PAAH
PHYSICAL ACTIVITY AND HEALTH

Dynamics of Change in Population Health Indicators of the Kostanay Region and the Republic of Kazakhstan

RESEARCH

LAZZAT S. NIYAZBEKOVA
ZHANAT U. SADIBEKOVA
SYRSULU E. MYRZAGULOVA
AINUR K. TEKMANOVA
BAKHYT B. TOKKULIYEVA

*Author affiliations can be found in the back matter of this article

]u[ubiquity press

ABSTRACT

Introduction: The study of the incidence rate and its dynamics shows the state of health of the population and the effectiveness of the work of healthcare institutions. This article is devoted to the study of the health of the population of the Kostanay region in comparison with the republican indicators.

Methods: The research used an observation of 100,000 people. The regulatory and legal documents in force in the Republic of Kazakhstan have been analyzed. The dynamics of changes in morbidity were studied and analyzed. Statistical processing of the received materials, logistic and interpretative evaluation of the results was carried out.

Results: The emphasis was placed on the study of diseases of the circulatory system, among which the leading place is taken by hypertension and ischemic heart disease. The dynamics of changes in the incidence of diseases of the respiratory system, injuries and poisoning, diseases of the digestive system, genitourinary system, diabetes mellitus, endocrine diseases, metabolic diseases, nervous diseases, diseases of the skin and subcutaneous tissue, and the spread of oncological diseases were also studied.

Discussion: In scientific activity, the issues of the organization of labor protection services are currently not studied, including the insufficiently developed system of monitoring the quality of professional activity, health and life of people employed in the main industries of the Republic of Kazakhstan.

CORRESPONDING AUTHOR:

Lazzat S. Niyazbekova

Department of Pathophysiology, Asfendiyarov Kazakh National Medical University, 050000, 94 Tole bi Str., Almaty, Republic of Kazakhstan

la.niyazbekova@gmail.com

KEYWORDS:

Incidence rate; diseases of organs and systems; the studied indicator; medical support; occupational diseases; occupational medicine

TO CITE THIS ARTICLE:

Niyazbekova, L. S., Sadibekova, Z. U., Myrzagulova, S. E., Tekmanova, A. K., & Tokkuliyeva, B. B. (2023). Dynamics of Change in Population Health Indicators of the Kostanay Region and the Republic of Kazakhstan. *Physical Activity and Health*, 7(1), pp. 13–23. DOI: https://doi.org/10.5334/paah.208

DOI: 10.5334/paah.208

INTRODUCTION

The Kostanay region of Kazakhstan is characterized by the rapid development of industry, which negatively affects the health of the population of the region. Morbidity is the most important indicator that determines the number of diseases in the population, and is one of the criteria for assessing the health of the population. Significant statistical material on morbidity has been accumulated. The use of scientific methodology to study the dynamics of morbidity makes it possible to establish the basic patterns of development of morbidity in different territories of the Republic of Kazakhstan (Sraubaev 2012, Shaimbetov *et al.* 2020, Omirbay *et al.* 2020). According to the findings of the UN Fund, in the field of population and the National Centre for the Formation of a Healthy Lifestyle, the current stage of population development in Kazakhstan is characterised by an increase in chronic non-epidemic and socially determined pathology. The leading causes of mortality in the urban and rural population are diseases of the circulatory system, accidents, poisoning and injuries, neoplasms, diseases of the digestive system, infectious and parasitic, which account for 91.3% in the city and 90% in the countryside from all deaths (Shayakhmetov *et al.* 2016; Ilderbayeva *et al.* 2016; Nazarchuk *et al.* 2018).

The problem of restoring medical support for the economically active contingent is highly relevant in many regions of the country. The main idea is to combine state and non-state approaches, to concentrate budgetary and extrabudgetary funds aimed at preserving and improving the health of workers, reducing general and occupational morbidity, premature mortality and increasing the average life expectancy of the working population of the country (Benavides *et al.* 2019; Cortés-Denia et al. 2022; Lelie et al. 2022). In addition to occupational morbidity, which occupies an insignificant place in the general structure of morbidity, the overall morbidity with a temporary disability remains high, and the average life expectancy decreases. Among workers, the proportion of occupational diseases is growing and the number of women working in harmful conditions is increasing (Niyazbekova *et al.* 2016). Deaths from cardiovascular and oncological diseases are frequent. In this case, it is necessary to screen people for these diseases and prescribe timely treatment. Cardiovascular diseases are common in industrialized countries, but it relies on the age at which people die from them. If at 70 years old – this is one thing, and at 50 – quite another. The specificity of Kazakhstan is that death from cardiovascular diseases and injuries occurs early in the country (Marinicheva *et al.* 2011, Guryev *et al.* 2020). However, the public health of the working population in the CIS countries, including Kazakhstan, is characterised at the present stage by extremely low birth rates, high morbidity and mortality. In the 1990s, the birth rate in the country fell from 14.6 to 8.4 per thousand inhabitants; the overall mortality rate has been increasing since 1994, and its rate was 14.7 (Pelclová *et al.* 2018; Patyk and Nowak-Senderowska 2022).

In the structure of occupational diseases in recent years, polyetiological and multifactorial occupational diseases predominate, which include: bronchitis, bronchial asthma, diseases of the peripheral nervous system and musculoskeletal system. To diagnose and identify the initial symptoms of occupational diseases, new methodological approaches and the development of scientifically grounded methods of early diagnosis are required (Joseph *et al.* 2018). Thus, the analysis of literature data of both foreign and domestic authors made it possible to reveal that in order to assess the health of the working population as a whole, it is necessary to study comprehensively from the standpoint of occupational health and safety. A review of special scientific literature showed that the issues of organising the occupational health and safety service have not been studied, including the insufficiently developed monitoring system for the quality of professional activity, health and life of men employed in the main industries in the Republic of Kazakhstan (Kraus *et al.* 2019, Matsuzaki *et al.* 2020, Ballin *et al.* 2020, Rohwer et al., 2022; Nurbek et al., 2022; Nabirova et al., 2022; Durdyev et al., 2022).

The purpose of this study was to study the dynamics of changes in morbidity in the Kostanay region in comparison with the republican indicators. Based on these data, the authors developed practical recommendations for improving the health and life expectancy of workers employed in mining enterprises.

MATERIALS AND METHODS

This article is devoted to the study of the health status of the population of the Kostanay region in comparison with the republican indicators in the period from 2005 to 2017. The study used a

calculation per 100000 people. The regulatory and legal documents in force in the Republic of Kazakhstan were analysed. The dynamics of changes in morbidity were studied and analysed. Statistical processing of the obtained materials, logistic and interpretive evaluation of the results was conducted.

The indicators of the dynamics of occupational morbidity used in this work were taken from the annual reports of the RSE by the right of economic jurisdiction "National Centre for Occupational Hygiene and Occupational Diseases" of the Ministry of Health of the Republic of Kazakhstan. Among the normative legal documents in force in the Republic of Kazakhstan, the laws on the approval of the occupational safety and health program, on public health and the health care system, and others were analysed.

As a result of the study, based on the scientific results obtained, the state of morbidity was studied and analysed. A comparative study was carried out based on the data on the morbidity of the population in the Republic of Kazakhstan. The authors also compared the dynamics of morbidity in North Kazakhstan, South Kazakhstan, East Kazakhstan, West Kazakhstan, Kostanay, Kyzylorda, Karaganda, Almaty Mangystau, Atyrau, Zhambyl, Akmola, Pavlodar, Kokshetau, Semipalatinsk, Torgay regions and also in Almaty city. The materials received from the health departments of the above regions were studied based on the results of periodic medical examinations of workers employed in hazardous working conditions for the period 2005–2017.

RESULTS AND DISCUSSION

The study of the dynamics of changes in the incidence of diseases of the circulatory system showed (Table 1) that in 2005 in the country as a whole it was 1058.0 per 100000 population. At the same time, the indicator under study was higher than the national average value in Almaty city (1694.8), Zhezkazgan (1348.1), Mangystau (1355.2), Kokshetau (1291.0) and Semipalatinsk (1210.3) regions, and lower in other regions of the country. Moreover, the highest incidence rate of diseases of the circulatory system was found in Almaty city, and the lowest in Kostanay region. It was found that in 5 years in 2009 the average republican indicator of the incidence of diseases of the circulatory system decreased by 7.5%. At the same time, in ten regions of the country there was a synchronous decrease in the studied indicator in the range from 29.9% in Kostanay region to 7.3% – in Aktobe (in Mangystau region by 27.2%). At the same time, in Kyzylorda, West Kazakhstan and Almaty regions, a significant increase in the incidence of diseases of the circulatory system was found, respectively by 46.7%, 25.0% and 24.9%. In other regions, the studied indicator either did not change, or changed statistically not significantly.

The dynamics of changes in the studied indicator in the next five years (2009–2013) showed that on average in the country it increased by 42.6%. In 13 regions of the country, the increase in the morbidity of diseases of the circulatory system ranged from 263.5% in the Mangystau region to 120.7% in the Almaty region. At the same time, in Pavlodar region, it did not change, and in Atyrau region it even decreased by 9.8. Finally, it was found that in the last five years of the studied period (2013–2017), the morbidity of diseases of the circulatory system increased by another 36.9% (in Mangystau region by 32.3%). At the same time, in 5 regions of the country, the studied indicator was higher than the national average, in 3 it was close to it, and in 6 it was much lower. Moreover, in comparison with 2009, the largest increase occurred in the South Kazakhstan region (1.9 times), and the smallest decrease – in Almaty city (by 24.2%) and in the West Kazakhstan region (by 19.7%).

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	1058	979.1	92.5	1396.4	142.6	1911.4	136.9
Kostanay	907	635.5	70.1	912.4	143.6	1194.9	131.0

Table 1 Dynamics of changes in the incidence of diseases of the circulatory system per 100000 population in the Republic of Kazakhstan in 2005–2017.

It is known that in the structure of the incidence of diseases of the circulatory system, the leading place is taken by the incidence of hypertension. The study of the dynamics of changes in this indicator (Table 2) showed that in 2005, with its average national value of 239.3 per 100000 population, the highest incidence of hypertension in the population was found in

Mangystau (619.1), Kokshetau (392.3), Atyrau (367.9) regions and in Almaty city (318.3), and the smallest – in Karaganda (114.0) and Akmola (141.3) regions. In other regions, the studied indicator fluctuated around the national average. After 5 years in 2009, the average republican value of the studied indicator has not changed much. At the same time, in the Karaganda, North Kazakhstan, Kyzylorda and Akmola regions, it increased by 1.8, 1.5, 1.5 and 1.4 times, respectively, and in Aktobe, Kostanay, Mangystau, Pavlodar, South Kazakhstan regions and in Almaty city, on the contrary, decreased by 8.0–12.0%.

Table 2 Dynamics of changes in the incidence of hypertension per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	239.3	251.5	105.1	404.9	161.0	577.5	142.6
Kostanay	223.7	193.8	86.6	298.7	154.1	338.5	113.3

In another 5 years, in 2013, there was a sharp increase in the incidence of hypertension, and the average republican indicator compared to 2009 increased by more than 1.6 times, amounting to 404.9 per 100 thousand population. At the same time, a simultaneous increase in the studied indicator occurred in 11 regions of the country. At the same time, it was most lost in Aktobe (2.3 times), East Kazakhstan (2 times), West Kazakhstan (1.9 times) and South Kazakhstan (1.8 times) regions. It was also found that only in Atyrau region in this five-year period the incidence of hypertension in the population decreased by 11.7%, and in Mangystau region – by 3.3%.

Study of changes in the incidence of hypertension in the population in 2013–2017 showed that it continued to increase throughout the country (by 42.6%) and amounted to 577.5 per 100000 population. At the same time, the studied indicator was higher than the national average value in Mangystau (1325.0), South Kazakhstan (854.0), Almaty (836.6) and Kyzylorda (685.5) regions, and lower in other regions of the country. Moreover, during the 5 studied years, the greatest increase in the incidence of hypertension was found in South Kazakhstan (by 275.1%), Mangystau (by 249.7%) and Akmola (by 199.7%) regions, and in East Kazakhstan, West Kazakhstan and North Kazakhstan regions and in Almaty city it, on the contrary, decreased in (by 14.7%, 22.1% and 26.2, respectively). The study of another important indicator of the incidence of diseases of the circulatory system – the incidence of coronary heart disease in the population (Table 3) showed that in 2005 it averaged 245.2 per 100000 population in the country (423.5 in the Mangystau region), while its highest value was recorded in Almaty city (389.4), Pavlodar (339.5), Kokshetau (318.4), Almaty (286.8) and Aktobe (286.0) regions, and the lowest is in Torgay (132.0), Akmola (170.1) and Taldykorgan (17.0) regions. In other regions of the country, the studied indicator fluctuated around the national average.

In the next five years (2005–2009), the incidence of coronary heart disease in the country as a whole decreased by 13.2%. At the same time, a synchronous decrease was found in 11 regions of the country (in the Mangystau region by 10.6%), and in Zhambyl, West Kazakhstan regions and in Almaty city, on the contrary, it increased by 50.8%, 11.3% and 3.6%, respectively. In another 5 years, in 2013, the average republican indicator increased by 1.5 times. Within the same limits, the incidence of coronary heart disease in the population increased in 12 regions of the country. It should be noted that the largest increase was observed in Karaganda (2.1 times), East Kazakhstan (2 times), Aktobe (1.8 times), North Kazakhstan (1.8 times) regions and in Almaty city (1.6 times). At the same time, it was found that in the Mangystau and West Kazakhstan regions, the studied indicator even decreased (by 19.0% and 7.3%, respectively). It was found that during the last studied year of the five-year period (2013–2017) the incidence of coronary heart disease in the country's population increased by 20.1% on average. At the same time, it was found that a synchronous increase in the studied indicator occurred in 7 regions of the country in the range from 236.5 in the South Kazakhstan region to 117.2% in Astana. At the same time, in Almaty city and the North Kazakhstan region, the studied indicator decreased, respectively, by 30.5% and 29.3% (in the Mangystau region by 4.1%), and in other regions of the country, its change was statistically insignificant.

Table 3 Dynamics of changes reduction of the incidence of coronary heart disease per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005.	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	245.2	212.9	86.8	321.5	151.0	386	120.1
Kostanay	243.2	169.9	69.9	203.3	119.7	243.3	119.7

The results of a comparative study of the incidence of respiratory diseases in the population of the Republic of Kazakhstan (Table 4) showed that in 2005 it was 32180.6 per 100000 population (in the Kostanay region 25919.4). At the same time, the studied indicator was higher than the national average value in Almaty city (58788.3), East Kazakhstan (47045.6), Semipalatinsk (44574.29), Karaganda (41038.6) and Pavlodar (37782.2) regions, and lower – in other regions of the country. Moreover, the lowest studied indicator was in Torgay (17652.5) and South Kazakhstan (18527.3) regions.

Table 4 Dynamics of changes in the incidence of respiratory diseases per 100,000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	32180.6	20675.7	64.2	20465.2	99.0	27653.2	135.1
Kostanay	25919.4	15727.3	60.7	14106.4	89.7	21632.5	153.4

It was found that after 5 years in 2009, the incidence of respiratory diseases in the country's population decreased by 35.8%. Moreover, the studied indicator decreased simultaneously in all regions of the country (in Kostanay region by 38.3%). After another 5 years, in 2013, the incidence of respiratory diseases in the country's population remained almost unchanged. Against this background, only in East Kazakhstan, North Kazakhstan, Mangystau and Kyzylorda regions, the studied indicator increased (by 29.8%, 26.0%, 14.4% and 10.8%, respectively), and in other regions of the country, it changed little or decreased. Finally, it was found that over the next five years (2013–2017), the incidence of respiratory diseases in the country's population increased by 35.1% (in Kostanay region by 53.4%). At the same time, the largest contribution to the formation of this indicator was made by Almaty, South Kazakhstan, Zhambyl and Pavlodar regions, in which it increased by 1.7, 1.7, 1.6 and 1.5 times, respectively.

Study of the dynamics of changes in the prevalence of cancer in the Republic of Kazakhstan in 2005–2017 (Table 5) showed that in 2005 it was 676.2 per 100000 population. At the same time, the highest cancer prevalence was in East Kazakhstan (940.6), Kostanay (858.1) regions and in Almaty city (913.6), and the lowest – in Mangystau (316.5), Torgay (344.0) and Kyzylorda (351.3) regions. In other regions of the country, the studied indicator fluctuated around the national average.

Table 5 Dynamics of changes in the prevalence of cancer per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	676.2	688.6	101.8	726.3	105.5	811.4	111.7
Kostanay	858.1	858.1	100.0	993.3	115.8	1099.6	110.7

It was found that during 2005–2009 the national average cancer prevalence has remained almost unchanged; in Akmola, Atyrau, Pavlodar and North Kazakhstan regions, it increased in the range from 8 to 11.0%, and in other regions of the country it decreased. Moreover, the greatest decrease in the studied indicator was observed in Almaty (by 23.8%), South Kazakhstan (by 15.5%) and Mangystau (by 14.7%) regions. It was shown that after another 5 years in 2013, the prevalence of cancer among the country's population increased by 5.5%. At the same time, the greatest increase in the studied indicator was found in Mangystau (by 37.4%), Kyzylorda (by 35.5%), Karaganda (by 30.2%) and Pavlodar (by 28.8%) regions. At the same time, it was found that in the South Kazakhstan, Akmola, Zhambyl regions and in Almaty city the studied indicator, on the contrary, decreased (by 28.1, 9.0%, 8.01% and 4.4%, respectively). Finally, it was found that during the next five years (2013–2017), the prevalence of cancer among the population of the country increased by another 11.7% (in Kostanay region by 15.8). At the same time, higher than the national average (811.4 per 100,000 population), the studied indicator was found in Karaganda (1339.4), East Kazakhstan (1159.8), North Kazakhstan (1102.4), Kostanay (1099.6) regions and in Almaty city (117.1). In other regions of the country, the studied indicator was either less than the national average, or equal to it.

The study of changes in the dynamics of the incidence of injuries and poisoning in the country's population showed (Table 6) that in 2005 in the country as a whole it was 5458.8 per 100000 population (in Kostanay region 4504.8). At the same time, it was found that in the regions of the country, the first ranking place according to this indicator was occupied by Karaganda

(9982.5), the second – by East Kazakhstan (8217.8) and the third – by Almaty city (6630.7). At the same time, the lowest studied indicator was South Kazakhstan (2661.1) and Torgay (2949.4) regions, and in other regions of the country it fluctuated around the national average.

Table 6 Dynamics of changes in the incidence of injuries and poisoning per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	5458.8	3990.4	73.1	3865.3	96.9	3813.4	98.7
Kostanay	4504.8	2671.1	59.3	2912.2	109.0	3624.2	124.4

It was found that after 5 years in 2009 the incidence of injuries and poisoning among the country's population decreased by 26.9% (in Kostanay region by 41.3%). At the same time, only in South Kazakhstan (by 14.6%) and Kyzylorda (by 2.5%) its increase was observed, and in other regions of the country, a decrease in the studied indicator was found in the range from 45.6% in Karaganda, to 4.1% – in Almaty regions. It is shown that in the next five-year period (2009–2013) the incidence of injuries and poisoning among the country's population decreased by only 3.1% compared to the previous five-year period. At the same time, its increase was observed in Mangystau, North Kazakhstan, East Kazakhstan, Karaganda, West Kazakhstan, Kyzylorda and Kostanay regions (by 53.2%, 35.7%, 119.3%, 119.2%, 111.1%, 109.8 and 109.0, respectively), and in other regions of the country, a decrease in the studied indicator was found. Moreover, it should be especially noted that in the Atyrau region it decreased by 2.5 times. It was shown that after another 5 years in 2017, the incidence of injuries and poisoning among the country's population remained almost unchanged and amounted to 3813.4 per 100,000 population. At the same time, an increase in the studied indicator was found in Zhambyl (by 50.3%), Akmola (by 36.1), Pavlodar (by 35.1%), Kostanay (by 24.4%), and in other regions of the country it was either equal to the national average or was lower.

The results of studying the dynamics of changes in the incidence of the population of the Republic of Kazakhstan of diseases of the digestive system are presented in Table 7. It is established that in 2005 the studied indicator averaged 3863.9 per 100000 population in the country (3731.2 in Mangystau region). At the same time, it was shown that it was higher than the average republican value in West Kazakhstan (14106.9), Karaganda (6268.8), Kokshetau (5947.6), Almaty (5205.4), South Kazakhstan (4964.9) and Semipalatinsk (3965.3) regions, and below – in other regions of the country. Moreover, the lowest studied indicator was in the Torgay (956.1), North Kazakhstan (1993.4) and East Kazakhstan (2172.9) regions. In 5 years, in 2009, the incidence of diseases of the digestive system in the country's population decreased by 31.2%. At the same time, only in 3 regions of the country (Kyzylorda, Aktobe regions and Almaty city) it increased (by 18.2%, 14.4% and 16.9%, respectively), and in other regions of the country it decreased (in Kostanay region by 11.6%). Moreover, in the West Kazakhstan and Karaganda regions, it decreased by 3 times.

In the next five years (2009–2013), it was found that the incidence of diseases of the digestive system in the country's population increased by 23.5% on average. At the same time, the main contribution to the formation of such an indicator was made by Mangystau, North Kazakhstan, Kostanay and Karaganda regions, in which the incidence of diseases of the digestive system increased, respectively, by 2.6, 2.0, 1.9 and 1.8 times. In other regions of the country, the studied indicator was either equal to the average republican value or less.

Table 7 Dynamics of changes in the incidence of diseases of the digestive system per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	3863.9	2659.6	68.8	3285	123.5	3780.4	115.1
Kostanay	1317.4	1164.2	88.4	2205	189.4	2586.1	117.3

It was found that during the five-year period under study (2013–2017), the incidence of diseases of the digestive system in the country on average increased by another 15.1% (in Kostanay region by 17.3%). At the same time, the greatest increase in the studied indicator was found in Atyrau (by 67.5%), Zhambyl (by 66.7%), Almaty (by 59.9%), Kyzylorda (by 52.3%) and Pavlodar (by 46.1%). In other regions of the country, the studied indicator was either lower or equal to the national average. At the next stage of the study, the dynamics of changes in the incidence rate of the population of the Republic of Kazakhstan with diseases

of the genitourinary system was studied (Table 8). These studies showed that at 2005 year on average in the country, the studied indicator was 5042.1 per 100000 population (in the Mangystau region 4323.2). At the same time, it was found that this indicator was higher than the national average value in Almaty city (11534.0), East Kazakhstan (6249.0), Pavlodar (5750.1), Karaganda (5681.2), Zhambyl (5696.0) and Semipalatinsk (5373.6) regions, and in the rest regions of the country, it was either equal or lower than the national average. Moreover, the lowest studied indicator was in the Atyrau region (2535.0).

In 5 years, in 2009, the incidence of diseases of the genitourinary system in the country's population increased by 5.8% on average. It was found that in Kyzylorda, Atyrau, West Kazakhstan, Karaganda regions and in Almaty, the studied indicator increased by 58.3%, 45.1%, 37.9%, 35.9% and 12.3%, respectively. In other regions of the country, it was lower (in the Mangystau region by 18.2%) or equal to the national average.

Table 8 Dynamics of changes in the incidence of diseases of the genitourinary system per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	5042.1	5335.4	105.8	6796.7	127.4	8384.6	123.4
Kostanay	4234.2	3874.9	91.5	5736.6	148.0	6364.6	110.9

It was shown that after another 5 years in 2013 compared to 2009, the incidence of diseases of the genitourinary system in the country's population increased by another 27.4%. At the same time, the greatest increase in the studied indicator was found in Aktobe (1.9 times), North Kazakhstan (1.8 times), East Kazakhstan (1.8 times), Mangystau (1.6 times) regions. In other regions of the country, the increase in this indicator was less pronounced, and in the Atyrau region it even decreased. It is shown that during the five-year period under study (2013–2017), the incidence of diseases of the genitourinary system continued to increase, and by 2017 it amounted to 8384.6 per 100000 population. At the same time, in Astana it increased 2 times, in Zhambyl region – 1.9 times, in South Kazakhstan region – 1.6 times; in Almaty, Pavlodar, Karaganda and Atyrau regions by 1.3–1.4 times. At the same time, it was found that in the East Kazakhstan, West Kazakhstan, Kyzylorda, Kostanay, Mangystau regions, the increase in the studied indicator was less pronounced, ranging from 10 to 20.0%, and in the North Kazakhstan region and in Almaty city it even decreased by 18.0% and 13.1%, respectively.

The results of the study of the incidence of endocrine and metabolic diseases in the population of the country are presented in Table 9. It has been established that in 2005 the national average under study was 379.9 per 100000 population (in Mangystau region 283.5). At the same time, the first five ranking places in terms of the studied indicator were occupied by Kyzylorda (764.3), East Kazakhstan (660.8) regions, Almaty city (572.0), Zhambyl (545.9) and Atyrau (578.7) regions, and the lowest indicator was in South Kazakhstan region (96.7).

Table 9 Dynamics of changes in endocrine and metabolic diseases per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	379.9	472.3	124.3	778.7	164.9	1053.7	135.3
Kostanay	283.5	272.3	96.0	578.2	212.3	724.8	125.4

It is shown that during 2005–2009 the incidence of endocrine and metabolic diseases among the country's population increased by 24.35. At the same time, in the Kyzylorda region, the studied indicator increased by 18.5%; in the East Kazakhstan region, on the contrary, it decreased by 28.6%; in Almaty city it was 1.7 times higher than in 2009; in Zhambylskaya – almost did not change; in Atyrau – decreased by 26.7%, and in South Kazakhstan – increased by 1.7 times. In the next five years (2009–2013), the incidence of endocrine and metabolic diseases among the country's population increased 1.6 times. At the same time, the studied indicator more than doubled in East Kazakhstan, North Kazakhstan, Kostanay, Mangystau and Aktobe regions. And in other regions of the country, the increase in the incidence of endocrine diseases and metabolic diseases, with the exception of the Atyrau region, was less pronounced, but statistically significant. It was found that during 2013–2017 the incidence of endocrine and metabolic diseases among the country's population increased by 35.3%, and amounted to 1053.7 per 100000 population. At the same time, it was shown that the greatest increase

in the studied indicator was found in Mangystau (2.3 times), Atyrau (2.3 times), Almaty (2.2 times) regions and in Astana (2.1 times). Along with this, in the West Kazakhstan and Kyzylorda regions, there was a decrease in this indicator, respectively by 38.3% and 9.2%.

It was of particular scientific and practical interest how the incidence of diabetes mellitus changed in the years under study (Table 10). It was found that in 2005 it averaged 43.3 per 100000 population in the country (46.8 in Mangystau region). At the same time, the highest values of the studied indicator were found in Almaty city (63.7), Zhambyl (68.7), North Kazakhstan (59.4), East Kazakhstan (51.7) and Akmola (50.3) regions, and the lowest in Almaty (24.5), Torgay (24.7) and Kyzylorda (27.9) regions. In 5 years, in 2009, the incidence of diabetes mellitus among the country's population increased by 10.6% and amounted to 47.9 per 100000 population. At the same time, in Almaty, Pavlodar, South Kazakhstan regions and in Almaty city, the studied indicator increased by 78.8%, 39.5%, 28.2% and 26.4%, respectively, and in other regions of the country it decreased or was equal to the national average. At the same time, the lowest incidence rate of the population with diabetes mellitus was found in the Mangystau region, amounting to 21.8 per 100000 population. Five years later, in 2013, the incidence of diabetes mellitus among the country's population increased almost 2 times. At the same time, in Aktobe region it increased more than 5 times, and Kostanay region 3.1 times, North Kazakhstan region 2.7 times, East Kazakhstan region 2.6 times, and South Kazakhstan region 2.4 times. It is shown that over the next five years, the incidence of diabetes mellitus among the country's population increased by 42.5%, and was already 133.5 per 100000 population. Moreover, a synchronous increase was observed in most regions of the country, with the exception of the West Kazakhstan region, in which the studied indicator decreased (by 14.6%, 9.0% and 3.5%, respectively).

Table 10 Dynamics of changes in the incidence of diabetes mellitus per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	43.3	47.9	110.6	93.7	195.6	133.5	142.5
Kostanay	51.7	45.7	88.4	142.2	311.2	137.2	96.5

The study of changes in the dynamics of the incidence of nervous diseases in the country's population showed (Table 11) that in 2005 for the country as a whole it was 5065.5 per 100000 population. At the same time, the first five ranking places in terms of its level were occupied by Semipalatinsk region (8409.0), Almaty city (8337.3), Mangystau (6827.2), Zhezkazgan (5812.1) and Kokshetau (5726.9) regions. At the same time, the lowest studied indicator was in the Torgai (2907.7) and South Kazakhstan (3014.8) regions (in Kostanay region 3880.8). In 5 years, in 2009, the incidence of nervous diseases among the country's population decreased sharply (3 times) and amounted to 1468.4 per 100000 population. At the same time, Almaty city (3215.3), Kyzylorda (2103.7), Almaty (1676.8), Zhambyl (1675.2) and Pavlodar (1645.8) regions took the first five ranking places, and the lowest indicator was in Mangystau (688.9), Akmola (770.1) and South Kazakhstan (882.5) regions. In the next five years (2009–2213), as studies have shown, the incidence of nervous diseases in the country's population increased by 26.7% and amounted to 1856.8 per 100000 population. At the same time, in 2013, the first ranked place was occupied by Almaty city (3909.9), Aktobe (2747.0), Kyzylorda (2770.0), East Kazakhstan (2510.8) and Karaganda (2138.1) regions, and the lowest studied indicator was in Kostanay (742.6) region.

Table 11 Dynamics of changes in the incidence of nervous diseases per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	5065.5	1468.4	29.0	1856.8	126.5	2100.1	113.1
Kostanay	3880.8	1059.1	27.3	742.6	70.1	1077.8	145.1

After another 5 years, in 2017, it was found that the incidence of nervous diseases in the country's population increased again (by 13.1%) and amounted to 2100.1 per 100000 population. It is shown that this year the first ranked place in terms of the studied indicator was occupied by Mangystau (3208.6), the second – by Almaty city (3206.1), the third – by Almaty (3035.2), the fourth – by Kyzylorda (2824.2) and the fifth – by Aktobe (2567.4) regions. Moreover, the lowest indicator was recorded in Atyrau (1017.2) and Kostanay (1077.8) regions.

The study of the dynamics of the incidence of diseases of the skin and subcutaneous tissue in the population of the country showed (Table 12) that in 2005 in the country as a whole it was 4140.1 per 100000 population (in Kostanay region 3326). At the same time, it was higher than the national average indicator in Semipalatinsk (6261.2), Kyzylorda (5873.9), Aktobe (5082.8), Zhambyl (4661.7), East Kazakhstan (4608.0) and Atyrau (4560.6) regions and in Almaty city (5678.6), and below – in other regions of the country. Moreover, it was the lowest in the Torgay (2363.6) and North Kazakhstan (2996.0) regions. It was found that after 5 years in 2009, the incidence of skin and subcutaneous tissue diseases in the country's population remained almost unchanged. At the same time, it was shown that in the Karaganda, Mangystau, Atyrau and Kyzylorda regions, it increased (by 46.9%, 21.5%, 21.0% and 13.9%, respectively), and in other regions of the country there was a decrease in the studied indicator in comparison with the national average value.

Table 12 Dynamics of changes in the incidence of skin and subcutaneous tissue per 100000 population in the Republic of Kazakhstan in 2005–2017.

REGION	2005	2009	% TO 2005	2013	% TO 2009	2017	% TO 2013
The Republic of Kazakhstan	4140.1	4035.1	97.5	4025.6	99.8	3661.8	91.0
Kostanay	3326	2821.3	84.8	3580.4	126.9	4173.1	116.6

In the next five years (2009–2013), the incidence of diseases of the skin and subcutaneous tissue in the country's population also remained almost unchanged. However, at the same time, in six regions of the country, this indicator increased (in Kostanay region by 26.9%), and in other regions of the country either remained the same or was significantly less than the national average. It was shown that after another 5 years in 2017, the incidence of skin and subcutaneous tissue diseases in the country's population decreased by 9.0% (in the Mangystau region by 11.0%). Moreover, only in Akmola, Kostanay and Aktobe regions it increased (by 26.0%, 16.0% and 8.3%, respectively), and in other regions of the country it was significantly lower, or equal to the average republican value.

CONCLUSIONS

In addition to occupational morbidity, which has an insignificant place in the general structure of morbidity, the overall morbidity with temporary disability remains high, and the average life expectancy decreases. The share of occupational diseases among the employed is growing and the number of women working in harmful conditions is increasing. Deaths from cardiovascular and oncological diseases are frequent. In this case, it is necessary to screen people and prescribe timely treatment. Cardiovascular diseases are typical for industrialised countries, but the specificity of Kazakhstan is that death from cardiovascular diseases and injuries occurs early.

Dynamics of changes in morbidity for the period 2013–2017 showed: the first place is occupied by diseases of the respiratory system, the number of diseases increased by 54.3%; in second place – diseases of the cardiovascular system – increased by 31% and in third place – injuries and poisoning – increased by 24.4%. Practical recommendations have been developed and proposed to improve the health and life expectancy of workers, as well as to optimise labour employed in the mining industry.

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR AFFILIATIONS

Lazzat S. Niyazbekova orcid.org/0000-0001-5330-4524
Department of Pathophysiology, Asfendiyarov Kazakh National Medical University, 050000, 94 Tole bi Str., Almaty, Republic of Kazakhstan

Zhanat U. Sadibekova orcid.org/0000-0003-3878-9329
Department of Social Health Insurance and Public Health, South Kazakhstan Medical Academy, 160001, 1 Al-Farabi Sq., Shymkent, Republic of Kazakhstan

Syrsulu E. Myrzagulova orcid.org/0000-0002-7011-4869
Department of Pathophysiology, Asfendiyarov Kazakh National Medical University, 050000, 94 Tole bi Str., Almaty, Republic of Kazakhstan

Ainur K. Tekmanova orcid.org/0000-0001-5676-4278
Department of Public Health, Asfendiyarov Kazakh National Medical University, 050000, 94 Tole bi Str., Almaty, Republic of Kazakhstan

Bakhyt B. Tokkuliyeva orcid.org/0000-0002-7912-9557
Department of Social Health Insurance and Public Health, South Kazakhstan Medical Academy, 160001, 1 Al-Farabi Sq., Shymkent, Republic of Kazakhstan

REFERENCES

Ballin, M., Nordström, P., Niklasson, J., Alamäki, A., Condell, J., Tedesco, S., & **Nordström, A.** (2020). Daily step count and incident diabetes in community-dwelling 70-year-olds: A prospective cohort study. *BMC Public Health*, *20*, 1830. DOI: https://doi.org/10.1186/s12889-020-09929-2

Benavides, F. G., Ramada, J. M., Ubalde-Lopez, M., Delclos, G. L., & **Serra, C.** (2019). A hospital occupational diseases unit: An experience to improve the identification and recognition of occupational disease. *Medicina Del Lavoro, 110*(4), 278–284.

Cortés-Denia, D., Isoard-Gautheur, S., Lopez-Zafra, E., & **Pulido-Martos, M.** (2022). Effects of vigor at work and weekly physical activity on job stress and mental health. *Scientific Reports, 12*(1), 16025. DOI: https://doi.org/10.1038/s41598-022-19966-z

Durdyev, S., Mohandes, S. R., Tokbolat, S., Sadeghi, H., & **Zayed, T.** (2022). Examining the OHS of green building construction projects: A hybrid fuzzy-based approach. *Journal of Cleaner Production, 338*, 130590. DOI: https://doi.org/10.1016/j.jclepro.2022.130590

Guryev, A. V., Tukov, A. R., Kalinina, M. I., & **Zubov, A. V.** (2020). The prevalence of diseases of non-occupational genesis in persons with diagnosis of occupational disease. *Problemy Sotsial'Noi Gigieny, Zdravookhraneniia i Istorii Meditsiny, 28*(1), 61–63.

Ilderbayeva, G., Zhetpisbaev, B., Ilderbayev, O., Taldykbayev, Zh., & **Bekeeva, S.** (2016). Metabolic processes of organism in remote period after the combined effects of radiation and emotional stress. *Georgian Medical News,* (250), 76–82.

Joseph, C. W., Garrubba, M. L., & **Melder, A. M.** (2018). Informing best practice for conducting morbidity and mortality reviews: A literature review. *Australian Health Review*, *42*, 248–257. DOI: https://doi.org/10.1071/AH16193

Kraus, W. E., Powell, K. E., Haskell, W. L., Janz, K. F., Campbell, W. W., Jakicic, J. M., Troiano, R. P., Sprow, K., Torres, A., & **Piercy, K. L.** (2019). Physical activity, all-cause and cardiovascular mortality, and cardiovascular disease. *Medicine & Science in Sports & Exercise*, *51*(6), 1270–1281. DOI: https://doi.org/10.1249/MSS.0000000000001939

Lelie, L., van der Molen, H. F., van den Berge, M., Hulshof, C. T. J., & **Proper, K. I.** (2022). The process evaluation of a citizen science approach to design and implement workplace health promotion programs. *BMC Public Health, 22*(1), 1610. DOI: https://doi.org/10.1186/s12889-022-14009-8

Marinicheva, G. N., Luchkevich, V. S., & **Grigorieva, N. O.** (2011). Study of the characteristics of social and hygienic functioning and risk factors affecting the health and quality of life of the population. *Biomedical Journal, 12*, 794–802.

Matsuzaki, M., Sherr, K., Augusto, O., Kawakatsu, Y., Ásbjörnsdóttir, K., Chale, F., Covele, A., Manaca, N., Muanido, A., Wagenaar, B. H., Mocumbi, A. O., & **Gimbel, S.** (2020). The prevalence of hypertension and its distribution by sociodemographic factors in Central Mozambique: A cross sectional study. *BMC Public Health, 20*, 1843. DOI: https://doi.org/10.1186/s12889-020-09947-0

Nabirova, D., Taubayeva, R., Maratova, A., Yesmagambetova, A., & **Singer, D.** (2022). Factors Associated with an Outbreak of COVID-19 in Oilfield Workers, Kazakhstan, 2020. *International Journal of Environmental Research and Public Health, 19*(6), 3291. DOI: https://doi.org/10.3390/ijerph19063291

Nazarchuk, O. A., Dmytriiev, D. V., Dmytriiev, K. D., Nazarchuk, H. H., & **Zaletskiy, B. V.** (2018). Characteristics of infectious complications in critically ill patients. *Wiadomosci lekarskie (Warsaw, Poland: 1960)*, *71*(9), 1784–1792.

Niyazbekova, L. S., Seyduanova, L. B., & **Saylybekova, A.K.** (2016). Morbidity of the rural population according to the data of appealability. *International Journal of Applied and Basic Research, 10*(2), 219–222.

Nurbek, Y., Asset, I., Timur, B., Bakhtiyar, S., & **Ermek, S.** (2022). Industrial traumatism and occupational morbidity in mining industry of Kazakhstan. *Journal of Public Health Research, 11*(1), 2169. DOI: https://doi.org/10.4081/jphr.2021.2169

Omirbay, R. S., Malgazhdarova, M. K., Batesova, F. K., & **Shevtsova, V. S.** (2020). Standard of the Republic of Kazakhstan "occupational health and safety management systems" and analysis of traumatism and occupational (job-related) diseases at the enterprises. In: *6th International Conference on Engineering and MIS, ICEMIS 2020*. New York: Association for Computing Machinery. DOI: https://doi.org/10.1145/3410352.3410751

Patyk, M., & **Nowak-Senderowska, D.** (2022). Occupational risk assessment based on employees' knowledge and awareness of hazards in mining. *International Journal of Coal Science and Technology, 9*(1), 75. DOI: https://doi.org/10.1007/s40789-022-00554-5

Pelclová, D., Švábová, K., Vocilková, A., Urban, P., & **Havlová, D.** (2018). Occupational skin diseases – pitfalls, causes, opinions. *Cesko-Slovenska Dermatologie, 93*(5), 190–195.

Rohwer, E., Velasco Garrido, M., Herold, R., Harth, V., & **Mache, S.** (2022). Police officers' work-life balance, job satisfaction and quality of life: longitudinal effects after changing the shift schedule. *BMJ Open, 12*(9), e063302. DOI: https://doi.org/10.1136/bmjopen-2022-063302

Shaimbetov, Z., Satybaldieva, U., & **Mamyrbayev, A.** (2020). Regional employment and occupational morbidity indicators in western Kazakhstan. *Open Access Macedonian Journal of Medical Sciences, 8*(E), 138–142. DOI: https://doi.org/10.3889/oamjms.2020.3406

Shayakhmetov, S. S. H., Toguzbaeva, K. K., Karakushikova, A. S., Ismailova, A. A., Orakbai, L. Z. H., Musina, A. A., & **Suleimenova, R. K.** (2016). *Prevention of health risks of the rural population of the Republic of Kazakhstan and measures to ensure their sanitary and epidemiological well-being*. Almaty: Methodical Recommendations.

Sraubaev, E. N. (2012). Actual problems of occupational hygiene and health protection of the working population of Kazakhstan. *Medicine and Ecology*, 4, 40–45.

TO CITE THIS ARTICLE:
Niyazbekova, L. S., Sadibekova, Z. U., Myrzagulova, S. E., Tekmanova, A. K., & Tokkuliyeva, B. B. (2023). Dynamics of Change in Population Health Indicators of the Kostanay Region and the Republic of Kazakhstan. *Physical Activity and Health*, 7(1), pp. 13–23. DOI: https://doi.org/10.5334/paah.208

Submitted: 05 September 2022
Accepted: 03 November 2022
Published: 09 January 2023