

Liakhova N. O., Holovanova I. A., Buria T. S.,
Havlovskiy O. D., Buria L. V.

Retrospective analysis of tuberculosis incidence in children and adolescents of Poltava region in 2019–2023

Poltava State Medical University, Poltava, Ukraine

Ляхова Н. О., Голованова І. А., Буря Т. С.,
Гавловський О. Д., Буря Л. В.

Ретроспективний аналіз захворюваності на туберкульоз дітей та підлітків Полтавської області в 2019–2023 рр.

Полтавський державний медичний університет,
м. Полтава, Україна

natanew2017@ukr.net

Introduction

Tuberculosis is the leading cause of morbidity and mortality from infectious diseases worldwide. The Global Tuberculosis Report 2021 (WHO TB report-2021) states that 8.75 % of all cured cases of tuberculosis between 2018 and 2022 involved children (3.5 out of 40 million), which means that the level of transmission of the infection in society is relatively high [1–3]. Therefore, the risk factors leading to the development of tuberculosis have received more attention over the years. Children suffer from more severe forms of tuberculosis than adults. Every year, 7.5 million children worldwide are infected with tuberculosis, and 1.1 million children suffer from tuberculosis, accounting for 12 % of the global burden of tuberculosis [1–3]. Children, meanwhile, have a disproportionately higher mortality rate – 230,000 deaths annually [4; 5]. These figures reflect the difficulties faced by healthcare systems in diagnosing and treating tuberculosis in this category of people. These difficulties particularly affect the most vulnerable groups of the population – children under three years of age and children co-infected with HIV. The incidence of tuberculosis increases further when children enter adolescence and the disease begins to develop in the same way as in adults [6].

Tuberculosis is one of the ten leading causes of death among children worldwide, but most national health systems give this problem low priority, neglecting the epidemic. Of the 1 million cases of tuberculosis in children worldwide, 75 % occur in 22 countries with a high disease burden [1]. In countries with a low disease burden, childhood tuberculosis accounts for about 5 % of the total, compared to 20–40 % in countries with a high disease burden [1–3]. Regional data from the World Health Organization showed that positive sputum smear results in children under 14 years of age account for 0.6 %–3.6 % of registered tuberculosis cases [3]. Since in about 95 % of cases in children under 12 years of age the smear is negative, it can be argued that these data underestimate the true burden of tuberculosis [7].

Given the above, children in developing countries continue to be a high-risk group.

According to experts from the F. G. Yanovsky National Institute of Phthisiology and Pulmonology of the National Academy of Medical Sciences of Ukraine, the main reasons for the unsatisfactory situation regarding tuberculosis in children are late diagnosis, a decrease in the body's adaptive reserves, and an increase in the frequency of primary drug resistance in TB pathogens [9].

The epidemiological situation regarding tuberculosis in Ukraine remains difficult, as there are a large number of patients who are sources of infection with *Mycobacterium tuberculosis*, which poses a particular danger to vulnerable groups – children and adolescents. The last five years in Ukraine have been characterized by a significant deterioration in the early detection, prevention, and treatment of the disease, which is associated with the COVID-19 pandemic and full-scale war [1; 6–8].

The aim of the study was to assess the incidence of tuberculosis among children and adolescents in Ukraine and Poltava region in 2019–2023.

Object, materials and research methods

Object of study: prevalence of tuberculosis among children and adolescents in Ukraine and the Poltava region.

Research methods. In accordance with the defined tasks and to achieve the goal of the work, the following methods were used: a systematic approach and analysis, a bibliosemantic method, and a medical-statistical method.

The systematic approach and analysis method was used to develop the program; select and apply research methods; plan scientific work with ensuring the phased and sequential implementation and analysis of the results.

The bibliosemantic method was used to analyze, compare, and summarize the data obtained on the detection of tuberculosis among children and adolescents in Ukraine and by region.

The medical-statistical method was used to characterize the dynamics of the main indicators of tuberculosis incidence among children of different age categories in Ukraine and by regions by calculating the basic growth rate (BGR) of the indicator.

Research materials: analytical and statistical reference books "Tuberculosis in Ukraine" for 2019–2023 from the State Institution "Center for Public Health of the Ministry of Health of Ukraine".

Research results

At the first stage of the study, we analyzed tuberculosis incidence rates among children and adolescents in Ukraine and by region. Regarding morbidity rates among children aged 0–17 in 2019–2023, the following was established (Table 1). The highest rates of cases per 100,000 of the corresponding population for 2019–2023 were observed in Dnipropetrovsk (11.1–20.9), Kirovohrad (11.6–86.1), and Odesa (10.9–22.0) regions, which coincides with the corresponding indicator for the population of all age categories, as shown in Table 1. Overall, for Ukraine, the indicator ranged from 7.2 in 2020 to 11.4 in 2023 per 100,000 of the corresponding population, and in the Poltava region – from 3.9 in 2021 to 9.8 in 2023, respectively. In 2019–2021, in the Poltava region, this indicator was significantly lower than the national average, but in 2022–2023 it increased significantly, exceeding the national average in 2022.

As for the base growth rate of this indicator, it was distributed across regions and Ukraine as follows.

The lowest rates were observed in Vinnytsia (–52.9 %), Ivano-Frankivsk (–52.1 %), and Kyiv (–56.6 %) regions, which may be due to both the successful implementation of tuberculosis control programs and low level of diagnosis of the disease. The highest growth rate in the number of tuberculosis cases was observed in Volyn (586.4 %), Kirovohrad (498.0 %) and Mykolaiv (154.2 %) regions. The latter figures may indicate both a sharp deterioration in the epid significant increase in the number of internally displaced persons who have moved to these regions. Across Ukraine, this indicator is 7.6 %, while in Poltava region it is 88.5 %, which is 11.6 times higher. This difference can possibly be explained by the large number of internally displaced persons living in Poltava, among whom there are many young families with children and teenagers. In general, most regions have a positive growth rate in the number of tuberculosis cases per 100,000 of the corresponding population.

The incidence of tuberculosis among adolescents (aged 15–17 years) in Ukraine and its regions is characterized as follows.

The highest incidence among children aged 15–17 was observed in the Odesa, Kirovohrad, and Dnipropetrovsk regions, and the lowest in Rivne, Chernivtsi, and Volyn, although the latter saw a sharp increase in 2023 (BTP +866.7 %).

In terms of the rate of increase, the lowest decline was observed in Chernihiv (–100 %), Ternopil (–54.5 %), and Odesa (–53.7 %), while the highest in Volyn (866.7 %), Mykolaiv (302.0 %), and Kirovohrad (181.8 %) regions. High growth rates were also observed in Rivne (125.5 %)

Table 1

Tuberculosis incidence (new cases + relapses) among children aged 0–17 years inclusive (2019–2023)

Administrative territories	Absolute number / per 100 thousand of the relevant population					BGR, %
	2019	2020	2021	2022	2023	
Vinnytsia	35/12,3	22/7,8	19/6,8	19/6,9	16/5,8	–52,9
Volyn	14/5,9	21/8,8	32/13,5	20/8,5	95/40,5	586,4
Dnipropetrovska	101/17,4	64/11,1	71/12,5	74/13,2	117/20,9	20,1
Zhytomyr	32/13,4	9/3,8	14/6,0	17/7,4	23/10,1	–24,6
Zakarpattia	28/9,6	16/5,5	35/12,1	27/9,4	35/12,1	26,1
Ivano-Frankivsk	26/9,4	9/3,3	27/9,9	14/5,2	12/4,5	–52,1
Kyiv	47/13,6	26/7,4	30/8,3	27/7,3	22/5,9	–56,6
Kirovohrad	24/14,4	19/11,6	35/21,6	100/63,3	136/86,1	498,0
Lviv	42/8,7	17/3,5	9/1,9	16/3,4	29/6,1	–29,9
Mykolaiv	10/4,8	16/7,8	13/6,5	8/4,1	24/12,2	154,2
Odesa	103/22,0	62/13,2	51/10,9	66/14,2	71/15,2	–30,9
Poltava	12/5,2	10/4,3	9/3,9	19/8,4	22/9,8	88,5
Rivne	16/5,8	11/4,0	18/6,5	15/5,5	19/7,0	20,7
Sumy	19/11,3	6/3,6	16/9,8	5/3,1	27/16,9	49,6
Ternopil	6/3,1	4/2,1	5/2,6	4/2,1	7/3,7	19,4
Kharkiv	49/11,3	57/13,2	60/14,1	14/3,3	31/7,4	–34,5
Khmelnyskyi	15/6,4	5/2,1	11/4,8	12/5,3	17/7,5	17,2
Cherkasy	22/11,1	24/12,3	29/15,1	19/10,1	31/16,4	47,8
Chernivtsi	5/2,7	2/1,1	4/2,2	10/5,5	6/3,3	22,2
Chernihiv	18/11,2	8/5,1	10/6,5	25/16,5	15/9,9	–11,6
Kyiv	31/5,6	19/3,3	10/1,8	21/3,7	30/5,3	–5,4
Ukraine	803/10,6	540/7,2	610/8,2	577/7,9	835/11,4	–7,6

Source: [10–14]

and Poltava (120.3 %) regions. In Poltava region in 2019 and 2021, this indicator was significantly lower than the national average, in 2020 it was slightly it increased significantly, in 2023 exceeding the national average by half (Table 2).

Analyzing the incidence of tuberculosis among children aged 0–14, the following was found the following. The highest incidence rates are observed in Dnipropetrovska, Odesa, and Zhytomyr regions, and the lowest in Ternopil and Chernivtsi regions and the city of Kyiv (Table 3). In Ukraine, this indicator reached average level and ranged from 5.9 per 100 thousand of the relevant population in 2020 to 10.4 in 2023. In Poltava region, the levels of the indicator were relatively low compared to others and ranged from 2.5 per 100 thousand eligible population in 2021 to 6.9 in 2022, much lower than the the national rate, except for 2022.

The growth rate of this indicator was the lowest in Vinnytsia (–65.6 %), Kyiv (–55.7 %) and Chernivtsi (–46.2 %) regions, and the highest in Kirovohrad (633.6 %), Volyn (568.8 %) and Ternopil (166.7 %) regions. In Poltava region, the growth rate of morbidity among children of this age is high (51.4 %) and is 3.3 times higher than the national rate.

Prevalence of all forms of active tuberculosis indicates the accumulation of tuberculosis among the population. There are areas where a decrease in this indicator can be observed: Vinnytsia, Dnipropetrovs'k, Zhytomyr, and Ivano-Frankivsk, Kyiv, Kirovohrad, Lviv, Mykolaiv, Poltava, Rivne, and Rivne, Kharkiv, Chernihiv, and Kyiv. This decrease in the indicator may indicate

both that children of this age have been deregistered due to recovery, and that part of the population migrated from the country during the war, taking children abroad. Instead, there is an increase in the prevalence of tuberculosis among children aged 0–14 years in Volyn region has increased to 185 % (Volyn region on the map Ukraine is located in the far west, so it can be assumed that during the during the war, IDPs with their children moved there), Zakarpattia, Odesa, Sumy, Ternopil, Khmelnytsky, Cherkasy, and Chernivtsi regions. In Ukraine as a whole, the prevalence among children aged 0–14 has decreased by 14 %. The highest prevalence of tuberculosis among this age group population is observed in Zaporizhzhia and Dnipropetrovska oblasts, where the highest rates in 2019 were 25.9 and 16.0 per 100 thousand, respectively. of the respective population, then we see its decline. Since these areas are frontline areas, it is reasonable to assume that emigration is the reason for this for this decline. Poltava region occupies an intermediate level among regions of Ukraine and its rate is lower than the national average. The tendency to downward trend, both in Poltava region by –12.5 % and in Ukraine by 17.5 % (Table 4).

The prevalence of tuberculosis in children aged 0–17 years is the total number, which includes children under 14, so the figures in the previous and of the previous and this table are correlated. So we have a similar picture to the with the previous table. Thus, we observe a decrease in the following regions: Vinnytsia, Dnipropetrovs'k, Zhytomyr, Ivano-Frankivsk, Kyiv, Lviv, Mykolaiv, Odesa, Kharkiv, Khmelnytskyi, and Chernihiv, and Kyiv. We highlighted in bold those regions where the prevalence

Table 2

Tuberculosis incidence (new cases + relapses) among children aged 15–17 years inclusive (2019–2023)

Administrative territories	Absolute number / per 100 thousand of the relevant population					BGR, %
	2019	2020	2021	2022	2023	
Vinnytsia	4/9,3	5/11,3	3/6,7	6/13,1	6/13,1	40,9
Volyn	1/3,0	6/17,3	8/22,1	4/10,6	11/29,0	866,7
Dnipropetrovska	18/22,3	14/16,3	14/15,8	15/16,2	20/21,6	–3,1
Zhytomyr	5/14,4	4/11,1	7/19,0	2/5,3	7/18,4	27,8
Zakarpattia	10/24,4	8/18,7	9/20,2	6/13,0	10/21,6	–11,5
Ivano-Frankivsk	9/21,9	3/7,1	3/6,9	3/6,6	1/2,2	–90,0
Kyiv	15/34,7	6/12,9	9/17,9	6/11,2	7/13,0	–62,5
Kirovohrad	7/28,5	3/11,9	2/7,8	9/34,4	21/80,3	181,8
Lviv	14/19,4	6/8,0	3/3,9	3/3,8	11/13,9	–28,4
Mykolaiv	3/10,0	5/16,2	2/6,3	3/9,3	13/40,2	302,0
Odesa	38/59,6	26/38,9	21/30,2	22/30,4	20/27,6	–53,7
Poltava	5/14,8	5/14,5	3/8,5	6/16,3	12/32,6	120,3
Rivne	2/5,1	3/7,4	4/9,6	3/6,9	5/11,5	125,5
Sumy	5/19,8	3/11,7	4/15,4	2/7,4	7/25,9	30,8
Ternopil	4/13,4	0/0,0	5/15,9	2/6,1	2/6,1	–54,5
Kharkiv	13/20,3	7/10,4	10/14,6	2/2,8	9/12,6	–37,9
Khmelnytskyi	5/14,4	1/2,8	5/13,9	3/8,1	4/10,8	–25,0
Cherkasy	5/16,8	7/23,2	4/13,1	5/15,9	4/12,7	–24,4
Chernivtsi	3/11,2	1/3,6	1/3,5	2/6,8	5/16,9	50,9
Chernihiv	5/20,7	2/8,1	2/8,0	8/31,0	0/0,0	–100,0
Kyiv	7/9,4	10/12,2	8/9,6	8/9,1	14/16,0	70,2
Ukraine	220/20,0	163/14,2	147/12,5	127/10,3	196/16,0	–20,0

Source: [10–14]

Table 3

Tuberculosis incidence (new cases + relapses) among children aged 0–14 years inclusive (2019–2023)

Administrative territories	Absolute number					BGR, %
	2019	2020	2021	2022	2023	
Vinnitsia	31/12,8	17/7,1	16/6,8	13/5,7	10/4,4	–65,6
Volyn	13/6,4	15/7,4	24/12,0	16/8,1	84/42,8	568,8
Dnipropetrovska	83/16,7	50/10,2	57/11,8	59/12,6	97/20,8	24,6
Zhytomyr	27/13,3	5/2,5	7/3,6	15/7,9	16/8,4	–36,9
Zakarpattia	18/7,2	8/3,2	26/10,6	21/8,7	25/10,3	43,1
Ivano-Frankivsk	17/7,2	6/2,6	24/10,5	11/4,9	11/4,9	–32,0
Kyiv	32/10,6	20/6,5	21/6,7	21/6,6	15/4,7	–55,7
Kirovohrad	17/11,9	16/11,5	33/24,2	91/69,1	115/87,3	633,6
Lviv	28/6,8	11/2,7	6/1,5	13/3,3	18/4,5	–33,8
Mykolaiv	7/4,0	11/6,4	11/6,5	5/3,0	11/6,7	67,5
Odesa	65/16,1	36/9,0	30/7,5	44/11,2	51/13,0	–19,3
Poltava	7/3,5	5/2,5	6/3,1	13/6,9	10/5,3	51,4
Rivne	14/5,9	8/3,4	14/6,0	12/5,2	14/6,1	3,4
Sumy	14/9,8	3/2,1	12/8,7	3/2,3	20/15,1	54,1
Ternopil	2/1,2	4/2,4	0/0,0	2/1,3	5/3,2	166,7
Kharkiv	36/9,8	50/13,7	50/14,0	12/3,4	22/6,3	–35,7
Khmelnyskyi	10/5,0	4/2,0	6/3,1	9/4,7	13/6,8	36,0
Cherkasy	17/10,1	17/10,3	25/15,4	14/8,9	27/17,2	69,3
Chernivtsi	2/1,3	1/0,6	3/2,0	8/5,3	1/0,7	–46,2
Chernihiv	13/9,6	6/4,5	8/6,2	17/13,6	15/12,0	25,0
Kyiv	24/5,0	9/1,8	2/0,4	13/2,7	16/3,3	–34,0
Ukraine	583/9,0	377/5,9	463/7,4	450/7,4	639/10,4	15, 6

Source: [10–14]

Table 4

Prevalence of all forms of active tuberculosis among children aged 0–14 years inclusive (2019–2023)

Administrative territories	Absolute number / per 100 thousand of the relevant population					BGR, %
	2019	2020	2021	2022	2023	
Vinnitsia	23/9,5	16/6,7	21/9,0	14/6,1	6/2,6	–73,9
Volyn	7/3,4	11/5,4	10/5,0	3/1,5	20/10,2	185,7
Dnipropetrovska	80/16,0	42/8,6	55/11,4	52/11,1	61/13,1	–23,7
Zhytomyr	31/15,2	4/2,0	7/3,6	12/6,3	12/6,3	–61,3
Zakarpattia	12/4,8	9/3,6	16/6,5	11/4,5	20/8,3	66,6
Ivano-Frankivsk	10/4,3	6/2,6	15/6,5	10/4,5	6/2,7	–40,0
Kyiv	27/9,0	16 (5,2)	19 (6,1)	14 (4,4)	8 (2,5)	–70,4
Kirovohrad	12/8,4	12 (8,6)	27 (19,8)	57 (43,2)	81 (61,5)	–85,2
Lviv	24/5,8	5 (1,2)	5 (1,2)	9 (2,3)	6 (1,5)	–75,0
Mykolaiv	10/5,7	8 (4,6)	12 (7,1)	7 (4,2)	5 (3,0)	–50,0
Odesa	49/12,1	27 (6,7)	35 (8,8)	49 (12,4)	59 (15,0)	20,4
Poltava	8/4,0	8 (4,1)	4 (2,1)	7 (3,7)	7 (3,7)	–12,5
Rivne	15/6,3	9 (3,8)	14 (6,0)	11 (4,8)	14 (6,1)	–6,7
Sumy	7/4,9	2 (1,4)	6 (4,4)	2 (1,5)	8 (6,0)	14,3
Ternopil	2/1,2	4 (2,4)	0	2 (1,3)	5 (3,2)	150,0
Kharkiv	27/7,3	34 (9,3)	23 (6,4)	14 (4,0)	16 (4,6)	–40,7
Khmelnyskyi	9/4,5	3 (1,5)	4 (2,0)	8 (4,2)	12 (6,3)	33,3
Cherkasy	23/13,6	17 (10,3)	23 (14,2)	15 (9,5)	26 (16,6)	13,04
Chernivtsi	2/1,3	1 (0,6)	3 (2,0)	7 (4,6)	3 (2,0)	50,0
Chernihiv	8/5,9	6 (4,5)	3 (2,3)	3 (2,4)	7 (5,6)	–12,5
Kyiv	12/2,5	6 (1,2)	2 (0,4)	11 (2,4)	9 (5,6)	–25,0
Ukraine	504/7,8	329 (5,2)	387 (6,2))	355 (5,8)	416 (6,8)	–17,5

Source: [10–14]

of prevalence rates for both children under 14 and under 17 inclusive. Thus, the decrease in Khmelnytsky and Odesa regions was due to children aged 15 to due to children aged 15 to 17 years. The rates increased in Volyn, Zakarpattia, Kirovohrad, Poltava, Rivne, Sumy, Ternopil, Cherkasy, Chernivtsi, Ternopil, Cherkasy, and Chernivtsi regions. Thus, the increase in the prevalence of tuberculosis in children in Kirovohrad, Poltava, and Rivne regions was mainly due to children over 15 years of age. Overall, in Ukraine, this figure decreased by –21.4 %. The leading position, as in the case of in 2019, Dnipropetrovska oblast occupied the leading position, as in the case of children under 14 (Table 5). As for the prevalence of tuberculosis in children under 17, Poltava region is lower than in Ukraine, but it is growing in the region and decreasing in the country.

The Public Health Center separately identifies children aged 15–17. This category of the population is on the verge of adulthood, and during the war and mobilization. According to our previous analysis, the decrease in the prevalence rate is decreasing in the following regions: Vinnytsia, Zhytomyr, Zakarpattia, Ivano-Frankivsk, Kyiv, Lviv, Odesa, Kharkiv, and Chernihiv, and Lviv. Our assumptions about the decrease in the prevalence of TB prevalence in Odesa and Khmelnytskyi regions at the expense of children aged 15–17 years were confirmed. (Table 6). The growth is observed in Volyn, Dnipropetrovska, Kirovohradska, Mykolaivska, Poltavska, Rivnenska, Sumy, Ternopil, Chernivtsi regions and the city of Kyiv. In general, in Ukraine the indicator is decreasing by 31.2 %, while in Poltava region, on the contrary, it is

growing. This situation requires the medical community, the government, and local communities to unite efforts to combat tuberculosis, namely to detect it in the early stages. Children who live with parents or relatives who are sick with the disease are particularly at risk.who are sick with this nosology (Table 6).

Discussion of research results

Tuberculosis has been with humanity for thousands of years, but despite the efforts of health workers, the achievements of pharmacology and the invention of new diagnostic tools, the fight against this disease occupies a prominent place in the list of urgent problems in the field of medicine. The fight against TB consumes a significant part of the budget of many countries around the world. Over the past few years, losses from TB in Ukraine have amounted to about 3.5 billion UAH per year [15; 16]. The World Health Organization (WHO) defines this disease as one of the most dangerous. The WHO report “Global tuberculosis report” for 2018, which formulated the main parameters of the tuberculosis epidemic in the world, stated that in 2017, 10 million people became ill with tuberculosis in the world and 1.6 million deaths from tuberculosis were recorded [1; 2; 16]. Tuberculosis is a major cause of childhood morbidity and mortality worldwide. Numerous publications, as well as WHO documents, emphasize that insufficient attention is paid to the issue of childhood tuberculosis in most countries, although children are the most susceptible to tuberculosis infection among the population [4–9; 15;

Table 5

Prevalence of all forms of active tuberculosis among children aged 0–17 years inclusive (2019–2023)

Administrative territories	Absolute number / per 100 thousand of the relevant population					BGR, %
	2019	2020	2021	2022	2023	
Vinnytsia	29 (10,2)	20 (7,1)	14 (5,0)	11 (4,0)	8 (2,9)	–72,4
Volyn	8 (3,4)	16 (6,7)	11 (4,7)	4 (1,7)	25 (10,7)	212,5
Dnipropetrovska	97 (16,7)	54 (9,4)	40 (7,0)	50 (8,9)	79 (14,1)	–18,6
Zhytomyr	38 (16,0)	6 (2,6)	7 (3,0)	11 (4,8)	16 (7,0)	–57,9
Zakarpattia	23 (7,9)	18 (6,2)	16 (5,5)	13 (4,5)	27 (9,4)	17,4
Ivano-Frankivsk	19 (6,9)	7 (2,6)	8 (2,9)	6 (2,2)	7 (2,6)	–63,2
Kyiv	40 (11,6)	23 (6,5)	14 (3,9)	12 (3,2)	14 (3,8)	–65,0
Kirovohrad	21 (12,6)	17 (10,3)	14 (8,7)	53 (33,6)	96 (60,8)	357,1
Lviv	35 (7,2)	11 (2,3)	4 (0,8)	5 (1,1)	13 (2,7)	–62,8
Mykolaiv	14 (6,8)	12 (5,9)	10 (5,0)	10 (5,1)	12 (6,1)	–14,3
Odesa	82 (17,5)	51 (10,9)	42 (9,0)	59 (12,7)	80 (17,2)	–2,4
Poltava	14 (6,0)	14 (6,1)	7 (3,1)	12 (5,3)	15 (6,7)	7,1
Rivne	16 (5,8)	11 (4,0)	12 (4,4)	9 (3,3)	18 (6,6)	12,5
Sumy	10 (5,9)	3 (1,8)	4 (2,5)	3 (1,9)	12 (7,5)	20,0
Ternopil	5 (2,6)	4 (2,1)	5 (2,6)	2 (1,1)	7 (3,7)	40,0
Kharkiv	37 (8,6)	41 (9,5)	10 (2,3)	3 (0,7)	18 (4,3)	–51,3
Khmelnytskyi	13 (5,5)	4 (1,7)	5 (2,2)	5 (2,2)	16 (7,0)	–18,7
Cherkasy	27 (13,6)	23 (11,8)	14 (7,3)	12 (6,4)	30 (15,9)	11,1
Chernivtsi	5 (2,7)	2 (1,1)	4 (2,2)	8 (4,4)	7 (3,9)	40,0
Chernihiv	11 (6,9)	7 (4,4)	3 (1,9)	3 (2,0)	7 (4,6)	–36,4
Kyiv	18 (3,2)	9 (1,6)	6 (1,1)	13 (2,3)	17 (3,0)	–5,6
Ukraine	703 (9,3)	496 (6,6)	328 (4,4)	335 (4,6)	553 (7,5)	–21,3

Source: [10–14]

Table 6

Prevalence of all forms of active tuberculosis among children aged 15–17 years inclusive (2019–2023)

Administrative territories	Absolute number / per 100 thousand of the relevant population					BGR, %
	2019	2020	2021	2022	2023	
Vinnitsia	6 (13,9)	4 (9,0)	3 (6,7)	3 (6,5)	2 (4,4)	–66,7
Volyn	1 (3,0)	5 (14,4)	4 (11,1)	2 (5,3)	5 (13,2)	400,0
Dnipropetrovska	17 (21,0)	12 (14,0)	14 (15,8)	15 (16,2)	18 (19,4)	5,8
Zhytomyr	7 (20,1)	2 (5,5)	7 (19,0)	2 (5,3)	4 (10,5)	–42,9
Zakarpattia	11 (26,8)	9 (21,0)	7 (15,7)	4 (8,6)	7 (15,1)	–36,4
Ivano-Frankivsk	9 (21,9)	1 (2,4)	2 (4,6)	1 (2,2)	1 (2,2)	–88,9
Kyiv	13 (30,1)	7 (15,1)	7 (13,9)	4 (7,4)	6 (11,2)	–53,8
Kirovohrad	9 (36,6)	5 (19,8)	4 (15,7)	8 (30,6)	15 (57,4)	66,6
Lviv	11 (15,2)	6 (8,0)	1 (1,3)	1 (1,3)	7 (8,8)	–36,4
Mykolaiv	4 (13,4)	4 (13,0)	4 (12,6)	3 (9,3)	7 (21,6)	75,0
Odesa	33 (51,7)	24 (35,9)	24 (34,6)	22 (30,4)	21 (29,0)	–36,4
Poltava	6 (17,7)	6 (17,4)	3 (8,5)	5 (13,6)	8 (21,7)	33,3
Rivne	1 (2,6)	2 (5,0)	4 (9,6)	3 (6,9)	4 (9,2)	300
Sumy	3 (11,9)	1 (3,9)	1 (3,9)	1 (3,7)	4 (14,8)	33,3
Ternopil	3 (10,0)	0 ()	5 (15,9)	1 (3,7)	2 (6,1)	–33,4
Kharkiv	10 (15,6)	7 (10,4)	4 (5,8)	2 (2,8)	2 (2,8)	–80,0
Khmelnyskyi	4 (11,5)	1 (2,8)	3 (8,3)	0	4 (10,8)	0
Cherkasy	4 (13,4)	6 (19,9)	4 (13,1)	6 (19,1)	4 (12,7)	0
Chernivtsi	3 (11,2)	1 (3,6)	1 (3,5)	2 (6,8)	4 (13,6)	33,3
Chernihiv	3 (12,4)	1 (4,1)	0	1 (3,9)	0	–100
Kyiv	6 (8,1)	3 (3,7)	6 (7,2)	6 (6,9)	8 (9,1)	33,3
Ukraine	199 (18,1)	167 (14,6)	127 (10,8)	98 (8,0)	137 (11,2)	–31,2

Source: [10–14]

17–19]. The majority of paediatric tuberculosis cases remain undiagnosed or unreported, with only 55 % of the estimated 1.25 million paediatric TB cases reported in 2023 [20]. Children carry a significant tuberculosis disease burden in settings with poor epidemic control and high levels of transmission. Even in high-resource settings, the diagnosis of tuberculosis in children can be challenging, but an accurate diagnosis can be achieved by adopting a systematic approach [21].

Leading experts in the field call late diagnosis, reduced adaptation reserves of the body, and an increase in the frequency of primary drug resistance of the TB pathogen the main reasons for the unfavorable situation with TB in children [18]. As is known, the clinical course of TB in children is characterized by a mild or asymptomatic course of the disease. Approximately 50 % of children with primary tuberculosis are asymptomatic and are diagnosed as a result of contact investigation. Children become infected from exposure to an adult or adolescent with contagious pulmonary tuberculosis. At the same time, diagnosing TB in children is much more difficult than in adults [16; 17; 22]. The diagnosis of infection and disease due to *Mycobacterium tuberculosis* in infants and children presents many clinical challenges. The distinction of infection from disease (tuberculosis) in children is often unclear. There is difficulty in obtaining positive microbiological confirmation of infection in sputum, gastric, tracheal, or bronchial aspirates and in other body fluids in infants and children. Problems related to various aspects of primary forms of TB in children remain relevant

and require new approaches and solutions [16]. To avoid the emergence of new cases of TB in children, measures are needed that ensure effective prevention of the disease, timely diagnosis, and prevent the chronicity of the disease. Ukraine is among ten countries with the highest burden of multidrug-resistant TB (MDR-TB) worldwide. Treatment success rates for MDR-TB in Ukraine remain below global success rates as reported by the World Health Organization. Few studies have evaluated predictors of poor MDR-TB outcomes in Ukraine.

Prospects for further research

Further epidemiological studies are needed to determine the burden of TB infection in specific geographic regions and risk groups, which will provide the basis for interventions adapted to both national and local conditions, including integrated approaches at the community level.

Conclusions

The analysis of the incidence of tuberculosis among children and adolescents we determined that in Poltava region the incidence of tuberculosis (new cases + relapses) is increasing, the largest increase was observed in the age group of 15–17 years, and in the same age group there was a significant exceeding the national prevalence of active forms of tuberculosis, which requires finding causes and ways to improve the health of adolescents of this age. In addition, the prevalence of active forms of tuberculosis exceeded the national rate for the entire study period.

The increase in the incidence and prevalence of tuberculosis among children in Poltava Oblast may be due to various reasons. One of them may be a large number of internally displaced persons, who live in Poltava region, an increase in the number of children, deterioration of the health of children and adolescents, etc. Another important reason may be the large number

of children who were not vaccinated against tuberculosis at the time.

An epidemiological study of the incidence of tuberculosis among children and adolescents in Poltava region shows a deterioration in the sanitary epidemic situation and indicates the need to improve organizational prevention and early detection measures.

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Purpose. The aim of the study was to assess the incidence of tuberculosis among children and adolescents in Ukraine and Poltava region in 2019–2023.

Materials and methods. Methods: a systematic approach and analysis, a bibliosemantic method, a medical-statistical method. Materials: analytical and statistical reference books “Tuberculosis in Ukraine” for 2019–2023 from the State Institution “Center for Public Health of the Ministry of Health of Ukraine”.

Results. In Poltava region, the growth rate of the indicator in all age groups is positive, the incidence is at an average level compared to other regions, but incidence is increasing, the largest increase was observed in the age group 15–17 years, this figure in 2023 was twice as high as the national one. The prevalence of all active forms of tuberculosis among different age groups decreased in all regions and in Ukraine, the rate in Poltava region is at an average level compared to others, but exceeded the national rate for all years of the study period. Among children the rate in the 0–14 age group for all years of the study period was significantly lower than the corresponding indicator in Ukraine, in the 0–17 age group it was close to the national one, with an excess in 2022.

Conclusions. The analysis of the incidence of tuberculosis among children and adolescents we determined that in Poltava region the incidence of tuberculosis is increasing, the largest increase was observed in the age group of 15–17 years, and in the same age group there was a significant exceeding the national prevalence of active forms of tuberculosis. In addition, the prevalence of active forms of tuberculosis exceeded the national rate for the entire study period.

Key words: children and adolescents, tuberculosis incidence, prevalence.

Мета. Мета дослідження полягала в ретроспективному аналізі захворюваності на туберкульоз дітей та підлітків в Україні та Полтавській області в 2019–2023 рр.

Матеріали і методи. Для досягнення мети роботи було використано метод системного підходу та аналізу, бібліосемантичний метод, медико-статистичний метод. Матеріали дослідження: аналітично-статистичні довідники «Туберкульоз в Україні» за 2019–2023 рр. Державної установи «Центр громадського здоров'я МОЗ України».

Результати. Захворюваність на туберкульоз серед різних вікових груп за 2019–2023 рр. дещо знизилася у більшості областей, але не має стійкої тенденції до зниження. Даний показник по Україні має негативний темп приросту в усіх досліджуваних вікових групах, окрім дітей віком 0–14 років. По Полтавській області темп приросту показника в усіх вікових групах позитивний, показники захворюваності на середньому рівні порівняно з іншими областями, проте захворюваність збільшується, найбільший приріст спостерігався у віковій групі 15–17 років, цей показник у 2023 р. вдвічі перевищував національний. Також перевищував всеукраїнський показник захворюваності серед дітей 0–17 років у 2022 р.

Поширеність усіх активних форм туберкульозу серед різних вікових груп знизилася по всіх областях та по Україні, показник по Полтавській області знаходиться на середньому рівні порівняно з іншими, проте перевищував національний за всі роки досліджуваного періоду. Серед дитячого населення показник у віковій групі 0–14 років за всі роки досліджуваного періоду був значно менше відповідного показника по Україні, у віковій групі 0–17 років наближався до національного з перевищенням у 2022 р. Проте показник поширеності активних форм туберкульозу у віковій групі 15–17 років незначно перевищував всеукраїнський у 2020 р, а в 2022 та 2023 рр. перевищував його відповідно в 1,5 та 2 рази і має позитивний приріст 33,3 %, тоді як по Україні він становить –31,2 %, тобто показник поширеності по Полтавській області переважає над загальнонаціональним за рахунок вікової групи 15–17 років.

Висновки. Аналіз показників захворюваності на туберкульоз серед дітей та підлітків показав, що в Полтавській області зростають показники захворюваності на туберкульоз (нові випадки + рецидиви), найбільший приріст спостерігався у віковій групі 15–17 років, і в цій же віковій групі спостерігалось значне перевищення національного показника за поширеністю активних форм туберкульозу, що потребує пошуку причин та шляхів покращення здоров'я підлітків цього віку. Окрім того, показники поширеності активних форм туберкульозу перевищують національні за весь досліджуваний період.

Підвищення показників захворюваності та поширеності туберкульозу серед дитячого населення в Полтавській області може бути пов'язано з різними причинами. Такими можуть бути велика кількість вимушених переселенців, які мешкають у Полтавській області, збільшення кількості дитячого населення, погіршення здоров'я дітей та підлітків тощо. Також вагомою причиною може бути велика кількість дітей, які свого часу не були вакциновані від туберкульозу.

Проведене епідеміологічне дослідження захворюваності на туберкульоз серед дітей і підлітків Полтавської області свідчить про погіршення санітарно- епідемічної ситуації та вказує на потребу вдосконалення організаційно-методичних заходів профілактики та раннього виявлення захворювання.

На нашу думку, зниження захворюваності на туберкульоз серед дитячого населення можливе шляхом посилення профілактичних заходів, постійного підвищення санітарної грамотності населення шляхом проведення лекцій, бесід, створення умов, що унеможливають зараження здорової людини від хворого на туберкульоз.

Ключові слова: діти і підлітки, захворюваність на туберкульоз, поширеність.

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Information about the authors

Liakhova Nataliia Oleksandrivna – Candidate of Medical Sciences, Associate Professor, Associate Professor at the Department of Public Health, Management and Medical Expertise of Poltava State Medical University; Shevchenko Str., 23, Poltava, Ukraine, 36011.

Natanew2017@ukr.net, ORCID ID: 0000-0003-0503-9935^{A, D, E}

Holovanova Iryna Anatoliivna – Doctor of Medical Sciences, Professor, Head of the Department of Public Health, Management and Medical Expertise of Poltava State Medical University; Shevchenko Str., 23, Poltava, Ukraine, 36011. yaryna.ua@gmail.com, ORCID ID: 0000-0002-8114-8319^{A, E, F}

Buria Tetiana Serhiivna – Intern of the Ophthalmology Department of the Municipal Enterprise “Poltava Regional Clinical Hospital named after M. V. Sklifosovsky of the Poltava Regional Council”; Shevchenko Str., 23, Poltava, Ukraine, 36011. burya.lilia@gmail.com, ORCID ID: 0009-0001-4470-8559^{B, C, D}

Havlovskyi Oleksandr Danylovych – Doctor of Medical Sciences, General Director of the Private Joint-Stock Company “Mirgorodkurort”, Gogol Str., 112, Myrgorod, Ukraine, 37600. yaryna.ua@gmail.com, ORCID ID: 0000-0002-0310-0766^{D, E}

Buria Liliia Volodymyrivna – Candidate of Medical Sciences, Associate Professor, Associate Professor at the Department of Hygiene and Ecology, Poltava State Medical University; Shevchenko Str., 23, Poltava, Ukraine, 36011. burya.lilia@gmail.com, ORCID ID: 0009-0008-0852-8885^{B, C, D}

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