

Maria Korzeniewska- Kosela

## TUBERCULOSIS IN POLAND IN 2013

National Tuberculosis and Lung Diseases Research Institute in Warsaw  
Department of Tuberculosis Epidemiology and Surveillance

### ABSTRACT

**AIM OF THE STUDY.** To evaluate the main features of TB epidemiology in 2013 in Poland and to compare with the corresponding EU/EEA 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 2013, 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 „European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis surveillance and monitoring in Europe 2015. Stockholm: European Centre for Disease Prevention and Control, 2015”.

**RESULTS.** 7250 TB cases were reported in Poland in 2013. The incidence rate was 18.8 cases per 100 000, with large variability between voivodships from 9.9 to 27.4. The mean annual decrease of TB incidence in 2009 - 2013 was 2.0%. 6403 cases had no history of previous treatment (rate 16.6). The number of all notified pulmonary tuberculosis cases was 6835; 17.8 per 100 000. The proportion of extrapulmonary tuberculosis among all registered cases was 5.7% (415 cases). In 2013, 34 patients had fibrous-cavernous pulmonary tuberculosis (0.5% of all cases of pulmonary tuberculosis). TB was diagnosed in 116 children (1.6% of all cases, incidence 2.0). The incidence of tuberculosis increased progressively with age to 33.7 among patients 65 years old and older. The mean age of new TB cases was 53.5 years. The incidence among men (26.8) was more than two times higher than among women (11.4). The incidence rate in rural population was lower than in urban areas; 17.1 vs. 20.0. Bacteriologically confirmed pulmonary cases (4825) constituted 68,2% of all pulmonary TB cases. The number of smear positive pulmonary TB cases was 2859 (61.3% of culture confirmed pulmonary cases). There were 52 foreigners registered among all cases of tuberculosis in Poland (0.7%) and 250 cases registered among prisoners (rate 298.0). There were 40 patients with MDR-TB (0.8% of cases with known DST results). TB was AIDS indicative disease in 35 cases. There were 630 deaths due to tuberculosis in 2012 (1.6 TB deaths per 100 000). Mortality among males – 2.6 – was more than 3 times higher than among females – 0.8.

**CONCLUSIONS.** In Poland in 2013 the incidence of tuberculosis was higher than the average in EU/EEA countries. The highest incidence rates occurred in older age groups. The incidence in men was more than 2 times higher than in women. The incidence of tuberculosis in children and the percentage of patients with drug-resistant tuberculosis are lower than average in the EU/EEA and that is favorable for epidemiological situation of tuberculosis in our country.

**Keywords:** *tuberculosis (TB), incidence, relapses, pulmonary TB, extrapulmonary TB, TB confirmed by culture, paediatric TB, TB in foreign-origin TB cases, TB in prisoners, TB/HIV co-infection, multi-drug resistant TB, mortality, Poland, 2013*

National Tuberculosis and Lung Diseases Research Institute has been gathering epidemiological data on tuberculosis in Poland since 1957. Reporting on tuberculosis is mandatory in Poland and as such obligation

is imposed by the law. According to 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 doctors and feldshers should submit the

form with data on the particular case of tuberculosis to the Poviát Sanitary-Epidemiological Station, the Border state-sanitary inspector, who is competent in respect for the place of diagnosis or to Voivodship Sanitary Inspector or other bodies competent with respect to type of infectious disease, infection, or death due to infectious disease. Forms are subsequently forwarded, on a quarterly basis, through Voivodship Sanitary-Epidemiological Station, to the National Tuberculosis and Lung Diseases Research Institute. The Institute, that was designated by Chief Sanitary Inspectorate as the body competent in the field of tuberculosis, keeps The Central Tuberculosis Register.

### AIM OF THE STUDY

Assessment of the epidemiological situation of tuberculosis in Poland in 2013 by comparison with the countries of the European Union (EU) and European Economic Area (EEA) with regard to the TB incidence in different population groups (in various age groups, in men and women), to the participation of extrapulmonary TB, to the participation of bacteriologically confirmed cases, to the prevalence of drug resistance, to tuberculosis in foreign-origin TB cases, in prisoners, in HIV infected subjects. Assessment of the burden of TB in terms of deaths due to TB.

### MATERIAL AND METHODS

Analysis of the data on TB cases reported in 2013 to the Register, on anti-TB drug susceptibility testing results (DST), on deaths from TB (data obtained from the Central Statistical Office), on cases in which tuberculosis was the AIDS defining illness (data provided by the National Institute of Public Health-National Institute of Hygiene) and analysis of the data from the report of the European Centre for Disease Prevention and Control/WHO Regional Office for Europe. Tuberculosis surveil-

lance and monitoring in Europe 2015. Stockholm: European Centre for Disease Prevention and Control, 2015.

TB drug susceptibility (DS) evaluation was made on the basis of records provided by all laboratories in Poland that perform DS tests.

### RESULTS

In 2013, 7 250 cases of tuberculosis were reported in Poland. This was 292 cases less than in the previous year and 2 243 cases less than in 2004. The incidence of all forms of tuberculosis in 2013 was 18.8 per 100 000 population (later in the text, the denominator in rates is skipped) and was lower by 4.1% as compared with 2012 and lower by 24.5% than a decade ago. The average annual decline in incidence in the years 2009-2013 was 2.0% and was lower compared to the previous five years 2004-2008 (3.1%) (Table I)

In 2013, 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 27.4 and świętokrzyskie – 24.3. The lowest incidence of tuberculosis in the country was recorded in voivodship wielkopolskie – 9.9 and podlaskie – 12.5 (Table II). The increase of TB incidence in comparison with the previous year was noted in 6 voivodships – lubuskie, mazowieckie, zachodnio-pomorskie, dolnośląskie, opolskie i małopolskie. In other 10 voivodships there was a decrease of TB incidence.

In 2013, as in earlier years, the incidence rates of TB were increasing with age, from 2.0 in children (0-14 years) up to 33.7 in subjects 65 years and older (Table I). The oldest patients ( $\geq 65$  years) constituted 25.9% of all new cases. The mean age of new cases of tuberculosis was 53.5 years.

6403 cases (88.3% of all patients) were the newly diagnosed and not previously treated cases (rate 16.6). 847 patients (11.7% of all cases, rate 2.2) had anti-TB treatment in the past (retreatment cases).

Table I. Tuberculosis cases (all forms) and tuberculosis notification rates by age groups. Poland 2004– 2013. Rates per 100.000 population. Data from Central TB Register

Year	Number of cases in age groups (years)						Rates					
	Total	0-14	15-19	20-44	45-64	65+	Total	0-14	15-19	20-44	45-64	65+
2004	9.493	120	129	2.836	3.835	2.573	24,9	1,9	4,2	20,3	39,5	51,7
2005	9.269	99	156	2.717	3.760	2.537	24,3	1,6	5,3	19,4	38,0	50,9
2006	8.587	69	156	2.529	3.655	2.178	22,5	1,1	5,5	18,0	36,4	42,8
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
2012	7.542	95	166	1.996	3.404	1.881	19,6	1,6	7,3	13,8	32,1	34,8
2013	7.250	116	113	1.903	3.241	1.877	18,8	2,0	5,2	13,2	30,8	33,7

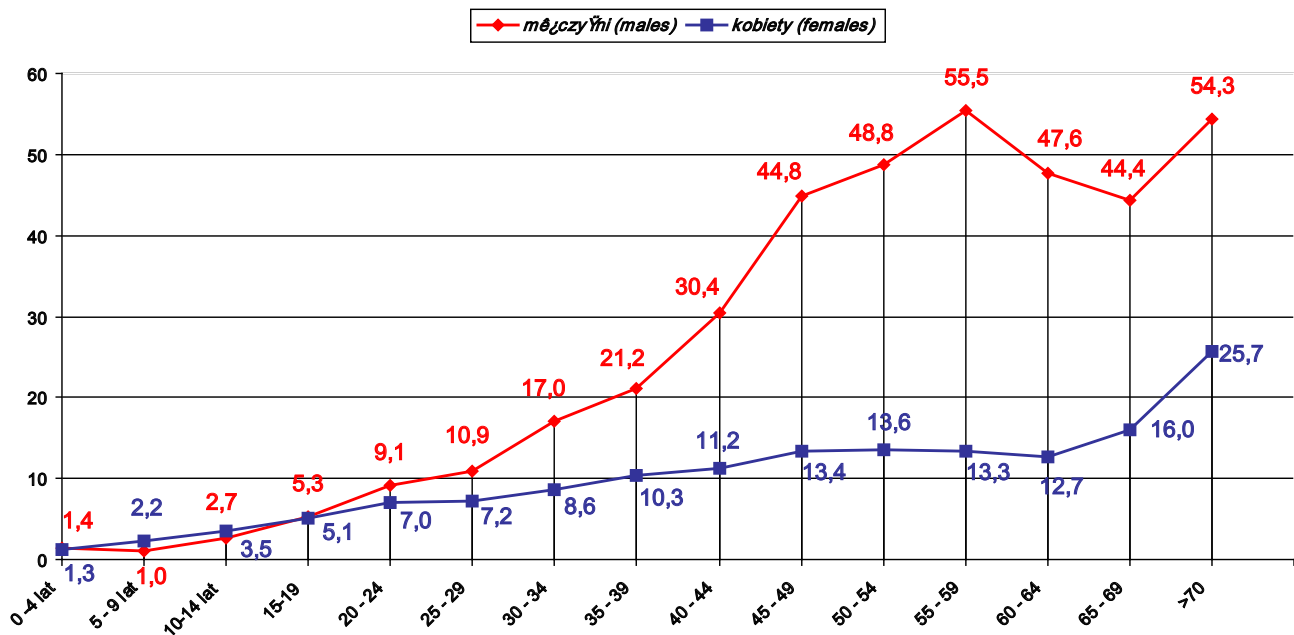


Fig. 1. Tuberculosis notification rates by sex and age. Poland in 2013. Rates per 100 000 population. Data from Central TB Register

6835 cases (94.3% of all patients) were the cases of pulmonary tuberculosis; rate 17.8. In 2013, 24 patients had caseous pneumonia and 34 patients had fibrous-cavernous pulmonary tuberculosis. Cases of caseous pneumonia accounted for 0.3% of all cases of pulmonary tuberculosis, tuberculosis fibrous-cavernous for 0.5%. In 2004 the proportion of cases of caseous pneumonia was 1,9%; of fibrous-cavernous tuberculosis – 1,7%.

Purely extrapulmonary tuberculosis was diagnosed in 415 patients (5.7% of all registered cases – rate 1.1). Most patients had pleural TB (142 cases), peripheral lymph node TB (104), urogenital TB (58) or bone and joint TB (44 cases, including 17 with spinal manifestation). 7 cases suffered from tuberculous meningitis and other central nervous system manifestation of TB. There were no children and no teenagers with TB meningitis in 2013.

Tuberculosis in children accounted for 1.6% of the total number of cases (116 paediatric cases, 62 with pulmonary and 54 with extrapulmonary TB). The most common form of TB in children was tuberculosis of the intrathoracic lymph nodes (41 cases).

Tuberculosis was confirmed by culture in 20 (17,2%) paediatric TB cases.

The highest incidence rates of tuberculosis in children were recorded in voivodship mazowieckie – 6.3 and śląskie – 4.4. In voivodships: lubuskie, opolskie and podlaskie there were no children with TB.

There were 113 cases of tuberculosis in the group of adolescents aged 15 to 19 years (rate 5.2). It was 53 cases less than a year earlier (rate 7.3). In 59 cases (52.2% of all adolescents with TB) the disease was

bacteriologically confirmed. The highest incidence rate of tuberculosis in the age group from 15 to 19 years was in voivodship mazowieckie – 13.6 and lubelskie – 13.0; the lowest in voivodship zachodnio-pomorskie – 1.0. The highest incidence of culture confirmed pulmonary tuberculosis was found in the youth from voivodship lubelskie (rate 6.9). In the group of adolescents in voivodship świętokrzyskie there was the highest incidence of sputum smear positive pulmonary tuberculosis (rate 4.0).

In 2013, as in previous years, there were more than twice as many males reported as females among all TB cases (2.2x) (Fig. 1). There were 4 991 cases registered in men – rate 26.8 and 2 259 cases in women – rate 11.4. Cases among men constituted 68.8% of the total cases. The biggest differences in incidence between males and females were observed in older age groups. Males between the ages 55-59 years had 4 times greater incidence rate of tuberculosis than women in the same age (55.5 vs. 13.3). The lowest incidence rate of tuberculosis in Poland was in women in wielkopolskie voivodship (6.2); the highest – in men in the voivodship lubelskie (36.7).

4647 cases of TB in urban areas (rate 20.0) and 2603 cases among the rural population (rate 17.1) were registered. In the past in Poland the epidemiological situation of tuberculosis was worse in rural than in urban areas. In 2013, the fourth time in the history of Register, the incidence of TB in rural areas was lower than in urban population.

Bacteriological confirmation was obtained in 4825 TB patients (66.6% of all TB cases) and in 4663 cases with pulmonary TB (68.2% of all pulmonary TB cases).

Table II. Rank-list of voivodeships by tuberculosis notification rates. Poland 2013. Rates per 100.000 population. Data from Central TB Register

Voivodeships	Rates	Rank-list	Rates
Poland	18,8	Poland	18,8
1. Dolnośląskie	22,6	1. Wielkopolskie	9,9
2. Kujawsko-pomorskie	16,6	2. Podlaskie	12,5
3. Lubelskie	27,4	3. Podkarpackie	13,1
4. Lubuskie	20,4	4. Warmińsko-mazurskie	13,3
5. Łódzkie	22,8	5. Zachodnio-pomorskie	13,8
6. Małopolskie	16,7	6. Pomorskie	15,5
7. Mazowieckie	22,1	7. Kujawsko-pomorskie	16,6
8. Opolskie	16,6	8. Opolskie	16,6
9. Podkarpackie	13,1	9. Małopolskie	16,7
10. Podlaskie	12,5	10. Lubuskie	20,4
11. Pomorskie	15,5	11. Mazowieckie	22,1
12. Śląskie	23,9	12. Dolnośląskie	22,6
13. Świętokrzyskie	24,3	13. Łódzkie	22,8
14. Warmińsko-mazurskie	13,3	14. Śląskie	23,9
15. Wielkopolskie	9,9	15. Świętokrzyskie	24,3
16. Zachodnio-pomorskie	13,8	16. Lubelskie	27,4

Incidence rate of all bacteriologically confirmed TB was 12.5; of pulmonary tuberculosis – 12.1 (Table III).

Extrapulmonary tuberculosis was confirmed by culture in 39.0% of cases.

Sputum smears were positive in 2859 subjects (61.3% of all patients with culture positive pulmonary tuberculosis; rate 7.4). In 2013, as earlier, there were differences between voivodships relating the proportion of TB cases with bacteriological confirmation. The percentage of cases with bacteriological confirmation among all pulmonary cases ranged from 60.4% in voivodship łódzkie to 90.5% in voivodship kujawsko-pomorskie.

Tuberculosis was diagnosed in 250 prisoners (incidence rate 298.0). Among patients registered with tuberculosis in 2013, there were 52 foreigners (0.7% of cases). The mean age of cases with foreign citizenship was 37.4 years. In 2013, according to the data obtained from the National Institute of Public Health - National Institute of Hygiene, in 35 patients tuberculosis was AIDS indicative disease.

40 patients with MDR-TB were registered in 2013. Subjects with MDR-TB constituted 0.8% of cases with known drug susceptibility testing results (DST results were available in 92.6% of all TB cases with positive cultures). There were no MDR-TB cases among children. The youngest patient with MR-TB was 19 years old. MDR-TB is defined as tuberculosis caused by bacilli resistant to rifampicin and isoniazid.

Resistance to isoniazid was detected in 3.7% of cases with known DST results.

Mortality from tuberculosis has been calculated by the Central Statistical Office on the basis of death certificates. Tuberculosis was considered the underlying cause of death in 630 of the deceased in 2012 (1.6 deaths per 100 000 population). 616 subjects died because pulmonary tuberculosis (rate 1.6). Extrapulmonary tuberculosis was cause of death in 14 persons. Deaths from tuberculosis were 0.2% of all deaths and 24.5% of deaths due to infectious and parasitic diseases in Poland.

The highest mortality rate (4.4; 37.9% of all deaths from TB) was in the age group of 65 years and more.

Table III. Culture confirmed pulmonary cases of tuberculosis and notification rates by age groups. Poland 2004-2013. Rates per 100.000 population. Data from Central TB Register

Year	Number of cases in age groups (years)						Rates					
	Total	0-14	15-19	20-44	45-64	65+	Total	0-14	15-19	20-44	45-64	65+
2004	5.108	19	69	1.720	2.056	1.244	13,4	0,3	2,3	12,3	21,2	25,0
2005	5.169	16	92	1.722	2.057	1.282	13,6	0,3	3,2	12,3	20,8	25,7
2006	4.989	9	75	1.668	2.103	1.134	13,1	0,2	2,7	11,9	21,0	22,3
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
2012	4.870	17	87	1.458	2.246	1.062	12,6	0,3	3,8	10,1	21,2	19,7
2013	4.663	13	56	1.389	2.133	1.072	12,1	0,2	2,6	9,6	20,2	19,2

There were no deaths from tuberculosis among children and in the group of adolescents. Mortality due to TB was more than 3 times higher in men than in women; rates respectively – 2.6 and 0.8. The highest death rates from tuberculosis were registered in voivodship śląskie (2.9) and lubuskie (2.5), the lowest – in Wielkopolska (0.7) and Podlasie (0.8).

## DISCUSSION

In 2013, the incidence rate of tuberculosis in Poland was lower compared to the previous year (18.8 vs. 19.6). The overall annual decrease in TB notification rates in the last five years was 2.0% and was lower than that in the previous five-year period, between 2004 and 2008 (3.1%).

In all European Union (EU) countries and in countries of European Economic Area (EEA) (Norway and Iceland) 64844 TB cases were reported in 2013; the overall notification rate was 12.7. In the last five years, TB incidence in the EU/EEA has been falling at an average rate of 5.6% per year. Almost 50% of cases occurred in the three countries - Romania, the UK and Poland but Poland did not join the group of 6 countries (Romania, Lithuania, Latvia, Bulgaria, Portugal and Estonia) with rates higher than 20 per 100 000. The highest TB incidence rate was recorded in Romania – 83.5; the lowest in Iceland – 3.4. In 18 EU/EEA countries the incidence rates were less than 10 (for example, Czech Republic – 4.8; Greece – 4.9; Finland – 5.0; Netherlands – 5.1; Germany and Italy – 5.3; Denmark – 6.4; Slovakia – 7.4).

28% (18 180) of all TB patients in EU/EEA in 2013 were born outside the country, that reported their case or they had no citizenship of this country. Nearly 80% of all foreigners TB patients registered in the EU / EEA stayed at the time of diagnosis of the disease in France, Germany, Italy, Spain and the UK. The highest percentage of foreigners in the group of patients with tuberculosis was recorded in Luxembourg (95%), Sweden (89%), Malta (88%) and Norway (86%). Poland, together with Bulgaria and Romania is among the countries with the lowest percentage of foreigners in the group of patients with tuberculosis (<1%).

The previously untreated new cases represented 77.9% of all cases of tuberculosis in EU/EEA. Only in 7 countries, including Poland, the proportion of patients treated in the past exceed 10%.

In Poland culture confirmation of tuberculosis was reported for higher proportion of cases than in all EU/EEA countries (in EU/EEA it was 62.1 % of all cases; in Poland – 66.6 %).

In Poland, some problems associated with tuberculosis, occur on lower extent than in the EU/EEA.

Countries with high proportion of foreign-origin TB cases are characterized by a preponderance of younger adults. In Poland, where the impact of foreigners on the epidemiology of tuberculosis is minor, the rates of incidence of TB are increasing with the age group. Poland belonged in 2013 to the group of 11 countries, where > 25 % of new cases of tuberculosis were the subjects  $\geq 65$  years. The largest proportion of elderly TB patients was notified in Finland (47.4%) and in Slovenia (41.7%). The oldest TB patients in the whole EU/EEA were the native Maltese (mean age 83 years). As in Poland, foreign-origin TB cases in EU/EEA were overall younger than native cases (mean age of foreigners with TB in Malta- 26 years).

In Poland, paediatric TB accounted for 1.6% of all TB cases. In 2013, in the EU/EEA countries the proportion of children was 4% among all TB cases; the average incidence rate in this age group (3.3) was also higher than in Poland (2.0). The highest incidence rates of TB in children were reported in Romania (22.2), Latvia (15.4), Bulgaria (14.7) and Lithuania (8.5), it means in countries with the worst epidemiological situation of tuberculosis in EU/EEA. The low incidence of paediatric TB suggest that the impact of recent transmission on the current TB dynamics is small.

The male-to-female ratio notified in TB cases in 2012 in EU/EEA was 1.6:1. Only in 8 countries, as in Poland, the proportion of men with tuberculosis was more than two times higher than proportion of women.

In Poland, 2013, as in previous years, the proportion of purely extrapulmonary tuberculosis in the total number of cases was low (5.7%). Another country with such a low percentage of extrapulmonary tuberculosis was Hungary (5%). In the EU the overall proportion was 22 %. In some European countries, extrapulmonary tuberculosis accounted for more than 40 % of all cases (Iceland, Sweden, the Netherlands and the United Kingdom). The above differences can be explained by differences in patient characteristics in Poland with low proportion of children and of cases of foreign origin, that are at higher risk of extrapulmonary TB.

Mortality due to tuberculosis, calculated from death certificates, decreased in Poland over the past five years (in 2008 the ratio was 2.1; in 2012 – 1.6).

In EU/EEA countries the numbers of TB patients infected with HIV have declined over the last 7 years. In 2013, for 21 765 TB patients (33.6 % of all patients in EU/EEA countries) HIV status was reported; 1 060 patients (4.9% of this group) were HIV-positive. Testing of all TB patients for HIV was carried out in 17 countries. The highest proportion of HIV-co-infected TB cases was found in Portugal – 14.5% and Estonia – 13 %. In Poland, TB patients are not routinely tested for the presence of HIV infection. Known is, what is

the number of people in whom tuberculosis was AIDS indicative disease. This number for years is low.

In Poland, the level of resistance to isoniazid and rifampicin was low in 2013. Overall, the proportion of cases in the EU/EEA with MDR-TB was 5% of cases with known drug susceptibility testing results. MDR-TB was most prevalent in three Baltic countries. In Estonia, Latvia and Lithuania, the percentage of patients with MDR-TB is the highest, ranging from 12 to 23% of pulmonary TB cases.

## CONCLUSIONS

Poland has already entered the group of countries with a low incidence of tuberculosis, in which the number of cases does not exceed 20 per 100 000 inhabitants. However, the incidence of tuberculosis in Poland is still higher than overall incidence in EU/EEA countries (18.8 vs. 12.7). In 2013, as in previous years, the territorial differences in the epidemiology of tuberculosis were found. For example in Wielkopolska and Podlasie incidence rates (9.9 and 12.5) were lower than in the EU/EEA as a whole.

The proportion of foreign-origin (non-citizen) TB cases among tuberculosis patients in Poland is small. This fact helps us to understand differences between

the epidemiology of TB in Poland and in the countries with higher proportion of immigrants. In Poland the highest TB incidence occurs in the older age groups and our country belonged in 2013 to the group of 11 countries, where > 25 % of new cases of tuberculosis were the subjects  $\geq 65$  years. In Poland there is also a large percentage of patients treated in the past. Patients with tuberculosis in Poland are in a majority men. Only in 8 countries, as in Poland, the proportion of men with tuberculosis was more than two times higher than proportion of women.

In Poland, unfavorable phenomena such as paediatric tuberculosis, HIV co-infection, the prevalence of tuberculosis caused by drug-resistant mycobacteria are less common compared with EU/EEA countries. The low prevalence of paediatric TB leads to the assumption that recent transmission does not contribute greatly to current TB dynamics in our country.

Received: 5.05.2015

Accepted for publication: 19.05.2015

### Address for correspondence:

Prof. nadzw. dr hab. Maria Korzeniewska-Koseła  
National Tuberculosis and Lung Diseases Research Institute,  
Department of Tuberculosis Epidemiology and Surveillance  
26 Płocka Street, 01-138 Warsaw, Poland  
Tel. +48224312123  
e-mail: m.korzeniewska@igichp.edu.pl