



# Tuberculosis Incidence in Estonia 2005

# Tuberculosis

## Incidence in Estonia

### 2005



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## Introduction

High incidence of tuberculosis has been a problem in Estonia since regained independence. The first National Tuberculosis Control program was initiated in 1998, and extension program in 2004. Thanks to these efforts and improved social conditions, the incidence of tuberculosis is showing a slight decreasing trend, but in spite of this Estonia is among the “leaders” among all European Union countries with respect of the spread of infectious diseases – both tuberculosis and HIV. Still, after 15 years of regained independence, the incidence of tuberculosis is 5 times higher than in the Nordic countries.

In 2005 Ministry of Social Affairs was responsible for Estonian Tuberculosis Registry (authorised data processor: North Estonia Regional Hospital). In conjunction with the upgrade of the medical information system in Estonia and the implementation of so-called E-Health (digital case report forms), most of the medical information systems, including registries, are planned to be brought under this new system.

Since 2001 the development of Tuberculosis Registry has been directed towards more detailed characterisation of MDR-TB cases in accordance with the international guidelines (M. Aziz et al. Guidelines for surveillance of drug resistance in tuberculosis, WHO 2003, Geneva) that has required also major reorganisation in the work of the Tuberculosis Registry (computer program, new position of a second secretary-data processor). In accordance with Decree No. 38 of the Minister of Social Affairs from March 30, 2001 about the establishment and management of Tuberculosis Registry, the sources of data will be the following paper documents: “TB notification form,” “Treatment outcome form,” “Laboratory form,” and “Treatment card” the copy of which has to be sent to the registry.

Most recent data about the notification of tuberculosis and other interesting information can be found from the website of National Tuberculosis Control Program: <http://www.tai.ee/?id=2339>. The data about the incidence of tuberculosis have also been published in the website of the Ministry of Social Affairs: <http://www.sm.ee/est/pages/index.html>.

As a result of a cooperation between Estonian Tuberculosis Registry with World Health Organization (WHO) and Tuberculosis Screening System of European Union (Euro TB), the data about the incidence of tuberculosis in Estonia is available also on the websites of these 2 organisations: <http://www.who.int/gtb/publications/globrep/index.html> and <http://www.eurotb.org/>.

This publication is focusing more on the aspects that have been less or not at all described in the above information sources. We have tried to give an overview about the relation between tuberculosis and social factors, the problem of MDR tuberculosis in Estonia, and the incidence of tuberculosis among HIV-positive individuals.

The Estonian Tuberculosis Annual Report 2005 includes an analysis of all registered tuberculosis cases including new and relapses and the analysis of the treatment results of the cases registered in 2003 (MDR-TB)/2004. In tables, the treatment results have been analysed in accordance with the definitions of WHO/IUATLD, whereas in a text below the tables the results have been presented in a more compact format that describes the actual situation more accurately. Hereby I would like to express my gratitude to all pulmonologists, nurses, laboratory workers, etc., as this publication is based on the data received from these people. Also, all remarks and suggestions that would help to make this publication more comprehensive are welcome.

Vahur Hollo  
Head of Estonian Tuberculosis Registry

The following data from Estonian Statistics have been used in the preparation of this annual report:

Population by gender and age groups (according to the data of the population census from 2000)

### Mean annual population in age groups in 2003-2005

	2003			2004			2005		
	Men and women	Men	Women	Men and women	Men	Women	Men and women	Men	Women
Total in all age groups	1353557	623705	729852	1349290	621525	727765	1346097	619949	726148
0-4	62761	32258	30503	64272	32987	31285	65866	33820	32046
5-9	63843	32775	31068	61951	31816	30135	61362	31607	29755
10-14	93635	48076	45559	85691	44004	41687	78042	39981	38061
15-19	106955	54559	52396	107160	54762	52398	106608	54648	51960
20-24	99349	50628	48721	101672	51721	49951	103451	52533	50918
25-29	93254	46926	46328	93640	47275	46365	94279	47747	46532
30-34	93929	46614	47315	93926	46678	47248	93478	46562	46916
35-39	88343	42888	45455	87976	42763	45213	88598	43136	45462
40-44	98240	46937	51303	96512	46157	50355	94141	45073	49068
45-49	95931	44728	51203	96374	45011	51363	96391	45100	51291
50-54	91007	41400	49607	90659	41234	49425	91066	41388	49678
55-59	71857	31614	40243	76646	33674	42972	81263	35684	45579
60-64	77210	32372	44838	71929	30196	41733	67527	28344	39183
65-69	70257	27438	42819	72301	28125	44176	73474	28533	44941
70-74	61866	22077	39789	60238	21547	38691	58999	21033	37966
75-79	45447	13244	32203	46835	14073	32762	48170	14890	33280
80-84	23475	5632	17843	25451	6020	19431	27453	6460	20993
85<	15789	3291	12498	15706	3271	12435	15639	3247	12392
Age unknown	409	248	161	351	211	140	290	163	127

### Mean annual population in counties in 2003-2005

County	2003			2004			2005		
	Men and women	Men	Women	Men and women	Men	Women	Men and women	Men	Women
Estonia total	1353557	623705	729852	1349290	621525	727765	1346097	619949	726148
Harju	521831	239270	282561	521224	239023	282201	521176	239114	282062
Hiiu	10319	4958	5361	10268	4935	5333	10234	4922	5312
Ida-Viru	175495	78934	96561	174293	78237	96056	173276	77604	95672
Jõgeva	37767	17826	19941	37560	17738	19822	37389	17639	19750
Järva	38331	17865	20466	38198	17784	20414	38091	17726	20365
Lääne	28166	13112	15054	28045	13053	14992	27921	12993	14928
Lääne-Viru	66897	30973	35924	66604	30808	35796	66325	30674	35651
Põlva	32038	15298	16740	31853	15199	16654	31650	15090	16560
Pärnu	89894	41748	48146	89501	41543	47958	89180	41366	47814
Rapla	37181	17764	19417	37063	17707	19356	36950	17654	19296
Saare	35470	16625	18845	35282	16553	18729	35142	16504	18638
Tartu	148932	67886	81046	148879	67870	81009	148928	67925	81003
Valga	35151	16333	18818	34963	16241	18722	34764	16164	18600
Viljandi	57001	26719	30282	56735	26567	30168	56493	26426	30067
Võru	39084	18394	20690	38822	18267	20555	38578	18148	20430

### Mean annual population in bigger towns in 2003-2005

Town	2003			2004			2005		
	Men and women	Men	Women	Men and women	Men	Women	Men and women	Men	Women
Tallinn	396762	178706	218056	396192	178476	217716	396102	178549	217553
Kohtla-Järve	46555	20913	25642	46189	20696	25493	45886	20498	25388
Narva	67554	30038	37516	67249	29856	37393	67040	29711	37329
Pärnu	44675	20001	24674	44482	19899	24583	44297	19812	24485
Tartu	101244	45047	56197	101390	45142	56248	101611	45288	56323

### Subjects in prison in 2003-2005

2003	2004	2005
4352	4576	4410

## Definitions and abbreviations

TB – tuberculosis, *tuberculosis* in Latin

HIV – Human Immunodeficiency Virus

WHO – World Health Organization

DOTS - Directly Observed Treatment Short course; treatment strategy that WHO recommends for tuberculosis control.

## Main definitions associated with tuberculosis

**New case** – tuberculosis has been diagnosed for the first time in life, the patient has not used antituberculosis drugs before or has used these for less than 1 month.

**Relapse** – tuberculosis has been repeatedly diagnosed in a person who has had tuberculosis before and has received appropriate treatment and has cured or completed treatment.

**Re-treatment case other than relapse** – antituberculosis treatment has been reinstated in a person who has discontinued earlier therapy or when this has proven to be ineffective.

**Smear positive TB** – a case of pulmonary tuberculosis where mycobacterium can be detected in microscopic investigation of the sputum specimen, i.e. the result of the investigation is positive. In order to detect the causative organism of TB in microscopic investigation, the number of mycobacteria in the sputum should be high and this specific patient is a considerable source of infection.

Although most of the mycobacteria found from the sputum are the causative organisms of tuberculosis, all the isolated mycobacteria have to be microbiologically identified at the species level in order to prove the presence of causative organism of tuberculosis.

**Culture positive TB** – a case of pulmonary tuberculosis in case of which the microbiological culture of the investigational material is positive. In comparison with smear positive cases, the number of causative organisms in the material may be considerably smaller and they can be identified only after special culturing of mycobacteria in laboratory conditions for 2 weeks to 2 months.

**Infectious TB cases** – a sum of smear positive and culture positive cases of pulmonary tuberculosis.

**Drug-resistant tuberculosis** – a case of tuberculosis where causative organism is resistant to one or more antituberculosis drugs.

**Multidrugresistant tuberculosis (MDR-TB)** – a case of tuberculosis where the *Mycobacterium Tuberculosis* strain is concurrently resistant to two main antituberculosis drugs isoniazide and rifampicin.

## Main definitions used when assessing and analysing treatment results

**Cured** – the patient who was spreading the bacteria completed treatment course and has negative culture results from samples collected in the final of treatment.

In case of multi-resistant tuberculosis, an MDR-TB Cured is a patient who has completed treatment according to country protocol and has been consistently culture-negative (with at least four results) for the last 12 months of treatment.

### Treatment completed

- The patient who has completed treatment according to the programme's protocol but doesn't meet the definition of cure because of lack of bacteriological culture after the 5th month of therapy.
- The patient who was not spreading bacteria at the start of therapy has undergone the complete course of therapy.

**Failed** - Treatment will be considered to have failed if two or more of the five cultures recorded in the final 12 months of therapy are positive.

**Defaulted** – the patient whose treatment was interrupted for two or more consecutive months.

# 1. Incidence of tuberculosis in Estonia

In 1990s the incidence of new tuberculosis cases and relapses increased from 26 cases per 100,000 inhabitants (in 1991) approximately 10% every year, achieving a maximum in 1998 – 59.2 registered tuberculosis cases per 100,000 inhabitants. Thereafter the annual increase in the incidence of tuberculosis started to decrease gradually, and years 2001-2002 can be regarded as a stability period with 51.9 and 47.7 registered cases per 100,000 inhabitants, respectively. Since then the incidence of tuberculosis has decreased by 5-10% annually.

**Table 1. Incidence of tuberculosis in Estonia in 1989-2005 (without Prisons Hospital)**

Year	New cases		Relapses		Total	
	Absolute number	Incidence per 100,000 inhabitants	Absolute number	Incidence per 100,000 inhabitants	Absolute number	Incidence per 100,000 inhabitants
1989	362	23,1	74	4,3	436	27,4
1990	332	21,1	91	5,8	423	26,9
1991	336	21,5	70	4,5	406	26,0
1992	328	21,4	75	4,9	403	26,3
1993	441	29,5	91	6,1	532	35,6
1994	518	35,4	105	7,2	623	42,6
1995	516	35,9	108	7,5	624	43,4
1996	593	41,9	90	6,4	683	48,2
1997	624	44,6	80	5,7	704	50,3
1998	649	46,8	127	9,2	776	56,0
1999	603	43,8	103	7,5	706	51,3
2000	608	44,4	147	10,7	755	55,1
2001	543	39,8	131	9,6	674	49,4
2002	508	37,4	117	8,6	625	46,0
2003	466	34,4	85	6,3	551	40,7
2004	443	32,8	77	5,7	520	38,5
2005	405	30,1	72	5,3	477	35,4

**Table 1a. Incidence of tuberculosis in Estonia in 1997-2005\***

Year	New cases		Relapses		Total	
	Absolute number	Incidence per 100,000 inhabitants	Absolute number	Incidence per 100,000 inhabitants	Absolute number	Incidence per 100,000 inhabitants
1997	660	47,2	84	6	744	53,2
1998	689	49,7	131	9,5	820	59,2
1999	642	46,7	112	8,1	754	54,8
2000	642	46,9	149	10,9	791	57,8
2001	570	41,8	138	10,1	708	51,9
2002	525	38,6	123	9,1	648	47,7
2003	490	36,2	89	6,6	579	42,8
2004	477	35,4	84	6,2	561	41,6
2005	424	31,5	77	5,7	501	37,2

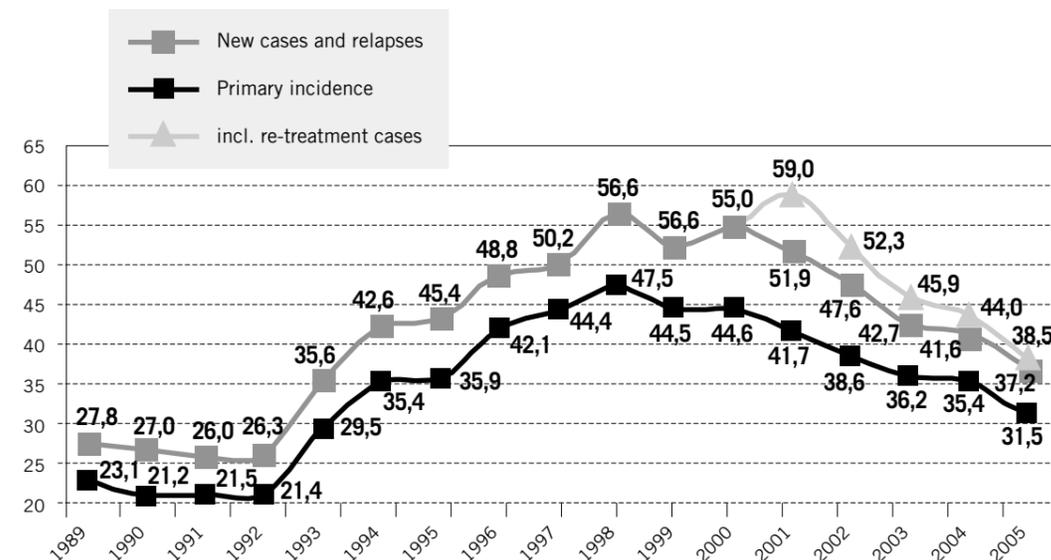
\* With the cases diagnosed in Prisons Hospital (until 1996 the incidence of tuberculosis in prisons was not reflected in national medical statistics).

\*\* Since 1994 the incidences per 100,000 inhabitants can differ from the ones published before due to the recalculation of average annual population based upon population census of 2000.

Starting from 2001 also retreatment cases are included in the notification statistics of tuberculosis – i.e. the patients in whom treatment is initiated after the failure of previous therapy (due to discontinuation of treatment, adverse effects, or refractory disease process). Appropriate data are published in the web pages of National Tuberculosis Control Program and European Commission’s Tuberculosis Surveillance System - EuroTB.

Figure 1 reflects the graphical description of the data in previous tables and also includes re-treatment cases.

Increase in the incidence of tuberculosis stopped in the beginning of the 2000s in association with the general social-economic development of Estonia and as a result of the measures taken in the treatment and prevention of tuberculosis.



**Figure 1. Registered tuberculosis cases per 100,000 inhabitants in 1989-2005.**

## 1.1 Incidence of tuberculosis by counties and in bigger towns

The biggest number of new tuberculosis cases in 2005 was diagnosed in Tallinn – 149 cases (see also Tables). The incidence in Tallinn is a bit higher than in Estonia on an average – 37.6 and 37.2 cases per 100,000 inhabitants, respectively. The highest incidence was registered among the prisoners – 544.2 cases per 100,000 detainees. However, diagnosing routines of tuberculosis in Prisons Hospital cannot be compared with the rest of society as all the detainees undergo prophylactic investigation for tuberculosis right after detention, and thereafter at least once a year. Therefore, the disease is often discovered in an early stage and the proportion of bacteriologically unproven tuberculosis is considerably higher among the detainees – 45.0% in 2005 (the average figure in Estonia is 24.3%). Also, Prisons Hospital treats tuberculosis in persons who are under arrest, and whose average annual number is very difficult to define – therefore the incidence may be smaller as the calculations are based upon the number of persons in prison institutions published by the Ministry of Justice.

Among the counties the highest incidence of tuberculosis was registered in Lääne-Virumaa – 57.1 cases per 100,000 inhabitants. Among the biggest towns the highest incidence was in Narva – 55.0 registered cases per 100,000 inhabitants. The lowest incidence was observed in Läänemaa (7.2/100 000 inhabitants), but also in Jõgevamaa and Võrumaa – 13.4 and 15.6 cases per 100,000 inhabitants, respectively.

**Table 2. Incidence of tuberculosis by counties in 2005**

	Absolute number of registered tuberculosis cases				Incidence per 100,000 inhabitants	
	New cases	Relapses	Total	Incl. MDR-TB	TB	MDR-TB
PRISONS HOSPITAL	19	5	24	1	544,2	22,7
HARJUMAA	173	26	199	30	38,2	5,8
HIIUMAA	2	1	3	0	29,3	0,0
IDA-VIRUMAA	64	10	74	6	42,7	3,5
JÕGEVAMAA	3	2	5	1	13,4	2,7
JÄRVAMAA	9	3	12	1	31,5	2,6
LÄÄNEMAA	1	1	2	1	7,2	3,6
LÄÄNE-VIRU	33	4	37	3	55,8	4,5
PÖLVAMAA	6	1	7	1	22,1	3,2
PÄRNUMAA	18	3	21	2	23,5	2,2
RAPLAMAA	8	1	9	1	24,4	2,7
SAAREMAA	15	2	17	1	48,4	2,8
TARTUMAA	35	11	46	10	30,9	6,7
VALGAMAA	15	2	17	3	48,9	8,6
VILJANDIMA	18	4	22	4	38,9	7,1
VÕRUMAA	5	1	6	3	15,6	7,8
ESTONIA TOTAL	424	77	501	68	37,2	5,1

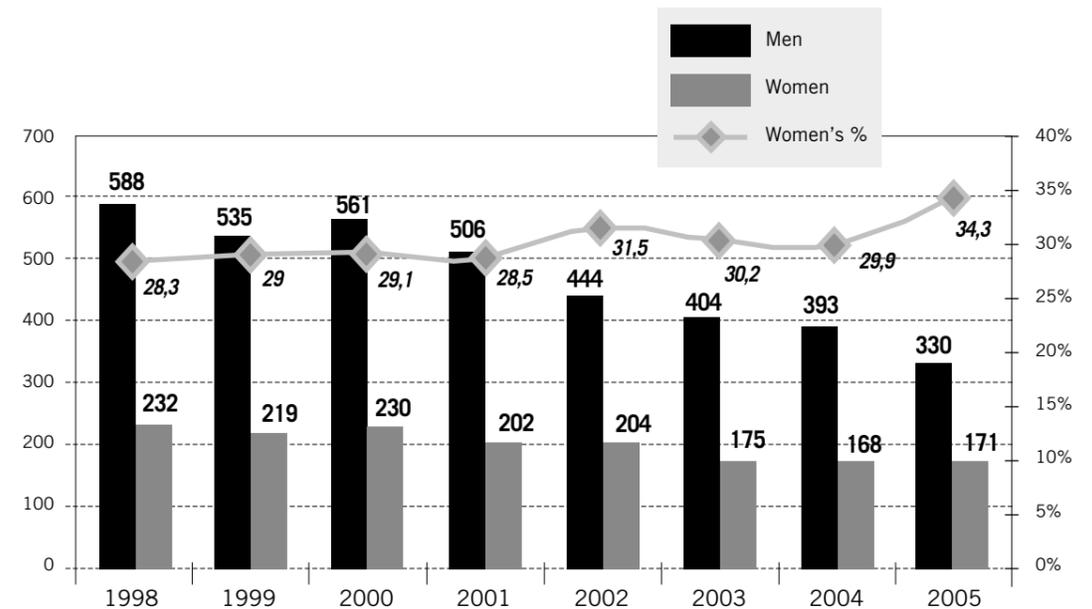
**Table 2a. Registered incidence of tuberculosis in bigger towns in 2005**

TOWN	Absolute number of registered tuberculosis cases			Incidence per 100,000 inhabitants	
	New cases	Relapses	Incl. MDR	All cases	MDR TB
TALLINN	132	17	20	37,6	5,0
TARTU	18	7	5	24,6	4,9
KOHTLA-JÄRVE	12	0	1	2,2	8,5
NARVA	30	9	5	58,2	7,5
PÄRNU	10	1	0	24,8	0,0

## 1.2 Social characteristics of tuberculosis patients

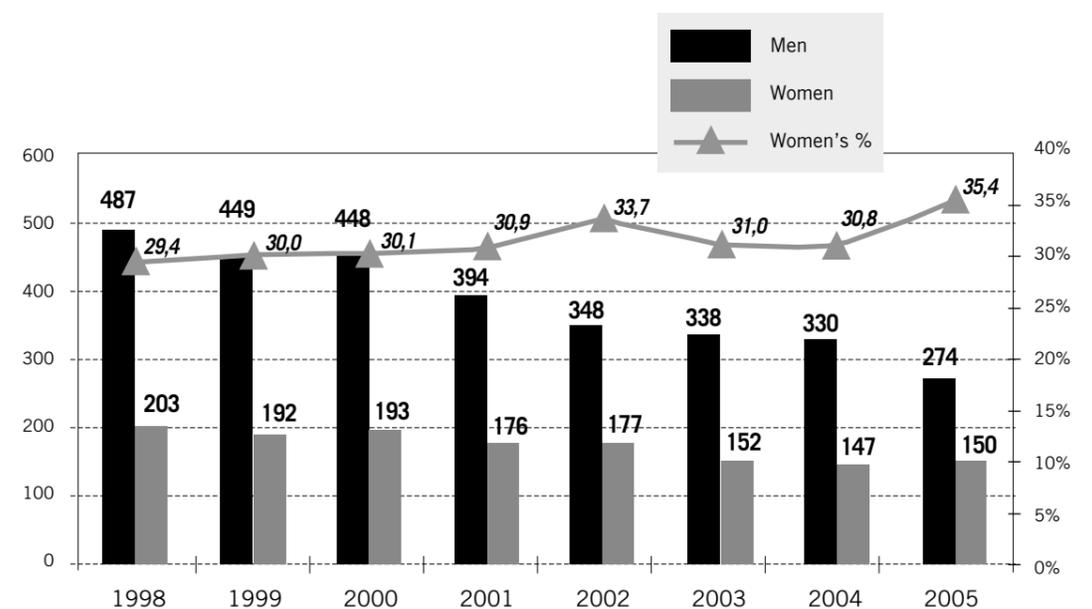
### Distribution by gender

In 2005 there were 329 men among tuberculosis patients (65.6%). Incidence per 100,000 inhabitants was 53.2 in men and 23.5 in women – i.e. more than two times lower among women. Since 1998 the incidence in men has decreased from 91.9 per 100,000 by 1.7 times by 2005. In women the respective figure is only 1.3 times. Therefore, the incidence of tuberculosis is decreasing more rapidly among man, and this is also reflected in figure 2.



**Figure 2. Distribution by genders of all tuberculosis patients in 1998-2005**

It makes sense to compare the social indicators separately for new tuberculosis cases as the incidence of relapses are affected by several other factors besides epidemiological situation – e.g. treatment mistakes, shortcomings of infection control in the hospitals, general condition of the patients, concomitant diseases, etc. In 2005, in total 424 new tuberculosis cases were registered (64.6% in men).



**Figure 2b. Distribution by genders of all new tuberculosis cases in 1998-2005.**

## Country of origin

In most of the European Union countries tuberculosis is a much bigger problem among immigrants than native inhabitants. Among all the tuberculosis patients registered in Estonia in 2005, 84.9% were born in Estonia. The proportion of immigrants among the total population has been very small during the 15 years of independence, and in 2005 tuberculosis was diagnosed only in one patient who was born in Russia and who has lived in Estonia for less than 5 years (might belong to the group of late immigrants). At the same time the EuroTB data system interprets "country of origin" distorted from our point of view – the majority of registered tuberculosis patients who were born outside Estonia have lived here for more than 15 years and should be regarded as native inhabitants from an epidemiological point of view. During the 8-year course of the National Tuberculosis Control Program, 78.1% of the tuberculosis cases have been registered in people who were born in Estonia and 21.9% in people who were born outside Estonia, mainly in former Soviet Union republics – 17% in Russia, 1.7% in the Ukraine, and 1.0% in Byelorussia. The percentage of patients from the rest of the countries is only 2% (90 cases in total). There is no significant difference between the years, except for 2004 where the percentage of persons born outside Estonia was 24.3. However, in 2005 it dropped to the lowest figure ever registered – 15.8%.

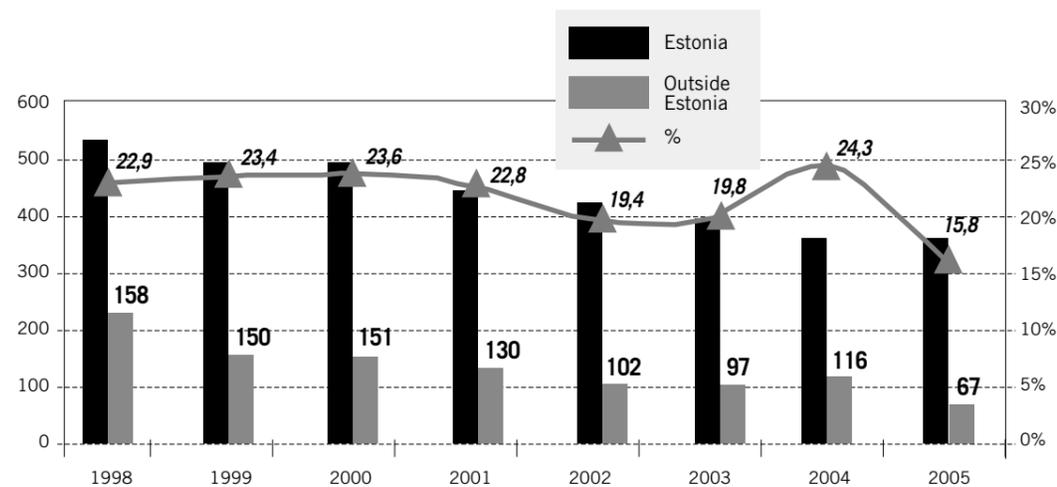


Figure 3. Distribution of tuberculosis patients by country of origin in 1998-2005.

## Education

Statistics Estonia issues data about the educational distribution of Estonian inhabitants from the 10th year of age. In 2005, all the patients were older, and therefore the data are comparable with the general educational distribution of Estonia (see figure 4 on page 13). There are more persons with basic and secondary education among the patients with tuberculosis than in Estonia in general – appropriate ratios are 25.3/19.2 and 56.7/46.7, respectively. This tendency has been relatively unchanged during the last years and can be explained with the higher tuberculosis incidence in the age group 45-55 years. At the time when this age group was obtaining their education, secondary education (11-12 classes) was compulsory in Estonia. Both tuberculosis patients with primary and higher education were registered 2 times less frequently than is the proportion of people with this educational level among the population of Estonia in total.

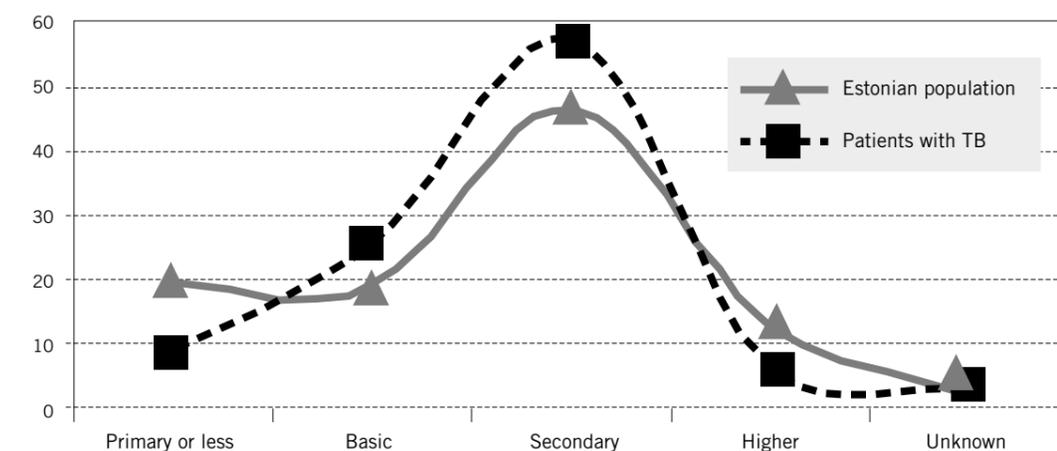


Figure 4. Distribution of tuberculosis patients by educational level in 2005 (%).

## Economical activity

The proportion of unemployed people (33.1% in 2005) has been stable over the years. This figure also includes economically inactive Estonian people (i.e. those not engaged in certain activity). The proportion of people without steady employment is of the same magnitude. The total share of pensioners and handicapped persons is 23.2%. The detainees constitute 4.7% of all the tuberculosis patients, which gives 14 times higher an incidence of tuberculosis in this group than in the total population as the detainees constitute 0.3% of Estonian inhabitants. The proportion of learning youth among the patients with tuberculosis is 2.8%.

Table 3. New tuberculosis cases by fields of activity in 1998–2005

Year	Unknown		Student		Unemployed		Conscript		Detainee		Dependant		Pensioner		Employed person		Unemployed person		Total
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	
1998	0	0,0	18	2,7	67	10,1	1	0,2	40	6,0	11	1,7	79	11,9	253	38,2	193	29,2	662
1999	0	0,0	14	2,3	98	16,1	3	0,5	40	6,6	11	1,8	57	9,4	189	31,1	195	32,1	607
2000	0	0,0	16	2,7	54	9,0	0	0,0	35	5,9	19	3,2	91	15,2	179	30,0	203	34,0	597
2001	2	0,4	17	3,2	46	8,6	0	0,0	27	5,0	11	2,1	73	13,6	152	28,4	207	38,7	535
2002	1	0,2	13	2,6	60	12,0	0	0,0	17	3,4	15	3,0	58	11,6	150	30,1	185	37,1	499
2003	5	1,1	13	2,8	37	7,9	0	0,0	25	5,3	9	1,9	68	14,5	148	31,6	164	35,0	469
2004	1	0,2	13	2,8	42	9,2	0	0,0	34	7,4	5	1,1	62	13,5	144	31,4	157	34,3	458
2005	4	1,0	13	3,2	51	12,6	0	0,0	19	4,7	12	3,0	43	10,6	134	33,1	129	31,9	405
Total	13	0,3	117	2,8	455	10,8	4	0,1	237	5,6	93	2,2	531	12,5	1349	31,9	1433	33,9	4232

## Occupation

Occupational analysis includes only those patients with tuberculosis who had a place of work at the time of falling ill. In 2005, there were 147 registered cases of tuberculosis among employed persons (29.3%) aged between 18-71 years. According to the population census data available at the website of Estonian Statistics, there were 544 650 employed persons aged 15-75 years, therefore the incidence of tuberculosis is 26.9 cases per 100,000 employees, which is considerably less frequent than in population in general (37.2 cases per 100,000 inhabitants).

Table 4. Incidence of tuberculosis by occupations

Occupation	Number	Incidence per 100,000 inhabitants
1 LEGISLATIVE BODY, HIGHER OFFICERS AND MANAGERS	2	3,0
2 HIGH-RANK SPECIALISTS	16	22,8
Including doctors 2221	2	44,9
Including nurses 3231	5	60,2
including teachers 2300	5	22,0
3 MID-RANK SPECIALISTS AND TECHNICIANS	9	12,3
4 OFFICERS	2	6,3
5 SERVICE AND SALESPEOPLE	20	29,9
6 SKILLED LABOURERS IN AGRICULTURE AND FISHING INDUSTRY	3	20,9
7 SKILLED LABOURERS AND CRAFTSMEN	32	37,6
8 DEVICE AND MACHINERY OPERATORS	17	26,2
9 UNSKILLED LABOURERS	42	72,8

## Place of residence

Place of residence (way of living) is registered in the tuberculosis registry by the doctor on the basis of the information obtained from the patient – persistent or occasional place of residence or homeless person. In 2005, 22 tuberculosis patients (4.4%) had an occasional place of residence; among them were 6 women and 16 men. 31 patients (6.2%) regarded themselves as homeless people, including 6 women.

In 2005, 53 patients (10.6%) lacked a persistent place of residence. In 13 (7.6%) female and 41 (12.4%) male tuberculosis patients lacking place of residence is a problem. Thus, 89.4% of all tuberculosis patients had a persistent place of residence. In two cases it was not possible to get information about the way of living as tuberculosis was diagnosed after death.

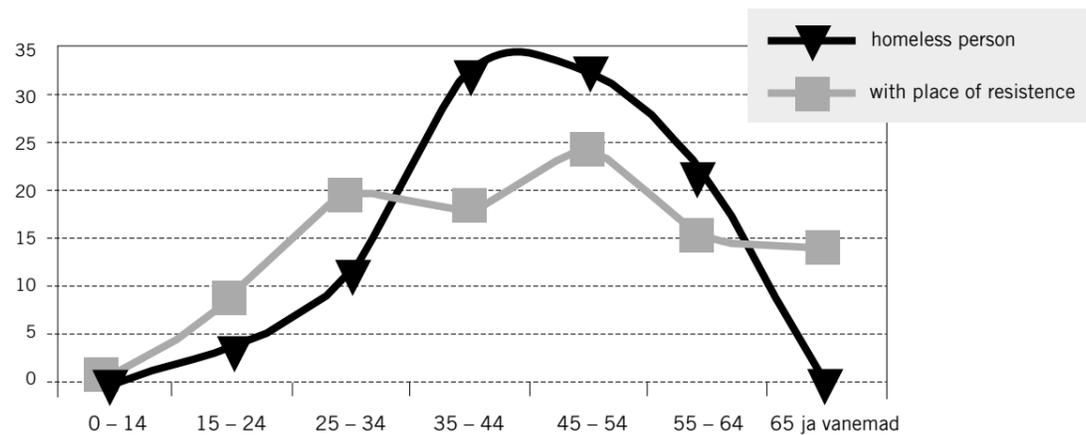


Figure 5. Age distribution of homeless people in percentages in comparison with the patients with a persistent place of residence.

## 1.3 Cases of tuberculosis registered in prison

Since 1996 all the cases of tuberculosis registered in prison are included in a single national registry similarly to all other cases. The incidence of tuberculosis during this time period has been up to 15 times higher (in 2000) than in Estonia in general.

Table 5. New cases and relapses in Prisons Hospital

Year	New cases	Relapses
1996	59	0
1997	38	3
1998	40	4
1999	39	9
2000	34	2
2001	27	7
2002	17	5
2003	24	4
2004	34	7
2005	19	5

Table 6. Registered cases of TB per 100,000 detainees

Year	Proportion	Absolute figure	Bact. confirmed %	MDR TB %
1996	1475	59	*	*
1997	1025	41	34,1	*
1998	978	44	66,6	28,5
1999	1066	48	58,3	50,0
2000	750	36	44,4	14,2
2001	711	34	55,9	36,8
2002	502	22	59,1	30,8
2003	643	28	53,6	33,3
2004	896	41	58,5	16,7
2005	544	24	54,2	8,3

In spite of the falling tendency observed in the last years, the incidence of tuberculosis in prison is still high in comparison with the respective figure in Estonia in general. In 2005, tuberculosis was registered only in one female detainee. By the localisation of tuberculosis among the 24 registered cases, 20 patients had pulmonary tuberculosis, 2 patients renal tuberculosis and one patient tuberculosis meningitis and one patient tuberculosis pleuritis. All the cases of extrapulmonary tuberculosis were bacteriologically confirmed. Relapses were registered in 5 patients (pulmonary tuberculosis in all cases). 9 cases were confirmed bacteriologically (42.1% of pulmonary tuberculosis cases). This indicator is considerably lower than in Estonia in general (73,4%).

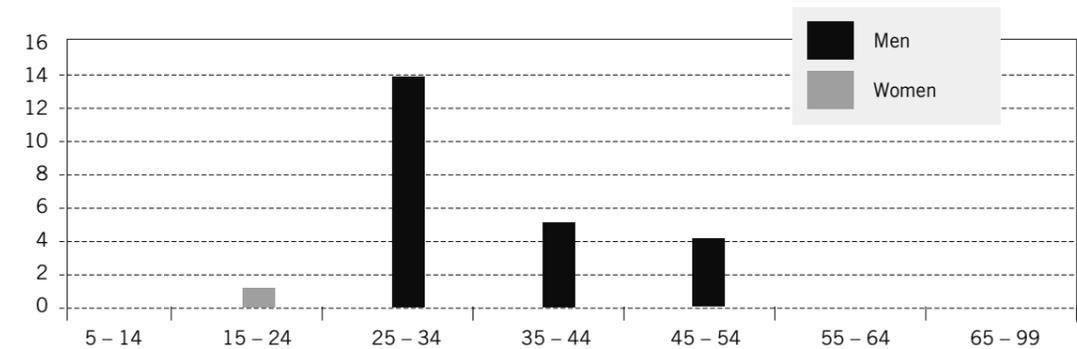


Figure 6. Gender and age distribution of the patients with tuberculosis registered in prison

The average age of tuberculosis patients diagnosed in 2005 in prisons was 34.4 years, which is 12 years less than observed in Estonia in general among the patients with tuberculosis (46.5 years). In 2005, only one multi-resistant tuberculosis case was diagnosed in Prison's Hospital, which constitutes 8.3% of all bacteriologically confirmed cases (12).

**Classification of tuberculosis cases on the basis of previous therapy.** Differently from several other diseases, in case of tuberculosis it's very important whether the patient has had tuberculosis before and whether he or she has received previous therapy or not. Both the duration of therapy and therapeutic regimen are dependent upon this factor. Therefore, for many years, the notions of new tuberculosis case and relapse have been used in the epidemiology of tuberculosis. Since 2001 tuberculosis registry also includes one more statistical indicator – re-treatment case other than relapse (see Definitions and abbreviations).

## 1.4 New cases and relapses of tuberculosis

During 2005, 424 new cases (84.6%), 77 relapses (15.4%) and 18 re-treatment cases other than relapses were registered in Estonia. The latter patients have been analysed in the incidence indicators of previous years, and have completed the previous therapeutic course with a status of either “defaulter” or “failure” (see Tables, page 29). The proportion of relapses has been stably in the range of 15-20%, being the highest in 2001 (19.5%) and the lowest in 2004 (14.8%).

The percentage of relapsed cases has exceeded consistently 10% in Estonia (10% is regarded as a good indicator for tuberculosis control system). An alarming factor is also a fact that drug-resistance is observed 3.5 times more frequently among the relapsed cases than in new tuberculosis cases – 13.3% and 47%, respectively, in 2005.

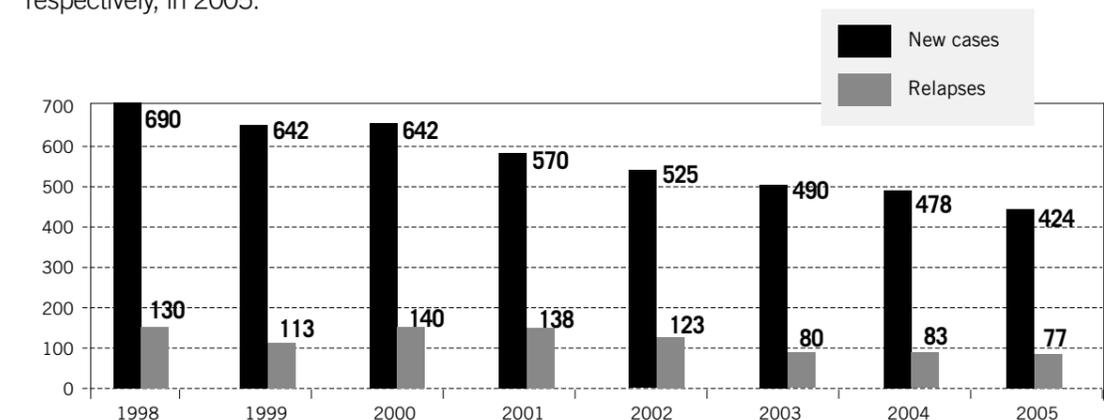


Figure 7. New tuberculosis cases and relapses in 1998-2005.

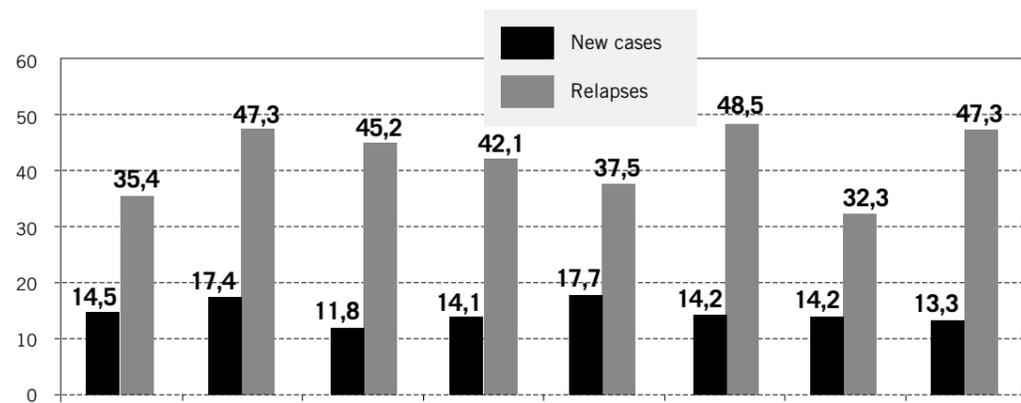


Figure 8. Proportion of multi-resistant tuberculosis cases (%) among all tested cases in 1998-2005.

Multi-drug resistant (MDR) tuberculosis has been observed 2-3 times more frequently in relapsed cases than in new tuberculosis cases.

## 1.5 Distribution of tuberculosis by age groups

**General:** The highest incidence – 125 patients per 100,000 inhabitants – was observed in the age group of 45-54 years. Especially high – 3 times higher than the average – is the morbidity among men in this particular age group. In terms of women, the highest incidence is observed in the younger age group of 25-34 years, but the morbidity among men remains higher in all age groups. Over the years, two-thirds to three-quarters of all tuberculosis patients have been men (for details please see Tables on pages 11, 12, 15, 17, 22, 23).

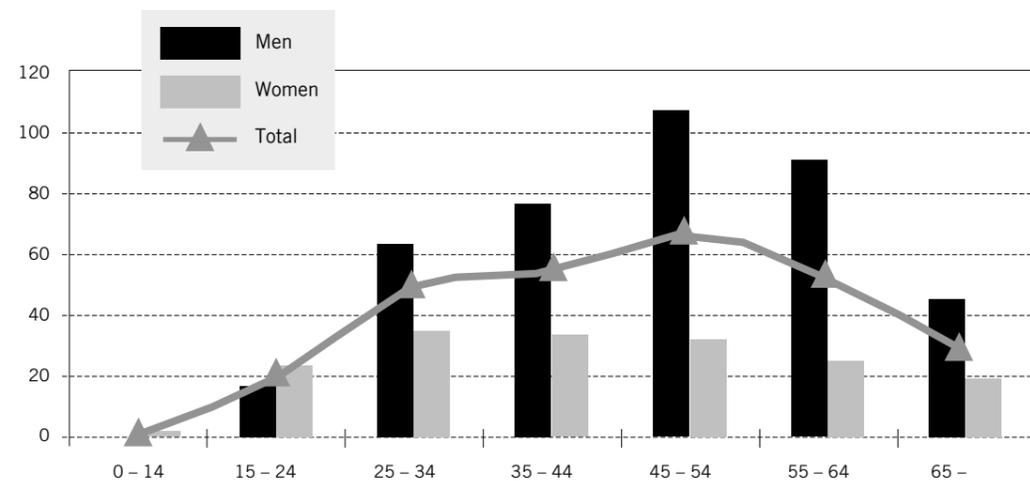


Figure 9. Incidence of tuberculosis per 100,000 inhabitants by age groups in 2005.

## 1.6 Tuberculosis in children

Tuberculosis in children differs from the tuberculosis in adults with respect of general indicators and course and localisation of the disease. The incidence in children per 100,000 children is 3 (2000) to 30 (2005) times less frequent than in population in general (see Table 10). During the course of the Tuberculosis Control Program, the incidence of tuberculosis among children has decreased considerably since 1998. Whereas men constitute two-thirds among adult tuberculosis patients, then in case of children the proportion of girls and boys is 55%:45% in favour of the girls.

Bacteriologically confirmed case of lymph node tuberculosis was last registered in 2004. Overall, of the 69 tuberculosis cases registered in children, only 5 were bacteriologically confirmed (7.2%). In 2005, one case of thoracic lymph node tuberculosis was registered in a 13-year old girl.

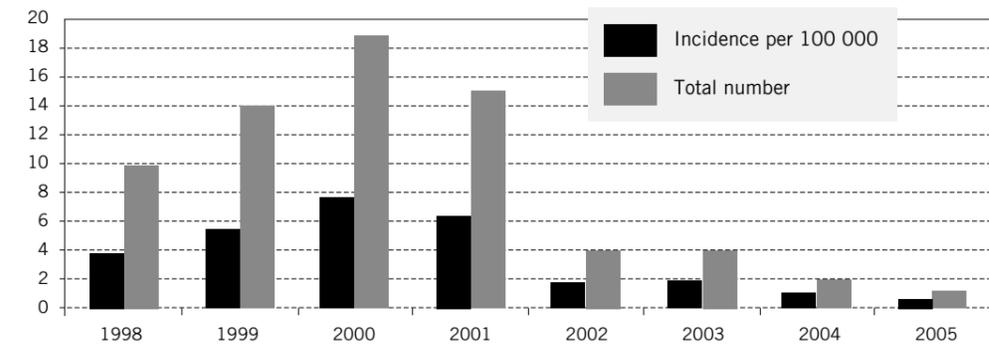


Figure 10. Tuberculosis in children in 1998-2005.

Table 7. Tuberculosis in children by diagnoses in 1998-2005

	1998	1999	2000	2001	2002	2003	2004	2005
Pulmonary tuberculosis A15.1	0	0	1	0	0	0	0	0
Pulmonary tuberculosis A15.2	0	0	0	0	0	1	0	0
Tuberculosis pleuritis A15.6	0	0	1	1	0	0	0	0
Pulmonary tuberculosis A16.0	2	2	6	1	0	0	0	0
Tuberculosis thoracic lymphadenitis A16.3	7	8	9	10	1	3	0	1
Tuberculosis pleuritis A16.5	0	1	0	0	1	0	0	0
Primary TB of respiratory tract A16.7	1	2	0	2	1	0	1	0
Bone tuberculosis A18.0	0	1	1	0	0	0	0	0
Other extrapulmonary TB A18.2- A18.5	0	0	1	1	1	0	0	1
Total	10	14	19	15	4	4	1	2

Among the 69 tuberculosis cases diagnosed in children, only 15 (21.7%) were cases of pulmonary tuberculosis, and among these only 2 (13%) were bacteriologically confirmed cases. In adults, the respective figures are approximately 90% and 75%.

## 1.7 Tuberculosis in adolescents

Among adolescents (children in the age of 15-17 years), similarly to younger children, tuberculosis is more frequently observed in females than in males – 63.8% and 36.2%, respectively. In total 56 cases of tuberculosis have been diagnosed in Estonia in adolescents during 1998-2005, including 37 (65%) bacteriologically confirmed cases. Incidence per 100,000 inhabitants is 3-4 times lower than the total incidence per all age groups.

Table 8. Tuberculosis in adolescents by diagnoses in 1998-2005

	1998	1999	2000	2001	2002	2003	2004	2005
Pulmonary tuberculosis A15.0	1	2	1	4	3	1	1	3
Pulmonary tuberculosis A15.1	5	4	5	2	0	0	2	1
Pulmonary tuberculosis A15.2	0	0	0	1	0	0	0	0
Tuberculosis pleuritis A15.6	0	0	1	1	0	0	0	0
Pulmonary tuberculosis A16.0	2	0	5	0	1	2	1	1
Tuberculosis pleuritis A16.5	1	0	0	1	0	0	0	0
Bone tuberculosis A18.0	0	1	0	1	0	0	0	0
Abdominal tuberculosis A18.3	0	1	0	0	1	0	0	0

HIV-positive patients have not been observed among the children and adolescents with tuberculosis, but refractory MDR-TB has been diagnosed in adolescents in 6 cases (22.2% of all the cases tested).

## 1.8 Pulmonary tuberculosis

In 2005, 449 cases of pulmonary tuberculosis were registered in Estonia (i.e. 89.6% of all tuberculosis cases). Among these 346 cases (77.1% of all the cases) were bacteriologically (with microbiological culture) confirmed infectious cases of tuberculosis.

According to the definition of World Health Organization (WHO), only those tuberculosis cases that have been proven to be positive with microbiological culture method are regarded as definite cases of tuberculosis. Also, the statistics of WHO do not include unproven relapses of tuberculosis. Therefore, certain differences in the incidence of tuberculosis are possible.

In Estonia three-quarters of all pulmonary tuberculosis cases are bacteriologically confirmed with microbiological culture method.

**Table 9. Bacteriologically (with microbiological culture) proven cases of pulmonary tuberculosis by years**

	Year								Total
	1998	1999	2000	2001	2002	2003	2004	2005	
Culture+	520	510	517	458	441	388	394	346	3574
% of tested	69,1	74,6	72,4	75,6	79,0	76,4	79,8	78,3	75,1

**Table 10. Smear positive cases of pulmonary tuberculosis by years**

	Year								Total
	1998	1999	2000	2001	2002	2003	2004	2005	
Smear+	371	307	316	267	255	228	236	191	2171
% of tested	49,3	44,9	44,2	43,8	45,5	44,7	47,8	43,2	45,5

The proportion of smear positive (especially contagious) cases of tuberculosis has been over the years approximately 45% of all tuberculosis cases.

**Table 11. Bacteriologically confirmed cases of pulmonary tuberculosis by counties in 2005**

COUNTY	Culture+ Absolute figure	% of tested	COUNTY	Culture+ Absolute figure	% of tested
PRISONS HOSPITAL	9	45,0	PÕLVAMAA	5	83,3
HARJUMAA	146	81,1	PÄRNUMAA	12	70,6
HIIUMAA	3	100,0	RAPLAMAA	8	100,0
IDA-VIRUMAA	48	72,7	SAAREMAA	11	78,6
JÕGEVAMAA	2	50,0	TARTUMAA	37	92,5
JÄRVAMAA	9	81,8	VALGAMAA	12	85,7
LÄÄNEMAA	1	100,0	VILJANDIMAA	12	66,7
LÄÄNE-VIRUMAA	27	79,4	VÕRUMAA	4	66,7
			Estonia total	346	78,3

Observed differences in smaller counties are statistically insignificant due to small absolute numbers. The smaller proportion of proven tuberculosis cases in Prisons Hospital most probably reflects earlier diagnosis of the disease – all detainees will undergo prophylactic investigations for tuberculosis at admission to the prison, and once a year thereafter.

## Cases of pulmonary tuberculosis by the results of bacteriological analysis

Nowadays microbiological analysis of mycobacteria is the most reliable method for the confirmation of the tuberculosis diagnosis, determination of therapeutic regimen (susceptibility test) and assessment of the efficacy of therapy (analysed material does not contain causative agents of tuberculosis any more, i.e. the result of analysis is negative).

**Table 12. Microbiological investigations in pulmonary tuberculosis cases registered in 2005**

	New cases	Relapses	Total
Smear+/Culture+	162	29	191
Smear+/Culture+	129	26	155
Smear+/Culture+	80	16	96
Not tested	6	1	7
Total	377	72	449

There were 103 (22.9%) bacteriologically unconfirmed cases of pulmonary tuberculosis registered in 2005, including 7 cases where material was not sent for laboratory investigation, 3 cases where tuberculosis was diagnosed at autopsy, and 4 cases where patients were not able to give material (sputum) for analysis.

## 1.9 Drug resistance of *M. tuberculosis*

(see also Table: Drug resistance of bacteriologically confirmed cases of pulmonary tuberculosis in 2001-2005)

According to the data of tuberculosis registry, drug resistance of *M. tuberculosis* was analysed in the strains isolated from 370 patients in 2005. In 122 cases (32.9%) drug resistance was observed against at least one first-line antituberculosis drug. According to the general practice in Estonia, the drug resistance of the causative organism of tuberculosis was tested with 4 first-line antituberculosis drugs and 5 second-line antituberculosis drugs.

Drug resistance was observed:

streptomycin –	113 strains (30.5%)
ethambutol –	67 strains (18.1%)
isoniazide –	95 strains (25.7%)
rifampicin–	68 strains (18.4%)

### Pulmonary MDR tuberculosis

(*M. tuberculosis* is *simultaneously resistant to isoniazide and rifampicin*)

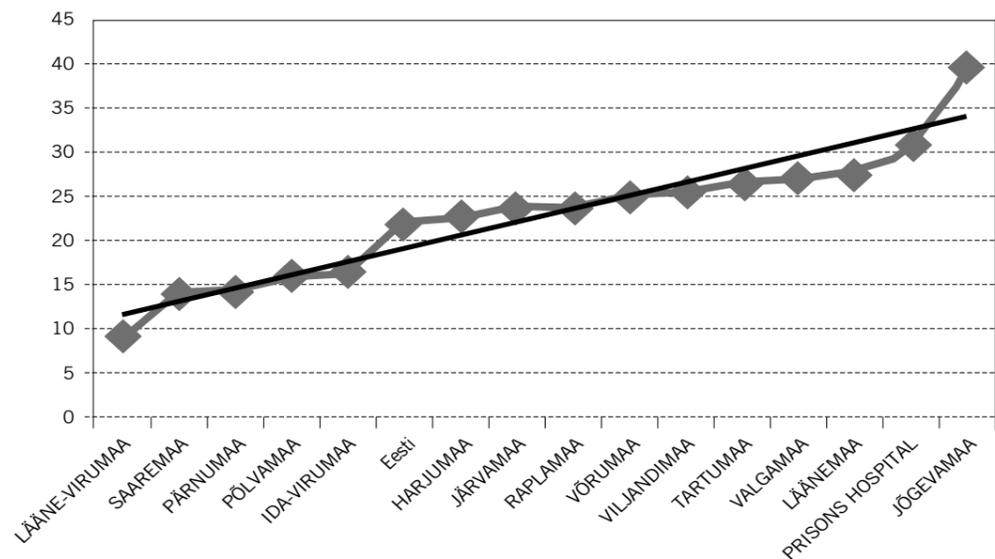
During the last years Estonia has been a “leading” country in the world with respect to the high incidence of drug resistance of *Mycobacterium tuberculosis*, especially multi-drug resistant tuberculosis. In 2005, 41 (14.1%) new cases of bacteriologically confirmed (with microbiological culture) tuberculosis were found to be multi-drug resistant, i.e. the causative organism was found to be resistant to at least isoniazide and rifampicin. The proportion of multi-resistant tuberculosis was higher among the patients with relapses: 48.1% (26 cases).

In 2005, 67 cases (19.5%) out of 344 cases confirmed with microbiological culture method were found to be resistant to at least *isoniazide and rifampicin*.

### Multi-drug resistant tuberculosis cases by counties in 1998–2005

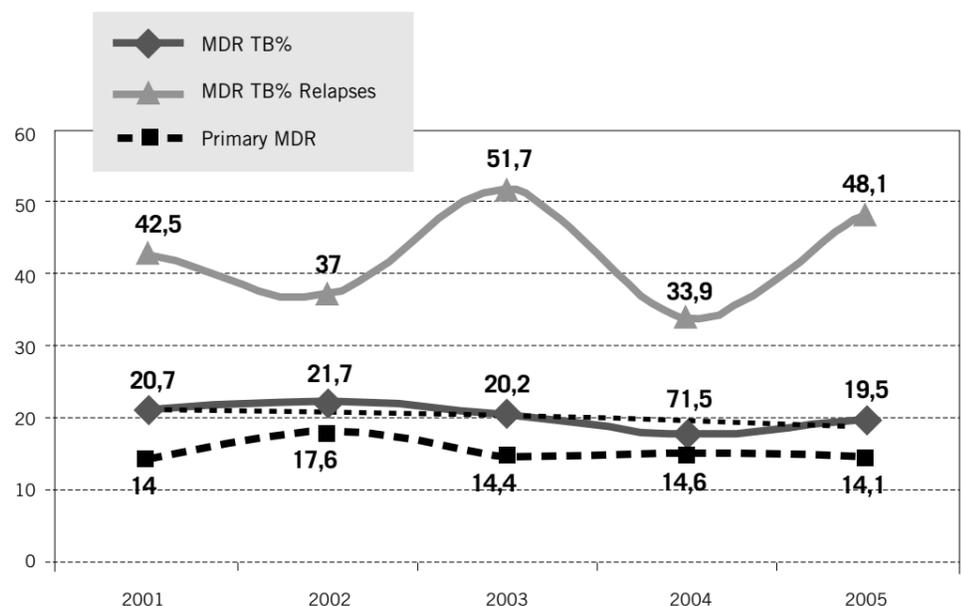
The total number of registered multi-resistant tuberculosis cases is as follows:

2001 – 93    2002 – 95    2003 – 78    2004 – 69    2005 – 67



**Figure 11. Percentage of MDR-TB cases by counties in 2001–2005**

Although the absolute figure of multi-resistant tuberculosis cases has decreased over the years, their proportion among all the diagnosed cases remains to be constantly high.



**Figure 12. Multi-resistant forms of pulmonary tuberculosis in 2001-2005 (% of all tested cases)**

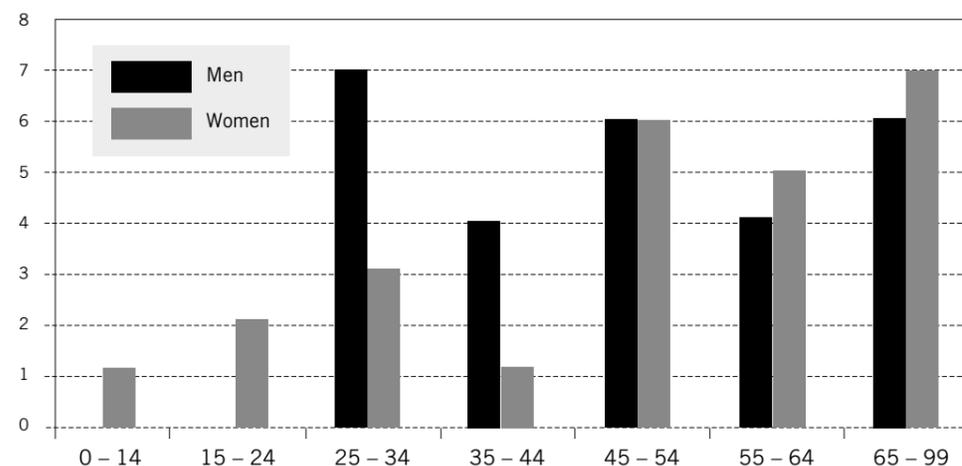
Although the absolute figure of multi-resistant tuberculosis cases has decreased over the years, their proportion among all the diagnosed cases remains to be constantly high.

## 1.10 Extrapulmonary tuberculosis

In 2005, 51 cases of extrapulmonary tuberculosis were registered, including 47 new cases and 5 relapses. Bacteriologically confirmed were 26 (50%) cases of extrapulmonary tuberculosis. In half of the cases tuberculosis was diagnosed on the basis of clinical signs and symptoms.

**Table 13. Cases of extrapulmonary tuberculosis by localisation.**

Localisation	RHK 10 code	2005
Tuberculosis pleuritis	A15.6	12
Tuberculosis pleuritis	A16.5	7
Tuberculosis of thoracic lymph nodes	A15.4	1
Tuberculosis of thoracic lymph nodes	A16.3	1
Tuberculosis meningitis	A17.0	1
Bone tuberculosis	A18.0	12
Urogenital tuberculosis	A18.1	9
Peripheral tuberculosis lymphadenopathy	A18.2	5
Skin tuberculosis	A18.4	1
Eye tuberculosis	A18.5	1
Adrenal tuberculosis	A18.7	1
Miliary tuberculosis (extrapulmonary)	A19.1	1
Extrapulmonary tuberculosis in total		52



**Figure 13. Extrapulmonary tuberculosis by gender and age groups in 2005.**

Differently from pulmonary tuberculosis there is no dominating age group among the patients with extrapulmonary tuberculosis. Also, the incidence is practically the same in men and women, in younger and older age groups morbidity in women even exceeds the morbidity in men.

In 2005, 25 women (48%) and 27 men (52%) were registered as having an active form of extrapulmonary tuberculosis. Only one case of multi-drug resistant extrapulmonary tuberculosis was registered in 2005: it was a patient with tuberculosis pleuritis, and multi-resistant strain of *M.tuberculosis* was isolated from the pleural effusion fluid.

## 1.11 HIV-positive patients with tuberculosis

Infection with human immunodeficiency virus (HIV) has been one of the most important risk factors of tuberculosis in the world in the recent years. In Estonia, HIV infection has been registered in approximately 2.5% of all the cases of tuberculosis. However, taking into the consideration the rapid increase in the number of HIV-positive individuals in Estonia, it can be expected that the number of HIV-positive tuberculosis patients will also start to increase. So far the statistics of HIV-positive tuberculosis patients

in Estonia is as follows: in total 99 cases in 90 individuals, including 9 HIV-positive patients with relapse of tuberculosis. Until 2001, all registered HIV-positive patients with tuberculosis were men (in total 70 men), in women the coexistence of tuberculosis and HIV infection has been registered in 20 cases. In the age group of 18-58 years the average age of tuberculosis patients at the time of diagnosing HIV-infection was 31.2 years.

**Table 14. Gender distribution of HIV-positive tuberculosis patients in different years**

	1997	1999	2000	2001	2002	2003	2004	2005	Kokku
Men	1	1	1	7	13	11	18	25	77
Woman					6	4	4	8	22
Total	1	1	1	7	19	15	22	33	99
%	0,1	0,1	0,1	1	2,7	2,6	3,9	6,6	1,8

Among the **HIV-positive tuberculosis patients** registered in 2005, **extrapulmonary tuberculosis** was observed in 4 (12.1%) patients (renal tuberculosis in 2 patients, tuberculosis pleuritis in 1 patient and tuberculosis meningitis in 1 patient). Multi-resistant forms of tuberculosis were registered in 6 cases (18.2%).

**HIV-positive tuberculosis patients by place of residence:** 16 cases (including 14 cases in Tallinn) were diagnosed in Harjumaa, 7 cases in Ida-Virumaa (including 3 cases in Narva), 7 cases in Prisons Hospital, 2 cases in Lääne-Virumaa and 1 case in Jõgevamaa.

**Treatment results (survival) of HIV-positive tuberculosis patients:** of the 95 HIV-positive tuberculosis patients registered in 1997-005, 6 patients were receiving therapy at the end of 2006, 34 patients are dead (including 26 from tuberculosis, 6 from HIV, 1 from pneumonia, and 1 due to narcotics overdose), 44 (46.3%) are recovered from the tuberculosis and 11 have discontinued therapy.

## 2. Treatment results

This annual report analyses the treatment results of “susceptible”(non-MDR-TB) cases registered in 2004 and multi-resistant tuberculosis cases registered in 2003. When comparing social indicators, the treatment results of susceptible and MDR tuberculosis have been summarised for those who started treatment in 2003 (i.e. registered tuberculosis cases).

Due to the differences in the duration of therapy and used drugs it makes sense to differentiate the treatment results of multi-resistant tuberculosis from other cases.

The World Health Organization in cooperation with EuroTB publishes the treatment results without taking into account drug resistance, whereas cases where therapy lasts for longer than 1 year are not regarded as successful therapeutic response.

### 2.1 Treatment results of tuberculosis patients registered in 2004

(For more details see Attachment: Tables)

In 2004, in total 561 patients with tuberculosis were registered, including 349 susceptible, 141 untested and 71 MDR-TB cases (500 cases of pulmonary and 61 cases of extrapulmonary tuberculosis).

Treatment results in the beginning of 2005 in non-MDR tuberculosis patients:

**cured/ treatment completed** – 408 (83.3%);

**died** – 44 (8.9%),  
incl. 27 for tuberculosis and 17 for other cause;

**defaulted**  
(for at least 2 months) – 68 (8.6%);

**failed** – 3 (0.6%) (etiological treatment was decided to be discontinued due to persistent spreading of bacteria or new treatment course was initiated)

**Table 15. Treatment results of tuberculosis patients registered in 2004 (new cases and relapses) by gender**

	Cured/completed treatment	Failed	Defaulted	Died for other cause	Died for tuberculosis	Total
Men	279	3	23	13	24	342
%	81,6	0,9	6,7	3,8	7,0	100,0
Women	129	0	12	4	3	148
%	87,2	0,0	8,1	2,7	2,0	100,0
Total	408	3	35	17	27	490
%	83,3	0,6	7,1	3,5	5,5	100,0

6.7% of men and 8.1% of women defaulted antituberculosis treatment – therefore in 2004, differently from several earlier years, men followed the therapeutic regimen more conscientiously than women. At the same time 10.8% of men and only 4.7% of women died during therapy, which probably reflects the fact that women turn to the doctor more early (tuberculosis process is in an initial stage). This also reflects the slight difference in the efficacy of treatment results – 81.6% in men and 87.2% in women. Therapeutic efficacy of female non-MDR tuberculosis patients exceeds even the global aim set by WHO for 2005 – 85%. However, this can't be said for the treatment results of men, and especially MDR-TB. Also, considerable differences exist between the treatment results of new tuberculosis cases and relapses (see Table 17).

### 2.2 Treatment results of patients with MDR tuberculosis registered in 2003

The proportion of multi-resistant tuberculosis cases among all the registered tuberculosis cases in Estonia has been in the range from 13.3% (in 2005) to 17% (in 2002). Due to much longer duration of therapy, frequent adverse effects and much lower efficacy of the second-line antituberculosis drugs, it is much more difficult to achieve positive response in case of MDR-TB than in case of tuberculosis with a susceptible causative organism. Starting from 2001, the Directly Observed Therapy System (DOTS-Plus) has been used in Estonia, which has helped to purchase second-line antituberculosis drugs up to 70% more cheaply via WHO in comparison with Estonian market prices. However, the treatment results of MDR tuberculosis are still more than 20% worse than in tuberculosis patients with a susceptible causative organism.

**Table 16. Treatment results of multi-drug resistant tuberculosis (MDR TB) cases confirmed by microbiological culture (in 2001–2003)**

Year	Completed treatment	Cured	Failure	Defaulted	Died for other cause	Died for tuberculosis	Total	Treatment efficacy %
2001	6	48	8	19	1	11	93	
%	6,5	51,6	8,6	20,4	1,1	11,8	100,0	<b>58,1</b>
2002	2	49	7	20	5	12	95	
%	2,1	51,6	7,4	21,1	5,3	12,6	100,0	<b>53,7</b>
2003	2	44	5	13	4	10	78	
%	2,6	56,4	6,4	16,7	5,1	12,8	100,0	<b>59,0</b>

**Table 17. Comparison of the treatment results of susceptible and multi-drug resistant tuberculosis (MDR TB) confirmed by microbiological culture registered in 2003**

	Cured	Completed treatment	Failure	Defaulted	Left Estonia	Died for tuberculosis	Died for other cause	Total	Treatment efficacy %
MDR TB	44	2	5	13	0	10	4	78	
%	56,4	2,6	6,4	16,7	0,0	12,8	5,1	100,0	59,0
"Susceptible" TB	244	8	2	23	1	21	10	309	
%	79,0	2,6	0,6	7,4	0,3	6,8	3,2	100,0	81,6
Total	288	10	7	36	1	31	14	387	
%	74,4	2,6	1,8	9,3	0,3	8,0	3,6	100,0	77,0

Positive treatment results in this table include columns "Cured" and "Completed treatment." The treatment results of susceptible (possible resistance to individual first-line antituberculosis drugs, but not to isoniazide and rifampicin simultaneously) bacteriologically confirmed tuberculosis cases is almost 20% better than the respective figure in case of MDR TB. The proportion of patients that have died for tuberculosis is ca. 13% in case of multi-resistant tuberculosis and less than 7% in case of susceptible tuberculosis.

## 2.3 Treatment results in relation to the social status of the patient (in 2003)

In the following tables treatment results in relation to the social differences have been presented. The year 2003 has been taken as a basis for the comparison as all the patients who started therapy in 2003, have completed it by the end of 2006. Only those tuberculosis patients have been analysed who have been treated with DOTS system at least in the intensive therapy phase.

### Marital status

**Table 18. Treatment results of tuberculosis cases in relation to the marital status**

	Cured	Completed treatment	Failure	Defaulted	Left Estonia	Died for tuberculosis	Died for other cause	Total
Married	147	5	6	11	1	12	8	190
%	77,4	2,6	3,2	5,8	0,5	6,3	4,2	80,0
Singles	139	5	1	25	0	17	5	192
%	72,4	2,6	0,5	13,0	0,0	8,9	2,6	75,0

Only adult population (over 18 years of age) have been included in the analysis. Information about the marital status was not available for 4 (1%) patients with tuberculosis (TB was diagnosed post mortem or due to inadequate family history). Singles, divorced and widows were included in one group – "singles," and patients living in unregistered or registered marriage in another group – "married." Treatment results were 5% better in married patients in comparison with singles, which can be mainly attributable to a smaller number of patients who discontinued therapy wilfully.

### Economic activity

The following table provides a comparison of bigger social groups by economical activity: of the 386 tuberculosis cases registered in total, 157 (40.7%) were observed in unemployed persons, 104 (26.9%) in employed persons, 59 (15.3%) in pensioners and 14 (3.6%) in detainees. In 10 cases (2.6%) tuberculosis was registered in dependent persons or pupils, and in 3 cases social status was not indicated in the registry.

**Table 19. The dependence of the treatment results of confirmed pulmonary tuberculosis cases of the social status**

	Cured	Completed treatment	Failure	Defaulted	Left Estonia	Died for tuberculosis	Died for other cause	Total	Treatment efficacy %
Detainee	14	0	0	0	0	0	0	14	
%	100	0	0	0	0	0	0	100	100,0
Pensioner	37	4	2	0	0	11	5	59	
%	62,7	6,8	3,4	0,0	0,0	18,6	8,5	100,0	69,5
Employed person	87	4	2	7	1	2	1	104	
%	83,7	3,8	1,9	6,7	1,0	1,9	1,0	100,0	87,5
Unemployed person	113	2	2	24	0	12	4	157	
%	72,0	1,3	1,3	15,3	0,0	7,6	2,5	100,0	73,2
Disabled person	26	0	1	4	0	4	4	39	
%	66,7	0,0	2,6	10,3	0,0	10,3	10,3	100,0	66,7
Dependent person	30	0	1	4	0	4	4	43	
%	69,8	0,0	2,3	9,3	0,0	9,3	9,3	100,0	69,8

Treatment result was more favourable in employed persons – 87.5%. All the detainees recovered, but their limited number in 2003 does not allow to make any definite conclusions. Also, a worse treatment result could be expected in pensioners, mainly due to higher mortality (ca. 27%). Unemployed persons discontinued prescribed therapy more frequently than other groups (15.3%).

### Education

This table analyses treatment results from the point of view of patients' education level: in 10 cases (2.6%) education was not indicated in the registry. We compared the treatment results of tuberculosis patients with basic, secondary and higher education.

**Table 20. Comparison of treatment results by educational level**

	Cured	Completed treatment	Failure	Defaulted	Left Estonia	Died for tuberculosis	Died for other cause	Total	Treatment efficacy %
Basic education or less	96	3	3	11	0	19	7	139	
%	69,1	2,2	2,2	7,9	0,0	13,7	5,0	100,0	71,2
Secondary education	166	6	4	24	0	10	5	215	
%	77,2	2,8	1,9	11,2	0,0	4,7	2,3	100,0	80,0
Higher education	18	1	0	1	1	1	0	22	
%	81,8	4,5	0,0	4,5	4,5	4,5	0,0	100,0	86,4

Out of the 22 patients with higher education 86.4% recovered, whereas respective figures for the patients with secondary and basic education were 80% and 71.2%. This observed difference – first of all between the patients with higher education and basic or primary education – can be mainly attributed to the higher average age of the patients with basic and primary education and higher mortality in this age group. Better treatment results of patients with higher education in comparison with those with secondary education is related to the lower treatment discontinuation rate in this patient population.

## Detection of tuberculosis

In total 121 (17.9%) bacteriologically confirmed tuberculosis cases registered in 2003 were detected at prophylactic investigation. The following table compares the treatment results of the cases diagnosed at prophylactic investigation (i.e. at earlier stage) with those detected in patients who turned to the doctor themselves with complaints.

**Table 21. Comparison of treatment results in relation to the turning to the healthcare institution**

	Cured	Completed treatment	Failure	Defaulted	Left Estonia	Died for tuberculosis	Died for other cause	Total	Treatment efficacy %
With complaints	218	9	7	30	1	30	10	305	
%	71,5	3,0	2,3	9,8	0,3	9,8	3,3	100,0	74,4
Prophylactically	69	1	0	6	0	1	4	81	
%	85,2	1,2	0,0	7,4	0,0	1,2	4,9	100,0	86,4

Positive treatment result was observed in 86.4% of cases that were detected at prophylactic investigation and only in 74.4% of cases detected in patients who had complaints. This difference is mainly related to the higher mortality rate in the latter group – 13.1% versus 6.1%, and smaller proportion of patients who discontinued therapy among the patients in whom tuberculosis was discovered at prophylactic investigation (7.4% and 9.8%, respectively).

## New tuberculosis cases in 2005

Form of active tuberculosis	RHK-10	Gender	Total	Age group																	
				04	59	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
A	B	D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<b>Pulmonary tuberculosis</b>	A15- A19;	M	250	0	0	0	7	9	20	27	23	32	34	35	27	15	8	5	4	4	0
		W	127	0	0	0	6	15	14	14	18	6	5	16	10	6	7	2	5	3	0
Including Focal		M	5							1			2		1	1					
		W	2			1					1										
		M	223			7	9	19	22	20	29	29	30	30	26	13	8	3	4	4	
		W	120			6	14	14	13	16	6	5	14	14	10	6	6	2	5	3	
Disseminated		M	22					1	5	3	3	4	4	4				2			
		W	4						1	1				2			1				
Fibrous-cavernous		M	0																		
		W	1																		
<b>Bacillary of pulmonary tuberculosis</b>																					
Bacterioscopy+, culture+		M	112				4	5	12	13	6	13	17	23	9	3	2		2	3	
		W	50				3	4	7	3	7	1	3	8	4	4	3		1	2	
Bacterioscopy-, culture+		M	87				3	4	6	9	9	13	7	9	12	7	2	3	2	1	
		W	42				1	8	6	3	5	3	1	2	3	2	3		4	1	
Bacterioscopy+, culture-		M	0																		
		W	0																		
Bacterioscopy-, culture-		M	48						2	5	8	6	10	2	6	5	3	1			
		W	32				2	3	8	6	6	2	1	4	3	1	1	2			
Bacterioscopic investigation not performed		M	3											1				1			
		W	3						1					2							
Bacillary pulmonary tuberculosis total		M	199	0	0	0	7	9	18	22	15	26	24	32	21	10	4	3	4	4	0
		W	92	0	0	0	4	12	13	6	12	4	4	10	7	6	6	0	5	3	0
including MDR		M	27					1	1	5	3	5	3	4	2	2	1				
		W	14				2	3	1	1	3			2	1					1	

Table 1 continued (Tuberculosis cases registered for the first time in life)

Form of active tuberculosis	RHK-10	Gender	Total	Age																			
				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	70-74	75-79	80-84	85+		
Extrapulmonary tuberculosis	Including bacteriologically confirmed	M	24	0	0	0	0	0	4	3	2	2	0	2	4	2	2	0	5	0	0		
		W	23	0	0	1	1	0	3	0	1	1	4	1	4	2	2	2	1	1	0		
		M	13					3	1	2			2	2									
		W	13				1		1			3	1	3	1	1	1						
		M	0																				
		W	1												1								
		M	1												1								
		W	1		1																		
		M	9				1		3	2					2								
		W	10					1	2						3	1	1						
Bone-joints	A18.0	M	6											1									
		W	5						1					1	1								
Nervous system	A17	M	0																				
		W	0																				
Urogenital	A18.1	M	5						2						1								
		W	4														2	1				1	
Other A18.2-A18.8, A15.8, A15.9, A19 (extrapulmonary), A16.7-A16.9		M	3					1															
		W	3			1																1	
Primary active tuberculosis in total	A15-A19	M	274	0	0	7	9	20	31	26	34	34	37	31	17	10	5	9	4	0	0		
		W	150	0	0	7	16	15	14	21	6	6	17	14	7	11	4	7	4	1	0		
Bacillary		M	16	0	0	0	1	3	1	3	2	0	3	2	2	0	0	2	0	0	0		
		W	212	0	0	7	9	19	22	16	26	25	32	24	11	7	4	5	4	1	0		
Cases discovered in prison		M	18						7	7	2												
		W	1				1																
Adolescents 15-17 years		M	2																				
		W	3																				
Discovered at prophylactic investigation		M	78				2	2	10	12	9	11	8	10	7	3	1			1	2		
		W																					

## 2.A. Relapses

Form of active tuberculosis	RHK-10	Gender	Total	Age																		
				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	70-74	75-79	80-84	85+	
Pulmonary tuberculosis	A15.01-3; A15.5, A15.7; A16.0-2; A16.4; A19 (lung)	M	53	0	0	0	0	1	0	6	3	6	10	8	9	3	2	2	2	1	0	
		W	19	0	0	0	1	1	1	3	4	4	1	1	0	0	1	1	2	1	0	
		M	2												1							
		W	0																			
		M	46						6	3	5	8	8	7	2	2	2	2	2	1		
		W	18					1	1	1	3	4	1					1	2	1		
		M	3					1					1									
		W	0																			
		M	1													1						
		W	0																			
Bacillary of pulmonary tuberculosis	Bacterioscopy+, culture+	M	20					1		3		1	7	1	5	1				1		
		W	9				1				3	1	1							2	1	
		M	19						2	1	1	1	6	3	2	2	2	2	1	1		
		W	7						1			2	2			1	1					
		M	0																			
		W	0																			
		M	13						1	1	5	2	1	1	1			2				
		N	3				1						1	1								
		M	1									1										
		W	0																			
Bacillary pulmonary tuberculosis total	including MDR	M	39	0	0	0	0	1	0	5	1	1	8	7	8	3	2	0	2	1	0	
		W	16	0	0	0	1	0	1	0	1	3	3	0	0	0	1	1	2	1	0	
Bacillary pulmonary tuberculosis total	including MDR	M	21					1		3		1	4	3	5	2	1					
		W	5								1	2	2									



### Drug resistance of bacteriologically confirmed cases of pulmonary tuberculosis in 2001-2005

Resistance	2001			2002			2003			2004			2005		
	New cases	%	Relapses												
Number of tested strains	342	100	107	343	100	93	328	100	59	335	100	59	289	100	55
Susceptible to 4 drugs	226	66,1	42	240	69,8	46	225	68,6	22	233	69,3	29	202	69,9	24
Resistance in total	116	33,9	65	103	29,9	47	103	31,4	37	103	30,7	30	87	30,1	31
Monoresistance	51	14,9	7	27	7,8	10	35	10,7	3	30	8,9	3	32	11,1	2
Isoniazide (H)	19	5,6	4	12	3,5	4	12	3,7	1	6	1,8	3	8	2,8	1
Rifampicin (R)	1	0,3	0	0	0,0	0	0	0,0	0	0	0,0	0	0	0,0	0
Ethambutol (E)	0	0,0	0	0	0,0	0	0	0,0	0	0	0,0	0	0	0,0	0
Streptomycin (S)	31	9,1	3	15	4,4	6	23	7,0	2	24	7,1	0	24	8,3	1
H+R resistance (MDR)	48	14,0	45	59	17,2	35	47	14,3	31	49	14,6	20	41	14,2	26
H+R	1	0,3	0	1	0,3	1	1	0,3	1	1	0,3	0	0	0,0	0
H+R+E	2	0,6	6	3	0,9	2	3	0,9	4	3	0,9	0	0	0,0	0
H+R+S	3	0,9	1	5	1,5	0	3	0,9	1	5	1,5	2	3	1,0	1
H+R+S+E	42	12,3	38	50	14,5	32	40	12,2	25	40	11,9	18	38	13,1	25
H+ other resistance	25	7,3	11	16	4,7	2	21	6,4	4	73	21,7	27	55	19,0	29
H+E	2	0,6	0	0	0,0	0	1	0,3	1	1	0,3	1	0	0,0	0
H+S	19	5,6	4	12	3,5	1	19	5,8	2	17	5,1	4	11	3,8	3
H+E+S	4	1,2	7	4	1,2	1	1	0,3	0	5	1,5	2	0	0,0	0
H resistance in total	83	24,3	61	89	25,9	40	80	24,4	35	73	21,7	30	63	21,8	30
R resistance in total	49	14,3	45	60	17,4	34	47	14,3	31	50	14,9	20	41	14,2	26
S resistance in total	91	26,6	55	87	25,3	39	86	26,2	30	92	27,4	26	79	27,3	30
E resistance in total	51	14,9	52	59	17,2	34	45	13,7	30	50	14,9	21	41	14,2	25

### Treatment results of tuberculosis cases with susceptible causative organism registered in 2005

M	Gender	N	Total	Microbiological confirmation of the diagnosis	Recovered	Completed treatment course	Ineffective therapy		Dis-continued therapy	Died		Left to another region	Treatment ongoing	MDR at the start of therapy	Total
							Total	incl. acquired MDR		Tuberculosis	Other cause				
New cases															
331	147	478	TOTAL		236	129	2	1	25	13	0	0	0	51	478
			% (row 1 of columns 14-13)		55,3	30,2	0,5	0,2	5,9	3	0	0	0	10,7	100
153	52	205	Bacterioscopy+, culture+		146	1	1	1	7	5	0	0	0	30	205
92	38	130	Bacterioscopy-, culture+		90	4	0	0	9	4	0	0	0	19	130
0	0	0	Bacterioscopy+, culture-		0	0	0	0	0	0	0	0	0	0	0
58	29	87	Bacterioscopy-, culture-		0	80	1	0	4	1	0	0	0	0	87
2	3	5	Bact. investigation not performed		0	3	0	0	0	1	0	0	0	0	5
305	122	427	Pulmonary tuberculosis total		236	88	2	1	20	11	0	0	0	49	427
11	12	23	Extrapulmonary - bact. confirmed		0	17	0	0	3	0	0	0	0	2	23
15	13	28	Extrapulmonary - bact. unconfirmed		0	24	0	0	2	2	0	0	0	0	28
Relapses															
62	21	83	TOTAL		24	19	1	0	10	4	0	0	0	20	83
			% (row 1 of columns 14-13)		38,1	30,2	1,6	0,0	15,9	6,3	0	0	0	24,1	100
23	8	31	Bacterioscopy+, culture+		11	2	1	0	4	3	0	0	0	10	31
22	6	28	Bacterioscopy-, culture+		13	0	0	0	2	2	0	0	0	10	28
0	0	0	Bacterioscopy+, culture-		0	0	0	0	0	0	0	0	0	0	0
10	3	13	Bacterioscopy-, culture-		0	10	0	0	3	0	0	0	0	0	13
1	0	1	Bact. investigation not performed		0	0	0	0	0	0	0	0	0	0	1
56	17	73	Pulmonary tuberculosis total		24	12	1	0	9	5	0	0	0	20	73
1	2	3	Extrapulmonary - bact. confirmed		0	3	0	0	0	0	0	0	0	0	3
5	2	7	Extrapulmonary - bact. unconfirmed		0	4	0	0	1	2	0	0	0	0	7

Re-treatment other than relapse		Microbiological confirmation of the diagnosis		Completed treatment course	Ineffective therapy		Discontinued therapy	Died Tuberculosis	Left to another region	Treatment ongoing	DR at the start of therapy	Total
Gender	Microbiological confirmation of the diagnosis	Total	incl. acquired MDR		Died Tuberculosis	Other cause						
M	W	T		Total								
Previous ineffective therapy in total												
10	0	10	TOTAL	0	0	1	2	0	0	0	7	10
			% (row 1 of columns 14-13)	0	0	33,3	66,7	0	0	0	70	100
6	0	6	Bacterioscopy+, culture+	0	0	1	2	0	0	0	3	6
4	0	4	Bacterioscopy-, culture+	0	0	0	0	0	0	0	4	4
0	0	0	Bacterioscopy+, culture-	0	0	0	0	0	0	0	0	0
0	0	0	Bacterioscopy-, culture-	0	0	0	0	0	0	0	0	0
0	0	0	Bact. investigation not performed	0	0	0	0	0	0	0	0	0
10	0	10	Pulmonary tuberculosis total	0	0	1	2	0	0	0	7	10
0	0	0	Extrapulmonary - bact. confirmed	0	0	0	0	0	0	0	0	0
0	0	0	Extrapulmonary - bact. unconfirmed	0	0	0	0	0	0	0	0	0
Discontinued previous therapy												
21	6	27	TOTAL	3	2	0	4	1	0	0	16	27
			% (row 1 of columns 14-13)	27,3	18,2	0	36,4	9,1	0	0	59,3	100
11	4	15	Bacterioscopy+, culture+	3	0	0	2	0	0	0	9	15
8	2	10	Bacterioscopy-, culture+	0	1	0	1	1	0	0	7	10
0	0	0	Bacterioscopy+, culture-	0	0	0	0	0	0	0	0	0
0	0	0	Bacterioscopy-, culture--	0	0	0	0	0	0	0	0	0
0	0	0	Bact. investigation not performed	0	0	0,0	0	0	0	0	0	0
19	6	25	Pulmonary tuberculosis total	3	1	0	3	1	0	0	16	25
1	0	1	Extrapulmonary - bact. confirmed	0	1	0	0	0	0	0	0	1
1	0	1	Extrapulmonary - bact. unconfirmed	0	0	0	1	0	0	0	0	1

Registered MDR cases in total		Microbiological confirmation of the diagnosis		Started therapy	Recovered	Completed treatment course	Ineffective therapy	Discontinued therapy	Died		Left to another region	Treatment ongoing		Total
M	W	Total	Microbiological confirmation of the diagnosis						Tuber-culo-sis	Other cause		Culture+	Culture-	
M	W	T												
New cases														
33	18	51	TOTAL		35	5	3	3	4	1	0	0	0	51
			% (row 1 from columns 14-13)		68,6	9,8	5,9	5,9	7,8	2	0	0	0	100
17	12	29	Bacterioscopy+, culture+	29	23	1	1	0	3	1	0	0	0	29
14	4	18	Bacterioscopy-, culture+	18	12	1	1	3	1	0	0	0	0	18
31	16	47	Pulmonary tuberculosis total		35	2	2	3	4	1	0	0	0	47
2	2	4	Extrapulmonary MDR TB	4	0	3	1	0	0	0	0	0	0	4
Relapses														
25	7	32	TOTAL		9	1	3	10	6	3	0	0	0	32
			% (row 1 from columns 14-13)		28,1	3,1	9,4	31,2	18,8	9,4	0	0	0	100
12	3	15	Bacterioscopy+, culture+	14	4	0	2	3	5	1	0	0	0	15
13	3	16	Bacterioscopy-, culture+	15	5	0	1	7	1	2	0	0	0	16
25	6	31	Pulmonary tuberculosis total		9	0	3	10	6	3	0	0	0	31
0	1	1	Extrapulmonary MDR TB	1	0	1	0	0	0	0	0	0	0	1
Re-treatment other than relapse														
19	5	24	TOTAL		5	0	4	8	7	0	0	0	0	24
			% (row 1 from columns 14-13)		20,8	0	16,.	33,3	29,2	0	0	0	0	100
14	3	17	Bacterioscopy+, culture+	16	3	0	3	5	6	0	0	0	0	17
5	2	7	Bacterioscopy-, culture+	6	2	0	1	3	1	0	0	0	0	7
19	5	24	Pulmonary tuberculosis total		5	0	4	8	7	0	0	0	0	24
0	0	0	Extrapulmonary MDR TB	0	0	0	0	0	0	0	0	0	0	0
incl. HIV+MDR TB														
Gender		Microbiological confirmation of the diagnosis		Started therapy	Recovered	Completed treatment course	Ineffective therapy	Discontinued therapy	Died		Left to another region	Treatment ongoing		Total
M	W	Total	Microbiological confirmation of the diagnosis						Tuber-culo-sis	Other cause		Culture+	Culture-	
M	W	T												
2	1	3	TOTAL		0	0	1	1	0	1	0	0	0	3
			% (row 1 from columns 14-13)		0	0	33,3	33,3	0	33,3	0	0	0	100
0	0	0	New cases	0	0	0	0	0	0	0	0	0	0	0
1	0	1	Relapses	1	0	0	0	0	0	1	0	0	0	1
0	0	0	Came over	0	0	0	0	0	0	0	0	0	0	0
1	0	1	Re-treatment other than relapse	1	0	0	0	1	0	0	0	0	0	1
2	0	2	Pulmonary tuberculosis total		0	0	0	1	0	1	0	0	0	2
0	1	1	Extrapulmonary MDR TB	1	0	0	1	0	0	0	0	0	0	1



## Notes

