

# How COVID-19 Affected Newly Discovered Cases of COPD in Three Industrial Regions of Kazakhstan

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## Abstract

**Introduction:** In the coming decades, COPD will take the 5th place among the leading causes of disability and already ranks 3rd among the causes of death. Approximately 384 million people worldwide suffer from chronic obstructive pulmonary disease (COPD), and it is estimated that more than half of patients with COPD may be undiagnosed.

**Aim:** To investigate the prevalence of chronic obstructive pulmonary disease in Kazakhstan and if COVID-19 affected detection of new cases of COPD in industrial regions of Kazakhstan.

**Materials and Methods:** A comparative retrospective analysis of the incidence of COPD in the context of the regions of the Republic of Kazakhstan for 2013-2022 was carried out according to the statistical collections "Health of the population of the Republic of Kazakhstan and the activities of healthcare organizations".

**Results:** Over the past 10 years in the Republic of Kazakhstan, there has been a decline in COPD prevalence. High prevalence was observed in 2016, with 386.2 cases per 100,000 population. The growth rate in 2022 was 80.62% compared to 2002. COPD prevalence per 100,000 population, broken down by regions, is highest in the Almaty region (502.8) and in the city of Almaty (440.4). The lowest rate was recorded in the Mangystau (104.3) and West Kazakhstan (106.5) regions.

**Conclusion:** Thus, in Kazakhstan, during the study period (2013-2022), there was a decrease in the incidence of COPD in dynamics. Despite the decrease in morbidity in the regions of southern Kazakhstan, there is a high incidence of COPD in this part of the country compared to northern and western Kazakhstan.

**Keywords:** Chronic Obstructive Pulmonary Disease, Prevalence, COPD Epidemiology

## 1. Introduction

COPD risk factors are smoking, industrial dust, fumes and other aerosolic microparticles irritating epithelium of bronchial tree [1]. Traditionally all industries are located in the Northern (coal mining), Western (oils and gas) and few in the South (certain metals like,

lead, plants and phosphor-organic fertilizers producers) [2-4]. Over the past 10 years, the incidence of COPD has been declining dynamically in the Republic of Kazakhstan. High incidence was observed in 2016, at 386.2 cases per 100,000 population. The growth rate in 2022 was 80.62% compared to 2002 (Table 1).

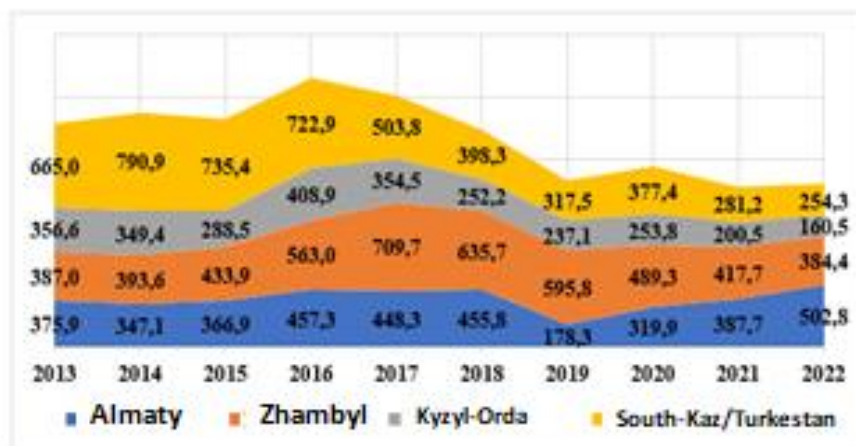
Год	The incidence rate of chronic and unspecified bronchitis and emphysema, registered for the first time in life, per 100 thousand population	Visibility index, %
2002	311.8	100
2003	285.9	91,69
2004	293.2	94,03
2005	322.2	103,3
2006	335.0	107,4
2007	321.4	103,07
2008	338.3	108,49
2009	363.4	116,5
2010	313,5	100,5
2011	321,0	102,9
2012	318.3	102,08
2013	315.9	101,3
2014	359.0	115,13
2015	340.5	109,2
2016	386.2	123,8
2017	345.5	110,8
2018	336.3	107,8
2019	323.7	103,8
2020	320.0	102,6
2021	290,4	93,13
2022	251,4	80,62

*Note: Compiled on the basis of data from the statistical collection of the Republic of Kazakhstan*

**Table 1: COPD incidence rates in the Republic of Kazakhstan for 2002-2022 (per 100 thousand population).**

In 2022, the national average incidence rate of COPD was 251.4 per 100,000 population. The highest incidence rate per 100,000 population by region was recorded in the Almaty region (502.8) and Almaty city (440.4). The lowest rates were recorded in the Mangystau (104.3) and West Kazakhstan (106.5) regions (Table 1). In the South Kazakhstan/Turkestan region, the incidence rate

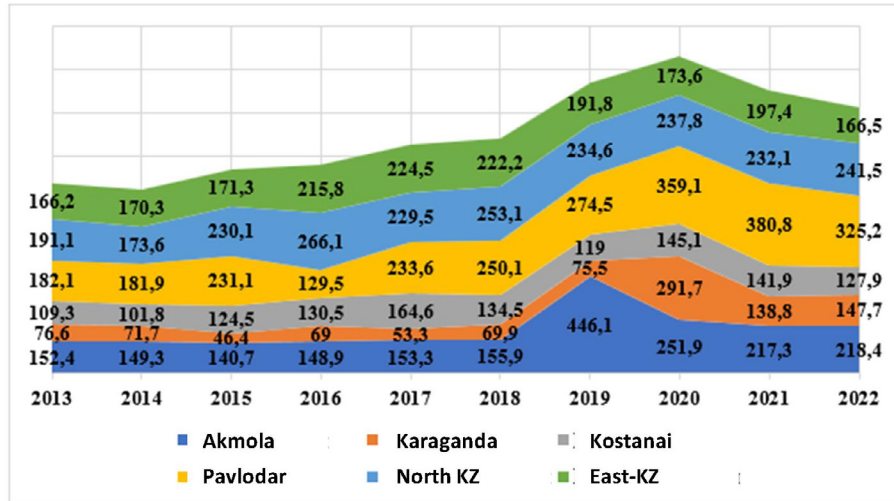
decreased from 665.0 per 100,000 population in 2013 to 254.3 per 100,000 population in 2022 (61.7%), Kyzylorda region – 55.5%, Zhambyl region – 0.6%. On the other hand, there was a significant increase in the incidence rate in the Almaty region from 375.9 per 100,000 population in 2013 to 502.8 per 100,000 population in 2022 (33.7%) (Figure 1).



**Figure 1: Analysis of COPD incidence for 2013-2022 in the regions of Southern Kazakhstan (per 100 thousand population)**

In 2022, the incidence rate in the Mangystau region decreased from 191.5 per 100,000 population to 104.3 per 100,000 population (45.5%), in the Atyrau region 4.7%, and in the Aktoobe region 39.3%. A significant increase was noted in the West Kazakhstan region, from 55.3 per 100,000 population in 2013

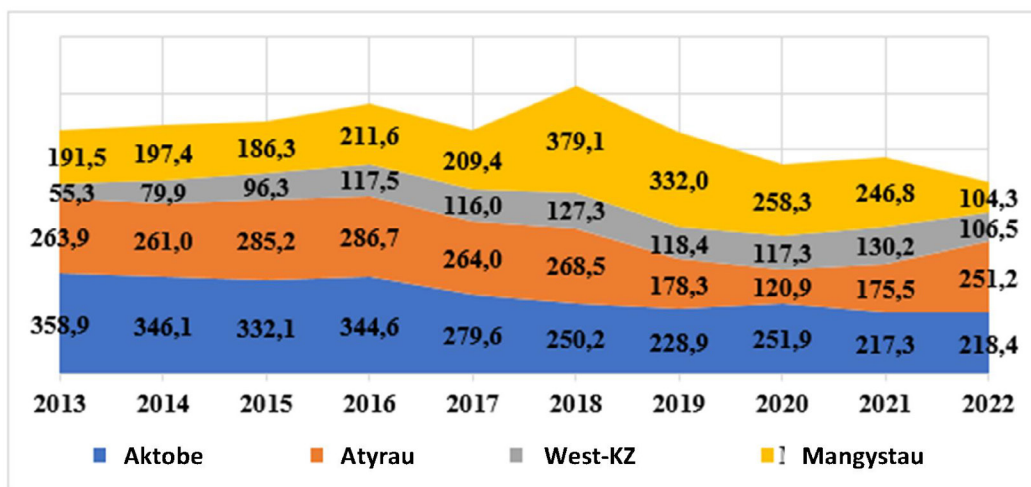
to 106.5 per 100,000 population in 2022 (92.5%) (Figure 2). In 2022, the average incidence rate in Western Kazakhstan was 170.1 per 100,000 population, which is 47.7% lower than in Southern Kazakhstan and 16.8% lower than in Northern Kazakhstan.



**Figure 2:** Analysis of COPD incidence for 2013-2022 in the regions of Western Kazakhstan (per 100 thousand population)

The highest incidence rates were in the Mangystau region in 2018 – 379.1 per 100,000 population, exceeding the average for the West Kazakhstan region, where the rate that year was 127.3 per 100,000 population. The lowest rates were also in the Mangystau region in 2022, at 104.3 per 100,000 population. However, consistently high

figures are observed in the Aktoobe region, from 358.9 in 2013 to a peak of 344.6 in 2016 and a slight decrease to 218.4 in 2022. In the Mangystau region, the figures did not exceed 251.2 per 100,000 population.



**Figure 3:** Analysis of COPD incidence for 2013-2022 in the regions of Northern Kazakhstan (per 100 thousand population)

An increase in the incidence of COPD was observed in the regions of Northern Kazakhstan in 2013-2022. Compared to 2013, in 2022 the incidence rate in East Kazakhstan region increased by 0.18%, North Kazakhstan region – 26.3%, Pavlodar region – 78.4%, Kostanay region – 17.02%, Karaganda region – 92.7%, Akmola

region – 42.9% (Figure 3).

## 2. Discussion of Results

In 2018-2019-2020, there was an increase in cases in two regions, western and northern. Interestingly, the southern part

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of Kazakhstan experienced an earlier peak in cases, in 2016. A precise explanation is difficult to provide. We believe this is related to the geography and rate of spread of COVID-19, as the outbreak, which began in southern China, spread to western and northern regions. The inclusion criteria in Table 1 show the incidence rates of bronchitis (chronic and unspecified) and emphysema, registered for the first time, per 100,000 population. Thus, the COVID-19 virus was included under the heading "unspecified bronchitis," as well as newly diagnosed cases of chronic bronchitis. Factors such as lack of knowledge about COPD, late presentation to GPs (due to limited access to primary care or non-specific and/or mild symptoms in the early stages of the disease) and lack of population screening may play a role in underreporting COPD in some regions of the country. The main risk factors for COPD development are smoking, particulate matter pollution, occupational exposure to particulate matter, household air pollution from solid fuels, and exposure to secondhand smoke [4,5]. Additionally, the infectious factor in the pathogenesis of COPD should be noted [6,7]. According to our data, the peak of the COVID-19 epidemic has increased the incidence of COPD and newly diagnosed cases [8,9].

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