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## TUBERCULOSIS IN POLAND IN 2011

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### ABSTRACT

**AIM OF THE STUDY.** To evaluate the main features of TB epidemiology in 2011 in Poland and to compare with the corresponding EU data.

**METHODS.** Analysis of case- based clinical and demographic data on TB patients from Central TB Register, of data submitted by laboratories on anti-TB drug susceptibility testing results in cases notified in 2011, data from National Institute of Public Health- National Institute of Hygiene on cases of tuberculosis as AIDS-defining disease, from Central Statistical Office on deaths from tuberculosis based on death certificates, data from ECDC report "Tuberculosis surveillance in Europe 2011".

**RESULTS.** 8478 TB cases were reported in Poland in 2011. The incidence rate was 22.2 cases per 100,000, with large variability between voivodeships from 12.8 to 37.0. The mean annual decrease of TB incidence in 2007 - 2011 was 0.4%. 7515 cases had no history of previous treatment i.e. 19.7 per 100,000. The number of all notified pulmonary tuberculosis cases was 7879 i.e. 20.6 per 100,000. The proportion of extrapulmonary tuberculosis was 7.1% (599 cases). TB was diagnosed in 111 children (1.3% of all cases, incidence 1.9). The incidence of tuberculosis increased with age to 41.9 among patients 65 years old and older. The mean age of TB patients was 53.3 years. The incidence among men i.e. 31.0 was more than two times higher than among women i.e. 14.0. The incidence in rural population was slightly lower than in urban, respectively 21.9 and 22.4. Bacteriologically confirmed cases (5327) constituted 67.6% of all pulmonary TB cases. The number of smear positive pulmonary TB cases was 2916 (37.0% of all pulmonary cases). There were 38 foreigners registered among all cases of tuberculosis in Poland and 204 cases registered among prisoners. There were 41 patients with MDR-TB (0.8% of 4993 cases with DST results). TB was initial AIDS indicative disease in 26 cases. There were 575 deaths due to tuberculosis in 2010 (1.5 TB deaths per 100,000). Mortality among males – 2.5 – was four times higher than among females – 0.6.

**CONCLUSIONS.** In Poland the incidence of tuberculosis is higher than the average in EU countries. In 2011 the highest incidence occurred in older age groups and was higher in men. Positive characteristic also when compared with the situation in many EU countries is the low incidence of tuberculosis in children and the low percentage of patients with drug-resistant tuberculosis.

**Keywords:** *tuberculosis, incidence, new cases, relapses, cases confirmed by culture, anti-TB drug resistance, mortality, Poland, 2011*

Tuberculosis (TB) reporting has been mandatory in Poland. Latest enacted acts, which regulate the issue of reporting, are the Act on the prevention and control of infections and infectious diseases in humans of 5 December 2008 and the Act amending the above Act and Act on State Sanitary Inspection of 13 July 2012. According to these Acts the obligation to report cases of TB has been imposed on doctors and fieldshers. Those responsible for the notification of cases should submit the report with data on the particular case of tuberculosis to the Poviats Sanitary-Epidemiological

Station. The National Tuberculosis and Lung Diseases Research Institute (Institute), designated by Chief Sanitary Inspectorate, as the completed body, receives reports through Voivodeship Sanitary-Epidemiological Station on a quarterly basis. In the Institute The Central Tuberculosis Register (Register) has been carried out.

**Aim of the study.** Assessment of the epidemiological situation of tuberculosis in Poland in 2011 by comparison with the countries of the European Union with regard to the incidence in the age groups and gender, to the participation

of extrapulmonary tuberculosis, to the participation of bacteriologically confirmed cases, to the scale of problem concerning the drug resistance, to tuberculosis in immigrants, prisoners, HIV infected subjects and to TB mortality.

## MATERIAL AND METHODS

Analysis of the data on TB cases reported in 2011 to the Register, on anti-TB drug susceptibility testing results (DST), on data on deaths by cause obtained from the Central Statistical Office, data from the National Institute of Public Health-National Institute of Hygiene of the cases of tuberculosis as an AIDS indicating disease and from the report the European Centre for Diseases Prevention and Control, "Tuberculosis Surveillance in Europe in 2011".

Susceptibility evaluation was made on the basis of reports sent by all laboratories in Poland that perform DST. The lists of positive results of cultures toward *Mycobacterium tuberculosis* also enabled to identify cases not yet reported by health care facilities and to fill the gaps.

## RESULTS

**Incidence of tuberculosis.** In 2011, 8478 cases of tuberculosis were reported in Poland. This was 969 cases more than in the previous year and 1997 less than in 2002. The incidence of all forms of tuberculosis in 2011 was 22.2 per 100,000 population (later in the text, the denominator in rates is skipped) and was higher by 12.7% as compared with 2010 and 19.0% lower than a decade ago. The average annual decline in incidence in the years 2007-2011 was 0.4% and was lower compared to the previous five years 2002-2006 (3.6%) (Tab.1).

In 2011, as in previous years, considerable differences in the incidence of tuberculosis between the voivodships were observed. The highest incidence of tuberculosis was recorded in the voivodship Lubelskie – rate 37.0, Świętokrzyskie – 32.3 and Łódzkie – 29.4.

The lowest in the country the incidence of tuberculosis was recorded in voivodship Wielkopolskie – 12.8, Warmińsko-Mazurskie – 13.4 and Podlaskie – 14.6. The increase in incidence compared to 2010 was noted in majority of voivodships, a decrease in 5 (Tab.2).

7515 cases (88,6% of all notified cases) were newly diagnosed and never treated (rate 19,7). 963 patients (11.4% of all cases, rate 2.5) had the history of anti-TB treatment (retreatment cases). Of 8478 cases reported in 2011, 7879 (92,9%) suffered from pulmonary tuberculosis; rate 20,6 per 100 000. Purely extrapulmonary tuberculosis affected 599 patients, 7,1% of all registered cases- rate 1,6.

The most common form of extrapulmonary tuberculosis (35,7%) was pleural TB (214 cases), lymphatic TB (99), bone and joint TB (86 cases, including 44 with spinal manifestation), urogenital TB (77). 13 cases suffered from tuberculous meningitis and other central nervous system manifestation of TB. There were no children and teenagers among them.

In 2011, as in earlier years, the incidence rates of TB was increasing with age, from 1.9 in children up to 41.9 in subjects 65 years and older. The highest proportion of cases (45.9% of total) was located in the group between 45 - 64 years, mean age of new cases of tuberculosis was 53.3 years (Tab.1).

The notification rate in children under the age of 15 years was 1,9 per 100 000.

Tuberculosis in children accounted for 1.3% of the total number of cases (111 cases, 49 more than in 2010). The most common form of TB in children was tuberculosis of the intrathoracic lymph nodes (37 cases) and pulmonary tuberculosis (60 cases).

Culture confirmation was reported for 27 paediatric cases (24.3%); pulmonary TB- for 19 (31.6%), extrapulmonary TB- for 8 (15.7%).

The highest incidence rates among children were recorded in voivodship Mazowieckie – 6.2; Lubelskie – 3.9 and Śląskie – 3.6. In 3 voivodships: Lubuskie, Opolskie and Zachodnio-Pomorskie no paediatric TB cases were notified (Tab.2). Cases of tuberculosis in adolescents aged 15 to 19 years accounted for 1.5% of

Table I Tuberculosis cases and tuberculosis notification rates by case status and age groups. Poland 2002– 2011. Rates per 100,000 population. Data from Central TB Register

Year	Number of cases in age groups (years)						Rates per 100.000 population					
	Total	0-14	15-19	20-44	45-64	65+	Total	0-14	15-19	20-44	45-64	65+
2002-2006 median	9,493	100	156	2.836	3.835	2.573	24.9	1.6	5.5	20.3	39.5	51.7
2002-2006 mean	9,589.6	102.6	167.2	2.866	3,201.8	2,575.2	25.1	1.6	5.4	20.5	40.1	52.0
2007	8.614	74	135	2.538	3.762	2.105	22.6	1.2	4.9	18.0	37.0	41.1
2008	8.081	76	115	2.248	3.685	1.957	21.2	1.3	4.3	15.9	35.8	38.1
2009	8.236	99	131	2.250	3.704	2.025	21.6	1.7	5.1	15.8	35.6	39.9
2010	7.509	62	114	2.086	3.441	1.806	19.7	1.1	4.6	14.6	32.8	34.9
2011	8.478	111	130	2.171	3.895	2.171	22.2	1.9	5.4	15.2	37.0	41.9

Table II Tuberculosis cases (all forms) and tuberculosis notification rates by age groups and voivodeships. Poland 2011  
Rates per 100,000 population. Data from Central TB Register

Voivodeships	Numbers						Rates					
	total	0-14	15-19	20-44	45-64	65+	total	0-14	15-19	20-44	45-64	65+
POLAND	8478	111	130	2171	3895	2171	22.2	1.9	5.4	15.2	37.0	41.9
1. Dolnośląskie	742	4	6	186	377	169	25.8	1.0	3.6	17.3	44.7	43.7
2. Kujawsko-pomorskie	377	2	3	124	171	77	18.2	0.6	2.2	16.0	29.7	29.5
3. Lubelskie	797	13	16	202	321	245	37.0	3.9	10.9	25.6	56.0	78.6
4. Lubuskie	165	-	2	34	89	40	16.3	0.0	3.1	8.9	30.6	33.5
5. Łódzkie	746	4	5	196	348	193	29.4	1.1	3.3	21.5	47.2	50.8
6. Małopolskie	545	2	9	128	215	191	16.5	0.4	4.1	10.1	25.4	42.2
7. Mazowieckie	1196	49	33	301	540	273	22.8	6.2	10.7	15.4	38.1	35.9
8. Opolskie	158	-	1	38	73	46	15.4	0.0	1.6	9.7	25.1	31.4
9. Podkarpackie	503	2	9	113	219	160	23.9	0.6	6.0	14.1	40.6	57.7
10. Podlaskie	173	2	3	57	71	40	14.6	1.1	3.7	12.9	22.7	22.8
11. Pomorskie	447	2	5	123	219	98	20.0	0.5	3.5	14.5	36.2	35.8
12. Śląskie	1300	23	17	349	643	268	28.0	3.6	6.3	20.2	48.2	40.4
13. Świętokrzyskie	409	2	9	93	162	143	32.3	1.1	10.9	20.4	45.5	75.5
14. Warmińsko-mazurskie	191	1	6	52	82	50	13.4	0.4	6.1	9.7	20.8	29.7
15. Wielkopolskie	437	5	2	100	213	117	12.8	0.9	0.9	7.6	22.9	28.8
16. Zachodnio-pomorskie	292	-	4	75	152	61	17.2	0.0	3.7	11.9	30.7	29.2

all cases (130 cases, rate 5.4). This was 16 cases more than in 2010.

In 2011, as in previous years, the males with TB were notified more than twice as often as women. There were 5,714 cases registered in men – rate 31.0 and 2,764 cases in women – rate 14.0. Cases among men constituted 67.4% of the total cases. The biggest differences in incidence between males and females were observed in older age groups. Males between the ages 50-54 years had four times greater incidence rate of tuberculosis than women in the same age (62.9 v. 15.5) (Tab.3). The incidence rate of tuberculosis in women in Wielkopolskie voivodship, the lowest in Poland, was 7.3; in men in the voivodship Lubelskie (highest incidence) - 50.6.

4618 cases of TB in urban areas (rate 22.4) and 3278 cases among the rural population (incidence 21.9) were registered. Rural inhabitants for many years suffered from tuberculosis more often than the urban population.

In 2011, the second time in the history of Register, the incidence of TB in rural areas was slightly lower than in urban population (Tab. 3). Bacteriological confirmation (positive culture results of diagnostic materials) was obtained in 5581 patients (65.8% of all cases); in pulmonary tuberculosis – in 5327 (67.6% of pulmonary tuberculosis, 62.8% of all cases). Incidence rate of all bacteriologically confirmed TB was 14.6; of pulmonary tuberculosis – 13.9 (Tab.4). In 2916 patients, ie 37.0% of all patients with pulmonary tuberculosis sputum smears were also positive (rate 7.6).

The culture confirmation of extrapulmonary tuberculosis was achieved in 42.4% of cases. There are differences between voivodeships relating the patients with bacteriologically confirmed TB. With regard to pulmonary tuberculosis the percentage of cases with bacteriological confirmation among all pulmonary cases ranged from 56.2% in voivodship Pomorskie and 57.2% in voivodship Łódzkie to 90.0% in voivod-

Table III Tuberculosis cases and tuberculosis notification rates by sex, age groups and place of residence. Poland 2011.  
Rates per 100,000 population. Data from Central TB Register

		Age groups														Total	
		0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69		70+
Poland	Numbers	30	36	45	130	261	405	422	522	561	797	1125	1154	819	485	1686	8478
	Rates	1.5	2.0	2.3	5.4	9.2	12.3	13.7	19.1	23.9	32.6	38.6	40.4	35.2	35.8	44.1	22.2
Males	Numbers	19	16	26	63	140	223	265	364	405	587	893	884	595	336	898	5714
	Rates	1.8	1.8	2.6	5.1	9.6	13.4	17.0	26.4	34.3	48.3	62.9	65.3	55.8	57.3	65.7	31.0
Females	Numbers	11	20	19	67	121	182	157	158	156	210	232	270	224	149	788	2764
	Rates	1.1	2.3	2.0	5.7	8.7	11.2	10.3	11.7	13.4	17.1	15.5	18.0	17.8	19.4	32.0	14.0
Urban areas	Numbers	18	26	29	76	153	266	264	310	352	481	715	748	518	319	925	5200
	Rates	1.5	2.6	2.7	5.7	9.3	13.2	13.4	18.4	25.3	33.0	38.9	39.6	33.3	35.9	39.2	22.4
Rural areas	Numbers	12	10	16	54	108	139	158	212	209	316	410	406	301	166	761	3278
	Rates	1.4	1.3	1.7	5.0	9.0	10.9	14.3	20.4	21.9	32.0	38.1	41.9	39.1	35.5	51.8	21.9

Table IV Culture confirmed pulmonary cases of tuberculosis and notification rates by case status and age groups. Poland 2002-2011. Rates per 100.000 population. Data from Central TB Register

Year	Number of cases in age groups (years)						Rates per 100,000 population					
	Total	0-14	15-19	20-44	45-64	65+	Total	0-14	15-19	20-44	45-64	65+
2002-2006 median	5,169	16	92	1.722	2.092	1.282	13.6	0.3	3.2	12.3	21.2	25.7
2002-2006 mean	5,283.6	15.4	88.4	1.786	2.096	1.297.8	13.9	0.3	2.9	12.8	21.7	26.2
2007	5,200	20	78	1.686	2.261	1.155	13.7	0.3	2.8	11.9	22.3	22.6
2008	4,892	19	71	1.505	2.238	1.059	12.8	0.3	2.7	10.6	21.8	20.6
2009	5,035	13	77	1.547	2.252	1.146	13.2	0.2	3.0	10.9	21.7	22.3
2010	4,585	15	71	1.395	2.098	1.006	12.0	0.3	2.9	9.8	20.0	19.4
2011	5,327	19	70	1.525	2.466	1.247	13.9	0.3	2.9	10.7	23.4	24.1

ship Kujawsko-Pomorskie and 88.4% in voivodship Opolskie.

204 subjects were diagnosed with TB when staying in detention centers or prisons (incidence rate 245.0). Among patients registered with tuberculosis in 2011, there were 38 foreigners (0.4% of cases). According to the information of the National Institute of Public Health - National Institute of Hygiene in 2011 tuberculosis was AIDS indicative disease in 26 patients with HIV infection.

**Antituberculosis drug resistance.** MDR-TB is defined as tuberculosis caused by bacilli resistant to rifampicin and isoniazid. The Central Tuberculosis Register recorded 41 cases of MDR-TB in 2011, including one case of extensively drug-resistant tuberculosis (XDR-TB) which means MDR-TB with resistance enlarged to any of the fluoroquinolones (such as ofloxacin or moxifloxacin) and to at least one of three injectable second-line drugs (amikacin, capreomycin or kanamycin). DST results were available in 4993 patients, representing 89.5% of all TB cases with positive cultures. MDR TB was reported for 0.8% of cases with drug susceptibility testing results. There was one child with MDR-TB infected because of household contact.

Resistance to isoniazid was detected in 185 patients (3.7% of cases with known DST results).

**Mortality due to tuberculosis (year 2010).** Mortality from tuberculosis has been calculated on the basis of death certificates. In 2010, according to the Central Statistical Office, tuberculosis was considered the underlying cause of death in 575 of the deceased (1.5 deaths per 100,000 population). The mortality rate was lower than in the previous year (2.0). 555 subjects died because pulmonary tuberculosis—rate 1.5. Extrapulmonary tuberculosis was cause of death in 20 persons. According to the Central Statistical Office, deaths from tuberculosis were 0.2% of all deaths and 20.5% of deaths due to infectious and parasitic diseases in Poland.

The highest mortality rate was in the age group of 65 years and more, and was 4.1. The largest number of people who had died of tuberculosis, were persons aged 45-64 years (284). No deaths from tuberculosis among

children and adolescents were registered. Mortality due to TB was four times higher in men than in women - rates respectively - 2.5 and 0.6. Rural inhabitants mortality from tuberculosis - 1.4 and was lower than the urban population - 1.5. In 2010, the death rate from tuberculosis was lower by 42.3% compared with 2001. The highest mortality from tuberculosis was registered in voivodeship Śląskie (rate 2.8) and Dolnośląskie (rate 2.0), the lowest in Podlaskie and Pomorskie (rate 0.8).

## DISCUSSION

An increase in the TB incidence, reported in Poland in 2011, may be explained rather by irregularity in registration of cases than a real increase. For comparison, in 2010 there was a significant decrease in the number of cases and incidence rates compared with the preceding year. Explanation of the situation will bring subsequent years.

The incidence of tuberculosis in Poland was higher than average incidence in the European Union plus Norway and Iceland (abbreviation for this group- EU) (72 334 cases, rate 14.2 per 100,000 population - data for 2011). In most countries of Western Europe, despite inflow of immigrants from countries with high TB prevalence, the notifications rates are low (Germany – 5.3 per 100 000, Italy – 5.8; Netherlands – 6.0; Norway – 7.3; Austria – 8.2; Czech Republic – 5.7; Slovakia – 7.3). The lowest incidence was noted in Iceland – 2.8. Poland (22.2) was on the seventh place in the group of countries with the highest incidence: after Romania (89.7), Lithuania (58.7), Latvia (39.7), Bulgaria (32.1), Estonia (25.4) and Portugal (23.9).

Although TB incidence in Poland is higher than the average in EU there are no phenomena which would be especially alarming.

TB relapse rate is an indicator of the correctness of anti-TB treatment and case management in a given area. New cases in the EU countries constituted 80% (88.6% in Poland). In Finland, up to 98% of all TB cases were new cases.



The cases of certain, definitive tuberculosis are cases confirmed bacteriologically by cultures. In Poland bacteriological confirmation of tuberculosis was obtained in a slightly higher percentage of cases than in the EU (65.8% vs 61%) but big differences between voivodeships occurred.

In Poland, the highest incidence of TB occurred in older age groups. In West European countries among the nationals the situation was similar. TB patients were oldest in Malta (mean age 77.3 years). The mean age of Finns suffering from tuberculosis was 67.0 years; Czechs – 57.8.

In Poland, tuberculosis in children constituted small percentage of total (1.3%; 1.9 per 100,000), less than in EU (4%; rate 4.0). The low prevalence of paediatric TB suggest that recent transmission does not contribute strongly to current TB situation. Romania, Spain and the United Kingdom accounted for 54% of all paediatric TB. In Western Europe children with TB are mostly immigrants. In the EU, as well as in Poland, TB occurs more frequently in men (1:1.8). Male predominance was higher among nationals.

In EU extrapulmonary TB was 22% of total, with the highest proportion in Iceland (67%). The differences between Poland (7,1%), Hungary (4%) and countries with high extrapulmonary TB burden could be partly due to various proportions of children and foreigners who were both found to be at least twice as likely to

have extrapulmonary manifestation compared with adults and nationals, respectively.

In Poland, unlike in Western Europe, immigration has a so far little effect on the epidemiological indicators of tuberculosis. In 2011, the highest percentage of immigrants among patients with tuberculosis were recorded in Sweden (89.4%) and Norway (87.8%).

In Poland, the co-occurrence of HIV and tuberculosis is rare judging on the number cases where tuberculosis was the AIDS indicative disease. In EU, of 21 490 cases with known HIV status, 963 (4%) were reported as being HIV- positive.

The proportion of TB caused by drug resistant bacilli was higher in EU in comparison with Poland. MDR-TB was reported for 1522 (5%) of cases with DST results. In Lithuania, Latvia and Estonia from 11 to 23% of new cases of pulmonary TB represented MDR-TB.

## CONCLUSIONS

In Poland, in the last decade, the incidence of tuberculosis has decreased substantially but is still higher than the EU average. The highest incidence occurs in older age groups, is higher among men, higher in the city than in rural areas. Positive phenomenon, even in comparison to other EU countries, is a low incidence of tuberculosis in pediatric patients and a low percentage of patients with MDR-TB.

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