

# Morbidity and prevalence of diseases of the circulatory system in the adult population of the Kyiv region, including the working-age population

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## ABSTRACT

**Aim:** To analyze the incidence and prevalence of diseases of the circulatory system in the adult population of the Kyiv oblast region, including the able-bodied population.

**Material and Methods:** Medical history records on cardiovascular diseases were the materials, and statistical methods of medical and social data procession were used in the study.

**Results:** The distribution of cardiovascular diseases in the adult population of the Kyiv oblast region was highlighted. The districts with the lowest and highest rates of myocardial infarction, strokes, ischemic disease and hypertension were found. The trends in relevant morbidity were described.

**Conclusions:** When analyzing data from statistical reporting, it was established that before the start of a full-scale invasion and partial quarantine restrictions due to the spread of SARS-CoV-2, the incidence of diseases in the circulatory system was characterized by significant unevenness across administrative units. However, a specific area with the highest morbidity was not singled out, only in respect of which it would be necessary to carry out measures to improve the provision of medical cardiology care. In general morbidity, areas with the highest levels of morbidity were established, which need to improve the provision of cardiac care, as this is a negative socio-economic factor with the need for intervention measures.

**KEY WORDS:** cardiovascular diseases, cardiology, social factors

Wiad Lek. 2024;77(4):772-777. doi: 10.36740/WLek202404124 DOI

## INTRODUCTION

Morbidity of the population, the level of disability and mortality are key negative indicators that characterize the interconnected vector of the influence of social, economic, and medical factors on a person. The higher the value of these indicators, the worse the state of health of the people of the studied population. According to WHO Mortality Database [1] according to ICD-10 and ICD-11 [2] in developed countries, the most frequent causes in terms of the absolute number of deaths and proportional mortality are cardiovascular diseases/diseases of the circulatory system (Cardiovascular diseases (I00-199)/ 11. Diseases of the circulatory system ) [3]. And although our country does not belong to developed countries according to OECD indicators, the incidence has a similar profile [4].

In the Global Reference List of 100 basic health indicators, conditions related to the circulatory system occupy one of the main places [5].

At the same time, one of the priority tasks of the relevant state bodies of the health care system (in Ukraine – the Ministry of Health) is the development,

coordination and control over the implementation of state programs for the development of health care, in particular disease prevention, the provision of medical assistance, which is impossible without an analysis of morbidity on corresponding nosological forms

## AIM

To analyze the morbidity and prevalence of cardiovascular diseases in adult people of the Kyiv oblast region, including the able-bodied population.

## MATERIALS AND METHODS

Medical history records on cardiovascular diseases were the basic initial processed medical documentation. Range statistical method, demographic statistical method, general scientific methods of synthesis, generalization, scientific data interpreting, systemic approach method, medical statistical method, and analysis of the activity of state medical institutions dealing with cardiovascular pathology in Kyiv oblast region.

The performance analysis of state (public) medical institutions and the extent of certain cardiovascular diseases diagnosed in Kyiv oblast region of Ukraine. The analysis is based on epidemiological statistical frequency distribution, tabular summary, generalization, and comparison. The availability data of cardiological service were analyzed by the representative selective studies of medical facilities, distributed by the relevant districts of Kyiv oblast region.

## RESULTS

According to the data in Table 1, which shows the incidence and prevalence of circulatory system diseases among the adult population of the Kyiv oblast region (by district), the lowest incidence rate was observed in the city of Slavutych. It did not exceed 1,407 per 10,000 of the corresponding population (2019), which was by 80.2% less compared to the general indicator for the region. At the same time, the highest incidence rate was observed in the Ivankiv district (2020), which was 84.1% higher than in the region. The difference between the highest and lowest incidence rates was 164.3%. The corresponding indicators were correlated with the levels of newly established diagnoses of relevant diseases per 10,000 population, where the lowest indicators were also in the city of Slavutych, and the highest in the Ivankiv district. According to open data, it was established that in 2021, there were only 5,649.8 diseases per 10,000 adult population (4,824.1 in 2022) and 3,031.5 per 10,000 working-age population (Fig. 1).

Indicators characterizing the working population are directly or indirectly indicators of the basis of the country's well-being, and not only economic. As a general characteristic, Table 2 presented information on the incidence and prevalence of diseases of the circulatory system in the able-bodied population of the Kyiv oblast region before the start of the COVID-19 pandemic, since the actual data changed their structure at the beginning of the pandemic and are not those that more clearly reflect the actual data. And after the beginning of a full-scale invasion - data with certain types of information were closed to public access.

The lowest value, as well as among the entire adult population, is the level of morbidity and prevalence of diseases of the circulatory system among the working population in the city of Slavutych - 83.4% lower than in the region. At the same time, the highest indicators among the able-bodied population were registered in the Pereyaslav-Khmelnytskyi district, which were 69.1% more than the indicators of the region.

According to individual nosological forms, among diseases of the circulatory system, the most com-

mon are hypertensive diseases (BA0X in accordance with ICD-11), coronary heart disease (BA4X), angina (BA40.Y) and myocardial infarction, acute and repeated (BA41 / BA42).

As in the case of general morbidity, the lowest indicators of the incidence of hypertension (80.3% lower compared to the indicator for the region) were in the city of Slavutych. In 2018, the highest indicators in the section of districts in the analysis per 10,000 of the relevant population were in Brovary district - 23.8%, and with a diagnosis established for the first time in life - in Skvyrsky district (by 110.1%); in 2019, the corresponding indicators were the highest in the Yagotyn district (by 35.9% per 10,000 of the corresponding population), with a diagnosis established for the first time in Ivankiv district (by 128.9%).

Regarding coronary disease, according to the lowest indicators, there is a similar situation in the city of Slavutych, where the incidence rate per 10,000 adults was 84.1%-81.2% (2018-2019), lower than in the region. However, it should be noted that in 2020, according to the indicator of the diagnosis established for the first time in life, the lowest level was in the city of Bucha. The highest levels were in Makarivskyi (by 65.7%, 2018), Yagotynskyi (by 59.2%, 2019) and Rokytnyanskyi (by 89.7%, 2020) districts. According to the diagnosis established for the first time in life, the highest incidence rate of coronary disease was in the Ivankiv district (by 140.5-222.6%, 2018-2020).

The highest incidence of angina pectoris (per 10,000 adults) was in Kagarlytskyi district (72.2% more than in the region, 2018; 101.6%, 2019); according to the diagnosis established for the first time in life, the highest level was in Ivankivskyi district (by 208.9%, 2018; 288.9, 2019) and Kagarlytskyi district (by 292.0%, 2019). The lowest indicators, according to the indicated levels, were in the city of Slavutych, where they corresponded to 90.2%-90.1% (2018-2019), lower than in the region (per 10 thousand adult population) and 1 case per diagnosis established for the first time in my life in 2018 and 2019. It should be noted that the city of Slavutych no longer had the lowest incidence of acute and repeated myocardial infarction; instead, the lowest rates were registered in 2018 in Zgurivskyi district (lower by 51.5% than in the region), in 2019 in Kyiv-Svyatoshynskyi district (by 68.9%) and in 2020 in Bilotserkivskyi district (by 61.5%). At the same time, the highest levels of morbidity were registered in Yagotyn district (2018, 50.7% higher than regional levels; 2019, 48.8%), Brovar district (2019, 55.0%) and Pereyaslav-Khmelnytskyi district (2020, by 108.7%). The relevant trends are shown in Fig. 2.

**Table 1.** Incidence and prevalence of diseases of the circulatory system in the adult population of the Kyiv oblast region (by district)

Names of districts	2018				2019				2020			
	All recorded diseases		Including the diagnosis established for the first time in his life		All recorded diseases		Including the diagnosis established for the first time in his life		All recorded diseases		Including the diagnosis established for the first time in his life	
	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population
Region	1120010.00	7929.70	73572.00	520.90	1008627.00	7114.80	63253.00	446.20	864642.00	6080.50	51382.00	361.30
Barishivskiy	23459.00	8170.20	1802.00	627.60	22701.00	7993.90	1846.00	650.00	18818.00	6708.30	1535.00	547.20
Bilotsepkivskiy	26629.00	6473.90	3095.00	752.40	26198.00	6410.70	2953.00	722.60	25705.00	6376.40	2699.00	669.50
Bohuslavskiy	20696.00	7277.30	1048.00	368.50	20798.00	7408.50	886.00	315.60	19096.00	6904.10	557.00	201.40
Borispiiskiy	67753.00	7355.20	2102.00	228.20	41677.00	4521.00	1953.00	211.90	58028.00	6267.70	2124.00	229.40
Borodyanskiy	42521.00	9314.00	2920.00	639.60	39405.00	8687.90	2547.00	561.60	30905.00	6861.10	1597.00	354.50
Brovapskiy	139886.00	10200.00	8736.00	637.00	131188.00	9478.30	7435.00	537.20	109378.00	7852.80	4568.00	328.00
Vasykivskiy	56457.00	7445.20	4374.00	576.80	48245.00	6407.00	3088.00	410.10	56617.00	7566.80	4885.00	652.90
Volodarskiy	10846.00	7734.40	1017.00	725.20	9041.00	6571.00	751.00	545.80	7731.00	5761.20	529.00	394.20
Vyshgorodskiy	43196.00	7279.70	3087.00	520.20	39423.00	6605.40	2505.00	419.70	29658.00	4922.00	2029.00	336.70
Zgurivskiy	12398.00	9277.90	659.00	493.20	12594.00	9585.90	677.00	515.30	12689.00	9931.10	644.00	504.00
Ivankivskiy	26611.00	10945.60	2673.00	1099.50	26674.00	11065.80	2661.00	1103.90	26801.00	11200.20	2702.00	1129.20
Kagarlitskiy	25713.00	9227.70	1876.00	673.20	25699.00	9327.80	1859.00	674.70	24913.00	9163.20	1789.00	658.00
K-Svyatoshynskiy	106032.00	7252.50	6329.00	432.90	92578.00	6031.40	4233.00	275.80	37827.00	2353.00	2665.00	165.80
Makarivskiy	30624.00	10407.50	1647.00	559.70	26421.00	9107.20	1180.00	406.70	22440.00	7770.10	1060.00	367.00
Myronivskiy	26089.00	9337.20	1459.00	522.20	25073.00	9060.80	770.00	278.30	23855.00	8742.90	881.00	332.90
Obukhivskiy	36428.00	6629.30	3130.00	569.60	35289.00	6452.30	2781.00	508.50	36136.00	6618.30	3178.00	582.10
P-Khmelnyskiy	35234.00	7823.00	2316.00	514.20	35134.00	7906.10	2287.00	514.60	33740.00	7706.70	2162.00	493.80
Polisky	3593.00	8138.20	209.00	473.40	3587.00	8089.80	209.00	471.40	3348.00	7744.60	167.00	386.30
Rokytnianskiy	20231.00	9572.30	1872.00	885.70	19809.00	9520.80	1458.00	700.80	19370.00	9463.60	1241.00	606.30
Squirskiy	24104.00	7895.20	3097.00	1014.40	25209.00	8384.80	2923.00	972.20	22550.00	7637.30	2266.00	767.50
Stavishchenskiy	14394.00	8077.90	674.00	378.20	13801.00	7868.70	607.00	346.10	12123.00	7038.00	466.00	270.50
Tarashchanskiy	20137.00	8965.70	978.00	435.40	19715.00	8929.70	933.00	422.60	18868.00	8746.50	837.00	388.00
Tetiivskiy	26146.00	9915.80	1353.00	513.10	24695.00	9435.70	1218.00	465.40	24106.00	9323.90	932.00	360.30
Fastivskiy	45672.00	7470.60	4299.00	703.20	46054.00	7592.70	4335.00	714.70	45397.00	7590.80	4191.00	700.80
Yagotynskiy	26884.00	10162.90	1319.00	498.60	26627.00	10220.30	1073.00	411.90	25771.00	10078.60	703.00	274.90
the city of Bila Tserkva	124516.00	7326.80	4452.00	262.00	97422.00	5752.90	3609.00	213.10	70464.00	4166.80	2142.00	126.70
Irpina city	51992.00	7115.10	4698.00	642.90	41080.00	5387.90	4273.00	560.40	26096.00	3283.80	1471.00	185.10
Bereza city	9250.00	6787.50	464.00	340.50	9240.00	6832.80	450.00	332.80	10820.00	8036.80	542.00	402.60
the city of Rzhyshevskiy	4002.00	6421.70	301.00	483.00	3728.00	6070.70	573.00	933.10	2574.00	4221.10	154.00	252.50
the city of Bucha	15641.00	5833.80	1297.00	483.80	16575.00	6022.70	888.00	322.70	6095.00	2172.30	422.00	150.40
m. Slavutych	2876.00	1373.90	289.00	138.10	2947.00	1407.00	292.00	139.40	2723.00	1308.00	244.00	117.20

## DISCUSSION

Global patterns in the spread of cardiovascular disease are widely divergent across continents. An instant view on the epidemiology of cardiovascular diseases shows that there is no clear dependence between the country's general economic rates and the prevalence and incidence of circulatory system diseases. For example, China demonstrates that cardiovascular diseases (CVD) are the leading cause of death in the country. Among eight critical features of the epidemiology of CVD in China, some features indicate a transition in CVD epidemiology owing to interrelated changes in demography, environment, lifestyle, and health care, including the rising burden from atherosclerotic CVD (ischaemic heart disease and ischaemic stroke), declining mortality from haemorrhage stroke, varied regional epidemiological

trends in the subtypes of CVD, increasing numbers of patients with moderate types of ischaemic heart disease and ischaemic stroke, and increasing ageing of patients with CVD. Other features highlight the problems that need particular attention, including the high proportion of out-of-hospital deaths of patients with ischaemic heart disease with insufficient prehospital care; the wide gaps between guideline-recommended goals and levels of lifestyle indicators; and the significant number of patients with undiagnosed, untreated, or uncontrolled hypertension, hypercholesterolaemia, or diabetes mellitus [6].

And these patterns are very close to Kyiv oblast region patterns revealed by us, besides the fact that China's economy is the second one around the globe. Meanwhile, Western patterns in developed countries

**Table 2.** Incidence and prevalence of diseases of the circulatory system among the able-bodied population of the Kyiv oblast region (by district)

Names of districts	2018				2019			
	All recorded diseases		Including the diagnosis established for the first time in his life		All recorded diseases		Including the diagnosis established for the first time in his life	
	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population	absolute data	per 10 thousand of the relevant population
Region	442727.0	4462.4	38426.0	387.3	383915.0	3869.9	30379.0	306.2
Barishivskiyi	10844.0	5539.7	1012.0	517.0	10407.0	5402.9	1041.0	540.4
Bilotsepkivskiyi	8863.0	3454.4	1760.0	686.0	8686.0	3429.9	1582.0	624.7
Bohuslavskiyi	9661.0	5102.5	488.0	257.7	9923.0	5311.5	451.0	241.4
Borispilskiyi	30648.0	4653.3	985.0	149.6	23443.0	3577.2	932.0	142.2
Borodyanskiyi	16023.0	4981.7	1017.0	316.2	15244.0	4803.1	891.0	280.7
Brovapskiyi	55531.0	5650.2	4137.0	420.9	50294.0	5092.8	2815.0	285.0
Vasylkivskiyi	25046.0	4896.3	2733.0	534.3	20384.0	4034.0	1772.0	350.7
Volodarskiyi	3308.0	3692.8	398.0	444.3	2620.0	3012.5	260.0	299.0
Vyshgorodskiyi	14082.0	3346.3	1390.0	330.3	12219.0	2901.8	1186.0	281.7
Zgurivskiyi	4629.0	5247.1	383.0	434.1	4911.0	5707.8	409.0	475.4
Ivankivskiyi	9386.0	5635.5	1248.0	749.3	9389.0	5692.4	1219.0	739.1
Kagarlitskiyi	7492.0	4073.3	909.0	494.2	7473.0	4132.4	891.0	492.7
K-Svyatoshynskiyi	49122.0	4569.2	3655.0	340.0	42769.0	3778.4	2556.0	225.8
Makarivskiyi	9180.0	4719.1	870.0	447.2	7486.0	3924.5	640.0	335.5
Myronivskiyi	7758.0	4240.3	608.0	332.3	7001.0	3880.4	361.0	200.1
Obukhivskiyi	21048.0	5477.5	2349.0	611.3	21215.0	5596.6	2147.0	566.4
P-Khmelnitskyyi	19766.0	6440.3	1265.0	412.2	19702.0	6543.6	1276.0	423.8
Poliskiy	1803.0	5696.7	100.0	316.0	1798.0	5613.5	101.0	315.3
Rokytnianskyyi	7287.0	5448.6	679.0	507.7	6759.0	5144.6	513.0	390.5
Squirskiy	7718.0	3841.3	1657.0	824.7	6883.0	3489.8	978.0	495.9
Stavishchenskyi	5445.0	4696.8	409.0	352.8	5552.0	4883.0	349.0	306.9
Tarashchanskyyi	6023.0	4064.4	490.0	330.7	5883.0	4063.1	431.0	297.7
Tetiivskyyi	10602.0	5911.3	818.0	456.1	9280.0	5232.6	671.0	378.3
Fastivskyyi	19742.0	4705.9	2160.0	514.9	19821.0	4792.5	2242.0	542.1
Yagotynskyyi	9660.0	5640.5	520.0	303.6	9480.0	5668.8	409.0	244.6
the city of Bila Tserkva	43605.0	3508.0	2120.0	170.6	23292.0	1894.2	1298.0	105.6
Irpin city	18004.0	3253.5	2887.0	521.7	12321.0	2133.6	2122.0	367.5
Berezan city	2709.0	2719.9	279.0	280.1	2691.0	2751.5	251.0	256.6
the city of Rzhyshev	2367.0	5338.3	85.0	191.7	1272.0	2912.8	116.0	265.6
the city of Bucha	4151.0	2018.5	848.0	412.4	4374.0	2068.7	292.0	138.1
m. Slavutych	1224.0	739.1	167.0	100.8	1343.0	830.0	177.0	109.4

before SARS-CoV-2 demonstrated a severe drop in CVD morbidity and prevalence in the adult population and especially in the working-age population fraction [7].

The incidence rates of particular nosological forms of CVD reflect the population's age structure, non-compliance with a healthy lifestyle and its quality, the spread of social problems, life expectancy, etc. [8].

Knowing the structure and social and medical indices characterizing CVD epidemiology is the key to understanding and guiding the correct action plan to improve cardiovascular assistance in the mentioned population groups in particular areas. Our findings indicated the bilateral ways of CVD epidemiology in Kyiv oblast region.

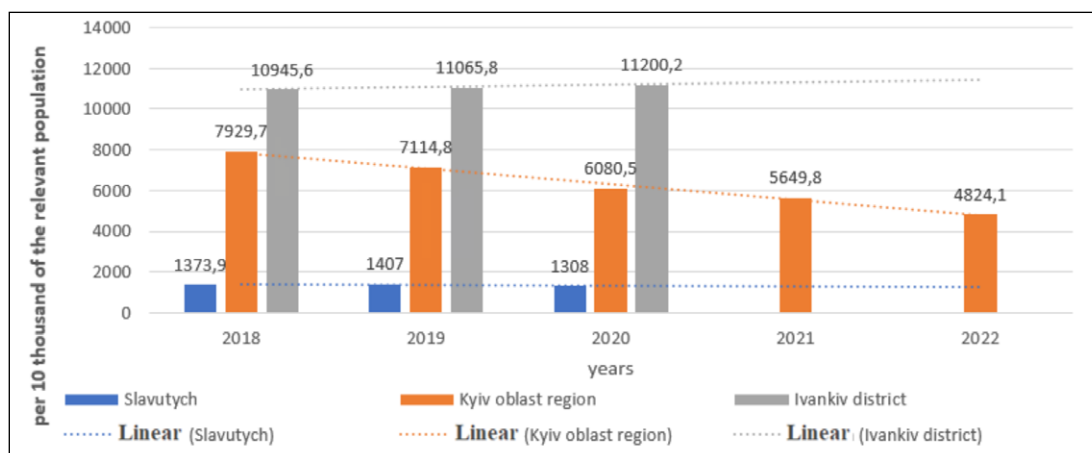


Fig. 1. Incidence rates of myocardial infarction in the adult population (by marginal rank distribution).

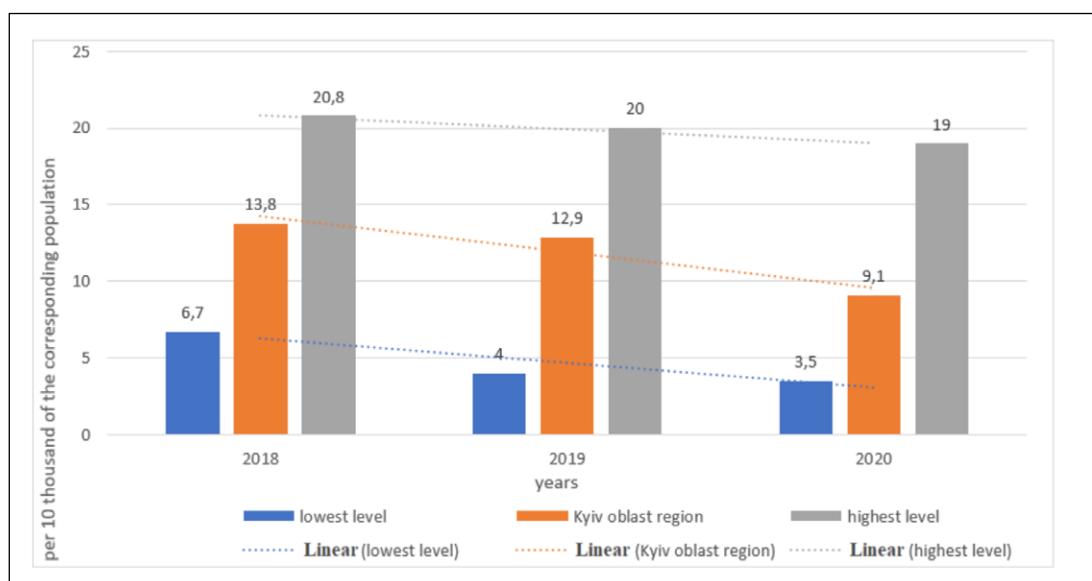


Fig. 2. Incidence rates of myocardial infarction in the adult population (by marginal rank distribution).

## CONCLUSIONS

When analyzing data from statistical reporting, it was established that before the start of a full-scale invasion and partial quarantine restrictions due to the spread of SARS-CoV-2, the incidence of diseases in the circulatory system was characterized by significant unevenness across administrative units. Thus, in the city of Slavutych (an exclave of Kyiv oblast region on the territory of Chernihiv region), the lowest incidence rates of circulatory system diseases per 10,000 adult population as a whole, per 10,000 working-age population, the lowest incidence rates of hypertension, angina pectoris, and coronary heart disease were noted. However, a specific area

with the highest morbidity was not singled out, only with respect to which it would be necessary to carry out measures to improve the provision of medical cardiology care. In general morbidity, it was established that the highest levels among the adult population with stable growth dynamics were registered in the Ivankivskyi district; however, in a detailed analysis by separate nosologies, such districts as Pereyaslav-Khmelnyskyi, Brovarskyi, Skvirskyi, Yagotynskyi, Makarivskyi, Rokytnyanskyi and Kagarlytskyi had the highest levels according to certain nosological forms and also need to improve the provision of cardiac care, as this is a negative socio-economic factor that requires intervention measures.

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*The article was performed in framework of research "Medical and social substantiation of the optimization of the healthcare organization in the context of the public healthcare system development" (2020-2022, № state registration 0120U100807).*

### CONFLICT OF INTEREST

The Author declare no conflict of interest

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**RECEIVED:** 28.10.2023

**ACCEPTED:** 22.03.2024

