

Medical and economic aspects of tuberculosis control in Ukraine during the Covid-19 pandemic

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Introduction. The epidemic situation of tuberculosis in the world and in Ukraine remains complicated and at this stage, during the COVID-19 pandemic, has certain characteristics.

Aim and objectives: To summarize the characteristics and forecast the risks of tuberculosis control in Ukraine during the COVID-19 pandemic.

Materials and methods. Interviewing doctors of different profiles (159 people), questioning among the doctors (70 people), analyzing literature data and statistics for 2019 – 2020. Based on these polls we studied the characteristics and forecasted the risks of tuberculosis control in Ukraine during the COVID-19 pandemic.

Results obtained. The most significant characteristics and risks of tuberculosis control in Ukraine during the COVID-19 pandemic have been identified.

Relevance of the research topic.

- The epidemic situation of tuberculosis in the world and in Ukraine remains complicated and at this stage, during the COVID-19 pandemic, has certain characteristics. Although there has been some reduction in the incidence of tuberculosis in Ukraine in recent years, a number of complex and controversial issues in the fight against tuberculosis have emerged due to the COVID-19 pandemic;
- the fight against tuberculosis is a task of national importance, in which the authorities, communities, medical services, scientists of different fields are to be involved
- there is insufficient awareness of TB issues among both the population and the authorities;
- there is no convincing reason to believe that this disease will be taken under control in the near future, because an effective vaccine that would give absolute immunity to the disease and highly effective anti-TB drugs is not synthesized in the world, and resistance to existing anti-TB drugs continues to develop (for various reasons);
- there is a significant percentage of detection of advanced cases of tuberculosis of various localizations (common, with complications), which indicates the late detection of this disease;
- significant incidence of tuberculosis among medical workers (500-800 cases per year in Ukraine and, e.g. 7-20 cases in Volyn Oblast);
- sanitation literacy of people on general issues, and on tuberculosis in particular, is low;
- tuberculosis patients and patients with suspected tuberculosis have increasing difficulties in receiving timely medical care due to quarantine measures related to the COVID-19

pandemic (deterioration of travel, the need for additional testing for coronavirus infection (mostly not free), consultations by phone, etc.);

- patients are not motivated to get treatment;
- low salaries of medical staff, inadequate conditions for patients in hospitals, and working conditions of staff;
- there is no law on the compulsory treatment of contagious people.

Aim and objectives: To summarize the characteristics and forecast the risks of tuberculosis control in Ukraine during the COVID-19 pandemic.

Materials and methods. Interviewing doctors of different profiles (159 people), questioning among the doctors (70 people), analyzing literature data and statistics for 2019 – 2020. Based on these polls we studied the characteristics and forecasted the risks of tuberculosis control in Ukraine during the COVID-19 pandemic.

During the survey and interviewing doctors, respondents were asked the following questions: 1) "Please identify what are the most important aspects of the fighting against tuberculosis in Ukraine during the pandemic COVID-19" in your opinion; 2) "Please identify the most significant risks of tuberculosis control in Ukraine during the COVID-19 pandemic."

According to official statistics, in Ukraine in 2020, compared with 2019, there was a decrease in the incidence of tuberculosis (including its recurrence) by 29.8%. The incidence of active tuberculosis (without recurrence) among the entire population of Ukraine in 2020 compared to 2019 decreased by 30.3%.

The incidence of active tuberculosis (without recurrence) among the population of Ukraine in 2020 (according to the distribution of territories in the direction of reducing the incidence rate) can be seen in the table below:

No	Administrative units	Indicator per 100 000 population
1	Odesa Oblast	73,6
2	Dnipropetrovsk Oblast	50,5
3	Donetsk Oblast *	46,7
4	Kirovohrad Oblast	45,8
5	Kherson Oblast	44,4
6	Zakarpattia Oblast	44,0
7	Kyiv Oblast	41,3
8	Zaporizhzhia Oblast	41,0
9	Mykolayiv Oblast	40,6
10	Volyn Oblast	37,9
11	Luhansk Oblast *	37,7
12	Chernihiv Oblast	36,1
13	Zhytomyr Oblast	36,0
14	Lviv Oblast	35,2
15	Sumy Oblast	32,9
16	Cherkasy Oblast	32,3
17	Rivne Oblast	30,6
18	Poltava Oblast	30,2
19	Khmelnysky Oblast	30,0

20	Kharkiv Oblast	28,1
21	Vinnitsia Oblast	27,6
22	Ivano-Frankivsk Oblast	24,5
23	The city of Kyiv	24,5
24	Chernivtsi Oblast	18,4
25	Ternopil Oblast	18,3
26	Autonomous Republic of the Crimea	-
27	The city of Sevastopol	-
Ukraine		34,3

** the territories under Ukrainian control*

The incidence of active tuberculosis, including its recurrence, among the population of Ukraine in 2020 (according to the distribution of territories in the direction of reducing the incidence rate) can be seen in the table below.

No	Administrative units	Indicator per 100 000 population
1	Odesa Oblast	91,8
2	Dnipropetrovsk Oblast	63,2
3	Donetsk Oblast *	59,6
4	Kirovohrad Oblast	56,5
5	Kherson Oblast	55,5
6	Zakarpattia Oblast	53,2
7	Kyiv Oblast	51,6
8	Zaporizhzhia Oblast	48,5
9	Mykolayiv Oblast	47,8
10	Volyn Oblast	47,8
11	Luhansk Oblast *	47,4
12	Chernihiv Oblast	44,4
13	Zhytomyr Oblast	44,0
14	Lviv Oblast	44,0
15	Sumy Oblast	41,9
16	Cherkasy Oblast	40,7
17	Rivne Oblast	37,2
18	Poltava Oblast	36,5
19	Khmelnitskyi Oblast	36,4
20	Kharkiv Oblast	35,2
21	Vinnitsia Oblast	33,9
22	Ivano-Frankivsk Oblast	29,2
23	The city of Kyiv	28,0
24	Chernivtsi Oblast	22,8
25	Ternopil Oblast	21,6
26	Autonomous Republic of the Crimea	-
27	The city of Sevastopol	-
Ukraine		42,2

** the territories under Ukrainian control*

The incidence of active tuberculosis, including its recurrence, among children aged 0-14 years inclusive in 2020 compared to 2019 can be seen in the following table:

No	Administrative unit	Children aged 0-14 years inclusive				± % (times) before 2019
		Absolute figures		Per 100 000 population		
		2019	2020	2019	2020	
1	Autonomous Republic of the Crimea	-	-	-	-	-
2	Vinnysia Oblast	31	17	12,8	7,1	-44,5 %
3	Volyn Oblast	13	15	6,4	7,4	+15,6 %
4	Dnipropetrovsk Oblast	83	50	16,7	10,2	-38,9 %
5	Donetsk Oblast *	20	11	7,8	4,5	-42,3 %
6	Zhytomyr Oblast	27	5	13,3	2,5	-5,3 times
7	Zakarpattia Oblast	18	8	7,2	3,2	-2,3 times
8	Zaporizhzhia Oblast	58	52	23,2	21,2	-8,6 %
9	Ivano-Frankivsk Oblast	17	6	7,2	2,6	-2,8 times
10	Kyiv Oblast	32	20	10,6	6,5	-38,7 %
11	Kirovohrad Oblast	17	16	11,9	11,5	-3,4 %
12	Luhansk Oblast *	4	5	4,6	5,9	+28,3 %
13	Lviv Oblast	28	11	6,8	2,7	-2,5 times
14	Mykolayiv Oblast	7	11	4,0	6,4	+1,6 times
15	Odesa Oblast	65	36	16,1	9,0	-44,1 %
16	Poltava Oblast	7	5	3,5	2,5	-28,6 %
17	Rivne Oblast	14	8	5,9	3,4	-42,4 %
18	Sumy Oblast	14	3	9,8	2,1	-4,7 times
19	Ternopil Oblast	2	4	1,2	2,5	+2,1 times
20	Kharkiv Oblast	36	50	9,8	13,8	+40,8 %
21	Kherson Oblast	24	7	14,3	4,2	-3,4 times
22	Khmelnyskyi	10	4	5,0	2,0	-2,5 times
23	Cherkasy Oblast	17	17	10,1	10,3	+2,0 %
24	Chernivtsi Oblast	2	1	1,3	0,6	-2,2 times
25	Chernihiv Oblast	13	6	9,6	4,5	-2,1 times
26	The city of Kyiv	24	9	5,0	1,9	-2,6 times
27	The city of Sevastopol	-	-	-	-	
Ukraine		583	377	9,0	5,9	-34,4 %

* The territories under Ukrainian control

The incidence of active tuberculosis, including its recurrence, in adolescents aged 15-17 years

inclusive in 2020 compared to 2019 is shown in the following table:

№ n/n	Administrative units	adolescents aged 15-17 years inclusive				± % (times) before 2019
		absolute values		per 100 000 people		
		2019	2020	2019	2020	
1	Autonomous Republic of the Crimea	-	-	-	-	-
2	Vinnysia Oblast	4	5	9,3	11,3	+21,5 %
3	Volyn Oblast	1	6	3,0	17,3	+5,8 times
4	Dnipropetrovsk Oblast	18	14	22,3	16,3	-26,9 %
5	Donetsk Oblast *	14	5	31,7	10,8	-2,9 times
6	Zhytomyr Oblast	5	4	14,4	11,1	-22,9 %
7	Zakarpattia Oblast	10	8	24,4	18,7	-23,4 %
8	Zaporizhzhia Oblast	14	18	32,8	40,4	+23,2 %
9	Ivano-Frankivsk Oblast	9	3	21,9	7,1	-3,1 times
10	Kyiv Oblast	15	6	34,7	12,9	-2,7 times
11	Kirovohrad Oblast	7	3	28,5	11,9	-2,4 times
12	Luhansk Oblast *	6	3	36,8	18,1	-2,0 times
13	Lviv Oblast	14	6	19,4	8,0	-2,4 times
14	Mykolayiv Oblast	3	5	10,0	16,2	+1,6 times
15	Odesa Oblast	38	26	59,6	38,9	-34,7 %
16	Poltava Oblast	5	5	14,8	14,5	-2,0 %
17	Rivne Oblast	2	3	5,1	7,5	+47,1 %
18	Sumy Oblast	5	3	19,8	11,7	-40,9 %
19	Ternopil Oblast	4	0	13,4	0,0	-
20	Kharkiv Oblast	13	7	20,3	10,4	-48,8 %
21	Kherson Oblast	8	12	28,0	41,1	+46,8 %
22	Khmelnyskyi	5	1	14,4	2,8	-5,1 times
23	Cherkasy Oblast	5	7	16,8	23,2	+38,1 %
24	Chernivtsi Oblast	3	1	11,2	3,6	-3,1 times
25	Chernihiv Oblast	5	2	20,7	8,1	-2,6 times
26	The city of Kyiv	7	10	9,4	12,2	+29,8 %
27	The city of Sevastopol	-	-	-	-	-
Ukraine		220	163	20,0	14,2	-29,0 %

** The territories under Ukrainian control*

The incidence of active tuberculosis, including its recurrence, among children aged 0-17 years

inclusive in 2020 compared to 2019 is shown in the following table:

No	Administrative units	Children aged 0-17 years inclusive				± % (times) before 2019
		absolute values		per 100 000 people		
		2019	2020	2019	2020	
1	Autonomous Republic of the Crimea	-	-	-	-	-
2	Vinnysia Oblast	35	22	12,3	7,8	-36,6 %
3	Volyn Oblast	14	21	5,9	8,8	+49,2 %
4	Dnipropetrovsk Oblast	101	64	17,4	11,1	-36,2 %
5	Donetsk Oblast *	34	16	11,3	5,4	-2,1 times
6	Zhytomyr Oblast	32	9	13,4	3,8	-3,5 %
7	Zakarpattia Oblast	28	16	9,6	5,5	-42,7 %
8	Zaporizhzhia Oblast	72	70	24,6	24,1	-2,0 %
9	Ivano-Frankivsk Oblast	26	9	9,4	3,3	-2,8 %
10	Kyiv Oblast	47	26	13,6	7,4	-45,6 %
11	Kirovohrad Oblast	24	19	14,4	11,6	-19,4 %
12	Luhansk Oblast *	10	8	9,6	7,9	-17,7 %
13	Lviv Oblast	42	17	8,7	3,5	-2,5 times
14	Mykolayiv Oblast	10	16	4,8	7,8	+1,6 times
15	Odesa Oblast	103	62	22,0	13,2	-40,0 %
16	Poltava Oblast	12	10	5,2	4,3	-17,3 %
17	Rivne Oblast	16	11	5,8	4,0	-31,0 %
18	Sumy Oblast	19	6	11,3	3,6	-3,1 times
19	Ternopil Oblast	6	4	3,1	2,1	-32,3 %
20	Kharkiv Oblast	49	57	11,3	13,2	+16,8 %
21	Kherson Oblast	32	19	16,3	9,8	-39,9 %
22	Khmelnyskyi	15	5	6,4	2,1	-3,1 times
23	Cherkasy Oblast	22	24	11,1	12,3	+10,8 %
24	Chernivtsi Oblast	5	2	2,7	1,1	-2,4 times
25	Chernihiv Oblast	18	8	11,2	5,1	-2,2 times
26	The city of Kyiv	31	19	5,6	3,3	-41,1 %
27	The city of Sevastopol	-	-	-	-	-
Ukraine		803	540	10,6	7,2	-32,1 %

* The territories under Ukrainian control

The incidence of active tuberculosis, including its recurrence, among the adult population aged 18 years and older in 2020 compared to 2019 is shown in the following table:

No	Administrative units	Adults aged 18 years and older				± % (times) before 2019
		absolute values		per 100 000 people		
		2019	2020	2019	2020	
1	Autonomous Republic of the Crimea	-	-	-	-	-
2	Vinnitsia Oblast	834	499	65,8	39,7	-39,7 %
3	Volyn Oblast	650	478	81,8	60,4	-26,2 %
4	Dnipropetrovsk Oblast	2 434	1 941	92,8	74,7	-19,5 %
5	Donetsk Oblast *	1 240	1 049	77,2	66,1	-14,4 %
6	Zhytomyr Oblast	805	528	81,9	54,2	-33,8 %
7	Zakarpattia Oblast	838	629	87,1	65,5	-24,8 %
8	Zaporizhzhia Oblast	1 150	828	81,5	59,3	-27,2 %
9	Ivano-Frankivsk Oblast	664	390	60,7	35,8	-41,0 %
10	Kyiv Oblast	1 209	815	85,3	57,3	-32,8 %
11	Kirovohrad Oblast	683	495	88,5	64,9	-26,7 %
12	Luhansk Oblast *	414	315	71,3	54,8	-23,1 %
13	Lviv Oblast	1 579	1 081	78,2	53,8	-31,2 %
14	Mykolayiv Oblast	760	519	82,2	56,7	-31,0 %
15	Odesa Oblast	3 179	2 109	167,2	111,2	-33,5 %
16	Poltava Oblast	714	494	61,6	43,0	-30,2 %
17	Rivne Oblast	602	408	68,5	46,6	-32,0 %
18	Sumy Oblast	665	441	73,1	49,0	-33,0 %
19	Ternopil Oblast	435	220	51,4	26,2	-49,0 %
20	Kharkiv Oblast	1 247	873	56,0	39,5	-29,5 %
21	Kherson Oblast	775	593	92,3	71,3	-22,8 %
22	Khmelnyskyi	717	460	69,9	45,2	-35,3 %
23	Cherkasy Oblast	637	460	63,4	46,3	-27,0 %
24	Chernivtsi Oblast	361	203	50,3	28,4	-43,5 %
25	Chernihiv Oblast	563	424	67,3	51,4	-23,6 %
26	The city of Kyiv	1 279	801	54,4	34,0	-37,5 %
27	The city of Sevastopol	-	-	-	-	-
Ukraine		24 434	17 053	71,0	49,9	-29,7 %

* The territories under Ukrainian control

The incidence of active tuberculosis, including its recurrence, among children aged 0-17 years inclusive in 2020 compared to 2019 is shown in the following table:

No	Administrative units	Total			
		absolute values		per 100 000 people	
		2019	2020	2019	2020
1	Autonomous Republic of the Crimea	-	-	-	-
2	Vinnysia Oblast	376	258	24,2	16,8
3	Volyn Oblast	372	277	36,0	26,9
4	Dnipropetrovsk Oblast	1 231	960	38,4	30,3
5	Donetsk Oblast *	580	488	30,4	25,9
6	Zhytomyr Oblast	469	291	38,4	24,1
7	Zakarpattia Oblast	540	402	43,1	32,1
8	Zaporizhzhia Oblast	589	417	34,5	24,7
9	Ivano-Frankivsk Oblast	337	209	24,6	15,3
10	Kyiv Oblast	705	450	40,0	25,3
11	Kirovohrad Oblast	453	260	48,2	28,1
12	Luhansk Oblast *	233	178	34,0	26,3
13	Lviv Oblast	783	566	31,3	22,7
14	Mykolayiv Oblast	397	311	35,1	27,8
15	Odesa Oblast	1 258	880	53,1	37,2
16	Poltava Oblast	383	284	27,5	20,6
17	Rivne Oblast	288	239	24,9	20,7
18	Sumy Oblast	354	227	32,8	21,3
19	Ternopil Oblast	228	124	21,9	12,0
20	Kharkiv Oblast	613	397	23,0	15,0
21	Kherson Oblast	441	317	42,6	30,9
22	Khmelnyskyi	342	221	27,1	17,7
23	Cherkasy Oblast	301	212	25,0	17,8
24	Chernivtsi Oblast	227	131	25,2	14,6
25	Chernihiv Oblast	294	244	29,5	24,8
26	The city of Kyiv	725	411	24,9	14,0
27	The city of Sevastopol	-	-	-	-
Ukraine		12519	8 754	29,8	21,0

* The territories under Ukrainian control

The incidence of active pulmonary tuberculosis with destruction (without recurrence) among the entire population of Ukraine in 2020 compared to 2019 is shown in the following table:

No	Administrative units	Total			
		absolute values		per 100 000 people	
		2019	2020	2019	2020
1	Autonomous Republic of the Crimea	-	-	-	-
2	Vinnysia Oblast	286	205	18,4	13,3
3	Volyn Oblast	217	161	21,0	15,7
4	Dnipropetrovsk Oblast	694	582	21,7	18,3
5	Donetsk Oblast *	451	416	23,7	22,1
6	Zhytomyr Oblast	220	161	18,0	13,3
7	Zakarpattia Oblast	347	260	27,7	20,8
8	Zaporizhzhia Oblast	429	295	25,2	17,5
9	Ivano-Frankivsk Oblast	200	136	14,6	10,0
10	Kyiv Oblast	468	321	26,6	18,1
11	Kirovohrad Oblast	136	111	14,5	12,0
12	Luhansk Oblast *	226	170	33,0	25,1
13	Lviv Oblast	487	287	19,5	11,5
14	Mykolayiv Oblast	289	214	25,6	19,1
15	Odesa Oblast	749	600	31,6	25,4
16	Poltava Oblast	230	190	16,5	13,8
17	Rivne Oblast	231	182	20,0	15,8
18	Sumy Oblast	153	111	14,2	10,4
19	Ternopil Oblast	167	97	16,0	9,4
20	Kharkiv Oblast	435	262	16,4	9,9
21	Kherson Oblast	256	208	24,7	20,3
22	Khmelnyskyi	243	162	19,3	12,9
23	Cherkasy Oblast	192	161	16,0	13,5
24	Chernivtsi Oblast	197	99	21,9	11,0
25	Chernihiv Oblast	141	84	14,1	8,5
26	The city of Kyiv	455	278	15,6	9,5
27	The city of Sevastopol	-	-	-	-
Ukraine		7899	5 753	18,8	13,8

** The territories under Ukrainian control*

The incidence of extrapulmonary tuberculosis (without recurrence) among the entire population of Ukraine in 2020 compared to 2019 is shown in the following table:

№ п/п	Administrative units	Total			
		absolute values		per 100 000 people	
		2019	2020	2019	2020
1	Autonomous Republic of the Crimea	-	-	-	-
2	Vinnysia Oblast	91	53	5,9	3,4
3	Volyn Oblast	84	63	8,1	6,1
4	Dnipropetrovsk Oblast	197	139	6,2	4,4
5	Donetsk Oblast *	60	71	3,1	3,8
6	Zhytomyr Oblast	70	33	5,7	2,7
7	Zakarpattia Oblast	44	33	3,5	2,6
8	Zaporizhzhia Oblast	86	69	5,0	4,1
9	Ivano-Frankivsk Oblast	46	25	3,4	1,8
10	Kyiv Oblast	115	76	6,5	4,3
11	Kirovohrad Oblast	53	31	5,6	3,3
12	Luhansk Oblast *	16	7	2,3	1,0
13	Lviv Oblast	80	74	3,2	3,0
14	Mykolayiv Oblast	37	14	3,3	1,3
15	Odesa Oblast	532	205	22,5	8,7
16	Poltava Oblast	37	21	2,7	1,5
17	Rivne Oblast	71	39	6,1	3,4
18	Sumy Oblast	66	33	6,1	3,1
19	Ternopil Oblast	40	25	3,8	2,4
20	Kharkiv Oblast	76	75	2,9	2,8
21	Kherson Oblast	41	30	4,0	2,9
22	Khmelnyskyi	49	46	3,9	3,7
23	Cherkasy Oblast	77	61	6,4	5,1
24	Chernivtsi Oblast	29	9	3,2	1,0
25	Chernihiv Oblast	23	29	2,3	3,0
26	The city of Kyiv	113	77	3,9	2,6
27	The city of Sevastopol	-	-	-	-
Ukraine		2 133	1 338	5,1	3,2

** The territories under Ukrainian control*

Volyn Oblast is a border region having borders with Poland and Belarus. Therefore, it will be interesting to consider the epidemiological situation with tuberculosis in this area. In 2020, 499 people fell ill with all forms of active tuberculosis (new cases and relapses) in Volyn Oblast, which is 48.51 per 100 000 population (2019 - 664 patients or 64.11). There was a reduction

of morbidity by 24.3% (in Ukraine - by 30.3%). The incidence decreased in all districts except in Kovel (+ 10.6%) and Rozhysche (+ 31.0%). The highest incidence rates are in Shatsk (72.14), Rozhysche (70.26), and Kovel (65.49) districts, the lowest are in Ivanychiv (25.65), Kamin-Kashyrskyy (31.15), Horokhiv (31.82) districts.

The recurrence rate of tuberculosis decreased compared to last year by 24.5% and is 10.60 per 100 000 population (as compared to 14.04 in 2019).

The incidence of newly diagnosed tuberculosis in the Oblast decreased by 24.6% - from 50.26 to 37.91 per 100 000 people. The incidence decreased both among the urban and rural population of the region:

- urban population - 34.89 per 100 000 population, a decrease by 20.6%;
- rural population - 41.17 per 100 000 population, a decrease by 27.8%.

The incidence of respiratory tuberculosis decreased by 23.3% - from 45.52 per 100 000 to 34.90 per 100 000 population; the incidence of extrapulmonary tuberculosis decreased by 25.7% from 8.23 per 100 000 population in 2019 to 6.10 in 2020.

The incidence of active pulmonary tuberculosis is 31.79 per 100 000 population. It shows a decrease of 24.4% as compared with 2019 figure (42.03). The highest incidence of pulmonary tuberculosis is in Kovel (47.96), Rozhysche (46.84), and Lutsk (44.75) districts; the lowest is in Lokachyn (9.24), Kamin-Kashyrskyy (14.02), and Horokhiv (21.88) districts.

It should be noted that the incidence increased only in Kovel (+ 21.4%), Lutsk (+ 13.9%) and Rozhysche (+ 39.6%) districts. A significant decrease occurred in Lokachyn (-77.5%), Ivanychiv (-62.7%), Kamin-Kashyrskyy (-59.0%) and Starovyzhiv (-49.6%) districts.

The incidence of destructive forms of pulmonary tuberculosis decreased by 25.5% from 21.01 per 100 000 population in 2019 to 15.65 per 100 000 people in 2020, although the proportion of destructive tuberculosis among the first detected decreased by only 0.8 % (from 50.0% in 2019 to 49.02% in 2020). This indicator shows that tuberculosis is often not detected at the level of primary medical care and is only diagnosed when patients with advanced cases of tuberculosis refer to doctors.

The incidence of bacillary tuberculosis decreased by 25.0%. (In 2019 it was 36.12 per 100 000 population while in 2020 it was 27.02 per 100 000 population). The highest rates were registered in Rozhysche (39.03), Kovel (38.74), and Turiysk districts (38.62). Significantly lower than the regional in Lokachyn (9.24), Kamin-Kashyrskyy (12.46), and Horokhiv (17.90) districts.

The share of bacillary tuberculosis among new cases of pulmonary tuberculosis decreased by 0.9% and is 85.0% against 85.9% in 2019.

The incidence of active tuberculosis in children (0 - 14 years inclusive) increased compared to last year by 17.9% from 5.86 (12 children) to 6.91 (14 children) per 100 000 children (5 children in Kivertsy district, 2 children each in Kamin-Kashyrskyy, Lutsk districts and the city of Lutsk, and 1 child each in Volodymyr-Volynskyi, Kovel, and Shatsk districts).

The incidence of active tuberculosis in children aged 15-17 inclusive increased 5.8 times from 2.97 (1 adolescent) to 17.26 (6 adolescents) per 100,000 of the relevant population (2 children in Lutsk and 1 each in Volodymyr - Volynskyi, Kovel, Starovyzhiv districts and Novovolynsk).

The incidence of co-infection with tuberculosis / HIV in the region decreased by 11.6% and is 3.60 per 100,000 population, against 4.07 per 100,000 population in 2019 (in absolute numbers - it is 37 people).

As of January 1, 2021, 440 patients with all forms of active tuberculosis are registered in anti-tuberculosis institutions in Volyn Oblast (in 2019 - 636). The prevalence rate was 42.77 per 100 000 population (including children aged 0-14 years inclusive - 4.94, children aged 15-17 years inclusive - 14.38 per 100,000 population). Decrease in the indicator by 30.6% (the prevalence of active tuberculosis in Ukraine for 9 months of 2020 amounted to 62.1 per 100 000 population).

During 2020, 7982 children were born in the region, of which 7182 were vaccinated, which amounted to 90.0% (as compared to 86.71% in 2019).

Prophylactic examinations revealed 58 cases of pulmonary tuberculosis out of 327 cases of pulmonary tuberculosis, which amounted to 17.7%.

10645 children (6.8% of the children subject to examination) were examined by the method of the tuberculin test. This is 14.0% less than the previous year. The number of conducted tuberculin testing remains extremely low, which in turn leads to the detection of tuberculosis in children in the later stages of the disease, more severe forms, and higher mortality from tuberculosis.

According to the Electronic Register, in 2020, 124 cases of chemoresistant tuberculosis were confirmed for the first time, of which 119 patients began treatment with second-line drugs.

Treatment is one of the most effective methods of fighting tuberculosis, able to reduce the incidence of tuberculosis among the population and prevent transmission of the infection. Treatment success rates in new and relapse cases decreased from the 2018 cohort to 76.6% of the previous year (2019) cohort, which is well below the WHO target of 85% for the European region and well below the global target of 90% treatment effectiveness (the indicator of successful treatment of new cases and recurrences in Ukraine of the cohort in 2018 was 77.2% while in Volyn Oblast it is 78.1%).

The low treatment success rate is due to the high percentage of deaths (target - <5%) and treatment interruptions (target - <5%), which indicates low motivation of patients to recover and unsatisfactory social support of TB patients during their treatment (food, hygiene kits or other).

There is a decrease in the effectiveness of treatment of cases of multidrug-resistant tuberculosis (MRTB):

- effective treatment of the cohort in 2017 - 43.8%,
- ineffective (treatment failure, death, treatment interruption) - 55.6%;

RR TB - the effectiveness of treatment of RRTB cohort in 2017 was 13.8%,

- ineffective treatment - 86.2%

HRTB - the effectiveness of treatment of HRTB cohort in 2017 was 77.8%,

- ineffective treatment - 22.2%

In Ukraine, the effective treatment of the cohort in 2017 of MRTB cases was 51.0%, RRTB cases - 34.4%. The effectiveness of treatment remains well below the WHO target of 75%.

According to the WHO recommendations, the effectiveness of treatment of such patients should be at least 75%. In the global cohort of treatment of patients with MR TB, Ukraine ranks one of the last places in recent years.

A good example of international cooperation in the fight against tuberculosis is the project *Reducing of the risk of TB epidemiology in the border areas of Ukraine and Poland through the construction of tuberculosis hospital for 100 beds in Zakarpattya Oblast and introduction of innovative methods of tuberculosis monitoring, prevention and treatment* (01.01.2019 - 31.12.2021). The main challenge of this project is a complex tuberculosis epidemic situation in Zakarpattya Oblast, where the incidence of the disease is much higher than in neighboring countries. There are several factors that affect the epidemiology: location (bordering on four EU countries), significant migration, a large number of people at risk, inaccessible villages. Moreover, shortcomings in the health care system in Ukraine and lack of modern medical equipment lead to insufficient access to modern diagnostics of tuberculosis and, finally, to a low level of detection of tuberculosis patients. At the same time, hospitals do not meet the appropriate standards that lead to the development and spread of chemoresistant tuberculosis and tuberculosis among medical personnel. Given the strong migration processes, this situation poses a threat to the national security of Ukraine as well as of neighboring Poland. The overall goal of this project is to reduce the incidence of tuberculosis in the area of the Program, which will be achieved primarily through the construction of a hospital for tuberculosis treatment in the village of Nyzhnia Apsha (Zakarpattya Oblast, Ukraine), equipped with modern medical equipment and innovative approaches to the detection, prevention, and counteraction of tuberculosis. The project also envisages the improvement of medical equipment at the Frederic Chopin Regional Clinical Hospital in Rzeszów. As a result introduction of cost-effective treatment and improvement of quality of medical services in the field of tuberculosis the project will increase efficiency detection of tuberculosis by up to 5%, reduce long-term morbidity by 1.5 times and improve the epidemic situation with tuberculosis in border areas. Closer Cross-border cooperation and exchange of experience between medical institutions of Ukraine and Poland will help lead to the achievement of the project goals.

The results obtained. After analyzing the data of questionnaires and surveys of respondents (doctors), we found that the most significant aspects of tuberculosis control in Ukraine during the COVID-19 pandemic are the following: 1) the state pays less attention to tuberculosis control, there is lack of understanding of priorities and methodologies for tuberculosis prevention and control; 2) unjustifiable and irrational closure of TB facilities and their structural units and reduction of highly professional specialists (there is a substitution of concepts: closure of insti-

tutions and staff reduction is called "optimization"); 3) further decrease in financing medicine in general and tuberculosis-related services in particular; 4) legal insecurity of medical workers in general and TB doctors in particular is growing (more frequent attacks on medical personnel with causing them physical, psychological damage and even death); 5) less sanitary - educational activities against tuberculosis; 6) emphasizing the role of charitable, public and volunteer organizations in the fight against tuberculosis and the outpatient model of treatment of patients with tuberculosis; 7) incidence of coronavirus infection of employees of tuberculosis services, which is life-threatening for employees and patients with tuberculosis; 8) deterioration of the availability of tuberculosis patients and patients with suspected tuberculosis to provide them with timely medical care (examination, treatment, transportation); 9) excessive workload on TB doctors related to keeping medical records, which often duplicate each other, and excessive reporting, which is often unjustifiable and unnecessary. After analyzing the literature (including official statistics) and data from questionnaires and surveys of respondents (doctors), we found that the most significant risks of tuberculosis control in Ukraine during the COVID-19 pandemic are the following: 1) increase in the incidence of multidrug-resistant tuberculosis; 2) increase in mortality from tuberculosis; 3) increase in the percentage of detection of advanced cases of tuberculosis; 4) increase in the new cases of being infected by the tuberculosis; 5) displacement of tuberculosis services as such; 6) increase in the frequency of tuberculosis recurrences; 7) increased failure rate in tuberculosis treatment; 8) decreased effectiveness of TB treatment; 9) deterioration of interstate relations of Ukraine with neighboring countries and partner countries due to the *deteriorating epidemiological situation* of tuberculosis (tourism, interstate labor relations); 10) significant economic losses of the state due to *deteriorating epidemiological situation* of tuberculosis in the country; 11) deterioration of knowledge of students of medical schools and doctors in the fight against tuberculosis (distance learning etc.); 12) the administration of anti-tuberculosis institutions is forced to falsify statistical data (financing for each case).

Conclusions:

1. Possible deterioration of the epidemiological situation of tuberculosis in Ukraine in the coming years.
2. There is a need to increase funding for measures to combat tuberculosis.
3. There is a need to revise funding mechanisms for TB measures.
4. Sanitary and educational work should be intensified, targeted at the authorities (in order to inform them of the importance and high priority of this issue) and general population (to educate them on prevention and early detection of tuberculosis and the importance of a healthy lifestyle, which is the key to preventing most diseases).
5. A law on the compulsory controlled treatment of the people infected with tuberculosis should be adopted; strong cooperation between doctors, sanitary-epidemiological service, and law enforcement agencies should be established.
6. Inpatient treatment should be a priority, as its goal is not only controllability and correctness of treatment, but also the isolation of patients with bacterial excretion, which is most important in interrupting the epidemiological chain of TB infection.
7. The fight against tuberculosis should be carried out at the interstate level, through the implementation of international projects.

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