 per 100,000 population; in
33 the previous year, they were higher, exceeding 1,500 per 100,000 population. In the period 2022-
34 2023, the rates remained stable at around 1,000 per 100,000 population. According to the
35 literature, the COVID-19 pandemic was paradoxical in that it was characterized by high
36 morbidity and mortality in adults, while in children the course was relatively favorable, with
37 moderate symptoms. For example, adults were characterized by multifocal pneumonia with
38 vascular symptoms, in some cases with Kawasaki syndrome. This was virtually absent in
39 children.[3]

40 The peak in morbidity and mortality due to COVID-19 occurred in 2020. After 2021, a gradual
41 stabilization was observed, but the level remained above pre-COVID levels (Figure 2). In 2022-
42 2023, the downward trend continues: the mortality rate will drop to 7.9 and 5.1 per 100,000
43 population, respectively, which is practically in line with pre-COVID levels.

44 The distribution of pneumonia cases by region of the Republic of Kazakhstan is presented in
45 Figure 3.

46 The highest rates across all study years were observed in the Pavlodar and Aktobe regions,
47 which may be due to both climatic conditions and demographic and industrial factors (Figure 3).
48 These regions are located in the northwest of the country, where the climate is cold. Low
49 incidence rates were observed in the Kostanay region, which is located in the east of the country,
50 where the climate is moderately cold and the population is less dense.

51 In general, the sharp rise in cases is associated with the peak of the pandemic, and the sharp
52 decline with the start of mandatory mass vaccination of the population, both adults and children,
53 as well as targeted vaccination of healthcare workers.

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60 Discussion

61 The presented data shows a dynamic of sickness rate with pneumonia in population of
62 Kazakhstan when the pandemic of COVID-19 was observed. We analyzed either sickness rater
63 and lethality. We found that epidemiological measures including obligatory mass immunization
64 against COVID-19 dramatically changed the situation in adults. We implemented Russian
65 vaccine Sputnik-b and Kazakh vaccine Kazvac. Targeted immunization was done in medical
66 workers and medical students and was mandatory.

67 Regional distribution of COVID-19- associated pneumonia are not fully understood. We
68 observed high rated in West-Northern areas, and the lowest in Eastern areas. We suggest that
69 climate and populational density plays a role. Thus, high density increases risk of infection and
70 reinfection. In Eastern areas there is no heavy industry compared to Western regions.

71 We are not aware of explanation why children were less affected than adults. Anyways,
72 vaccination of children was also done. Our data correlate with literature search; children who
73 contract Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) typically manifest
74 milder symptoms or remain asymptomatic. The pathophysiological mechanisms that mitigate
75 lung injury in children are as follows: the expression level of ACE2 receptor in children is lower;
76 the binding affinity between ACE2 receptors and viral spike proteins in children was weaker; [4]

77 We were interested to look for fibrotic changes in children affected by COVID-19 pneumonia
78 assuming the still have sclerotic changes in lungs despite weak clinical presentation.

79 **Conclusion**

80 Analysis of morbidity shows the effectiveness of anti-epidemic measures, including vaccination
81 against COVID-19, in stabilizing pneumonia incidence.[4, 5]

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123 Figure 1



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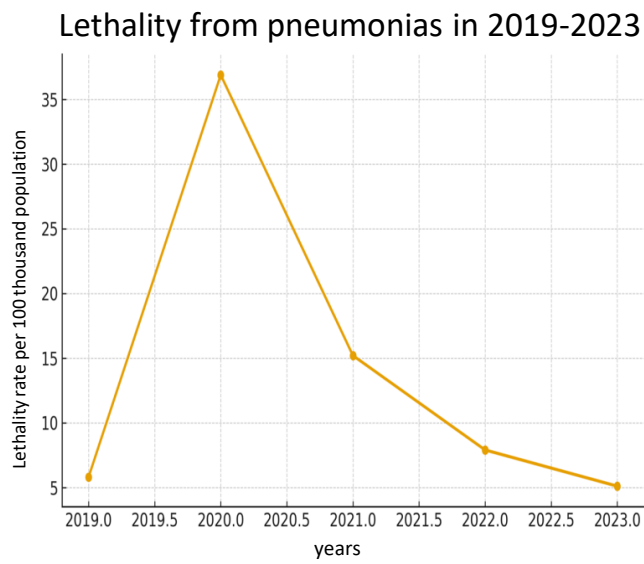
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132 Figure 2



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