TUBERCULOSIS
in the Russian Federation

An analytical review of the TB statistical indicators used in the Russian Federation

2008

TUBERCULOSIS IN THE RUSSIAN FEDERATION 2008

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This analytical review is a joint publication prepared by the Ministry of Health and Social Development of the Russian Federation, the Central Research Institute for Management and Information Services in Health Care, the Research Institute of Phthisiopulmonology, I.M. Sechenov Moscow Medical Academy (RIPP), the Central Tuberculosis Research Institute (CTRI), the Federal Penitentiary Service (FSIN), the Federal Service for External Quality Control of Clinical Laboratory Research, with participation of the World Health Organization Office in the Russian Federation.

The analytical review continues the series of publications issued in 2007–2008 («Tuberculosis in the Russian Federation», – 2006, An Analytical Review of the Main TB Statistical Indicators used in the Russian Federation, Moscow, 2007, 126 pp., and «Tuberculosis in the Russian Federation – 2007, An Analytical Review of the Main TB Statistical Indicators Used in the Russian Federation», Moscow, 2008, 172 pp.).

The review contains analysis of indicators calculated based on national and sectoral service reports; the significance of these indicators for assessment of the epidemiological situation for TB and the quality of TB control activities in the Russian Federation in 2007–2008 are discussed, along with the trends in these indicators in the last 10–15 years. The analysis is presented with due account on the international definitions and approaches used in processing medical and epidemiological statistical data.

Particular importance is attached to the methods of application and interpretation of indicators used in the Russian Federation and internationally for assessment of effectiveness of TB control activities, and to the comparison of the situation for TB in the Russian Federation, in other countries, and in the European Region.

This analytical review has been developed by a joint effort of

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List of abbreviations

ART	antiretroviral therapy
AFB	acid fast bacilli
AIDS	acquired immune deficiency syndrome
AO	Autonomous area («Okrug»)
CC	correctional colony
CDL	clinical diagnostic laboratory
CFR	Central Federal Region
ChT	chemotherapy
CI	confidence interval
CNS	central nervous system
CPT	cotrimoxazole preventive therapy
CS	correctional system
CTRI	Central Tuberculosis Research Institute, Russian Academy of Medical Sciences
DFG	dispensary follow-up group (see Annex 1)
DR	drug resistance
DST	drug susceptibility test
EPTB	extra-pulmonary TB
EQA	external quality assurance
EQC	external quality control
FAP	feldsher-midwife station
FCMTB	Federal Centre for Monitoring TB Control in the Russian Federation (at FPHI)
FCTB	fibrous-cavernous tuberculosis
FCTB-HIV	Federal Centre of TB Care for HIV-infected patients, RF MoH&SD
FEFR	Far-Eastern Federal Region
FPHI	Central Research Institute for Management and Information Services in Health Care (Federal Public Health Institute)
FSEQC	Federal System of External Quality Control of Clinical Laboratory Research
FSIN	Federal Penitentiary Service of the Russian Federation
FSSS	Federal Service of State Statistics (Rosstat)
FTP	federal target programme
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GHC	general health care
GLC	Green Light Committee
HIV	human immunodeficiency virus
IBRD	International Bank for Reconstruction and Development
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th Revision
IUATLD	International Union Against Tuberculosis and Lung Disease
MbT	Mycobacterium tuberculosis
MDR	multidrug resistance
MoH	Ministry of Health of the Russian Federation
MoH&SD	Ministry of Health and Social Development of the Russian Federation (former MoH)
MoJ	Ministry of Justice of the Russian Federation
NTRI	Novosibirsk TB Research Institute
NWFR	Northwestern Federal Region
PFR	Privolzhsky Federal Region
PHC	primary health care
PTB	pulmonary TB

RAMS	Russian Academy of Medical Sciences
RF	Russian Federation
RIPP	Research Institute of Phthisiopulmonology, I.M.Sechenov Medical Academy
RTB	respiratory TB
SbFR	Siberian Federal Region
SFR	Southern Federal Region
SIZO	pre-trial detention centre
SSC	State Statistical Control
SSTM	State System of TB Monitoring
St-PRIPP	Saint-Petersburg Research Institute of Phthisiopulmonology
TB	tuberculosis
TBD	TB dispensary
TBF	TB facility
UFR	Urals Federal Region
UNAIDS	The Joint United Nations Programme on HIV/AIDS
URIPP	Urals Research Institute of Phthisiopulmonology
WHO	World Health Organization
WHO RF	WHO TB Control Programme in the Russian Federation

Introduction

This analytical review is a joint effort of the Ministry of Heath and Social Development of the Russian Federation (MoH&SD), the WHO TB Control Program in the Russian Federation (WHO RF), the Central Research Institute for Management and Information Services in Health Care (also known as Federal Public Health Institute – FPHI), the Research Institute of Phthisiopulmonology, I.M. Sechenov Moscow Medical Academy (RIPP), the Central Tuberculosis Research Institute (CTRI), Russian Academy of Medical Sciences, the Federal Penitentiary Service (FSIN), and the Federal Service for External Quality Control of Clinical Laboratory Research (FSEQC).

The review contains updated materials of the analytical reviews published in 2006–2007 («Tuberculosis in the Russian Federation 2006. An analytical review of the main tuberculosis statistical indicators used in the Russian Federation», Moscow, 2007, 126 pp. and «Tuberculosis in the Russian Federation 2007». An analytical review of the main tuberculosis statistical indicators used in the Russian Federation, Moscow, 2008, 172 pp.).

Compared to the previous editions, in addition to analysis of 2008 statistical reports, this review significantly updates sections on the methods of estimation of TB indicators. Each chapter in the review has a separate section that dwells on issues related to TB spread in the world and in the WHO European region in comparison with the Russian Federation (RF).

The review also presents an analysis of TB indicators based on the national and sectoral statistics data along with the use of these indicators in the assessment of the epidemiological situation for TB and TB control activities in the Russian Federation (RF) in 2006–2008. The review also examines trends in the indicators over the past 10–15 years.

Data analysis has been performed basing on the internationally accepted definitions and approaches used in processing medical and epidemiological statistical information. The review considers the WHO-approved indicators for analysis of TB epidemiological indicators and TB control effectiveness, and compares the situation for TB in RF, other countries of the world and in the WHO European Region.

Special attention has been paid in this review to the methodological issues related to the use and interpretation of various TB indicators used in RF and other countries for assessment of TB control effectiveness.

In the last three – four years, there have been significant changes in TB control in Russia. MoH&SD Orders Nos. 109 and 50 [20, 21] were issued, which provided a solid basis for improvements in phthisiatric services and for enhancement of the regulatory framework for TB control activities in Russia. International Bank for Reconstruction and Development (IBRD) loan project «TB and AIDS Prevention, Diagnostics and Treatment» was implemented and the Global Fund project «Promoting a Strategic Response to TB Treatment and Care for Vulnerable Populations in the Russian Federation» is now coming to final stage.

Owing to these projects, almost all bacteriological tuberculosis laboratories and one third of CDLs participating in TB diagnosis and treatment have been upgraded. Qualification and practical skills of health workers of TB control services and primary healthcare (PHC) facilities were improved at training courses organized in all RF regions. In these years, the system of supervision of RF regions by the federal TB research institutes was resumed, and activities against MDR-TB and other activities took place (drugs procurement and infection control improvement, hospitals renovation, staff training), etc.

In recent years, major activities for TB service modernization were finalized by the end of 2008, so the main outcomes from these activities can be expected in 2009–2010.

At the same time, the data analysis presented in the review shows that in past two years certain positive results of all these efforts have been observed. For example, TB notification rates in civil populations stopped to increase due to improvements in TB detection (including a more active use of fluorography and improvements in the detection of MbT+ patients in many regions), while TB relapses rates and the proportion of chronic TB patients started to decrease. TB mortality rates also decreased in the last three years.

The review demonstrates that stabilization of the epidemiological situation to a certain extent is due to increased efficiency of TB service in penitentiary system (FSIN).

It should be noted that these positive results were observed in a stable, but still challenging epidemiological TB situation. In general, the basic indicators in Russia still demonstrate a high TB burden. Moreover, there is a vivid dispersion of indicators between RF regions, which is due to unfavorable situations for TB in these regions and federal okrugs. Some basic indicators (such as effectiveness of treatment and confirmation of diagnoses with laboratory tests) are still low, whereas the current MDR-TB spread and the number of patients with chronic TB are high. The presence of some disconcerting prognostic indicators, such as changes for the worse in demographic

and social characteristics of TB patients, may be due to unfavorable socio-economic situations in these regions, which werre aggravated by the 2008 world economic crises.

The quality and completeness of TB-related statistical data on tuberculosis significantly improved over the past two years, which significantly increased the capacity of analysis of data on TB notification, management and effectiveness of treatment. In particular, this review uses more widely information derived from the reporting forms approved by MoH&SD Order No. 50 [21]. This became possible as a result of intensive work of the specialized TB Research Institutes and WHO RF in the supervision of developing the reporting forms and verification of data received from these forms.

Overall, the data presented in this review has confirmed the following:

- The information available in the statistical reporting forms on TB in the Russian Federation is sufficient for a general analysis of TB situation in the country.
- The indicators used to assess TB epidemiology trends are adequate to meet the analysis' objectives and, for the most part, are compatible with the internationally-accepted indicators.
- Significant dispersion in indicator rates exists across the territories of the Russian Federation, which requires a differentiated data analysis to be performed by territory, by groups of territories and by region.
- To conduct data analysis based on advanced principles of epidemiological analysis and biostatistics, it is necessary to use data from the State System of TB Monitoring (SSTM) that is currently being developed and is to be based on territorial case-based computerized TB surveillance registries.

This publication is intended for use by public health leaders in the territories of the Russian Federation, directors of general health care and TB facilities, TB specialists and epidemiologists, and public health managers.

In preparing the publication the information was used from state and sectoral statistical report forms, demographical and socio-economic data from the Federal Service of State Statistics of the Russia (FSSS), Global Tuberculosis Control reports of WHO/IUATLD[1], SSTM data, and data from scientific publications.

The Annex contains tables of the main epidemiological indicators of TB control activities in Russia in 2004–2008.

[1] The UNION.

Improvement of TB patient service management in the Russian Federation within the framework of the National Priority Project in Public Health

Krivonos O.V., Mikhailova L.A.

The Russian Federation is committed to TB control at the Federal Government level. This commitment is supported by the system of federal laws and RF Government ordinances («On the Prevention of Tuberculosis Spread in the Russian Federation, No. 77-ФЗ of 18.06.2001, RF Government's Ordinance No. 892 of 25.12. 2001), orders (prikazes) of ministries and agencies (MoH&SD orders Nos 109, 50, 690 and others), and respective provisions in national projects in public health domain.

Currently, all major TB control activities are being performed following the National Priority Project in Public Health and the Federal Target Programme «Prevention and Control of Socially Significant Diseases (2007–2011)», which includes a major TB control component (36.5% of funding)[2].

The sub-programme was developed in compliance with the RF Government Resolution No. 1706-p of 11.12.2006. It determined additional measures for decreasing TB-related morbidity, mortality and disability, improvement of TB patients treatment, provision of early diagnosis and prevention of severe complications of TB, also by means of strengthening the material and technical basis of healthcare facilities,

The sub-programme envisages increased funding of TB control activities from the federal budget and budgets of the subjects of the Russian Federation. Overall expenditures on the sub-programme implementation amounted to 26 277,8 million rubles (in prices in respective years*), including 9 781,1 million rubles from the federal budget and 16 496,7 million rubles from budgets of the subjects of the Russian Federation.

The national programme for improvement of TB patient services in the Russian Federation is based on a multilevel approach and inter-sectoral coordination between all branches of state power.

TB services are provided at 4 levels: municipal (general public health), subject of the Russian Federation (specialized medical services, including the leading regional TB dispensary), federal specialized research institutes of phisiopulmonology or tuberculosis, and on the federal level. TB services at all the levels must be accessible for all RF citizens.

TB service system management, as well as inter-departmental and international coordination, is performed on the federal level.

In the process of TB control implementation, MoH&SD ensures the normative-legal regulation of activities in TB prevention, detection, diagnosis, treatment and rehabilitation of TB patients in all health facilities. Presently, inclusion of non-medical measures in the national TB control strategy is under consideration.

The improvement of the normative-legal regulation of TB patient care will make it possible to:

– involve social, economic, financial, legal, law enforcement structures in TB control activities and increase responsibility of decision-makers at all levels for effective development and introduction of TB control policies in the Russian Federation;
– ensure the implementation of Federal Law No. № 77-ФЗ of 18.06.2001 «On the Prevention of Tuberculosis Spread in the Russian Federation» (including development of by-laws);
– upgrade the current TB control management and activities in the Russian Federation in accord with recent advances in science and technology, and introduce new techniques in TB prevention, diagnosis and treatment practices;
– enhance the system of statistical data collection, analysis and interpretation;
– ensure inter-departmental coordination in TB prevention, diagnosis and treatment.

Along with the MoH&SD institutions and facilities, mechanisms for active case detection, highly qualified and effective diagnosis and treatment, including surgical and high-tech methods, psychosocial and professional rehabilitation of TB patients should be established in the RF Ministry of Justice, FSIN, Ministry of Internal Affairs and the Ministry of Defense systems.

To enhance effectiveness of coordination of non-governmental and international organizations with the current activities performed by the federal agencies engaged in TB control, a new inter-departmental coordination body was established in August, 1999, represented by the High Level Working Group for TB (HLWG). HLWG includes thematic working groups in major areas of TB control. HLWG was established at the initiative of the Russian Federation Ministry of Health and the World Health Organization for creating an effective mechanism for dialogue

[2] RF Government Ordinances No. 96 of 18.02.2008, No. 423 of 02.06.2008 and No. 319 of 09.04.2009.

* 1 US$ = ~ 30 rubles (interpreter's comment).

between Russian and international experts on issues related to TB control and development of recommendations for improvement of strategies and tactics in combating TB in the Russian Federation. Beside MoH&SD and WHO, HLWG includes the RF Ministry of Justice, the Federal Service on Surveillance for Consumer Rights Protection and Human Well-being (Rospotrebnadzor), Russian Academy of Medical Sciences, and other organizations participating in the implementation of TB control programmes in Russia.

Availability of reliable data on the epidemiological situation of TB in the country and on the effectiveness of TB control activities is a major condition for successful implementation of the national TB control programme. Publication of this analytical review is intended to be a link in a chain of national efforts in combating the disease.

The social effectiveness of TB control programmes implementation will be reflected in increased longevity and quality of life, preservation and increasing of national labour resources, and in reducing the social and psychological stress in society caused by the danger of TB spread.

1. TB surveillance and the statistical reporting system in the Russian Federation

Son I.M., Skachkova E.I.

TB development processes and the manifestations of the disease are quite complex. A number of factors, reflected to varying degrees in the commonly used indicators, have an impact on TB spread processes [2, 18]. The factors influencing the spread of the disease include:

– regional specificity (demographic, social and economic characteristics, standards of life, education, intensity of migration, etc.);
– political and economic processes (crises, conflicts);
– the influence of TB spread in the penitentiary system on TB incidence in the civil population;

and finally,

– the effectiveness of TB control (management of TB prevention activities, timely case detection and effective treatment of TB patients in both specialized and general public health facilities).

On the other hand, the registered TB indicators are also influenced to a vast degree by other factors directly not related to the effectiveness of TB prevention, case detection and treatment measures. Such factors include:

– the statistical system of recording and reporting forms currently in use (quality of filling the forms, completeness of data collection, and effective data flow management);
– qualifications of the staff responsible for data collection and processing and the level of technical support (communications infrastructure, computers and software);
– the level of motivation of leaders and staff in the central and local specialized institutions in receiving correct information.

Unfortunately, the limited space of this publication and the structure of available statistical data do not allow for a complete assessment of the impacts of these factors on the results received. Nevertheless, some of these factors will be examined during data analysis and interpretation.

The monitoring and evaluation of changes in epidemiological rates and the indicators of the effectiveness of TB activities should be based not only upon information received from the federal statistical surveillance data, but also from results of special sampling studies. In this connection it is important that the statistical reporting system ensures collecting reliable data at regional and federal levels by using modern data processing techniques and provides a solid basis for taking appropriate administrative decisions.

Therefore, along with reviewing the traditional TB indicators, the current edition considers ways to expand the use of the existing reporting forms, and to calculate additional indicators.

Currently, the bulk of the information used to assess the TB situation is contained in 15 reporting forms.

The main TB reporting forms are as follows:

1. State statistics reporting forms:

– Form No. 33 «TB patients' information» includes data on registered and followed-up TB patients in TB control facilities in the subjects of the Russian Federation from permanent residents of respective regions;
– Form No. 8 «Information on active TB case notifications» that includes all new and relapse TB cases registered in the subjects of the Russian Federation. The form includes information about cases registered in TB control facilities and by other institutions (including the Federal Penitentiary Service, FSIN), as well as about cases diagnosed postmortem and among foreigners, persons from other regions, and homeless.
– Form No. 61 «HIV patients' information» contains information about TB-HIV co-infection cases.

These forms of State statistical control (SSC) are completed in the leading regional TB dispensaries (TBD) in the subjects of the Russian Federation and are submitted to the regional health authorities (health statistics offices or health information and analysis centres), and then are sent to the FPHI Statistics Department, which checks and processes the forms and submit them to the Russian Federation MoH&SD and, finally, to the Federal Service of Health Statistics (Rosstat).

2. Forms of sectoral statistical reports, introduced by Executive Order No. 50 of the Ministry of Health of Russian Federation [16, 21]:

– Form No. 7-TB «Information on new and relapse TB cases» contains data on detection and registration of TB patients for treatment;

– Form No. 8-TB «Information on chemotherapy outcomes in pulmonary TB patients» reflects the results of chemotherapy TB treatment.

Information for these forms is collected and filled in by the organizational-methodological (TB management) divisions in the leading TBDs in the subjects of the Russian Federation and after that is submitted to the regional monitoring centres at specialized TB research institutes[3], where the reports quality is verified with support of WHO coordination offices located at these institutes. At same time, the reporting forms are submitted to the FPHI Centre for Monitoring TB Control in the Russian Federation (FCMTB) and to RIPP. The RIPP Monitoring Center was earlier responsible for data collection and analysis, but since 2008 this role was has been taken by FPHI's Federal Center for Monitoring TB Control in Russian Federation. The 2007 aggregated data from TB cohort forms presented in the previous analytical review has been reviewed and approved by experts from the Joint Thematic Working Group on Epidemiological TB Surveillance (Russian Federation, WHO TB RF). In this issue of the review, all the 2007 data is presented based on the verified information contained in the FPHI-published sectoral reporting forms [16].

3. Sectoral TB forms of FSIN of the Russian Federation

– Form No. 4-TB, annual, is filled in late January for TB patients registered and followed up at FSIN penalty and correctional facilities (convicts, defendants and persons on trial).
– Form No. 1-MED, quarterly aggregated report «Information on socially significant diseases in persons imprisoned in Penalty system institutions and selective indicators of health services», which provides aggregated data from CIZO and correctional institutions on diseased patients and persons who died of TB, HIV-infection, TB-HIV, malaria and other socially significant diseases.

4. Demographic and socio-economic data, obtained from FSSS reports:

– Form No. 1 (population in the subjects of the Russian Federation and nationwide for the calculation of intensive indicators before 2006).
– Form No. 4 (population in the subjects of the Russian Federation and nationwide for the calculation of intensive indicators for 2006–2007).
– Official WEB publications of FSSS [17].

Before 2008, the intensive indicators, such as TB notification and mortality rates, were calculated based on the average population in the reporting year[4], and TB prevalence rate was calculated based on the population as of 1st January of the next year. The values of intensive indicators for 2008 used in the review are preliminary. They were calculated according to Form No. 4 based on the population as of 01.01.2008. These indicators will be updated after receiving final data on population in the subjects of the Russian Federation and in the country as a whole as of 01.01.2008.

Besides, the review is based on the results of processed and analyzed data from SSTM databases, which includes information in compliance with the Rosstat approved TB reporting forms.

[3] In the subjects of the Russian Federation data is submitted to the following research institutes in accordance with the institutes' areas of supervision: RIPP, CTRI, NTRI, St-PRIPP, and URIPP.

[4] Annual average population is calculated based on half of the sum of population as of January 1st of the reporting year and as of January 1st of the following year.

2. TB notification rate in the Russian Federation

Belilovsky E.M., Borisov S.E., Skachkova E.I., Son I.M., Danilova I.D., Pashkevich D.D.

Along with TB mortality and TB prevalence, the TB case notification rate is a most important indicator characterizing the TB situation in the country.

However, the notification rate has both epidemiological and «organizational» components [2]. The latter reflects the capacity of TB control facilities to detect TB cases. The real capacity of TB control facilities is always insufficient to guarantee that all new TB cases will be detected at a given territory. Therefore, the real values of TB incidence always differ to a certain extent from those registered by statistical institutions.

We will use the term «TB notification rate» in this review»[5]. A separate section will deal with the current methods used for estimation of this indicator.

This chapter contains the following:

– epidemiological data on the TB notification rate in the Russian Federation as a whole, along with the TB notification rates in the territories of the Russian Federation (republics, oblasts, and geographical units – okrugs), and in individual population groups;
– analysis of the structure (disease forms and sites) of detected TB cases;
– review of the indicators referring to case-finding management (ways, channels and methods used for TB detection and confirmation of diagnosis);
– comparison of TB notification rates in the Russian Federation with respective data from other former Soviet Union countries and selected countries of the world;
– description of the methods used for the TB incidence estimation.

2.1. Trends in TB notification rates and the socio-demographic structure of registered TB patients in the Russian Federation

Significant changes have been observed in TB notification rate in the Russia over the last 20–25 years [2] as seen in Fig. 2.1. A gradual decrease in the rate in the 1970–1980's, reaching a low 34.0[6] was replaced by a significant increase in 1991–2000, rising to 90.7 (an increase of 2.7 times) with stabilization of the rate in the first decade between 82 to 84 per 100,000 population.

Decreased TB notification rates in the Soviet Union in the years prior to Perestroika present a vivid illustration demonstrating a relative stability in society and systematic efforts in combating TB spread including administrative measures. In those years, the government provided significant financial resources for TB control activities and effective work of phthisiatric services in case registration and following-up of TB patients. The quality of TB case-finding in permanent populations ensured a relatively low level of hidden incidence and undetected cases (about 12–15%), if this calculation is based on the number of postmortem diagnosed TB cases, cases of spontaneously recovered TB patients and on the level of registered new TB cases with severe late-detected TB [29, 33].

It should be noted that the definition of hidden TB incidence and new cases undetected within a certain period of time includes three subgroups [33, 41]: (1) people with TB who were not diagnosed by health services and recovered spontaneously, died or moved to another region; (2) people with TB who will be diagnosed in the following reporting period (e.g. next year) and were sources of TB infection in the reporting year[7], and, finally, (3) people presenting new TB cases, who were erroneously registered as cases transferred-in from another region or as registered and followed-up in another TB facility (without completing Form 089/y-tub for the TB patient as a new TB case).

The accelerated pace of the decrease in notification rates in 1988–1990 may be related to the socio-economic crisis in late 80's and early 90's. The crisis also entailed problems with reliability and completeness of case registration and with timely submitting of new TB case notifications for data entry into reporting documents in the regions.

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5 Russian language term «registered TB incidence» corresponds to the international English language terms «TB notification rate» or «Case notification rate», as opposed to the English terms «TB incidence rate» or «TB morbidity», which reflect the real level of incidence, estimated only by special methods.

6 Hereinafter, notification and mortality rates are calculated per 100,000 of the annual average population of the country, region, or among the reviewed population group.

7 This component of hidden incidence is compensated by the number of registered patients who became ill with TB before the reporting period.

The dynamics of notification rates after 1991 clearly reflects changes in the socio-economic situation in the country. Proven TB notification rates were registered following the economic crises of 1991, 1994[8] и 1998 (increased by 19.8, 20.4 и 12.1% respectively) [33]. For these years, the SSTM individual patient data shows a significant growth in the percentage of new TB cases among the unemployed, mainly after the years of crisis [1]. Today this percentage is more than 50% in most subjects of the Russian Federation, while the official unemployment rate in the country by the end of 2008 was 7.7%[9] ([17], see Fig. 2.2). This proves the well-known thesis that TB is a socially significant disease [1, 18, 38].

According to SSTM data [18, 27, 31], while the nationwide TB notification rate was 82.6 in 2006, the notification rate among the unemployed amounted to between 500 and 1,000 per 100,000 unemployed individuals, depending on calculation method; and these levels went up by almost 20% in three years (2004–2006). At the same time, the notification rate among employed populations was approximately only 45[10], and among disabled persons up to 50 per 100,000 of respective population groups.

The available data on the social status of TB patients proves the need for further development of social support programs for TB patients in Russia [42]. The active participants of the programs implementation are MoH&SD, WHO, the Russian Red Cross and International Federation of Red Cross and Red Crescent Societies.

In 2003–2007, the major epidemiological indicators for TB were relatively stable in Russia. This applied, first of all, to the TB notification rates [33]. This indicator varied between 82 and 84 per 100,000 population (82.6 in 2006 and 83.2 in 2007[11]). The annual changes were statistically non-significant and compatible with the value of 95% confidence interval, which is about 0.5 per 100,000 population[12] (see Fig. 2.3).

But in 2008 a relatively small but statistically significant growth to 85.1 cases per 100,000 population was registered.

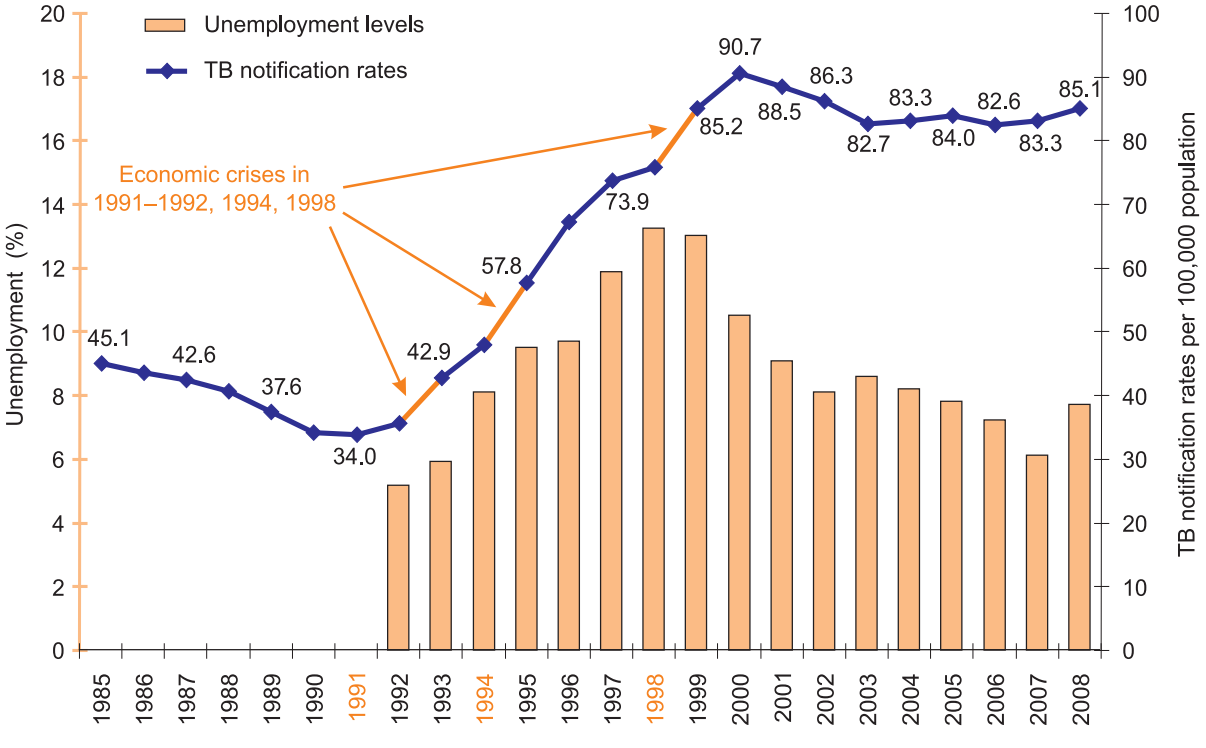


Fig. 2.1. TB notification rates and unemployment levels in the Russian Federation, 1985–2008 (Sources: Form No. 8 and [24]; population: Forms No.1 and No. 4)

8 The so-called «Black Tuesday» of 11 October, 1994, is referred to in this case, after which in 1995, according to official data, population incomes fell by 25-30% and the share of population living below poverty line increased proportionally (e.g., see «Report on Standards of Living: Definitions, Indicators, and Situation in Russia' issued in 1997 by the Centre of Microeconomic Analysis – at http://www.forecast.ru/_archive/projects/urg/urg.htm).

9 Based on information received from sampling occupation surveys in regions. Persons are considered unemployed if they are of able-bodied age and do not have a job (gainful employment), are searching for a job, and are ready to start working at the moment of evaluation [7].

10 The results are obtained from the Federal Center for Monitoring of Tuberculosis Spread Control data based on data from 31 subjects of the Russian Federation, where among 46,612 new TB cases notified in 2006, there were 24,009 unemployed, 12,717 employed and 2,556 disabled persons. According to FSSS data, there were registered 2,254,000 unemployed or 2,481,000 not employed in economics among economically active population, and 28,440,000 employed individuals.

11 According to the Form No. 8.

12 I.e. inter-annual changes in notification rate within 0.5 per 100,000 are not statistically significant.

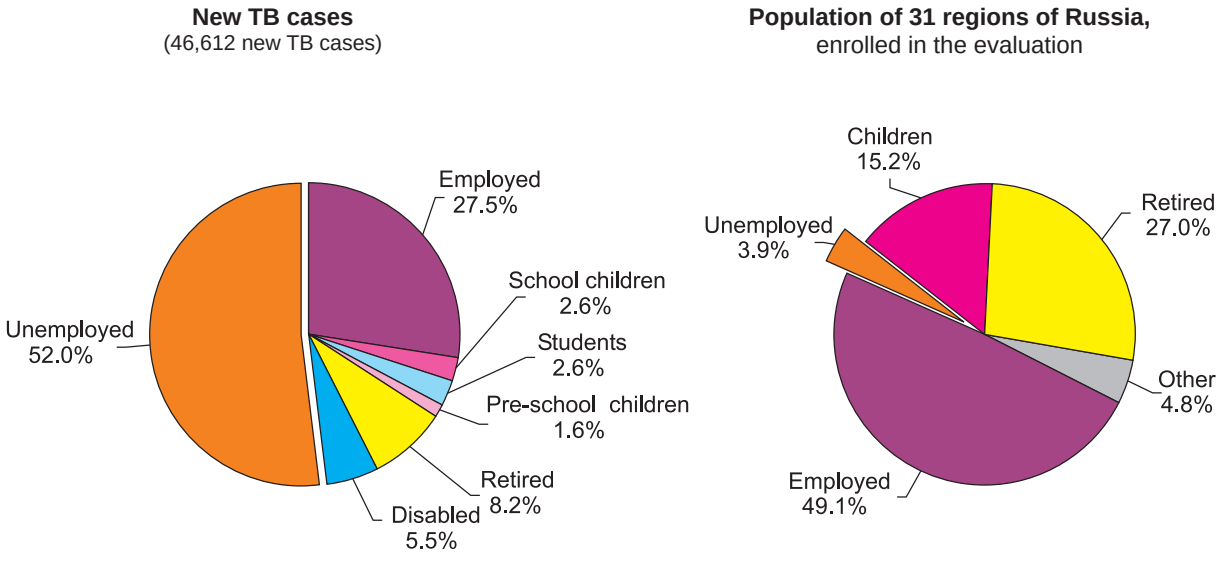


Fig. 2.2. Socio-economic status of new TB patients and of the total population, 2006, 31 regions of Russian Federation (Source: [27,31 and 24])

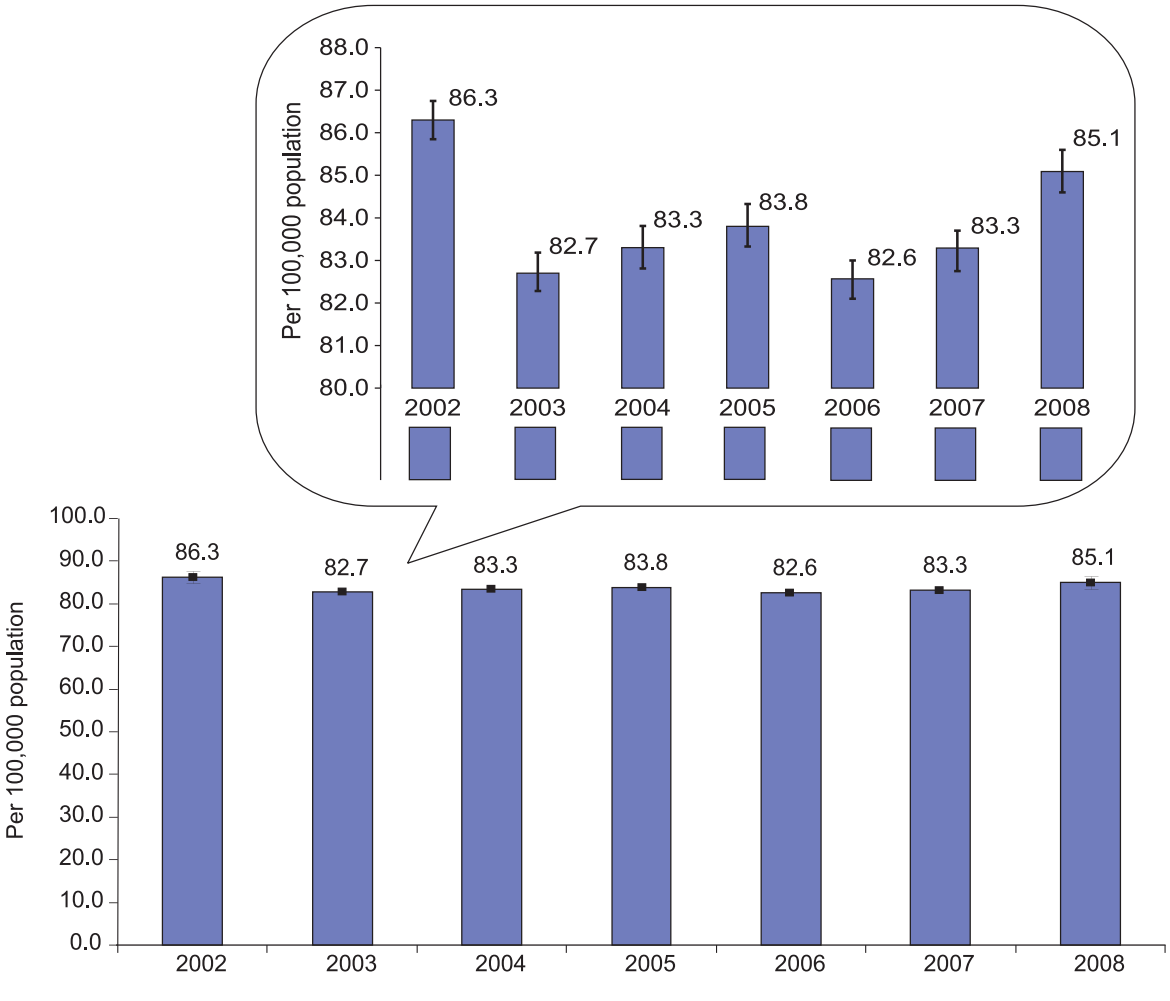


Fig. 2.3. TB notification rates in 2002–2008 in the Russian Federation. Lines mark variations in values of 95% CI (Source: Form No. 8; population – Forms No. 1 and No. 4)

In assessments of the general TB notification rate dynamics in Russia (as well as any for any other epidemiological indicator) one should take into account changes in the indicator-related territorial factor (see below), as well as the proportion of notification rates in different population groups. The indicator dynamics may also be influenced by changes in the statistical reporting system and in the regulatory documents laid in the basis of the national statistics system.

For example, the slight increase in the number of new TB patients in 2007 compared to 2006 (from 117,646 to 118,367, see Fig. 2.4) occurred primarily due to the improved registration of TB patients among foreigners (from 554 to 2,123 cases), whereas the absolute growth of new cases in 2008 was caused by increased notification rates in all the major categories of the population, including permanent residents, patients in FSIN facilities, and foreigners.

In Russia, the territorial indicator of TB notification rate is based on Form No. 8 reports (85.1 per 100,000 population in 2008). This indicator includes the number of new TB cases (120,835) registered by all agencies in different population groups – permanent residents (civil population), inmates and persons on trial in penitentiary system facilities, military personnel, etc. (Table 2.1). From the Form No. 8 data follows that the main contributor to the TB notification rate (85.9% in 2008) were TB cases detected among the civil population, including homeless people, and deceased TB cases previously not registered as TB cases. Cases detected in medical facilities under other jurisdictions (Ministry of Internal Affairs, Ministry of Defense, Ministry of Justice, etc.) account for 13.0% (15,667 patients in 2008). According to Form No. 33, 81.0% of all detected TB cases were registered in the MoH&SD facilities (97,886 new cases, 2008).

Cases detected in FSIN health facilities (convicts and persons on trial) accounted for the most significant proportion of cases registered under the category «other agencies». They still have an impact on the overall notification rate in the country. In 2008, the proportion of all TB cases detected in FSIN facilities was 12.0% (14,501 cases, Form No. 8). Anyhow, due to major efforts to improve the effectiveness of TB activities in the penitentiary system, the TB notification rate decreased from 4,347 in 1999 to 1,308 in 2008 per 100,000 FSIN population including convicts, defendants and persons on trial (see Chapter 6 «TB in the penitentiary system»). Meanwhile, the notification rate registered in MoH&SD facilities among permanent residents (see Fig. 2.5) was significantly increasing until 2004, and thereafter essentially stabilized (2007: 67.7 per 100,000 population, 96,251 cases), but in 2008 increased to 68.9 per 100,000 population (97,886 cases), which has become the maximum indicator since 1960s.

It should be noted that the contribution of patients with foreign nationals in the overall notification rate of TB is minimal (less than 2%). In addition, a significant increase in the number of reported cases of tuberculosis

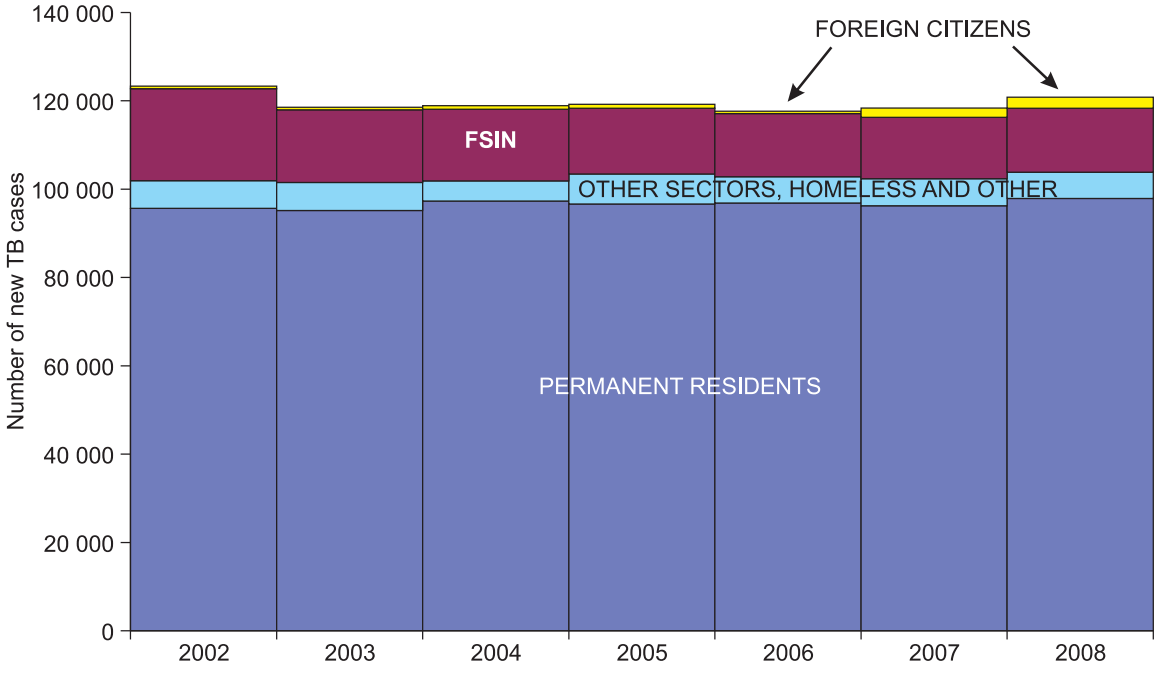


Fig. 2.4. New TB cases registered in the Russian Federation in 2002–2008 among permanent residents (civil population), FSIN population, patients for other agencies' health facilities, and among foreign nationals (Source: Form No. 8)

among foreign nationals linked, first of all, not only with increasing spread of the disease in this category, but also with the improvement of the registration of the disease among them (implementation of Federal Law No. 115-ФЗ of 25.07.2002 «On the legal status of foreign nationals in the Russian Federation», governmental regulation No. 188 of 02.04.2003, and Federal Law No. 189-ФЗ of 05.11.2006 «On amending the Russian Federation Code of Administrative Violations of the Law»). Therefore, this increase in the number of this category of citizens in the structure of TB notification rate is due to obligatory primary medical examination for TB for those arriving to Russia when they receive a temporary registration.[13]

Table 2.1

New TB cases registered in 2005–2008 in the Russian Federation, according to reporting forms No. 8 and No. 33

Indicator	Source (statistical form)	2005		2006		2007		2008	
		Abs. No.	%	Abs. No	%	Abs. No	%	Abs. No	%
New TB cases, total	Form 8	119,226	100.0	117,646	100.0	118,367	100.0	120,835	100.0
Including TB cases, among permanent residents (civil population)	Form 8	103,432	86.8	102,809	87.4	102,379	86.5	103,834	85.9
– patients registered in TB control facilities in the subjects of RF	Form 33	96,646	81.1	96,867	82.3	96,251	81.3	97,886	81.0
– new cases among foreign nationals	Form 8	896	0.8	554	0.5	2,123	1.8	2,500	2.1
– new cases registered in other agencies	Form 8	16,598	13.9	16,180	13.8	15,453	13.1	15,677	13.0
– including registered in FSIN facilities	Form 8	14,898	12.5	14,283	12.1	13,865	11.7	14,501	12.0

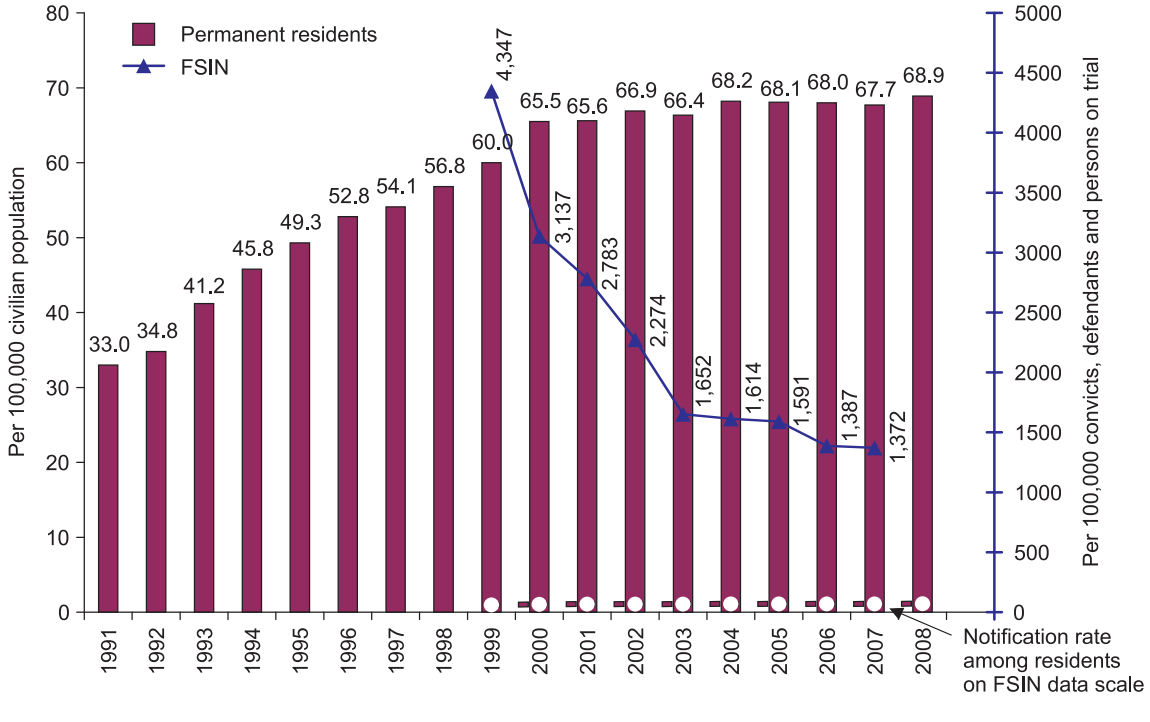


Fig. 2.5. TB notification rates among permanent residents and the FSIN population, 1991–2008, Russian Federation. The dotted line and circles at the bottom right denote notification rates among residents reproduced in FSIN data right scale (Sources: Forms 8 and 4-tub; population – Forms No.1 and No.4)

[13] Total number of new TB cases according to Form No. 8, excluding prison (FSIN) data and data about new TB cases among foreign nationals.

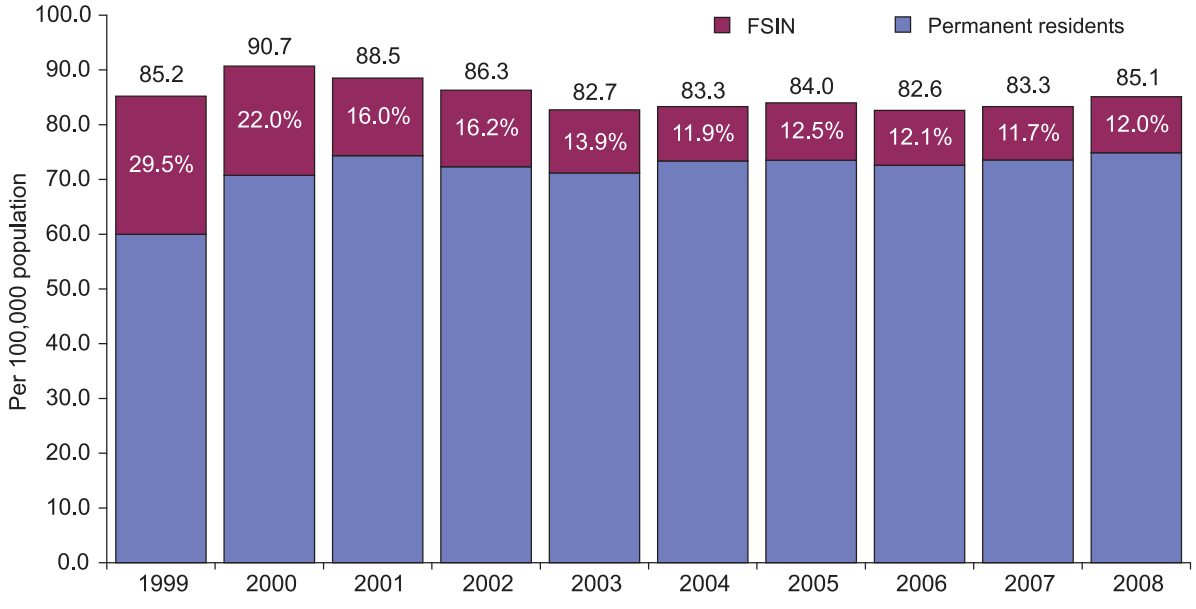


Fig. 2.6. Percentage of the overall TB notification rate contributed by the FSIN population, 1999–2008. Black labels above the bars indicate the overall TB notification rate in the Russian Federation, including data from all jurisdictional entities (Sources: Form No. 8 and 4-tub, population: Forms No. 1 and No. 4)

Therefore, over the last few years, the trend of the TB notification rate has been affected by two separate processes: an increase in the number of cases registered among the civil population (from 87,258 in 1999 to 97,886 cases in 2008, according to Form No. 33) and a decrease in the percentage of registered cases in the penitentiary system – from more than a quarter (29%) in 1999 to 12.0% in 2008 (see Fig. 2.6). It should be noted however that the notification rate among the FSIN population remains high (1,308 per 100,000 in 2008).

The notification rate in each group of the population is of a relative nature. It reflects, first of all, the risk of the disease in this group and not the percentage of the absolute number of cases in the country. For example, the high level of TB notification rate in FSIN population (almost 1,400 per 100,000 in opposite to only 68.9 for civilians) combines with a limited portion of the absolute number of new TB cases from FSIN among all TB cases (less than 12%,while the civil population accounts for 85.8%). It is therefore very important to know the absolute number of patients for planning the resources needed for targeted TB control activities.

2.2. TB notification rates in the Federal Regions and Subjects of the Russian Federation

The total (integral) value of any indicator derived for the whole country may substantially differ from those registered in separate territories. This is particularly true for Russia, the country with the largest area in the world, which includes the regions that significantly differ both in geographic and demographic conditions, and socio-economic level and the population structure.

Countywide indicators are not sufficient for management decisions in the organization of tuberculosis control in each particular subject of the Federation.

Therefore, along with the average rates for Russia it is important to take into account changes in the notification rate on the level of regions or subjects of the Russian Federation.

TB notification rates differ significantly from territory to territory in the Russian Federation. The highest territorial rates in the Russian Federation (data from Form No. 8, 2008) are steadily reported in a number of territories in the SbFR and FEFR[14]: in the Republic of Tyva (241.0 per 100,000 population), Primorskiy Krai (191.3), Jewish Autonomous Oblast (189.7), Republic of Buryatia (159.1), Amur Oblast (156.7), Kurgan Oblast (149.5), Kemerovo Oblast (147.5), and Irkutsk Oblast (142.6). The lowest rates are registered mainly in the north-west and southern territories: in the Republic of Ingushetia (31.4 per 100,000 population), Kostroma Oblast (42.6), St. Petersburg city (44.1), Kabardino-Balkaria (48.4), Republic of Bashkortostan (48.6), and in Vologda Oblast (49.7).

[14] Hereinafter, comparisons of notification rates take into consideration only territories with populations over 100,000.

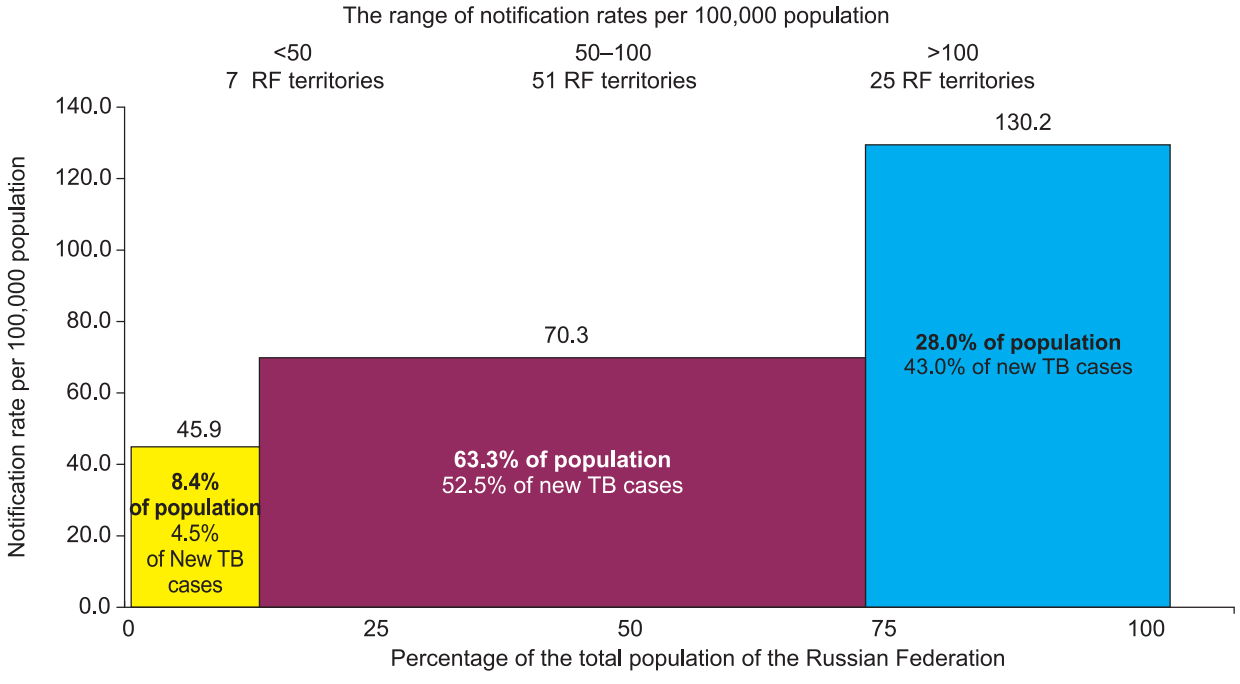


Fig. 2.7. Distribution of the population and the Russian Federation territories by the level of TB notification rate, 2008. Territories are divided into 3 groups: with a notification rate higher than 100, from 50 to 100, and lower than 50 per 100,000 population. The width of the rectangle represents the relative population covered by those territories; the height of the rectangle indicates the notification rates in respective groups (Source: Form No. 8: population – Forms 1 and 4)

The low rates can be connected with a lower spread of the disease in the territories or with inadequate detection, diagnosis and notification of new TB cases.

TB notification rates were over 100 per 100,000 population in 25 of 83 subjects of the Russian Federation accounting for 28% of the nationwide population and 43% of new detected TB cases (see Fig. 2.7). Relatively high notification rates (from 50 to 100 per 100,000 populations) were registered in 51 additional territories. These account for 52.5% of new TB cases detected in Russia and for almost 63,3% of the nationwide population. Relatively low notification rates (below 50 per 100,000 population) were registered only in 7 territories (4.5% of all new TB cases in 2008).

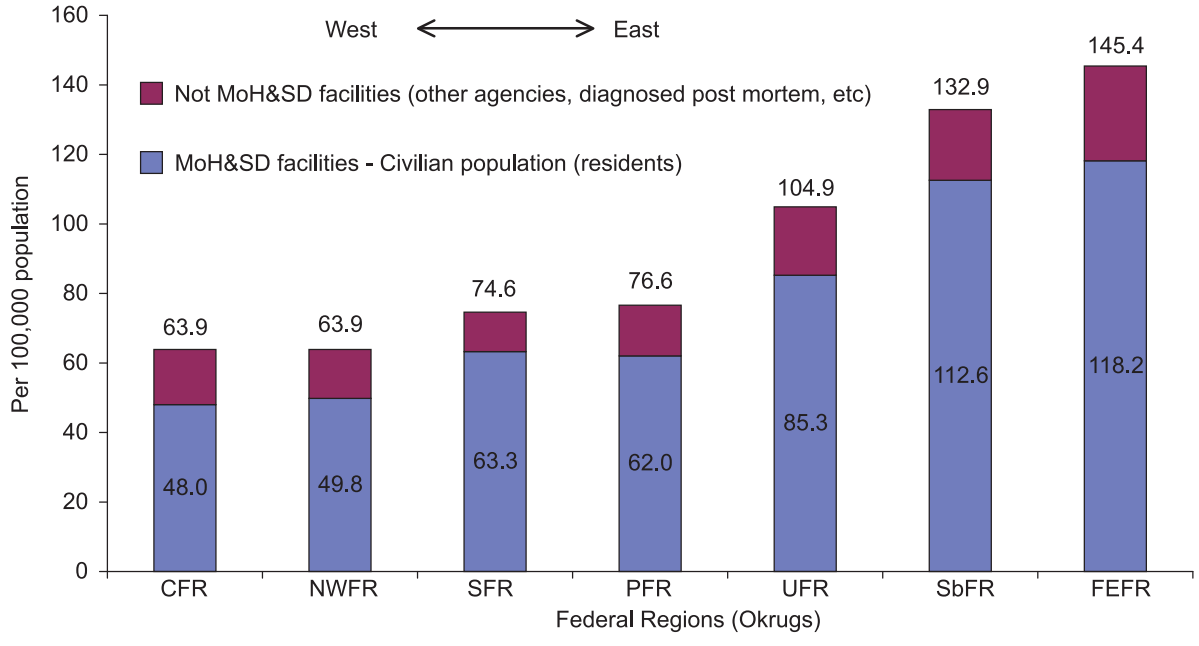
If the notification rates in permanent residents (registered in Form No. 33) are considered without data from the penitentiary system, other agencies, cases registered postmortem, and without followed-up homeless patients, the highest indicators are observed in the same territories in the SbFR and FEFR: in the Republic of Tyva (185.5 cases per 100,000 population), Jewish Autonomous Region (173.6), Primorskiy Krai (156.8), Republic of Buryatia (141.5), Amur Oblast (127.8), Irkutsk Oblast (125.6) and Kemerovo Oblast (124.6). The lowest notification rates in permanent residents are registered mainly in the central and northern territories: in Moscow city (29.3 per 100,000 population) and St. Petersburg city (36.2), Kostroma Oblast (34.9), Murmansk Oblast (38.5), Vologda Oblast (39.1), Yaroslavl Oblast (39.6) and in the Republic of Ingushetia (31.4).

There has been a reliable correlation between TB notification rate and geographic location of Russia's regions. With the exception of the Kaliningrad region (oblast), which is situated for a considerable distance to the west from the main territory of Russia, the rate is gradually increasing from west to east (see Fig. 2.8a) – from 63.0 and 62.2 in the CFR and NWFR to 128.0 and 132.3 in FEFR and SbFR (Form No. 8, 2008).

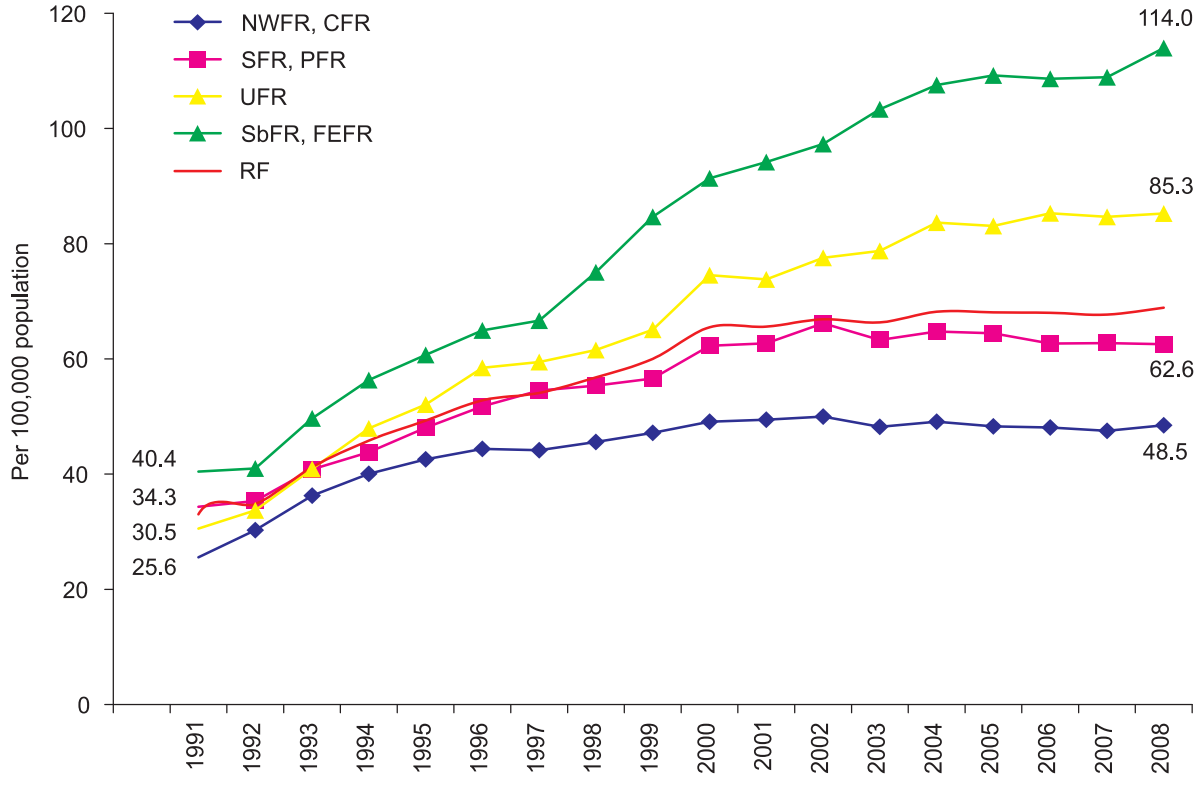
The eastern regions of the country reported higher growth of notification rates. In the regions located in the east (SbFR and FEFR) and in the Urals (UFR), the notification rate increased by 2.7 times from 1991 to 2005, while in the west it increased by 1.8–1.9 times (see Fig. 2.8).

In 2008, the notification rates from the three eastern regions (UFR, SbFR and FEFR) had an increasing effect on the overall TB notification rate in the Russian Federation. However, lack of increase in the notification rates in 2000's in the more populated European part of Russia (CFR, NWFR, SFR and PFR) in part restrained the increase in the overall TB notification rate in the country and, finally, determined the process of rate stabilization. In the past three years (2005–2007), TB notification rate stabilized in all federal districts.

Therefore, the nationwide increase in the notification rate in 2008 is primarily caused by the indicator growth in SbFR and FEFR. The notification rate increases in these regions were about 4% and 10% respectively (from 128.1 to 132.9 and from 132.6 to 145.4 per 100,000 population of these regions).



A) TB notification rate distribution by Federal regions, Form No. 8



B) Trends of the TB notification rate in four groups of federal regions and the Russian Federation, 1991–2007, Form 33, civil population (residents)

Fig. 2.8. Geographic distribution of TB notification rates by Federal region and trends by groups of regions, 1991–2008. (Sources: Form No. 33 MoH&SD facilities and No. 8, population from forms Nos.1 and 4)

A strong relationship between territorial notification rates and socio-economic factors (first of all, the level of quality of life in territories) can be observed. The level of quality of life is characterized by such indicators as the percentage of the population with income below the cost of living (Fig. 2.9) and unemployment level (Fig. 2.10).

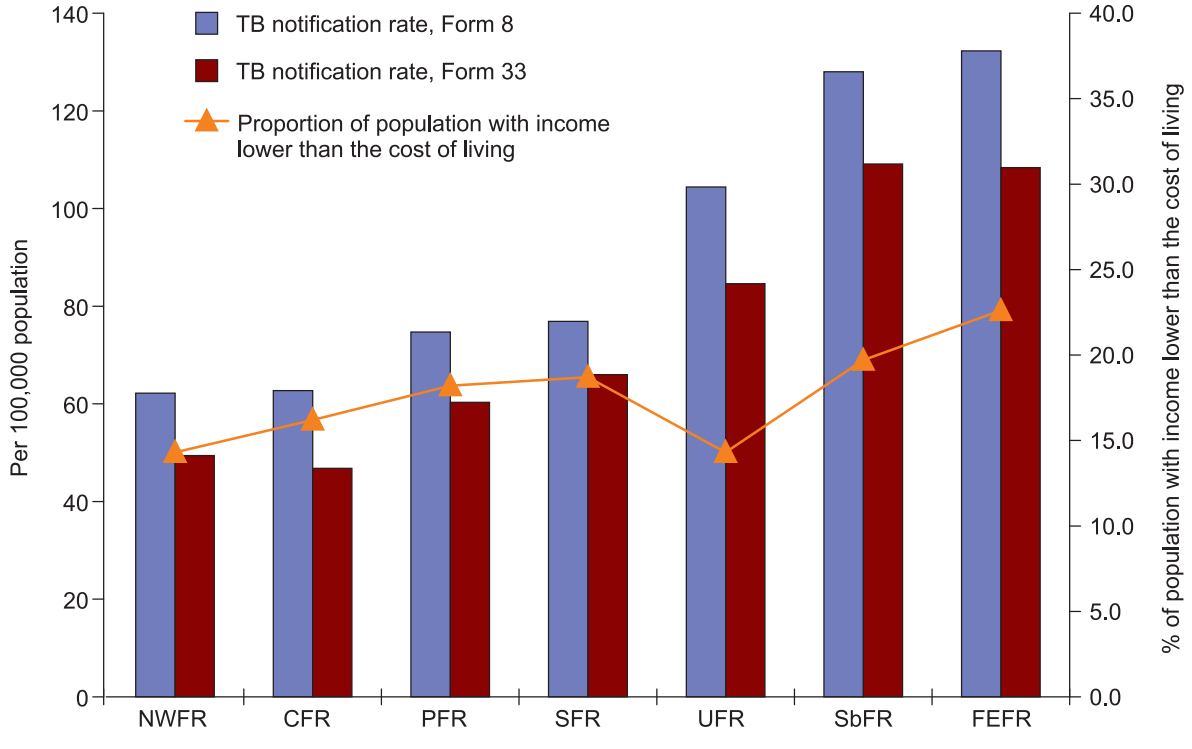


Fig. 2.9. Percentage of population with income below the cost of living and the tuberculosis notification rate in the Federal Regions of the Russian Federation, 2007. The regions are displayed on the figure on a geographical basis: from North-West to the Far East. (Sources: Forms ## 8 and 33 [24])

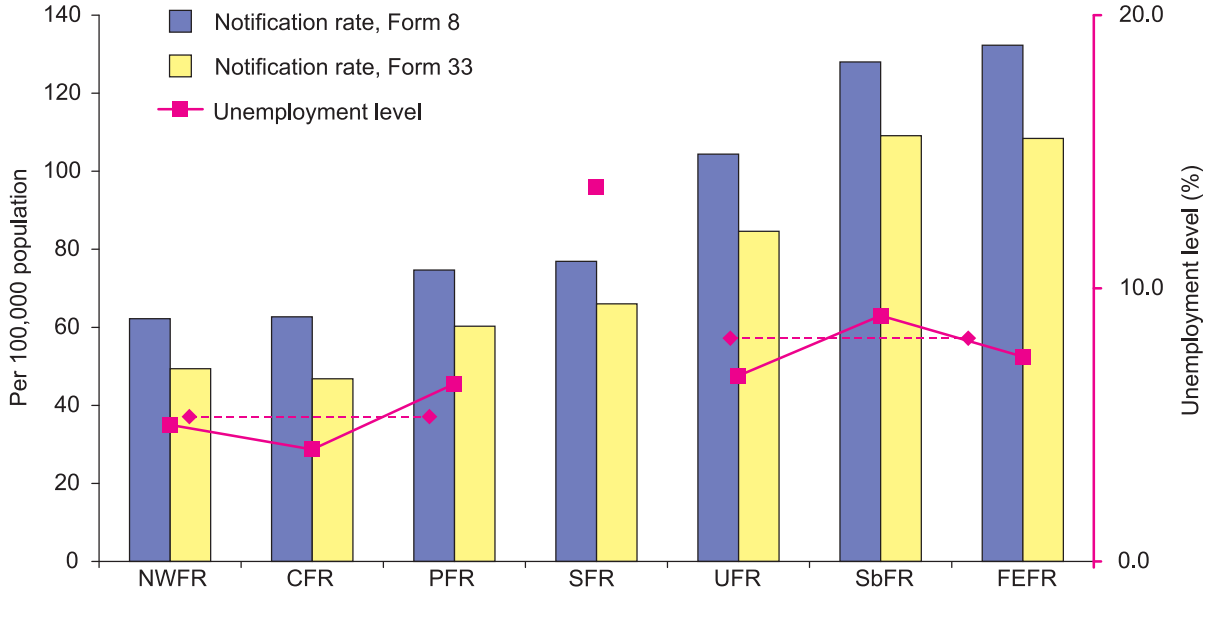


Fig. 2.10. The unemployment and TB notification rates in the Federal regions, 2007. Pink dotted line shows the total rate of unemployment in general and in the three regions to the west of the Urals (NWFR, CFR and PFR) and in the three districts in the east (UFR, SbFR и FEFR). The regions are displayed on the figure on a geographical basis: from the North-West to the Far East. (Sources: Forms No. 8 and No. 33 [24])

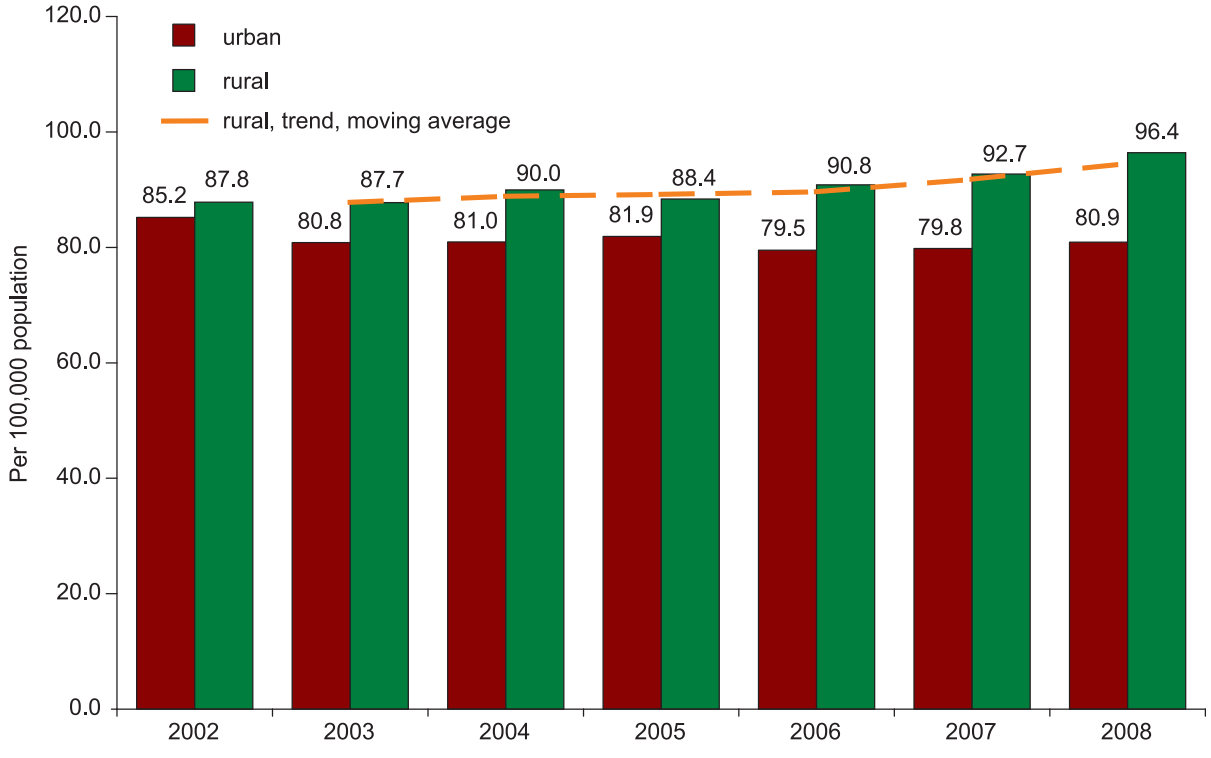


Fig. 2.11. TB notification rates in urban and rural population, Russian Federation, 2002–2008
(Source: Form No. 8; population, Forms No. 1 and No. 4)

Differences in the proportion of the population with income below the cost of living in the federal regions (2007) correlate with the TB notification rates in these regions, except UFR (Fig. 2.9).

Changes in the unemployment rate from region to region also correlate in general with the TB notification rates, except UFR[15] (Fig. 2.10).

It is important to note that in Russia, unlike many other countries, TB notification rate is higher among the rural population than among urban ones – 96.4 and 80.9 per 100,000 population respectively ($p < 0.001$, Form No. 8). In the last 7 years, particularly, in 2008, the notification rate increase was practically only from the rural population (Fig. 2.11).

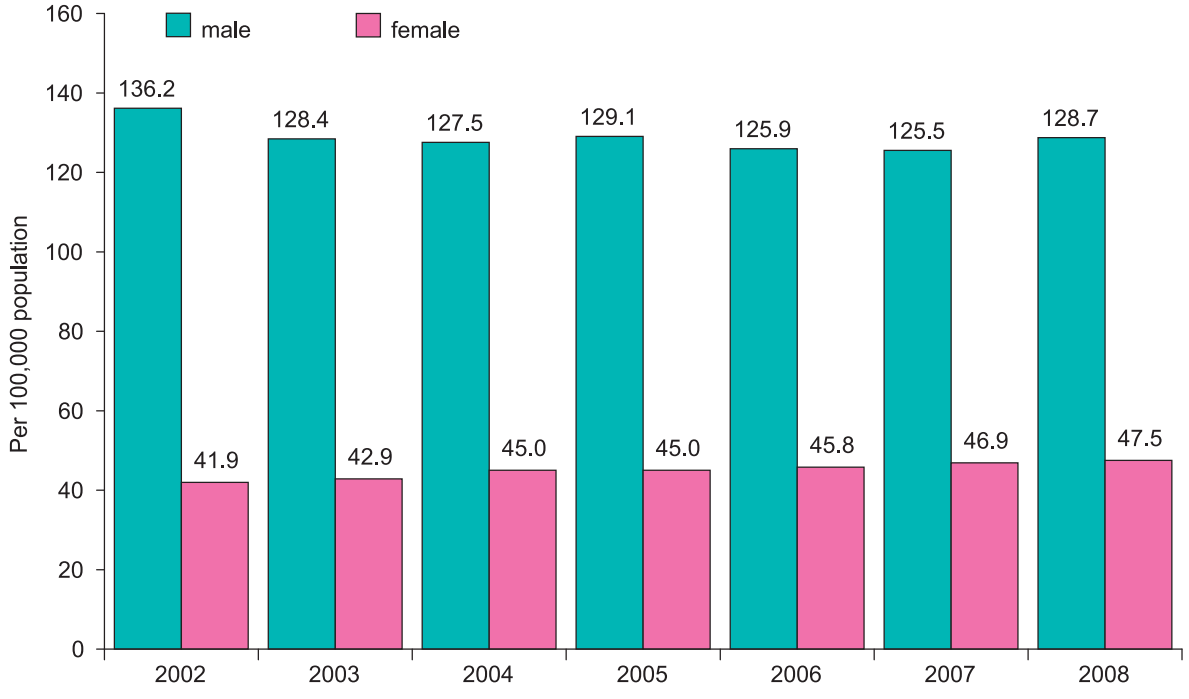
2.3. TB notification rates in different age and gender groups

Assessments of TB notification rates in different age and gender groups are often used for indirect assessment of the burden of the epidemiological situation for TB in a region or nationwide. It is considered that a higher notification rate among males compared to that among females, as well as a significant peak of this indicator among people in middle and young age groups, may be regarded as a prognostic indication to unfavorable situation for TB in future [41]. These population groups are most socially active and, therefore, have a higher probability of social contacts, which increases the risk of TB spread in population.

When assessing the age and gender related characteristics of TB notification rates, it is also important to define in a separate group the penitentiary sector population due to its explicit demographic specificity, i.e. predominance of young males.

In the Russian Federation, TB is more common in males (per 100,000 population): the notification rate among males is almost three times higher than that among females (Fig. 2.12). Over the last several years, this ratio decreased from 3.2 to 2.7. In general, 70% of new TB cases are diagnoses among males (84,601 of 120,835 cases in 2008).

[15] SFR data was excluded from Fig. 2.10 because the total unemployment level for SFO is mainly defined by the unemployment levels in the Republic of Ingushetia (58.5%) and Chechnya (66,9%), which resulted from the recent Chechen crisis. At the same time, the crisis could be a reason of a probable notification rates in these territories.

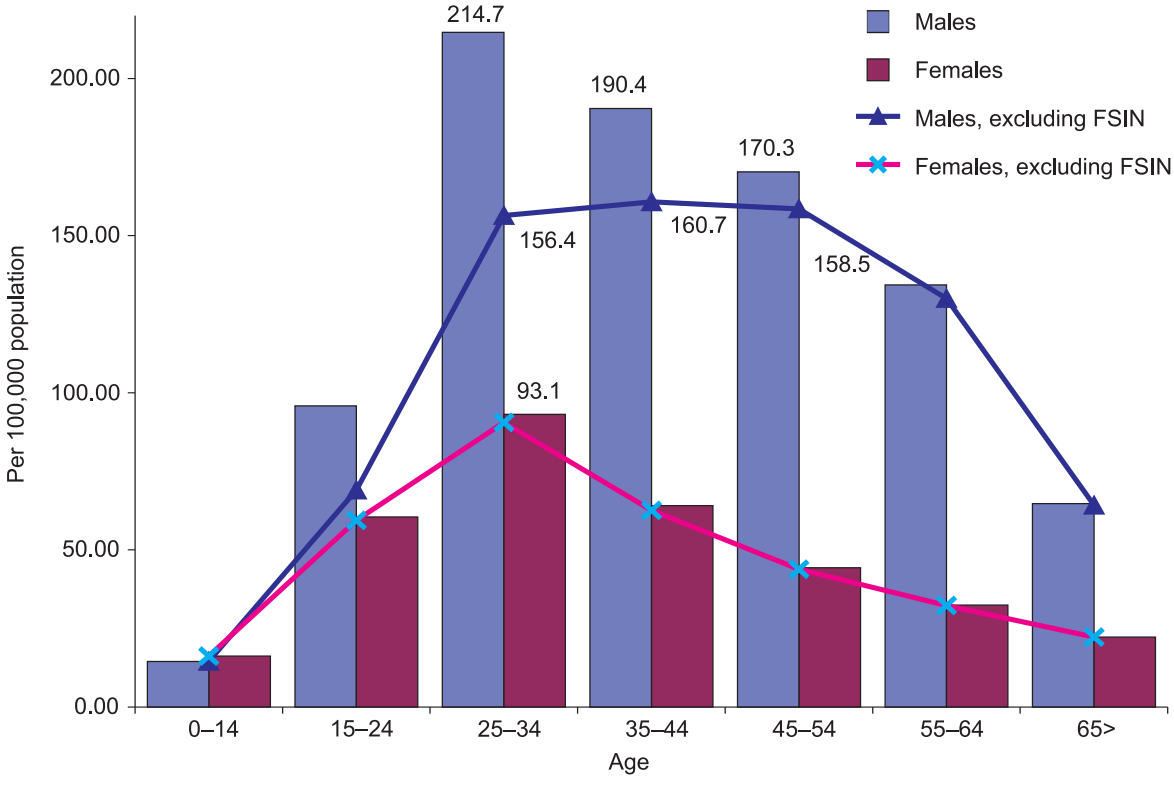


A) TB notification rates in males and females

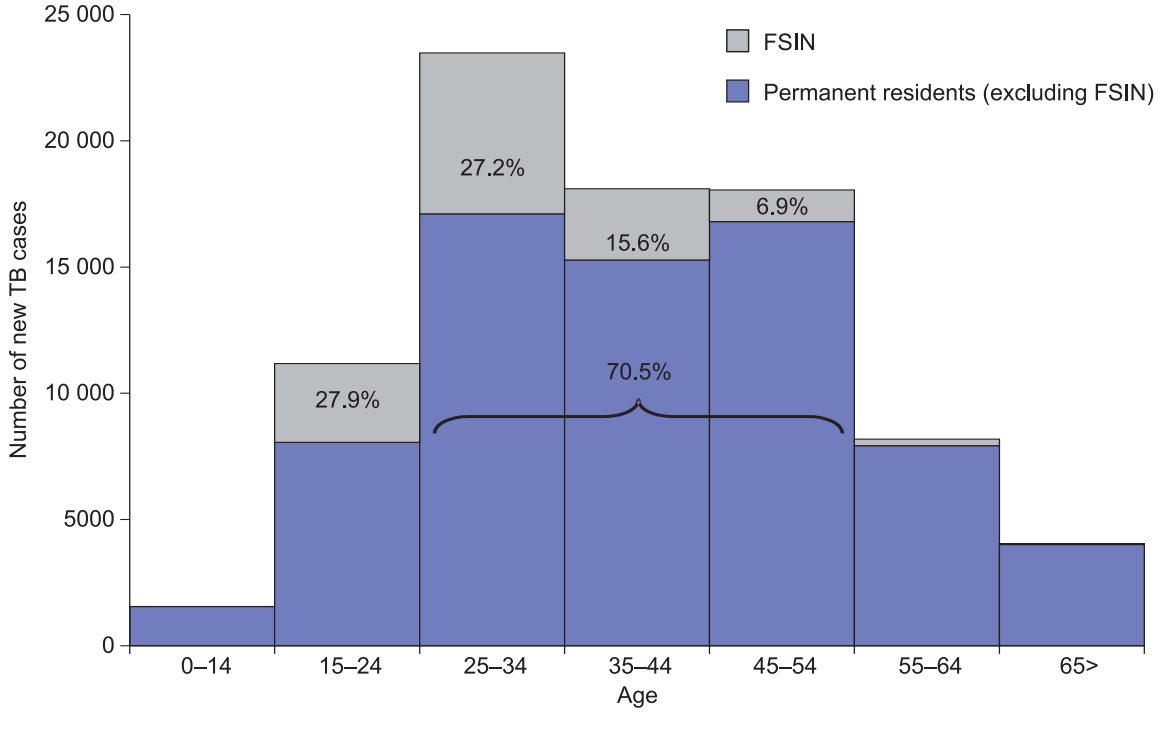
B) Number of new TB cases among males and females, civil and FSIN populations.
Percentage of cases detected in FSIN facilities is indicated above the bars

Fig. 2.12. New TB cases among males and females, Russian Federation, 2002–2008
(Source: Form No. 8; population – Form No. 4)

Over the past several years, an increase in the notification rate has been observed among females (from 41.9 per 100,000 in 2002 to 47.5 in 2008), and a decline was observed in the same period among males (from 136.2 to 125.4), which changed for another increase to 128.7 in 2008. It should be noted that the decline in the notification rate among males was due to the decrease in the number of new cases registered in FSIN system facilities



A) TB notification rates for different age and gender groups of the entire population and of the civil population of the Russian Federation (excluding FSIN)



B) Structure of new TB cases registered among males of different age groups. Cases from FSIN, civil population of the Russian Federation. Braces show percentage of new male cases in age group 25–54 years

Fig. 2.13. TB notification rates and number of TB cases in different gender and age groups, 2008. The entire population, FSIN and civil population of RF (Sources: Form No. 8, population – Forms No. 1 and No. 4)

(including convicts, defendants and individuals on trial). The rate for males from the civil population practically did not change over these years (in the range of 105–107 per 100,000 – See Fig. 2.12B).

Individuals in different age groups are characterized by different susceptibility to TB infection and probability of a contact with source of infection, and therefore different measures should be taken for different age groups in TB control programmes, which makes it necessary to examine notification rates by age group for each gender (Fig. 2.13A),

Among the male population of the Russian Federation, the highest risk of TB is among 25–34 year olds age group (214.7 per 100K in 2008). However, the notification rate among the FSIN population makes a considerable contribution to the overall rate for this gender and age group (almost 30%). When considering notification rate data for permanent resident males only (without FSIN), the highest rate in Russia falls at an older age group – 45–54 year olds (160.7 per 100K, 2008). The notification rate among 25–34 year old males from the resident population only is considerably lower than the rate among all males from this age group, and equals 156.4 per 100,000 compared to 214.7 per 100,000, respectively.

Basing on the personal based registers of SSTM [2] data, the analysis of 5-year age intervals (not 10-year, as accepted in Russian and international practice) for the resident population excluding FSIN in 2004–2006 allows to identify two pronounced peaks in TB notification rates among males of the age groups of 26–30 and 41–45 years old. The peak in the 26–30 years old age group is more specific for the territories of the SbFR and FEFR.

It should be noted that the socio-economic burden of TB is to a greater extent determined by the absolute number of cases in economically active age groups, not by the TB notification rate. Analysis of the form No. 8 shows that 70% of new TB cases among males occur during the most productive years, between 25–54 years old, accounting for 60,000 new TB cases a year (Fig. 2.13B). It is noteworthy that over the past six years the number of new TB cases among men of the most productive age (25–34 years) has increased by 30% (Fig. 2.14).

The highest notification rates among females fall at the fertile age of 25–34 years old (Fig. 2.13A). The notification rate in this age group has been increasing every year. From 1999 to 2008, the rate increased from 70.6 to 93.1 per 100,000 population (Fig. 2.14), and the percentage of TB cases registered in this age group among all female cases increased from 23.3% to 28.3%.

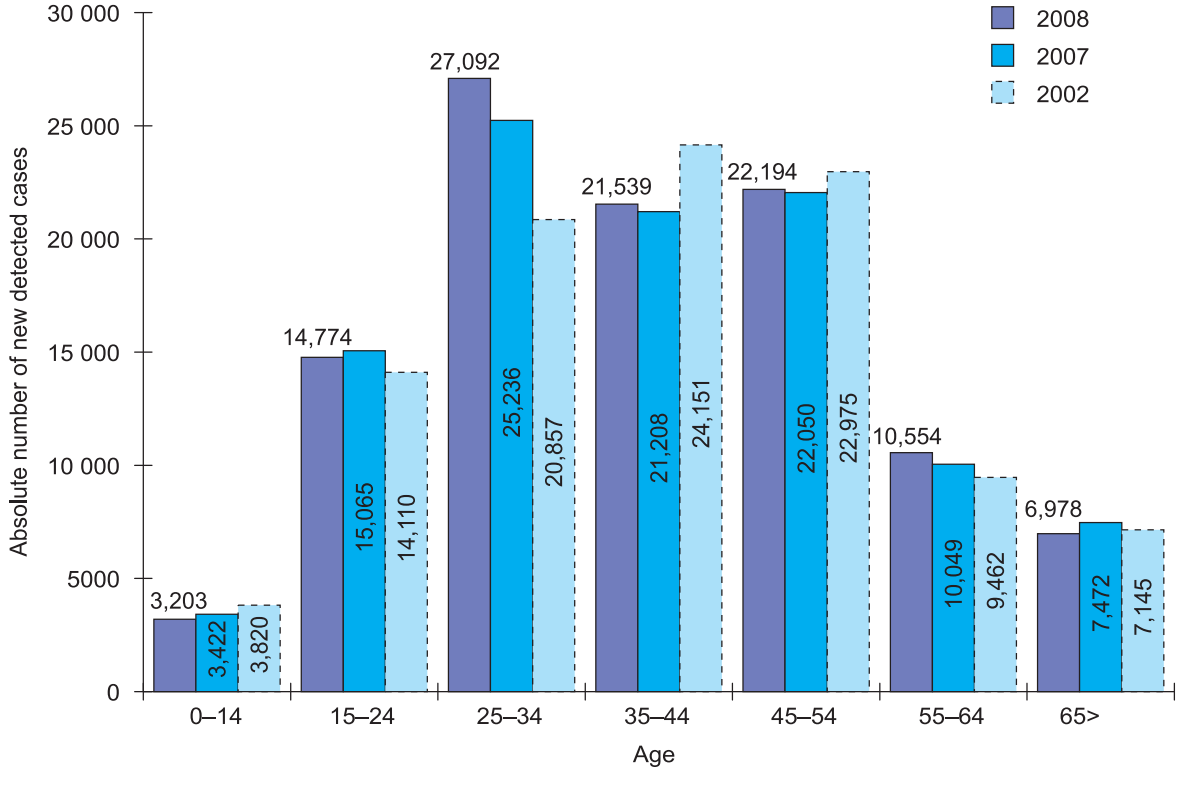


Fig. 2.14. The number of new cases of tuberculosis among men of different age groups, the civil population, the Russian Federation, 2002, 2007 and 2008. Information from Form No. 8 excludes data from FSIN. (Sources: Form No. 8, population: Forms No. 1 and No. 4)

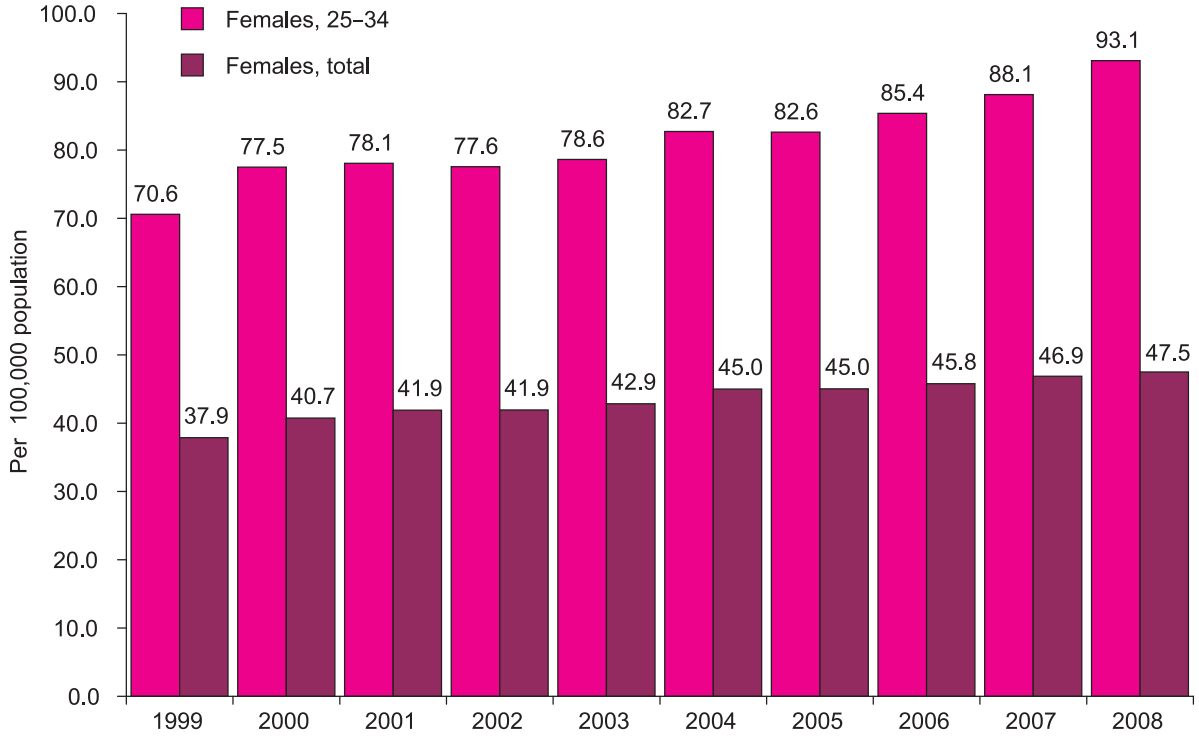


Fig. 2.15. The notification rate among females (Sources: Form No. 8; population: Forms No. 1 and No. 4)

Overall, the presence of peaks in the notification rate among the younger and more productive age groups in both males (25–34 and 45–54 years old) and females (25–34 years old) indicates an unfavorable TB epidemiological situation in the country. Furthermore, it suggests that a high level of TB spread will be retained into the near future. Thus, the high notification rate of tuberculosis in these age groups is a prognostic sign of the deteriorating situation in the future.

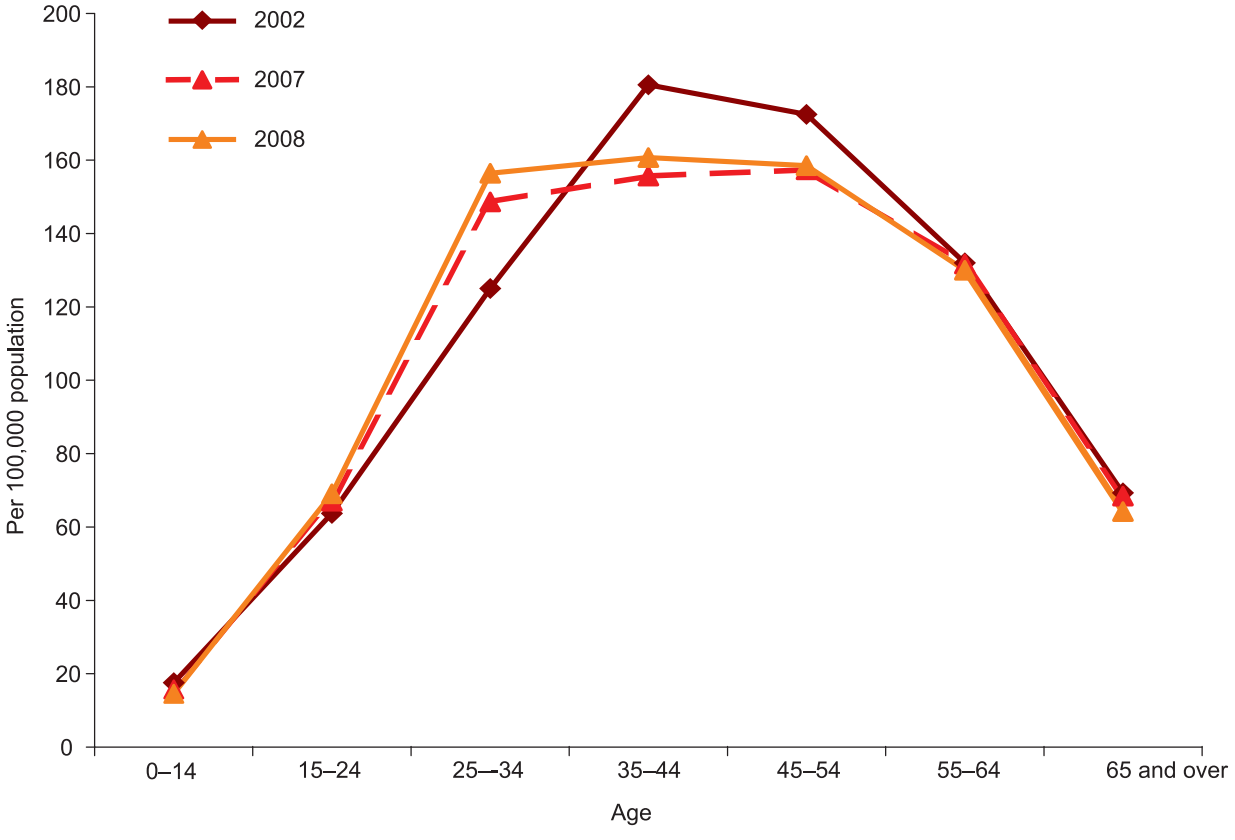
Analysis of the gender and age structure trends in tuberculosis notification rates over the past seven years (2002–2008) shows that although the overall notification rate has stabilized, the age structure of patients was deteriorating during this period – the new TB patients are becoming younger. This is noted in more or less in all federal districts of Russia.

Graphs (Fig. 2.16 and 2.17) show the emergence in 2007–2008 of a new maximum or a gradual shift towards age of 25–34 years for men, especially in the Urals and Siberian Federal Regions. As noted above, in recent years an increase in peak among women aged 25–34 years was observed, especially in SbFR, FEFR and UFR.

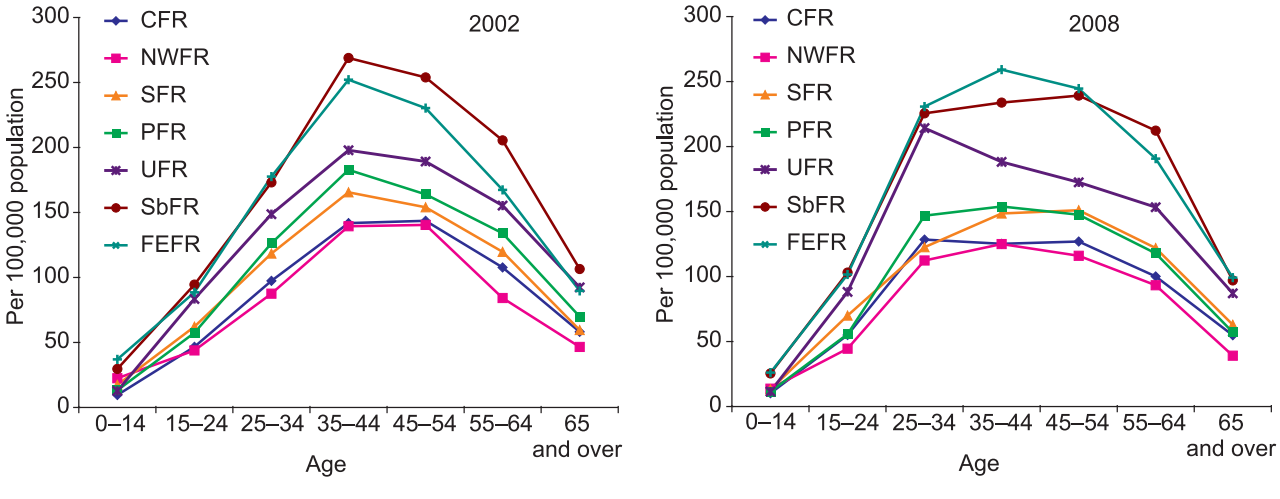
In 2002, a marked maximum notification rate among men aged 25–34 was only in two territories – the Republic of Tuva and the Yamalo-Nenets AO (1.5–2 times higher than the overall notification rate among males from the civil population), while in 2007 there were 12 territories with the peak in TB notification among 25–34 years old group, exceeding the overall notification rate among men more than 1.6 times (the Republic of Tatarstan, the Republic of Tuva, the Khanty-Mansi AO, in Tyumen, Orenburg, Ulyanovsk, Chelyabinsk, Leningrad, Vladimir, Samara, Tver and Novgorod oblasts).

Most other territories have a strong two-humped TB notification among males of two age groups – 25–34 and 45–54 years. Significant notification rate peak for men over the age of 55 years, exceeding the average notification among civilian men almost 2 times was registered only in the Republics of Chechnya and Dagestan. This can relate to a relatively lesser burden of TB in these territories, as well as to some problems with registration of TB among young people, or to a high level of migration of young men outside the region and, as a consequence, using overrated value of population of this age group in denominator for calculation of the notification rate.

The peak of tuberculosis notification among the female civil population exceeds the nationwide notification among women more than twice in 23 administrative units of the Russian Federation (Tver, Nizhni Novgorod,



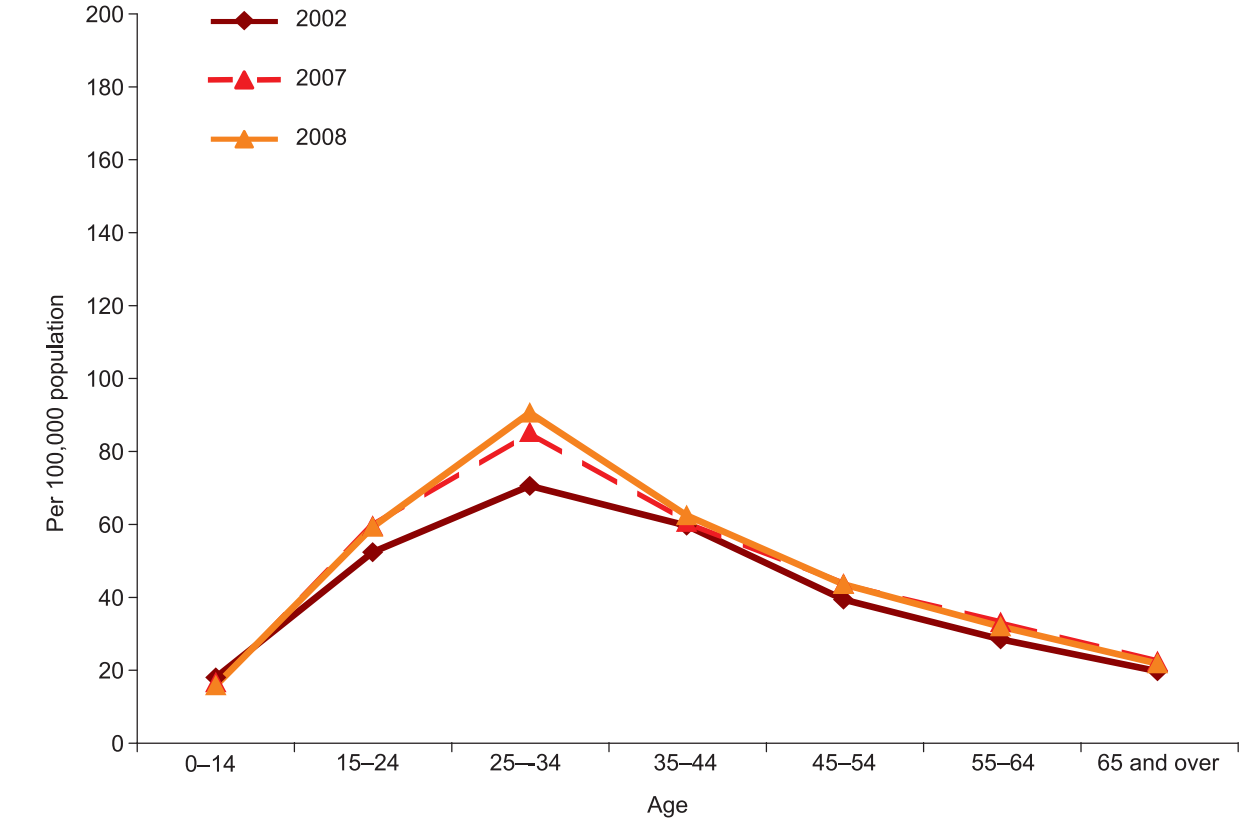
A) Russian Federation



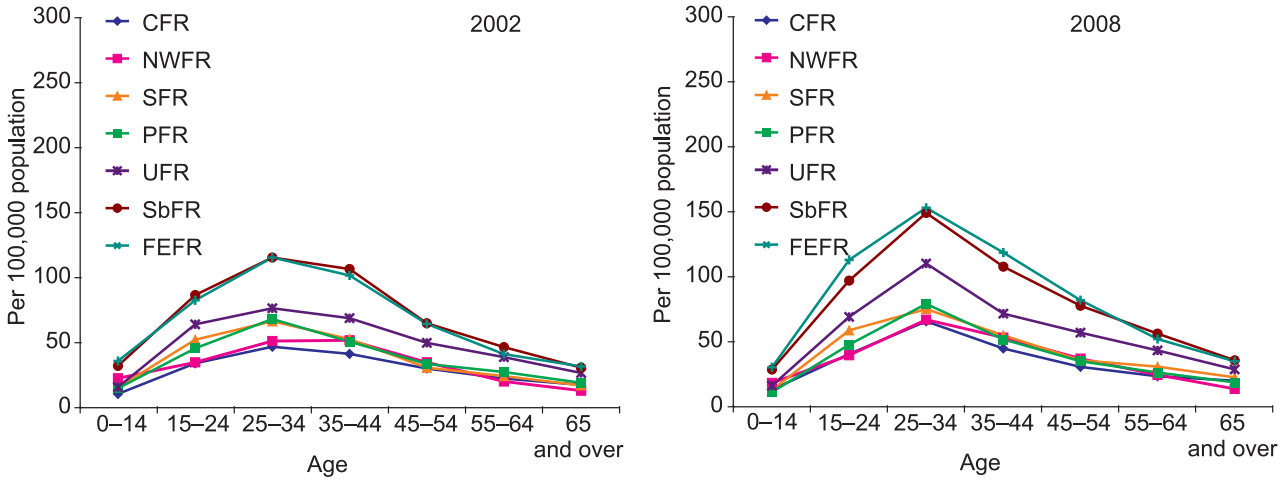
B) Federal Regions

Fig. 2.16. Registered TB notification rate among men of different age groups of the civil population, the Russian Federation, 2002, 2007 and 2008. Data from Form No. 8 excluding FSIN (Sources: Form No. 8; population: Forms No. 1 and No. 4)

Pskov, Penza, Ryazan, Volgograd, Orenburg, Vologda, Kursk and Moscow oblasts, Perm Krai and other territories of the Russian Federation. In 2007 there were 14 such regions, and only 7 in 2002.



A) Russian Federation



B) Federal Regions

Fig. 2.17. Registered TB notification rate among women of different age groups of the civil population, the Russian Federation, 2002, 2007 and 2008. Data from From No. 8 excluding FSIN (Sources: Form No. 8; population: Forms No. 1 and No. 4)

2.4. TB notification rate among children[16]

In international practice, the definition «child» includes individuals aged from new born to 17 years 11 months 29 days. However, it is clear that from the epidemiological point of view this group is too heterogeneous for correct analysis. Apart from the biological processes of growth and hormonal changes, it is especially important to separate adolescent group aged 15–17, because this age is characterized by increased communication and social

[16] V.A. Aksenova (RIPP) participated in preparation of section 2.4.

activity. Moreover, patients at this age predominantly have specific age-related localizations of the disease (18–20% of pulmonary TB in patients of 0–14 years of age to almost 85% of TB cases with this localization in adolescents aged 15–17 years). Given this information, this section contains summary data for child population of 0–17 years of age along with separate data for children 0–14 years of age and adolescents aged 15–17 years.

TB notification rate among children is another important prognostic indicator based on epidemiological and demographic data. Anyhow, this parameter depends to a large degree on TB case finding and registration management among this age group.

Overall in the RF, from 1992 to 2001, the TB notification rate among children 0–14 years of age increased almost two-fold (from 9.4 to 19.1 per 100,000 children, Fig. 2.18). High notification rates in 1999–2001 were supposedly related to hyperdiagnosis following the introduction of computer tomography.[17] Over the following five years, the rate did not substantially change (16.2–16,4 per 100,000 population with some minor fluctuations within the 95% CI limits (± 0.55 per 100,000 population), with a proven decline to 15.4 per 100,000 population in 2008. Since the structure of TB forms among children 0–14 years of age did not substantially change while case notification rates declined in all the age groups (0–4, 5–6 and 7–14 years) in 2007–2008, it would be appropriate to suggest that the trend is being determined by improved epidemiological situation of TB among children rather than by any changes in case detection management in this population group.

In contrast to children aged 0 to 14 years, adolescents (15–17 years of age) had an increasing TB notification rate before 2006 (Fig. 2.19). From 2002 to 2006, TB notification rate in this group increased from 32.7 to 39.2 per 100,000 of annual average number of adolescents. In 2007–2008, the value started to decline and decreased to 36.1 per 100,000 population. However, in recent years, changes may be partly linked to the significant reduction in the number of adolescent population in 2004–2008 (from 7,462,000 to 5,584,000 as of January 1 of referred years). This may affect the calculation of notification rate due to conditional nature of the definition «annual average population 15–17 years of age» that is used as the dominator.

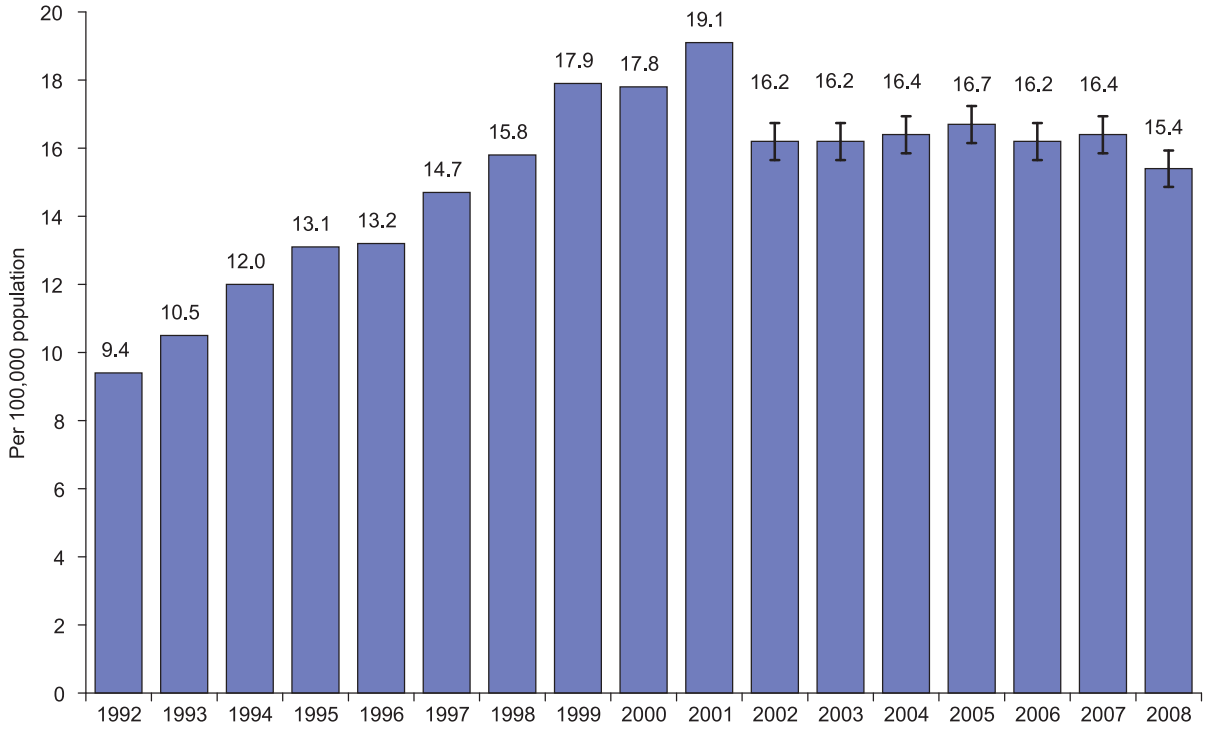


Fig. 2.18. TB notification rate among children 0–14 years of age, 1992–2008, the Russian Federation.
Lines of variation for 2002–2008 indicate 95% confidence intervals.
(Sources: Form No. 8; population: Forms No. 1 and No. 4)

[17] Аксёнова В.А. Инфицированность и заболеваемость туберкулезом детей как показатель общей эпидемиологической ситуации по туберкулезу в России / В.А. Аксёнова // Проблемы туберкулеза. – 2002. – №1. – С. 6–9 // (Aksenova V.A. TB infection and notification rate among children as an indicator of the epidemiological situation of TB in Russia / Problemy tuberkuleza. – 2002. – No. 1, p. 6–9).

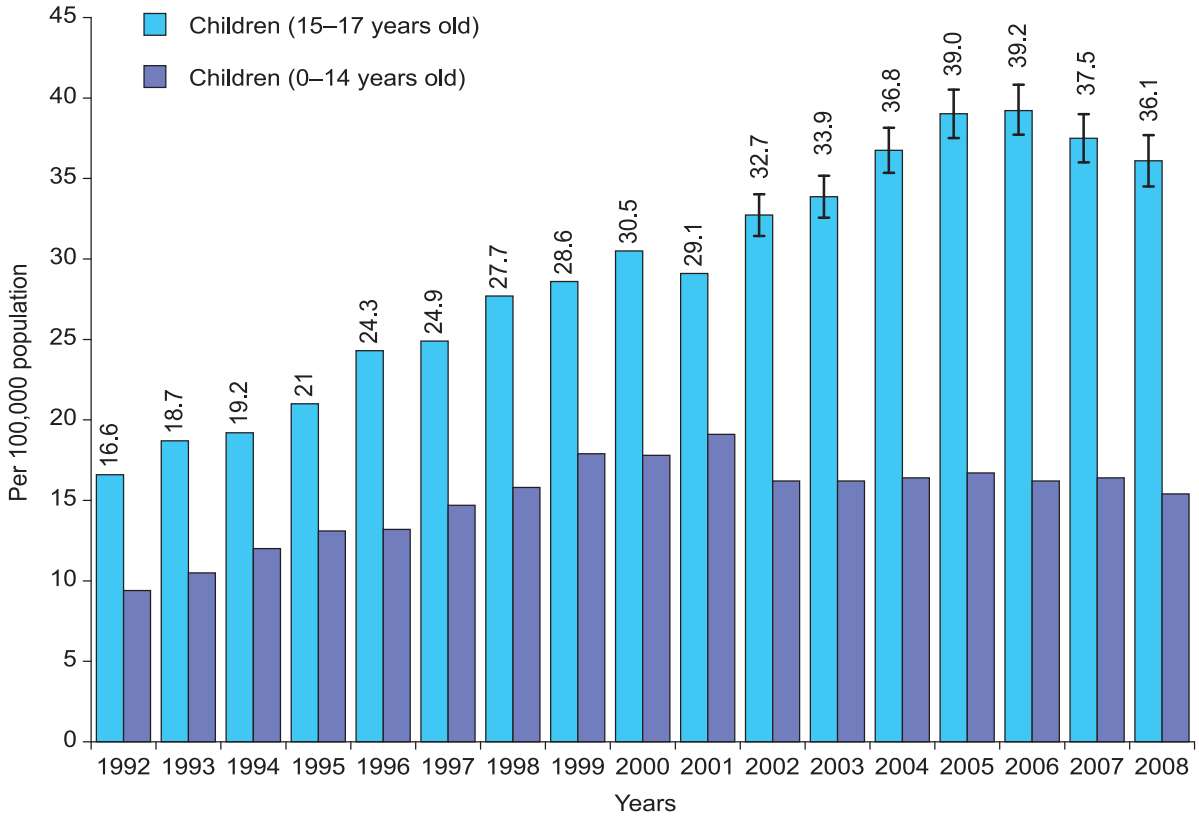


Fig. 2.19. TB notification rate among children 0–14 years and adolescents 15–17 years of age, 1992–2008, the Russian Federation. Lines of variation for 2002–2008 indicate 95% confidence intervals. (Sources: Form No. 8; population: Forms No. 1 and No. 4)

As a whole, TB notification rate among adolescents is more than two-fold as compared to that among children aged 0 to 14 years, which proves the need for special attention to the adolescent age group. Also, it should be noted that TB notification rate significantly varies in the age group 0–14 years. According to the Form No. 8 (2008) data, the highest level of this indicator is found in the age group 5–6 years (45.6 per 100,000 of children of that age), and its low values are in age groups 0–4 years (7.1 per 100,000) and 7–14 years (13.7 per 100,000).

Anyhow, in spite of the general decline of nationwide notification rate by 6.3% among children of 0–14 years in 2008, the indicator trend differs in RF regions if compared to the previous year. In 31 subjects of the Russian Federation (over 1/3) notification rates among children of 0–14 years increased. Moreover, the increase was over 20% in 14 regions (Kirov, Bryansk, Saratov, Lipetsk, Orel, Tambov, Pskov, Kurgan and Volgograd oblasts, the Republic of Altai, the Yamalo-Nents AO, Primorsky Krai, Perm Krai, and St.Petersburg city), while notification rates fell by over one third in 12 regions (in Leningrad, Belgorod, Magadan, Ulyanovsk, Vologda, Sakhalin, Murmansk and Ryazan oblasts, the Khanty-Mansi Autonomous Area, in the Republic of Karelia, the Udmurtian Republic and in the Republic of Kalmykia).

When considering TB notification rates and trends in different regions, it should be taken into account that the number of children with TB registered in each subject of the Russian Federation is relatively small. For example, according to the Form No. 8 data, in 2008 in a half of territories the number of reported new cases among children under the age of 15 ranges from 11 to 55. This leads to significant differences in indicators by years for each subject of the Russian Federation, as well as among territories. Therefore it is appropriate to assess trends in TB notification rate among children for a period of time exceeding 1 year. Fig. 2.20 shows the distribution of subjects of the Russian Federation by the summary level of the indicator, calculated for a period of five years (based on the total number of children with TB in 2004–2008 and respective populations. It is shown that the TB notification rates among children ranges from 76.0 (the Kamchatka Krai) and 73.5 (Kaliningrad Oblast) to 5.3 (Murmansk and Kursk Oblasts, the Republic of Adygea)[18] per 100,000 population.

[18] The indicator divergence is shown for territories with children population over 25,000.

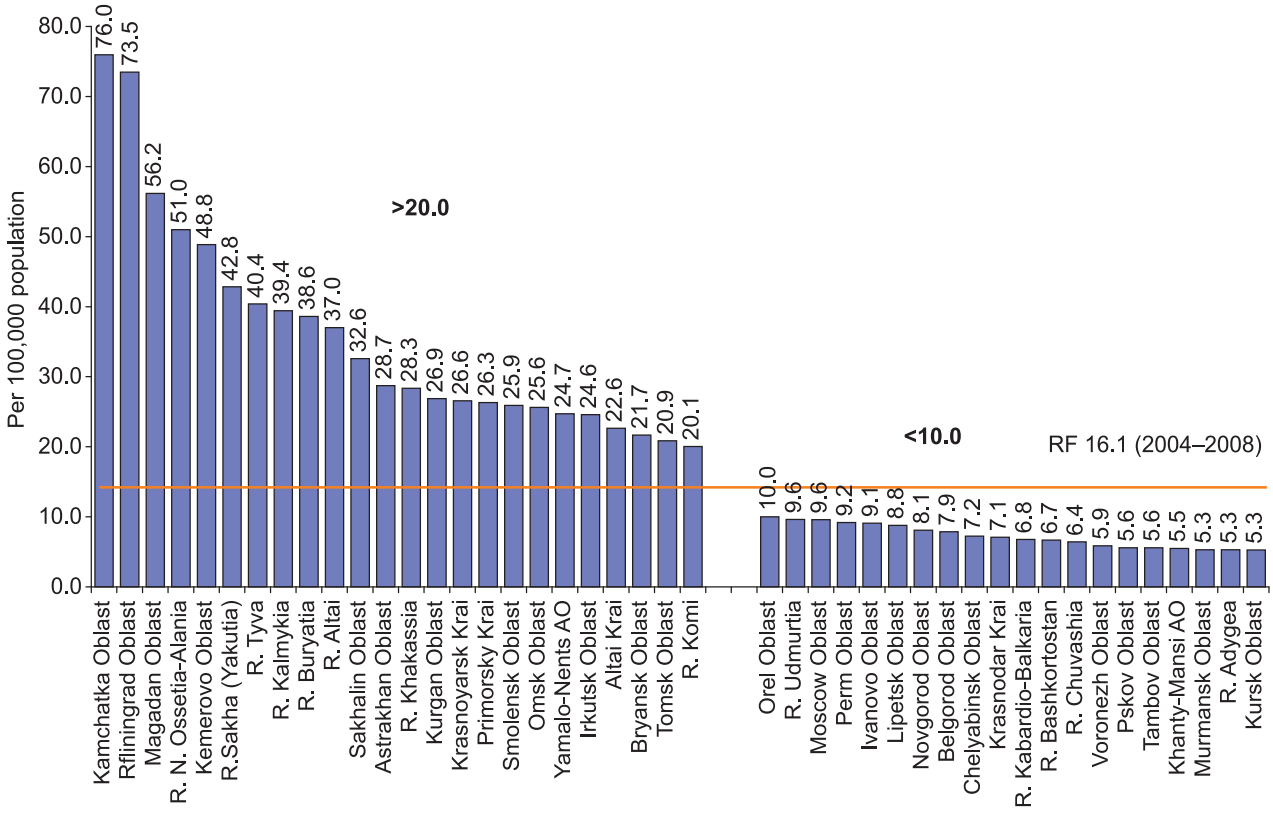


Fig. 2.20. Registered TB notification rates among children in the Russian Federation, aggregated data for 5 years (2004–2008) (Sources: Form No. 8; population: Forms No. 1 and No. 4)

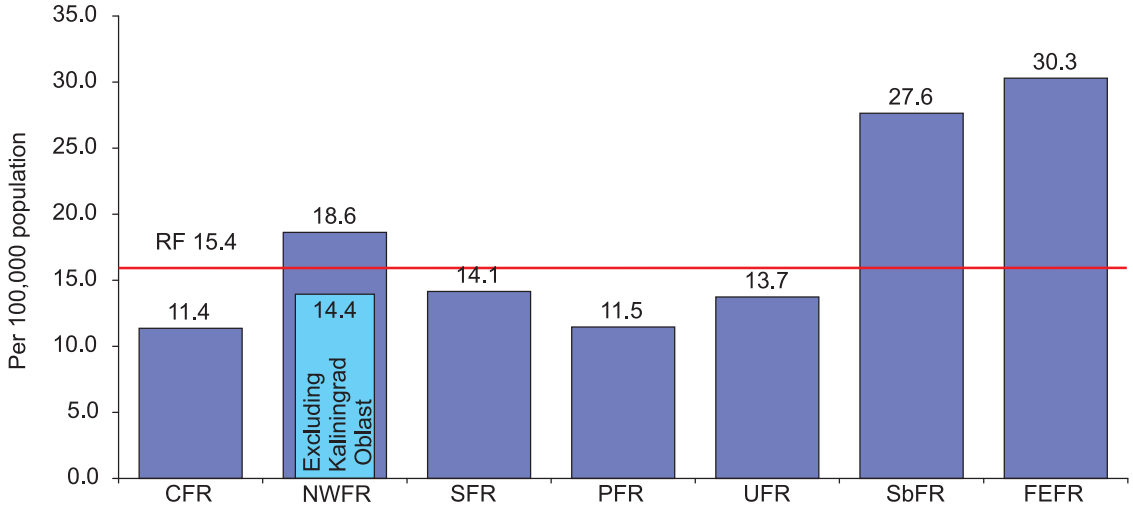


Fig. 2.21. Notification rates among children in the federal regions of the Russian Federation, 2008. Total data for NWFR is presented without Kaliningrad Oblast (Sources: Form No. 8; population: Form No. 4)

Fig. 2.21 displays data on TB notification rates in federal regions. In the east (SbFR and FEFR) the notification rate indicator is almost two-fold compared to that in the Urals, central, southern and western[19] regions of the Russian Federation.

The data confirms that the epidemiological situation of tuberculosis in the eastern regions is much more severe than in the west.

[19] Notification rate for the North-West Federal Region is shown without Kaliningrad Oblast located far to the west from other territories of this federal region and characterized by a high TB notification rate among children.

2.5. Structure of new TB cases in the Russian Federation Pulmonary TB (PTB) is traditionally considered as epidemiologically most dangerous form of the disease

Among all new cases registered at all TB services, 90.8% (2008, Form No. 8) are pulmonary TB. The proportion of PTB is lower in regional civilian TB facilities, which provide a higher quality of extra-pulmonary diagnosis (89.9% in 2008, Form No. 8). This percentage varies quite broadly by subjects of the Russian Federation (Fig. 2.22): from 79.5–81.2% (Yaroslavl Oblast, the Republic of North Ossetia and St. Petersburg city) to 94–97% (Khabarovsk, Lipetsk, Pskov oblasts, Jewish AO and the Republic of Chuvashia). Currently, this percentage depends to a large degree on the capacity of regional and local health facilities to diagnose respiratory TB of extra-pulmonary localizations[20] (upper respiratory tract and bronchi, intrathoracic lymph nodes and pleura) and of extra-respiratory sites [21] (bones and joints, urogenital organs, CNS, etc.). This capacity depends on the availability of medical specialists and their qualifications, and on the level of adequate knowledge about extra-pulmonary TB among PHC staff and other medical specialists, such as urologists, gynecologists and physicians in other fields of expertise.

The notification rate of extra-respiratory TB (ERTB) is relatively low. The rate remained stable in the period of 1992–2002, at about 3.3 per 100,000 population, and by 2007, declined to 2.8 (Fig. 2.23). Anyhow, the percentage of such cases among all new cases in the Russian Federation decreased substantially from 10.2% in 1992 to 3.3% in 2008. Among children and adolescents (0–17 years), the percentage is higher – 8.7%. Therefore, the notification rate of ERTB in recent years has had a relatively small impact on the trend in the overall TB notification rate in the country. It could be possible that this rate is underestimated due to registration specifics of the combined pathology of pulmonary TB and TB of other organs. Unfortunately, currently available reporting documents record only the major pathology, which is in most cases a pulmonary TB case. Furthermore, a considerable number of ERTB cases also remain undetected due to inadequate knowledge about early TB detection methods among GHC physician, and sometimes due to ignoring this problem[22].

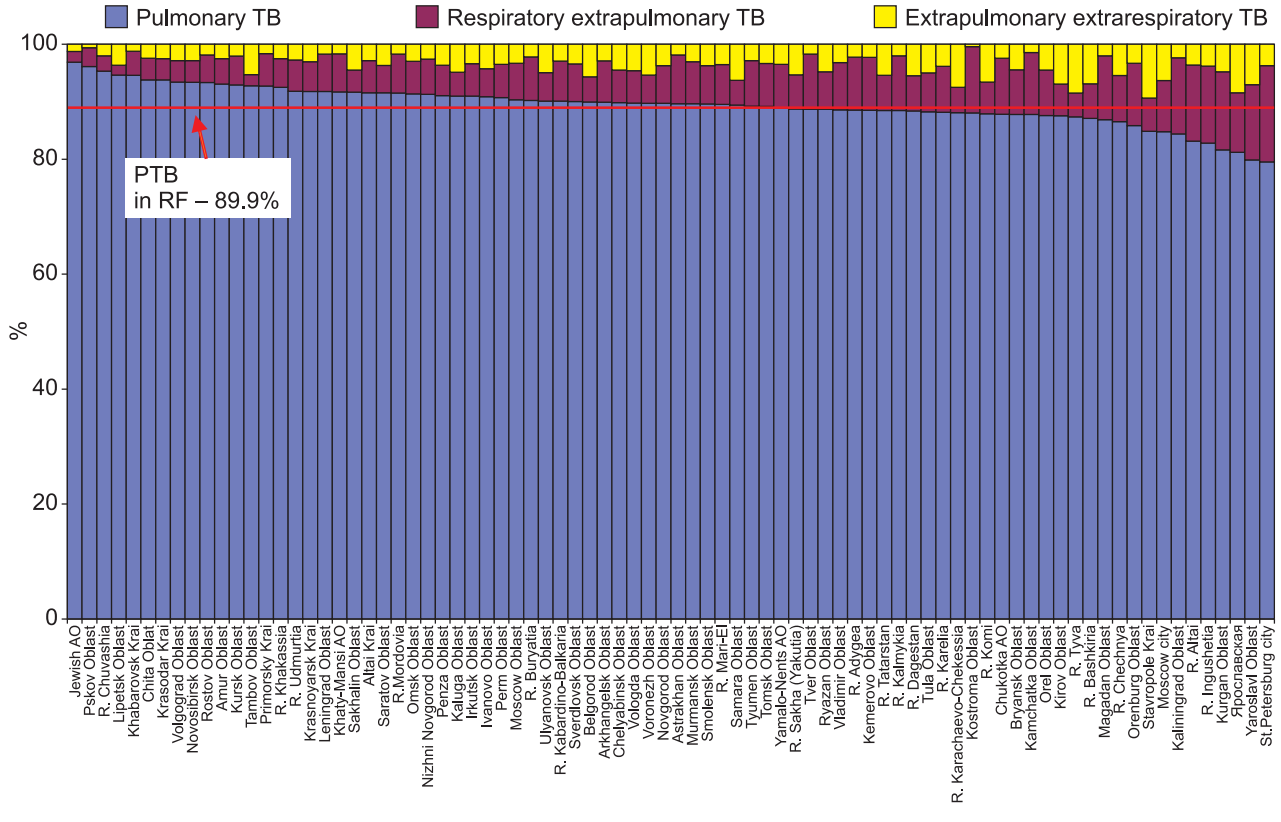


Fig. 2.22. TB sites among new cases, registered in territories of the Russian Federation, 2008. Pulmonary TB, respiratory TB of extra-pulmonary sites and extra-respiratoryTB (see text). (Source: Form No. 33)

[20] Without lung parenchyma lesion.

[21] Historically, in the USSR and in later in Russia, the Russian definition of extra-pulmonary TB («внелёгочный туберкулёз») does not correspond to the specifically linguistic meaning of this term and means indeed 'TB of extra-pulmonary localization', or extra-pulmonary TB (ERTB). This review evaluates ERTB based on appropriate data from Russian reports with taking due account of these circumstances (interpreter's note).

[22] Левашев Ю.Н., Мушкин А.Ю., Гришко А.Н. Внелегочный туберкулез в России: официальная статистика и реальность // Пробл. туб. и болезней легких. – 2006. – № 4. – С. 3–6 (Levashev Yu.N., Mushkin A.Yu, Grishko A.N. Extra-respiratory TB in Russia: statistics and the reality // Problemy tuberkuleza i bolezni legkikh. – 2006. – P. 3–6).

It appears necessary to introduce the concept of combined site TB cases into the TB recording and reporting forms. This would allow for more accurate calculation of the level of extra-pulmonary and extra-respiratory TB spread in the country. Such a measure is important for defining the need for extra-respiratory TB specialists in the regions and conducting training courses on extra-respiratory TB diagnostics for physicians of all fields of expertise.

Timely detection of extra-respiratory TB is also critical due to the high level of disability in such patients (25).

In 2008, among sites of new extra-respiratory TB cases (Fig. 2.24), urogenital TB is most common (35.5%), with the other common forms being TB of bones and joints (29.7%), TB of peripheral lymphatic nodes (14.8%), CNS and brain membranes (7.5%), and ocular TB (7.0%).

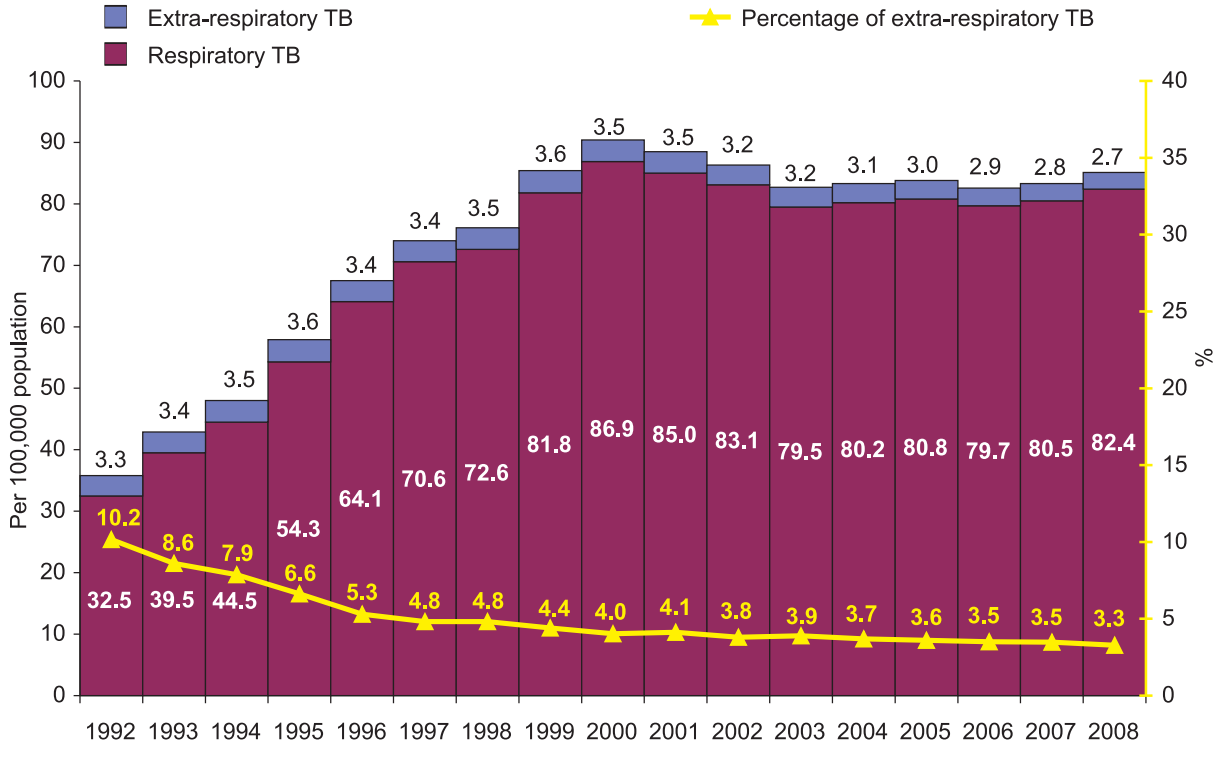


Fig. 2.23. TB notification rates of respiratory and extra-respiratory TB, and the percentage of extra-respiratory TB, 1992–2007 (Sources: Form No. 8; population: Forms No. 1 and No. 4)

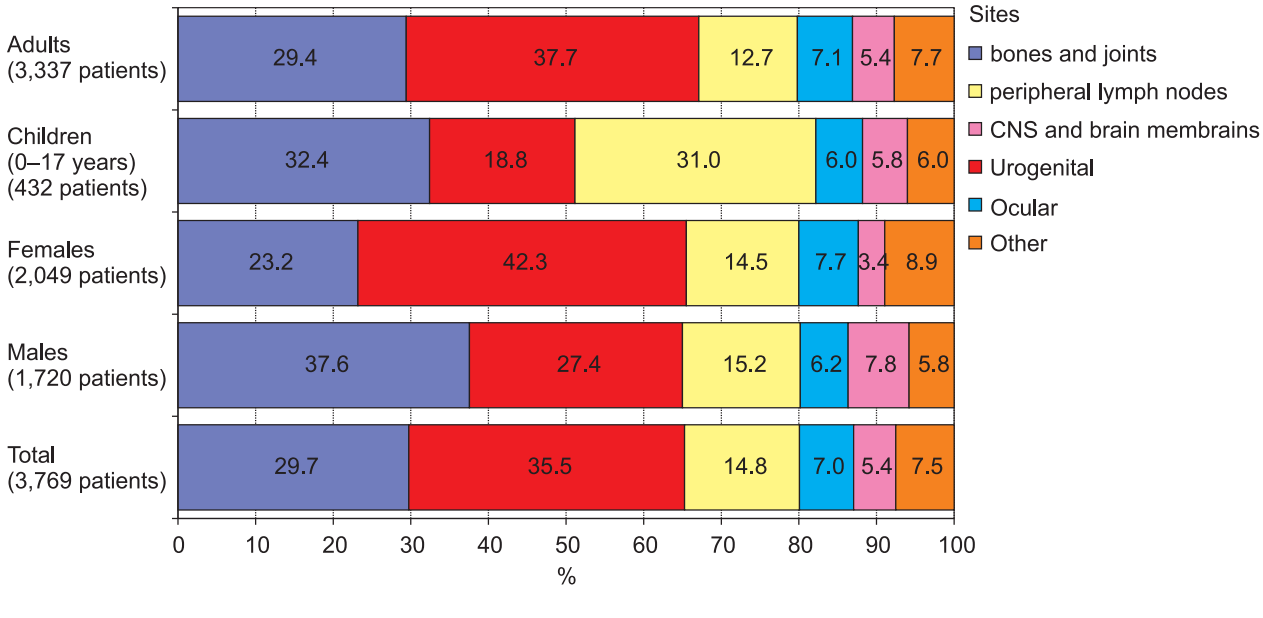


Fig. 2.24. Clinical structure (sites) of new extra-respiratory TB cases, Russia, 2008. (Source: Form No. 8)

The clinical structure (sites) of new extra-respiratory cases is different in males and females. Males more often than females have TB of bones and joints. Females more frequently have urogenital TB. TB of bones and joints is the most common form of the disease among children and adolescents aged 0–17 with extra-respiratory forms of the disease registered in the last 2 years.

It should be noted that according to Form No. 8, in 2007 there was some increase (1.2 times) of the proportion of tuberculosis of bones and joints among patients younger than 18 years and older than 45 years. In the same groups, the proportion of peripheral lymph node TB also slightly decreased in 2007.

In 2008, TB of bones and joints in children and adolescents was more common and, as compared to 2007, a statistically significant increase in TB of peripheral lymph nodes was registered from 21.1% to 31% (from 95 to 134 cases) with a decrease in the percentage of urogenital TB from 23.3% to 18.3% (from 101 to 81 cases).

The effectiveness of TB detection activities is reflected in the proportion of severe pulmonary TB among new cases.

TB cases with pulmonary tissue destruction (cavern) and fibro-cavernous TB (FCTB) are registered in TB reporting forms. Special attention is paid to the most epidemiologically dangerous cases – bacteriologically positive TB cases which are laboratory confirmed.

In the last three years, the percentage of destructive pulmonary TB among new cases in Russia overall decreased from 51.6% in 2005 to 47.3% in 2008.

At the same time, this rate differs substantially by territory (Fig. 2.25). A high rate of destructive forms of pulmonary TB can be partly accounted for by late detection of TB. On the other hand, a low rate may reflect either successful early detection activities, or low effectiveness or limited use of x-ray diagnostics when evaluating TB patients.

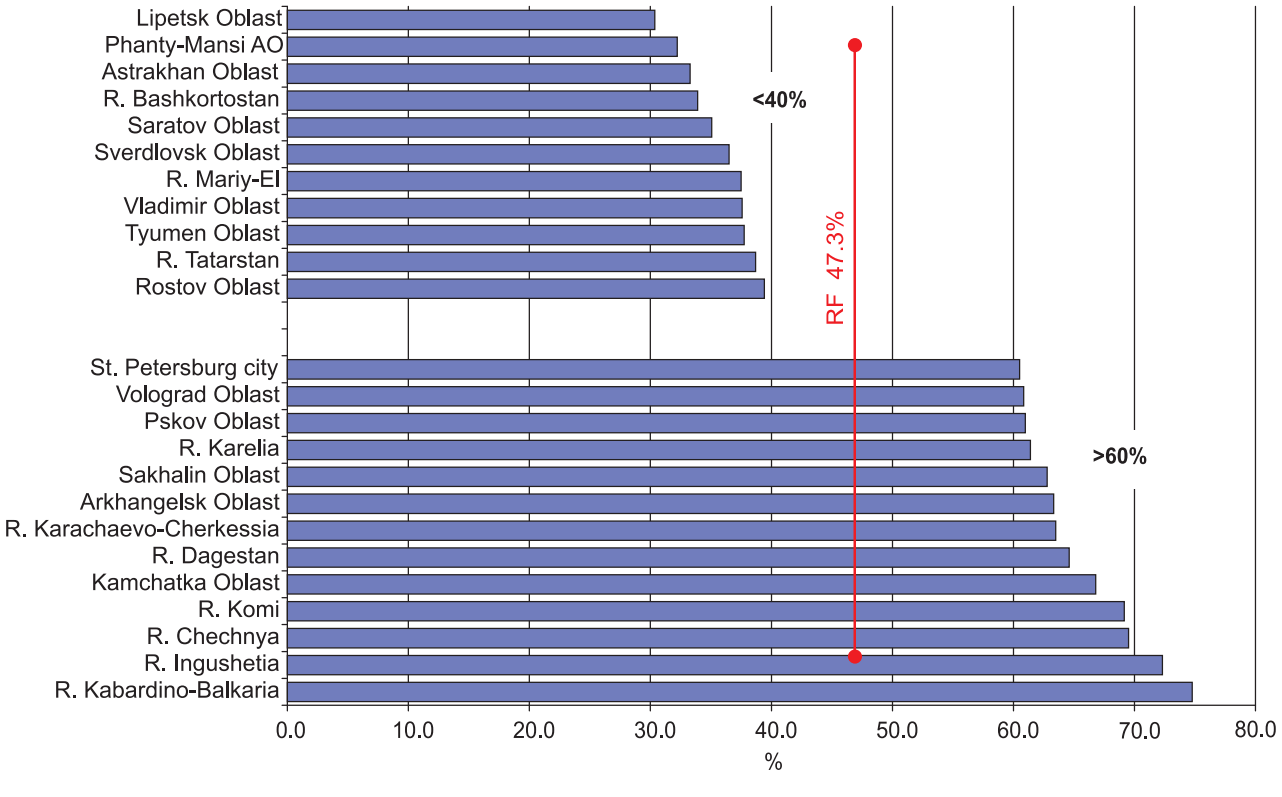


Fig. 2.25. Percentage of new pulmonary TB cases with lung destruction in the territories of the Russian Federation, 2008. Only territories with rates < 40% and > 60% are shown. (Source: Form No. 33)

The percentage of FCTB cases among all detected pulmonary TB cases is an important indicator reflecting late TB detection (Fig. 2.26). After an increase in the percentage of FCTB in late 80's to late 90's, since 1999 a steady decline in the percentage of this epidemiologically severe form of pulmonary TB has been observed. In 2008, the percentage of FCTB among all detected pulmonary TB cases was 2.1% (2.4% in 2007). This decline in the proportion of FCTB may reflect improvements in pulmonary TB detection.

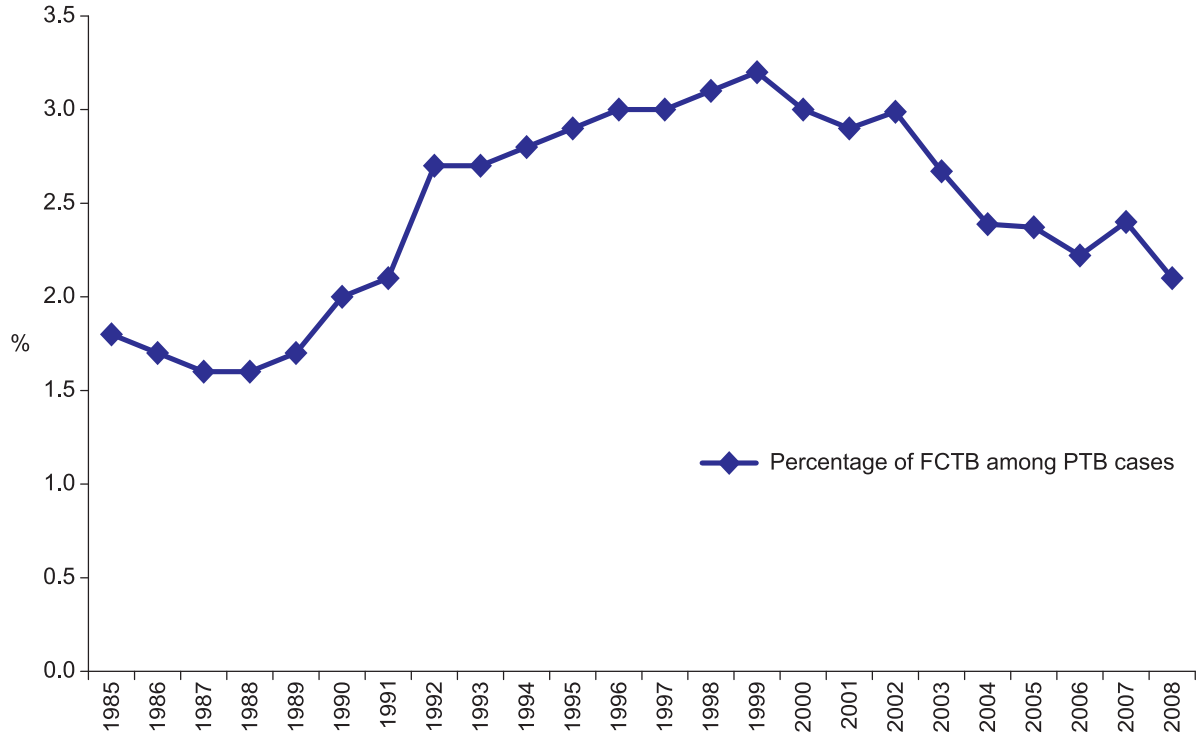


Fig. 2.26. Percentage of new cases with FCTB among pulmonary TB cases registered in TB control facilities (Source: Form No. 33)

Similar to the proportion of destructive pulmonary TB, the percentage of FCTB varies considerably by territory. In some territories notification rates are over 6% (Kamchatka Krai – 11.9%, Irkutsk Oblast – 6.8%, Nizhny Novgorod Oblast – 6.6%, Primorsky Krai and Republic of Altai – 6.3%, Kursk Oblast – 6.0%). In 2008, this form of pulmonary TB was not registered at all in five regions, while in four regions it did not exceed 0.2%, which may be caused both by a more effective work of TB services or by inadequacies in PTB diagnosis and registration of TB patients.

2.6. MbT+ TB cases detection

In assessing the epidemiological situation, TB cases confirmed by laboratory methods, i.e. new cases of MbT+ TB are considered with special attention. Particularly important are the notification rate of MbT+ TB patients and proportion of MbT+ TB patients among new TB cases.

In recent years, similar to the overall notification rate, there has been a stabilization of the notification rate of tuberculosis, confirmed by laboratory methods. The notification rate of MbT+ TB diagnosed by all methods remains at 32–35 per 100K population. At the same time, in 2000–2008 the notification rate of sputum smear positive TB detected with microscopy (ss+) increased – from 13.6 to 21.0 in MoH&SD institutions (see Fig. 2.27). This indicates not only an increase in the number of these particularly epidemiologically dangerous cases, but also the improvement of laboratory diagnosis resulting in higher proportion of notified MbT+ TB. The latter fact (increased percentage of ss+ in different population groups, e.g. among all new cases or among patients on re-treatment) may be used for indirect assessment of lab tests quality in TB diagnosis confirmation and/or monitoring effectiveness of treatment.

The TB registration system currently used in Russia is characterized by somewhat redundant reporting. Therefore, there are several options for calculating the proportion of MbT+ among new TB cases. Depending on the reporting form used (Forms No. 33, No. 8 and No. 7-TB), different patients groups are used for calculation (all registered patients including the penitentiary system facilities and patients from the civil population only), different forms of the disease (all cases, RTB or PTB), and different methods used for MbT+ detection (all methods, microscopy or culture).

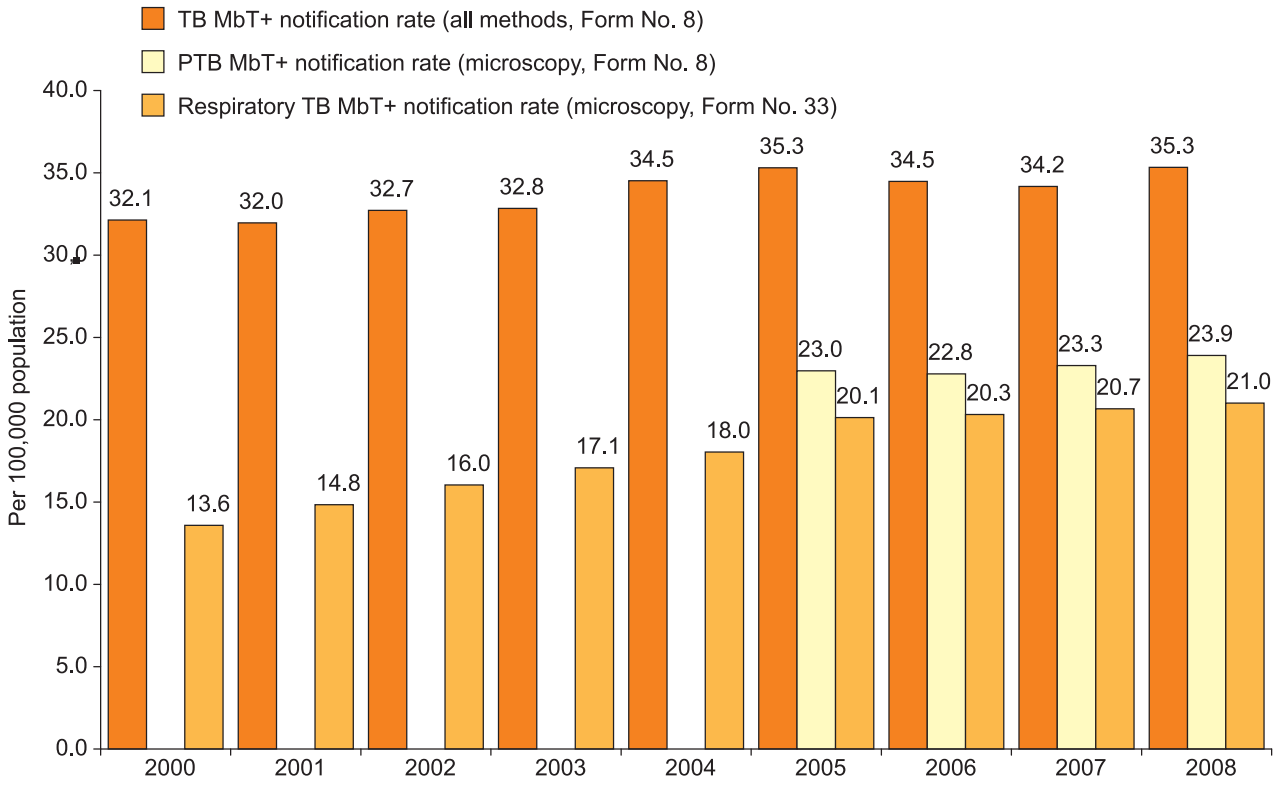


Fig. 2.27. Notification rates of MbT+ TB cases: (1) all localizations, confirmed by any method (Form No. 8); (2) notification rates of MbT+ PTB cases diagnosed by microscopy (Form No. 8); (3) MbT+ respiratory TB cases diagnosed by microscopy (Form No. 33). Sources: for the entire population – Form No. 8; for permanent resident population – Form No. 33; Data on population: Forms No. 1 and No. 4)

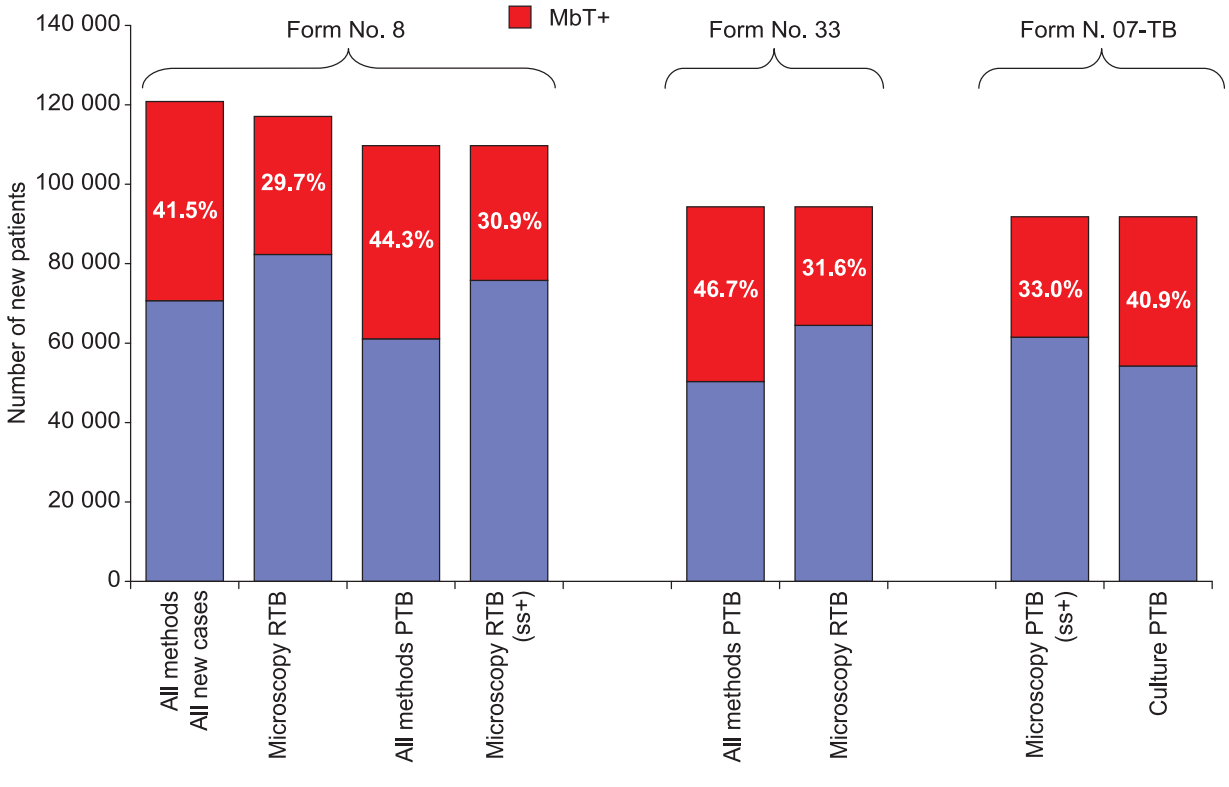


Fig. 2.28. Percentage of bacteriological positive cases confirmed by different methods among new cases, new cases of respiratory TB (RTB) and pulmonary TB (PTB), Russian Federation. Sources: Forms No. 8, No. 33 and 07-TB, 2008

Fig. 2.28 presents the approaches most commonly used in RF. Reporting form No. 8 allows for the calculation of percentage of new bacteriologically positive cases confirmed by any method among all new cases registered in a territory (41.0%)[23]. Of special interest is the percentage of bacteriologically positive TB cases among pulmonary TB cases (44.3%); of these, 30.9% were confirmed by microscopy (ss+ TB). Form No. 33 allows for the calculation of the indicator for the permanent resident population (i.e., cases registered in civilian population). Among PTB cases, the percentage of bacteriologically positive cases confirmed by microscopy was 31.6%, and by all methods – 46.7%.

Form No. 7-TB approved by RF MoH&SD Executive Order No. 50 of 13.02.04 [21] shows laboratory tests results most fully and precisely. Annual report Forms No. 8 and No. 33, which have been used for many years in the Russian TB Service, contain aggregate information collected by the end of December. Therefore, these reports do not include data on the results of culture tests for most newly diagnosed patients who were registered in November and December (because in Russian labs culture tests need 2–3 months before results can be received (interpreter's note), i.e. the MbT+ data contained in those forms are not complete[24]. Besides, these forms do not include data on the number of patients tested by culture (coverage by culture examinations). Form No. 7-TB is submitted in the beginning of the second quarter following the end of the reporting year, and contains complete annual data on new cases with MbT+ PTB diagnosed by both microscopy and culture (the latter indicator – the number of new MbT+ cases diagnosed by culture – is not presented in Forms No. 33 and No. 8). In addition, Form No. 7-TB provides information on the coverage of new detected cases by laboratory tests including both microscopy and culture.

There is also another reason for not using the 2005–2008 data from Forms No. 8 and No. 33 for calculating such indicators as «notification rate of MbT+ « and «proportion of MbT+ among new TB cases». In the guide on completion of tables in Forms No. 8 and No. 33 (which include data on the number of MbT+ patients among new detected cases), in 2005–2008[25] no specific information was requested on the date of MbT+ detection in relation to the date of case notification or of beginning of treatment.

Consequently, in some territories in recording notification forms for new TB cases, the dates of detection of bacillary excretions could not be corresponded to the time of patient registration or of the beginning of treatment. If bacilli excretion was detected during treatment (e.g. 1–3 months after case registration) of a new TB patient who was initially not MtB + , information on the presence of MtB was adjusted and in Forms No. 8 and No. 33 this patient was included in the cohort of new MbT+ TB patients.

Therefore, it should be noted that data on the number of MbT+ TB cases is collected for calculation of MbT+ TB notification rates and for assessment of effectiveness of laboratory services in TB case detection. Consequently, a patient has to be included in Forms No. 8 and No. 33 as a «new TB patient with bacillary excretion» only if bacillary excretion was confirmed not later than the date this patient was registered as a new TB case (or before treatment was started)[26]. If this condition is met, the information collected may be used for (a) assessment of the spread of this most dangerous form of the disease (PTB with bacillary excretion), and for (b) assessment of laboratory services effectiveness in the detection of new TB cases.

Detection of bacillary excretion during treatment, i.e. when the patient is followed-up, is not that important from the epidemiological viewpoint. Moreover, the intensive indicator for MbT+ TB cases calculated with including MbT+ TB cases detected after patient registration, reflects some king of prevalence indicator, not morbidity (see in detail in Chapters 4 and 7).

Therefore, currently the indicators that are calculated based on the number of MbT+ new TB cases may be most precisely calculated basing on Form No. 7-TB.

According to MH&SD Form No. 7-TB, in 2008 [16] in the civilian sector the proportion of registered new ss+ PTB cases was equal to 33.0% (33.4% in 2007)[27], and culture confirmed new PTB cases – 40.9% (39.6% in 2007). According to the data provided in this reporting form, coverage by microscopy and culture in RF regions was quite high. In 2007 and 2008, sputum microscopy was performed in 98.2% of new PTB cases and culture tests were performed in 91.8% of new cases with positive microscopy in 2008 (87.2% in 2007).

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23 All percentage values of MbT+ patients in the description of Fig. 2.28 are provided for 2008.

24 Same applies to drug resistance TB data.

25 For example: the respective cell in Form No. 33, table 2400, column 3, line 1 - «Total: MbT+ among RTB patients» / «New case of active TB » and cell in Form No. 8, table 1000, column 5, line 7/8 – «New TB cases» / «Number of RTB cases...» / «incl. cases with bacterial excretion detected by microscopy», and others.

26 To be more precise, if the sample was taken not later than the date of case registration or the date treatment was started.

27 For 2007, here and thereafter updated data is provided from the RIPP and FPHI Review published in 2009 [16]. The statistical indicators for 2007 presented in [16] are slightly different from those published in the previous issue of the Analytical Review (see notes in Chapter 1 of this Analytical Review).

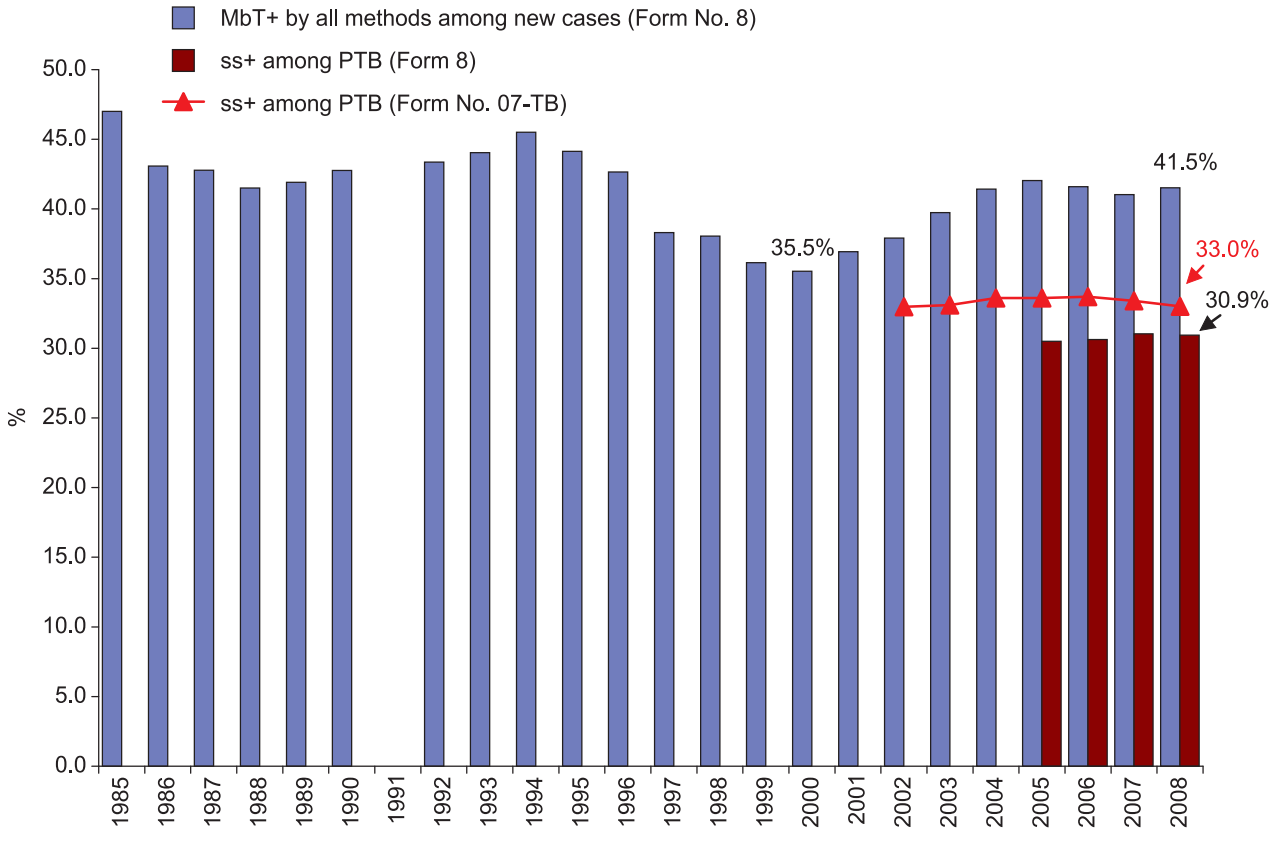


Fig. 2.29. Proportion of bacteriologically positive PTB cases in the Russian Federation. Based on data on bacteriologically positive cases confirmed by any method among all new TB cases (Form No. 8) and new ss+ PTB and s+ RTB cases (Forms No. 33 and No. 7-TB, respectively)[28]

Fig. 2.29 also indicates that from 2000 to 2004 a gradual increase in the proportion of MbT+ among new cases was observed. In circumstances of a relative stabilization of the epidemic process, this meant improved efficiency of laboratory services in TB detection. However, in the past three years the values of these indicators have not changed and remained at a low level. It is significantly lower than the internationally accepted values (50% for microscopy and 75% for culture) [41].

Only in 20 subjects of the Russian Federation (Fig. 2.30) the proportion of new TB cases with MbT+ determined by any method exceeds 50%, in 5 subjects it does not exceed 30%. Percentage of patients with ss+ (Fig. 2.31) diagnosed with microscopy was over 50% in 5 subjects (8 in 2007). In 10 subjects this indicator did not exceed 25%. Only in 20 subjects of the Russian Federation the proportion of new TB cases with MbT+ confirmed by culture was more than 55% (Fig. 2.32). In 16 subjects this indicator did not exceed 25%. However, the low proportion of MbT+ determined by culture, based on the recently introduced Form No. 7-TB, may also reflect inadequate filling forms on culture results, i.e. show insufficient collaboration between the laboratory and epidemiological surveillance services.

In general, the figures stress the need for further improving laboratory services, particularly in Southern and Ural Federal Regions. It is also obvious that quality of laboratory tests (microscopy and culture) is high in NWFR, where the proportion of laboratory confirmation of TB diagnosis is relatively high compared to other regions of Russia.

[28] For 2002, 2003, 2004 and 2005, data in Forms No. 07-TB were collected in 23, 24, 34 и 67 subjects of the Russian Federation respectively. In 2006, 2007 and 2008 the data were collected in all RF subjects.

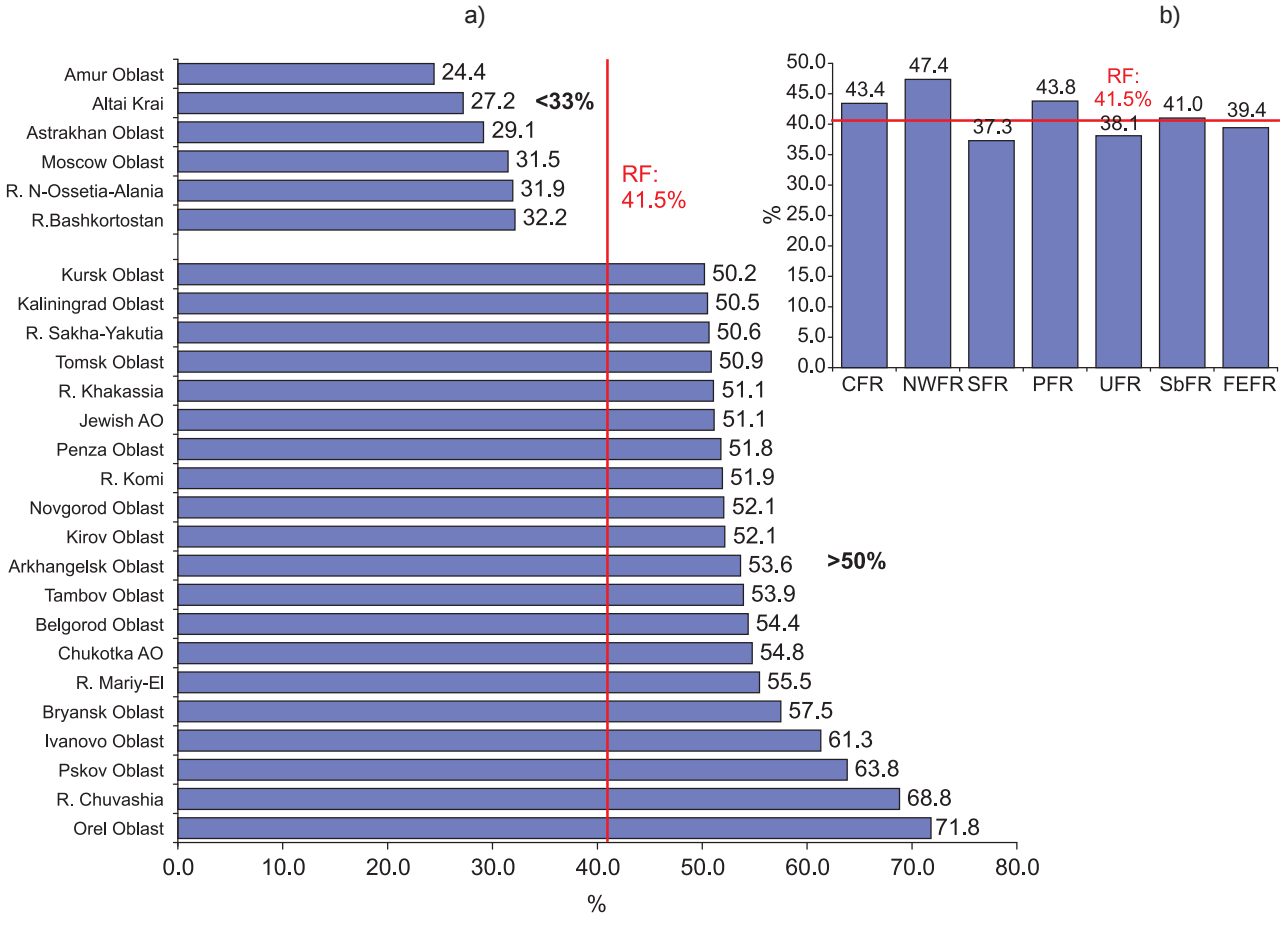


Fig. 2.30. Percentage of new bacteriologically positive PTB cases confirmed by any method, (a) for groups of territories with lowest (< 33%) and highest (> 50%) indicator values, and (b) by subjects of the Russian Federation, 2008 (Source: Form No. 7-TB)

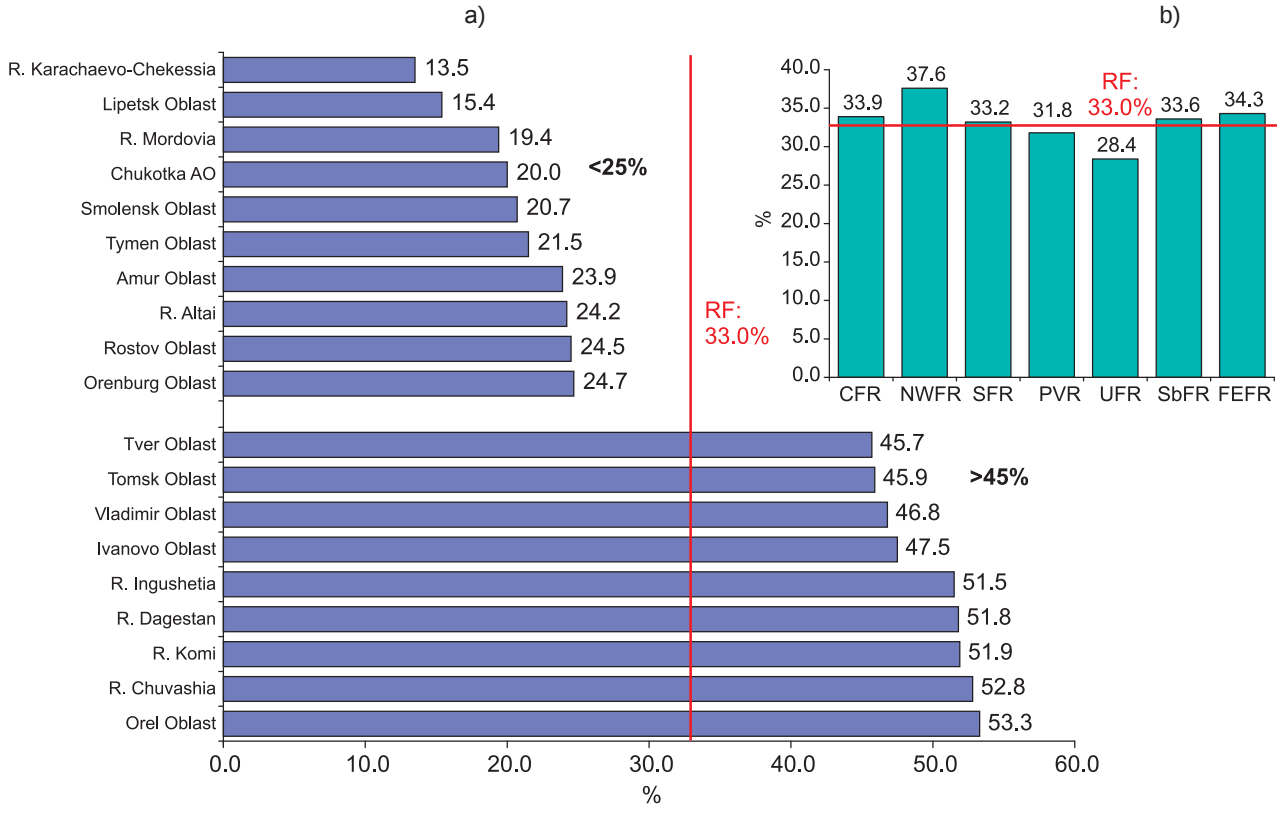


Fig. 2.31. Proportion of new PTB smear positive cases detected by specific microscopy methods (ss+): (a) for territories with < 25% and > 45% indicator values, and (b) by subjects of the Russian Federation, 2008 (Source: Form No. 7-TB)

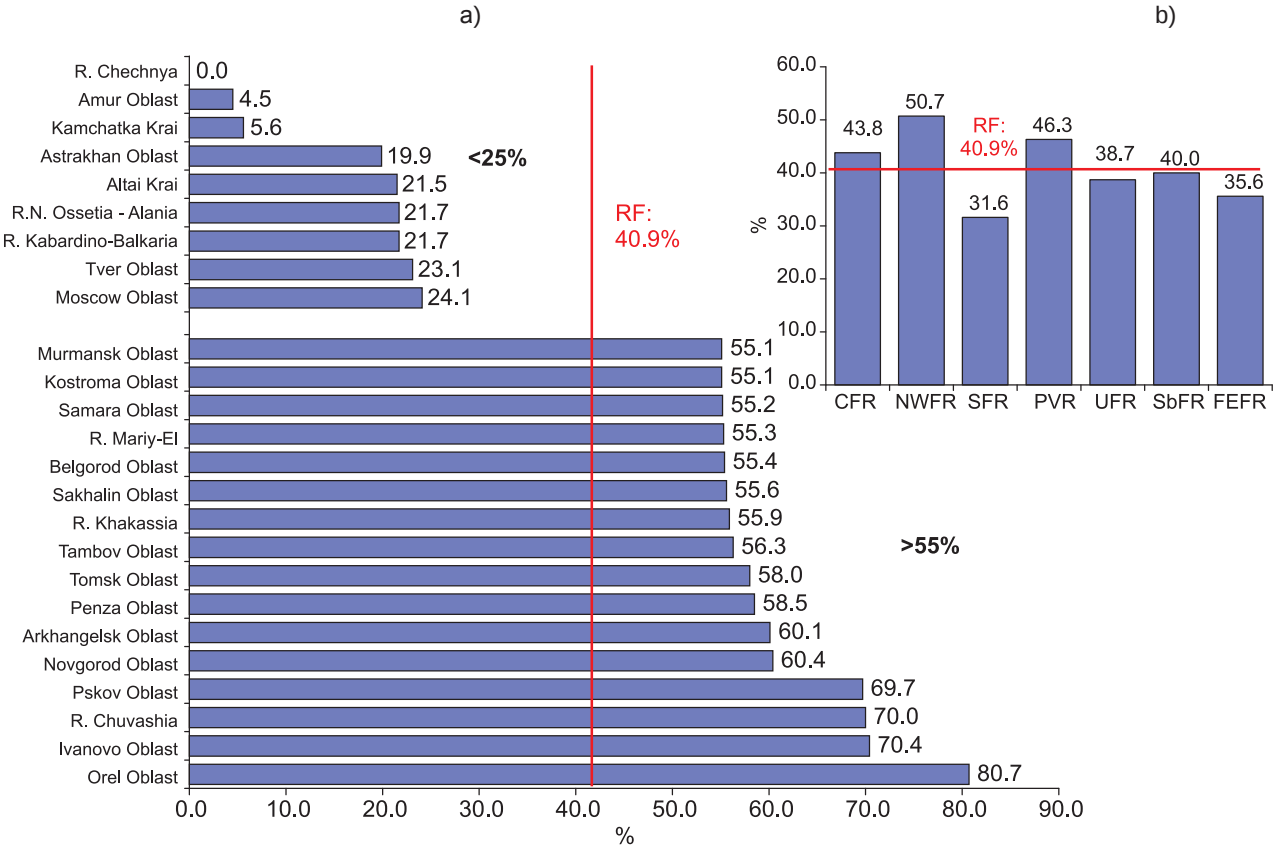


Fig. 2.32. Proportion of new RTB MbT+ cases diagnosed by culture, 2008; (a) RF territories with > 55% and < 25% values (b) by Federal Regions. Russian Federation (Source: Form No. 7-TB)

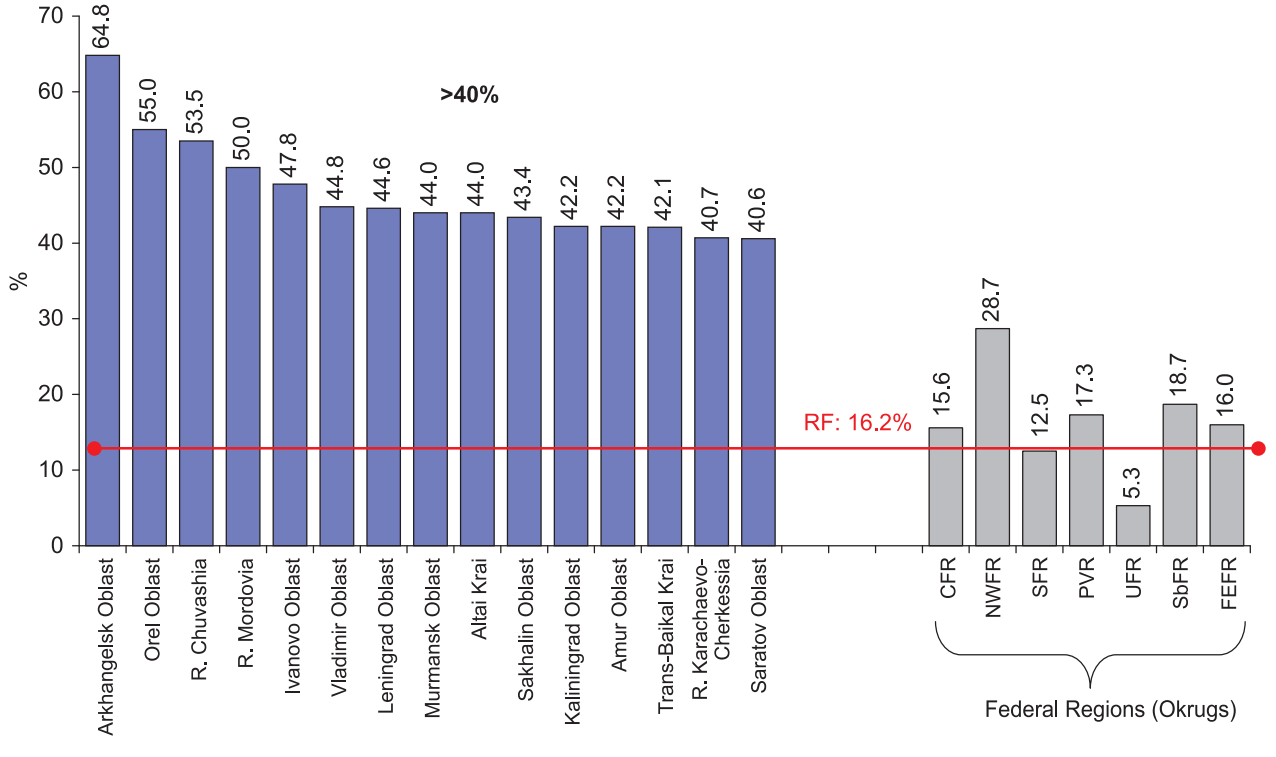


Fig. 2.33. Percentage of smear-positive TB cases detected in PHC facilities among those diagnosed in TB control facilities. Subjects of the Russian Federation with values more than 40%, and by Federal regions (Source: Form No. 7-TB)

An important indicator pointing to the effectiveness of TB control services administration is the ratio of the number of smear-positive PTB cases detected in PHC facilities to the number of cases diagnosed in TB control facilities [16]. This indicator is based upon data in Form No. 7-TB. It is not significant on the national level, but there has been a statistically reliable trend to growth (12.5%, 14.1% and 16.2% in 2006, 2007 и 2008 respectively). Sputum smear microscopy should become a routine method of differential diagnosis of TB in PCH facilities. Anyhow, in spite of its simplicity, this method is insufficiently used in PHC facilities, although the situation varies widely throughout RF regions. In 2008, the proportion of microscopy-diagnosed smear positive PTB patients detected in PHC facilities increased 40% in 15 subjects of the Russian Federation (Fig. 2.33).

Another important indicator reflecting effectiveness of microbiological laboratories is the ratio of MbT+ cases to the number of patients with destructive pulmonary TB (TB with cavern(s) of lung) among new TB cases. This indicator shows how often bacterial excretion is diagnosed in most severe forms of respiratory TB and the degree of laboratory services involvement in diagnosis and detection of TB cases.

Over the last three years, the value of this indicator in Russia overall has reached or slightly exceeded 100%, and the most significant increase was registered in 2008 (from 100.3% in 2007 to 105.6% in 2008).

The portion of MbT+ cases among new PTB cases with pulmonary destruction as indicator improves evaluation of quality of laboratory detection of TB cases. Values of this indicator have become available since 2006 after the introduction of the new reporting form No. 7-TB [16].

According to this form, bacillary excretion is now diagnosed in only 57.9% of PTB patients with pulmonary destruction, which indicates low effectiveness of bacteriological diagnosis at this stage. Nevertheless, this indicator is rather high in some territories of the Russian Federation (Fig. 2.35), exceeding 80% in Orel, Ivanovo, Vladimir, Novgorod oblasts and in the Republic of Chuvashia. It is less than 45% in Orenburg, Yaroslavl, Amur, Smolensk oblasts, Krasnodar Krai, and in Altai, Karachaevo-Cherkessia and Mordovia.

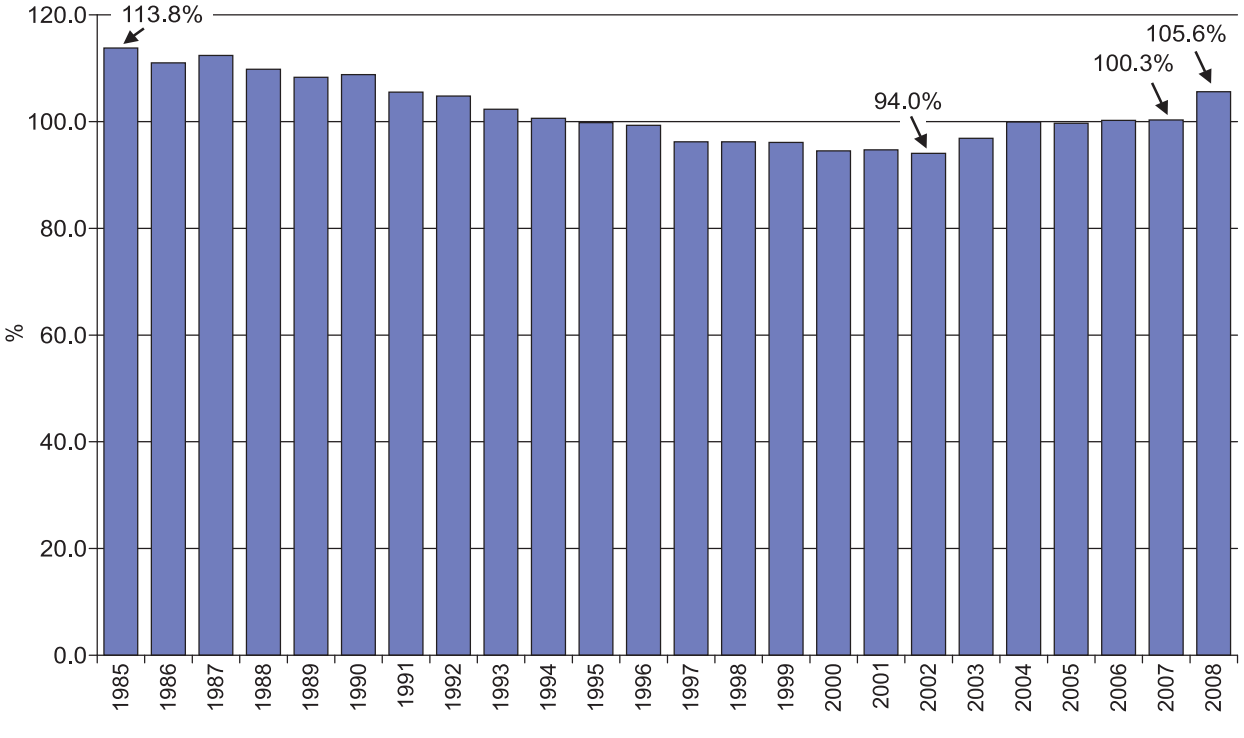


Fig. 2.34. Proportion of the number of MbT+ cases to the number of TB patients with pulmonary destruction among RTB cases (Source: MoH&SD data, form No. 33)

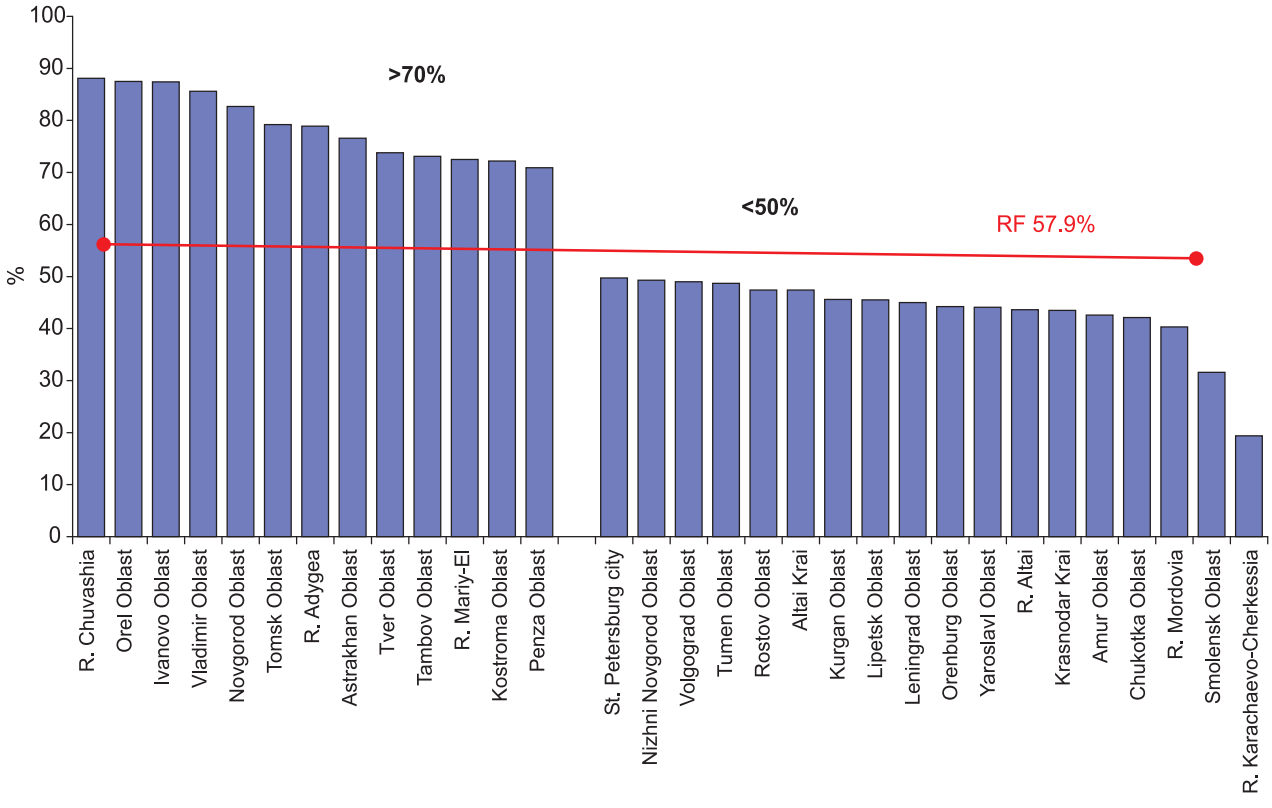


Fig. 2.35. Portion of the ss+ TB cases among RTB cases with pulmonary destruction, 2008. Subjects of the Russian Federation with values less than 40% and more than 70% (Source: MoH&SD data, form No. 33)

It should be noted that the proportion of MbT+ cases among destructive PTB patients is an integral indirect indicator reflecting all technical stages of laboratory examination: the collection of samples, preparation of samples for testing, the testing itself, as well as qualification of the personnel and proper quality assurance at all stages of laboratory performance. In recent years, the system of external laboratory quality control is beginning to operate in the country. It provides verification of laboratories potential in performing tests for detection of *Mycobacteria tuberculosis*, which is a very but not only prerequisite for effective performance of laboratory services. This system will be described in detail in section 9 «Laboratory testing quality assessment».

2.7. TB notification rates for persons having contacts with TB patients

Form No. 33 contains a very important information block – the number of TB patients who had both contacts with MbT+ patients and MbT- patients. By the beginning of the 21st century, TB notification rate among individuals who had been exposed to MbT+ patients exceeded 800 per 100,000 annual average number of contacts. In recent years, the indicator value started to decline, reaching the level of 774.1[29] and 777.5 per 100,000 contacts in 2007 and 2008 respectively (805.6 in 2006), although the decrease is still not statistically significant (Fig. 2.36).

In 2008 there were notified 2,119 TB cases among contacts, with the average annual number of contacts equal to 272,558. Notification rate among contacting children of 0–14 years of age was continuing to decline in 2008, although it remained high. This indicator decreased form 588.3 in 2006 to 512.9 ($p < 0.05$) in 2007[30] per 100,000 contact children and to 464.6 ($p < 0,05$) in 2008. In 2007, the overall notification rates among contacts was 11.3 times higher than notification rates among permanent population, those among contact children (0–14 years) – 30 times higher, and adolescents (15–17 years) – 25 times higher than the corresponding notification rates in these age groups.

[29] Here and below (including Fig 2.36) data for 2007 on notification rate among contacts does not include the Republic of North Ossetia, which has to be verified (for example, the number of TB cases diagnosed in 2007 among adult contacts was 881, while the values ranged between 0 and 2 in the previous years).

[30] 440 TB cases among contact children from about 77,000 average annual number of contacts.

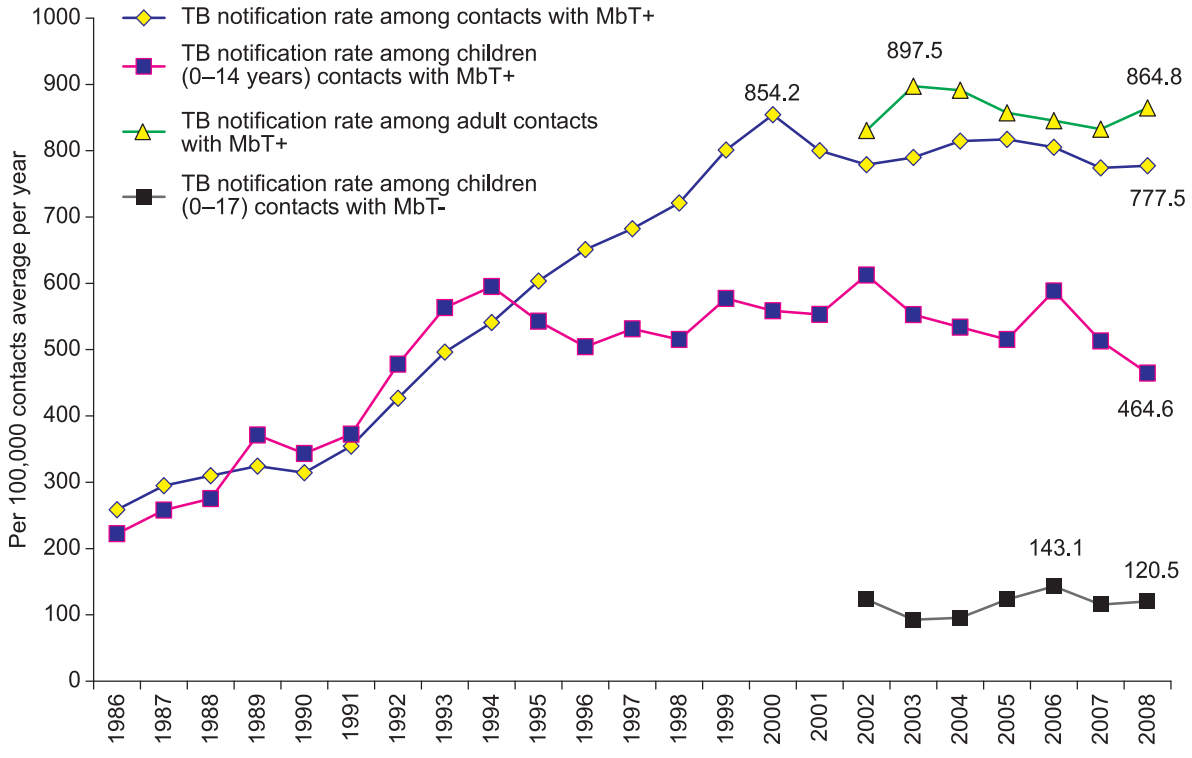


Fig. 2.36. TB notification rates among adults, adolescents and children exposed to MbT+ and MbT- patients in the Russian Federation (Source: Form No. 33, 2007; data for 2007 does not include the Republic of North Ossetia 28)

The overall notification rate among children and adolescents of 0–17 years of age who had contacts with MbT+ patients (610.1 cases per 100,000 average annual contacts in 2008) was 5.1 times higher than among children and adolescents who had contacts with TB patients without bacillary excretion (120.5 cases per 100,000 average annual contacts in 2008). This proves again the necessity to pay special attention to MbT+ patients as epidemiologically most dangerous group of TB cases.

2.8. TB case-finding management in the Russian Federation

The levels of TB notification rates and the diagnosed TB forms in a region to a large degree depend upon case-finding management [5].

In the RF at present, radiological (X-ray) methods are predominantly used for TB case-finding. Along with film fluorography, digital fluorography methods started to be actively introduced. Fluorography is performed in polyclinics with patients who visit polyclinics and were not surveyed by X-ray in the current year, as well as to people belonging to high-risk groups for TB (patients with diabetes, patients receiving corticosteroids, on radiation therapy, etc.).

In 1985–1987, the highest coverage of the population by TB screening was attained, reaching 75% of the population. During the first post-soviet years, the situation changed dramatically: the scope of planned and actual screening activities decreased, and less than half of the population subject to routine tests for TB was screened. By 2000s, the populations covered by active screening increased slightly and stabilized in the range of 57–59% (58.2% in 2006). Anyhow, the percentage of TB cases detected during the screening activites did not exceed 55% (Fig. 2.37, Table 2.2).

In assessments of TB case-finding scope and quality in 2007–2008, it should be emphasized that by that time modernization had been performed in primary health care facilities, including provision of digital fluorography equipment within the National Health Project, and the national TB services were equipped with bacteriological laboratories (equipments and laboratory staff were financed from IBRD loan and GF grant). Thanks these activities and following the implementation of subprogram «Urgent measures to combat tuberculosis in Russia» of the

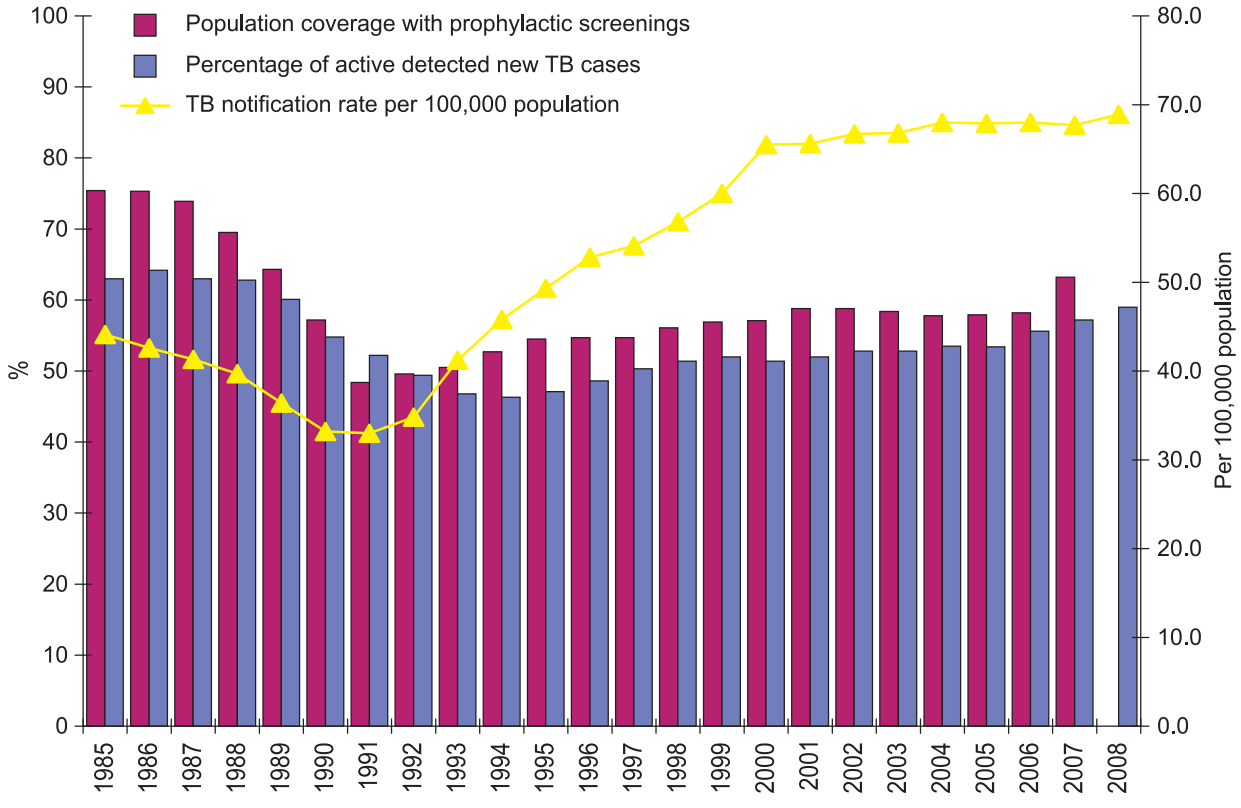


Fig. 2.37. Active detection of TB cases in the Russian Federation. Coverage by screening, percentage of new TB cases found by active detection activities[31], TB notification rates (Source: Form No. 33) [33]

Table 2.2

Populations tested for TB, Russian Federation, 2005–2008 (Source: Forms Nos. 33 and 30)

Indicators	2005	2006	2007	2008
Screened for early detection of TB by all methods (patients): Total	82,833,191	82,957,322	82,901,835	87,121,448
% of total population	57.9	58.2	58.3	61.3
Including: covered by fluorography (patients)	59,586,046	59,904,093	61,054,847	63,923,789
% of all examined	71.9	72.2	73.6	73.4
% of total population	41,6.	42.0	43.0	45.0
% of the population 15 years and older	49.0	49.3	50.3	52.7
Including: tuberculin skin tests for children of 0–17 years (patients)	21,149,813	20,521,136	19,584,049	20,524,971
% of all examined	25.5	24.7	23.6	23.6
% of total population	14.8	14.4	13.8	14.5
% of children (0–17)	73.7	74.7	73.3	77.7
Including: tested by microscopy (patients.)	973,256	919,996	980,025	1,047,162
% of all tested	1.2	1,1	1,2	1.2
% of total population	0.68	0,65	0,7	0.7
of them in general health care facilities (patients)	600,098	627,412	732,026	833,789
% of all tested by microscopy	61.7	68.2	74.7	79.6
TB cases detected by screening	51,591	53,881	55,031	57,748
% of TB cases detected by screening*	53.4	55.6	57.2	59.0
detected per 1000 examined patients	0.62	0.65	0.66	0.66
TB cases detected by fluorography	48,923	51,160	52,334	52,414
Detected per 1000 examined	0.8	0.9	0.9	0.8
% of all TB cases detected by screening	94.8	94.9	95.1	90.8
TB cases detected by microscopy	1,851	2,242	2,123	2,170
Detected per 1000 tested	1,9	2,4	2,2	2,1
% of all TB cases detected by screening	3,6	4,2	3,9	3,8

* Percentage calculated per all new cases in patient lifetime without cases detected postmortem.

[31] From the line of Form 33 «detected patients with TB diagnosed for the first time in their lifetime out of the number of persons screened for TB».

Federal Target Program «Preventiion and control of social diseases (2002–2006)», it became possible to increase in 2007 the proportion of population covered by screening up to 63.2% ($p < 0001$), the proportion of TB cases detected through screenings increased from 53% in 2002–2005 to 59.0% in 2008 ($p < 0.001$).

In 2008, the proportion of TB-cases (excluding those diagnosed postmortem) detected by screening was more than 70% in six subjects of the Russian Federation: Lipetsk, Rostov, Magadan, Saratov and Voronezh oblasts and in Krasnoyarsk Krai. In all the subjects of the Russian Federation (excluding Chechya) the proportion of new cases detected by screening was over 40%, while in 2007 this indicator was below 40% in six federal territories. In 2003–2006 the number of such territories gradually decreased from 21 to 10 territories.

On the whole, in 2008 57.9% of new TB cases were diagnosed through active detection activities among residents including cases diagnosed postmortem, 40.3% cases were diagnosed upon patients' visits to health facilities with complaints («passive TB detection»), and 1.8% cases diagnosed postmortem[32].

In 2008, TB case-finding rates remained relatively high in all screening activities (0.7 per 1000 individuals examined), fluorographic examinations (0.8 per 1000 persons examined) and microscopy tests (2.1 per 1000 tested for TB).

2.9. TB relapses

There are two ways to define «relapse» in the RF. The first approach is based on dispensary follow up definitions [20]. Following these definitions, a relapse case is a re-registered (repeatedly registered) active TB case in a person who has had a history of being followed up in a dispensary group or a following up in TB cured (so called as «non-active TB») dispensary groups. That is, an «appearance of new evidence of active TB in a person with a previous history of TB who was earlier cured; such a patient is from follow up group No. III or has been removed from the registry due to cure». (*If dispensary group didn't change yet after the end of successful treatment course and a new evidence of active TB were detected, the case was not defined as relapses – explanation for English version of review*).

The other Russian definition of «relapse» is based on treatment history of the patient [21] (see Annex). According to this definition, a relapse is defined as a «new episode of disease in patients with a previous effective course of chemotherapy, and new evidence of confirmed TB in the form of positive results of sputum microscopy or culture tests and/or clear clinical-radiological evidence of TB».

Both definitions include references to a previous cure or successful course of chemotherapy during previous TB disease episode. Therefore, at present due to the reduction of duration of follow up after the initial stage of therapy in group I [20] both definitions of relapses have become closer each other. The level of relapses is an important indicator of dispensary activities and treatment management effectiveness.

Two types of relapses are considered in the dispensary follow up system: «early» relapses – those in dispensary follow up group III («non-active TB) at the time of repeated TB diagnosis; and «late» relapses – relapses among individuals previously removed from a dispensary follow up groups[33].

Fig. 2.38 demonstrates MoH&SD data indicating an increase in relapses in 2004 –2005 followed by a significant decrease in 2007 (from 9.2 in 2006 to 9.0 per 100,000 population, or from 13,171 to 12,771 relapse cases).

In 2008, this indicator showed a slight growth – 9.2 per 100,000 population (13,046 cases). Basing on Form No. 8, which includes data from all services and institutions since 2005, the number of relapses per 100,000 population is steadily growing from 10.3 (14,677 cases) in 2005 to 11.4 (16,154 cases) in 2008.

If consider separately the structure of relapses basing on Form No. 33, the so-called «early» (among those in the dispensary group III) and «late» (from those removed from the registry) relapses, it could be noted that the increase in relapses rate in 2003–2006 occurred because of an increase in early relapses, which can be related not only to ineffective treatment, but also to the erroneous formation of dispensary group III during the re-arrangement of dispensary groups in 2004 (Fig. 2.39)

[32] According to Form No. 8, 2161 TB cases were diagnosed postmortem in the country in 2008. The contribution of FSIN facilities to this number was not that significant – according to Form No. 4-tub, in 2006 only 10 cases were detected in penitentiary system facilities (see Chapter 6).

[33] Until 2004, late relapse cases also included relapse cases from the follow up group VIIA, including cured before persons with significant residual effects of TB.

Reduced rates of TB relapses were registered nationwide after 2006, which was due to a broad scope of activities to increase effectiveness of national TB control program and to improve the regulatory basis of TB control activities in the country [20], [21]. By 2007–2008 the number of early relapse cases was reduced to slightly more than 4700 cases per year, and the percentage of early TB relapse among all relapse cases decreased from 39.7% in 2006 to 37.6% in 2008 ($p < 0.005$)[34]. The proportion of early relapse among all new RTB cases was also steadily decreasing and fell down to 5% (4727 cases in 2008).

An increase of the number of early RTB relapses has been observed in 75 subjects of the Russian Federation in 2003–2006. The highest increase was reported in the Republic of Kalmykia (by 3.8 times), Khabarovsk Krai (by 3.7), Republic of Kareliya (by 3.5), Chelyabinsk Oblast (by 3.4) and in the Republic of Altai (by 3.1). In 9 territories, there was a reported decrease in the number of early relapses, most strongly in Belgorod, Tambov and Orel oblasts and the Republic of Tyva.

In 2006–2008, reduced rates of early relapses were registered in almost 50 federal regions. Nevertheless, this indicator is still increasing in 33 territories.

The available data does not support the opinion expressed by many Russian experts that the new approaches to TB case-finding and treatment management might lead to increased relapses. On the contrary, in 2002–2005, prior to the implementation of improved TB control, there had been a signification growth of early relapses, which indicated substantial shortcomings in TB patient management. These shortcomings may also cause the current increase in late relapses, i.e. recurrence of the disease in patients who received basic treatment courses before 2005–2006.

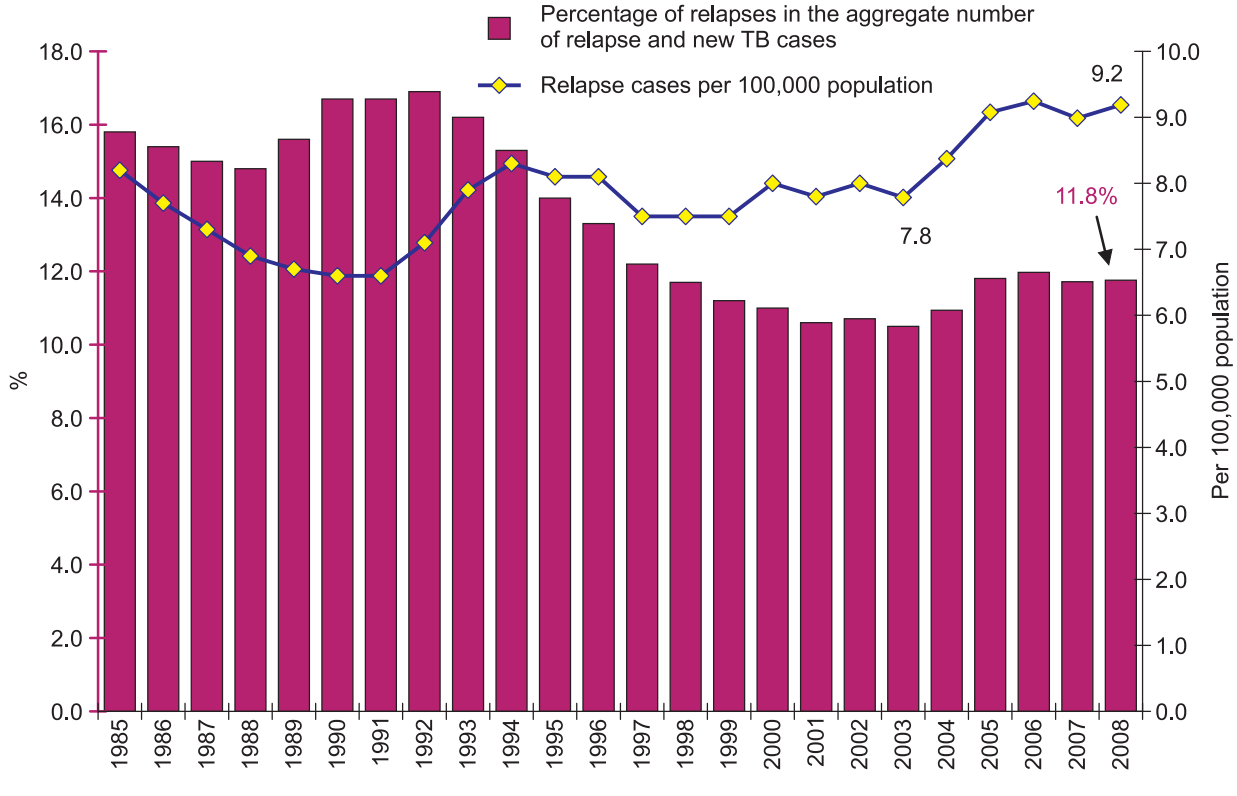
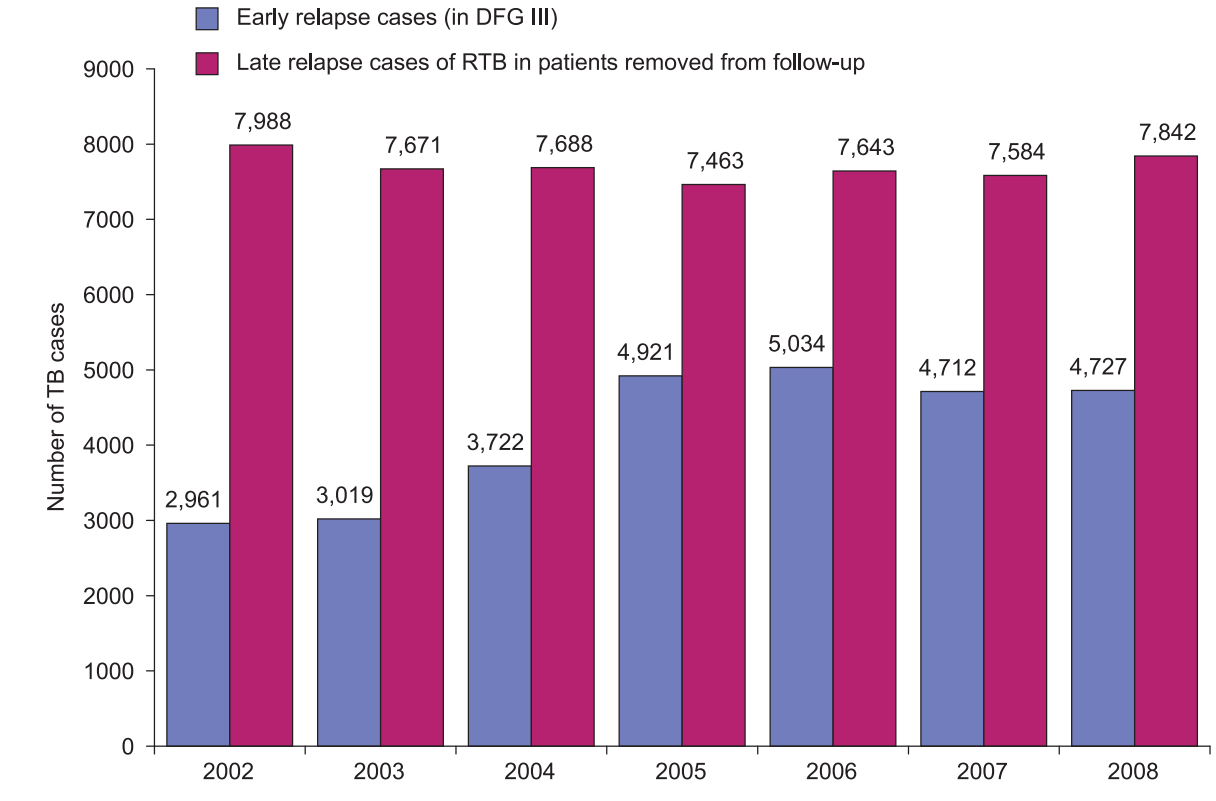
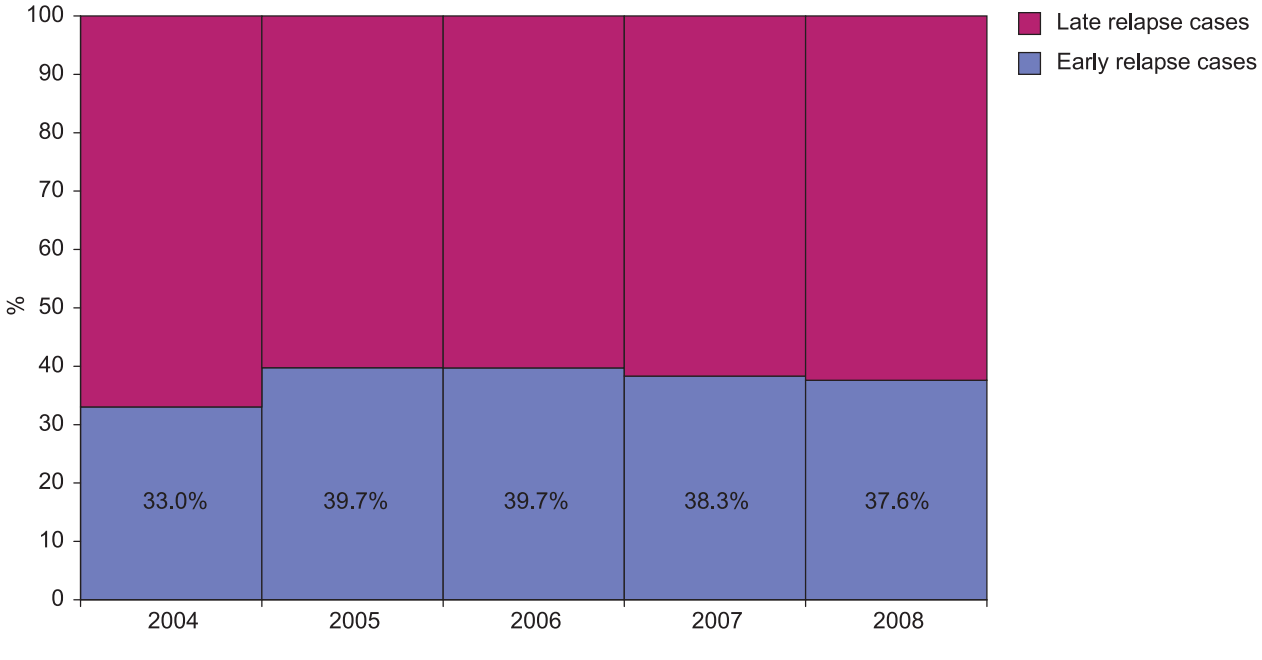


Fig. 2.38. TB relapses. Proportions of «early» and «late» relapses among the total number of TB relapses and new TB cases and the level of relapses per 100,000 population, Russian Federation (Source: Form No. 33)

[34] CI for three proportions in 2006-2008 was calculated by chi-square.



A) Absolute annual numbers of early and late relapse cases



B) Percentage of early relapse cases among all registered relapse cases

Fig. 2.39. Early and late relapse cases of respiratory TB, Russian Federation (Source: Form No. 33)

2.10. Comparison of TB incidence in the Russian Federation, other European countries and worldwide

In assessments of TB morbidity in different countries it is important to take into account differences in national systems of detection and diagnosis of TB cases. The real TB incidence differs from the TB notification rate in any country. This difference is sometimes significant and depends, first and foremost, on the effectiveness healthcare facilities in TB case-finding and is different not only between countries but also within regions in individual countries.

Therefore, WHO has developed a system of estimating the real values of major indicators (TB incidence, MbT+ TB incidence, TB mortality and TB prevalence).

In comparisons of indicators between countries, in addition to *TB notification rate* (i.e. registered TB cases), which is discussed in this chapter, international publications (including WHO) also include estimated values of *TB incidence rate* or *estimated TB incidence rate*.

The concept of *TB incidence* rate denotes the actual TB morbidity rate in the population, while *TB notification rate* reflects the frequency of new cases in the population that has been measured (registered) by the national health statistics service and differs to a certain extent for the real incidence value.

Various techniques are used on the national level for estimating TB incidence rate depending on specificity of national systems of health statistics.

Since most of WHO methods of estimation of real incidence are not applicable in the Russian Federation (they are based on some indicators that can not be assessed in Russia, for example, the so-called «annual risk of infection»), a simplified method is used based on expert estimates of proportions of undetected TB cases for the threshold year and extrapolation of the result to other years.

In Russia, an estimate of undetected TB cases was made in 1997 by Prof. A.G. Khomenko with questionnaires distributed among Moscow and regional experts. The results obtained for the reference year (1995) were included in a joint RF-WHO report in 1997. This assessment stated a prior estimate of the number of undetected cases for the reference year (1995) and the number of registered TB cases who actually had not TB diagnoses (hyperdiagnostics). Basing on these assumptions it was established that the number of detected new cases constituted 76% of the actual number people with TB. Calculations of notification rates for other years were performed on the basis of multiplying this coefficient by a moving averaged for three years incidence (including relapses with MbT+). For 2007, the estimated incidence of TB (including ss+ TB relapses) was equal to 110 per 100,000 population.

Presently, the expert estimate of undetected TB cases is being reconsidered for another reference year (2007). This issue was discussed at a meeting held in Berlin by the WHO Regional Office for Europe in April, 2009. Besides, Russian experts are working at a dynamic estimation method, which will allow for making annual amendments depending on the current specificity and structure of detected cases. This approach will provide a basis for estimating actual incidence rates both nationwide and in the subjects of the Russian Federation.

Of course, all these approaches are only approximate. However, more precise methods of estimation have not yet been developed, and in the meantime it is essential to have at least an approximate estimation of the real incidence.

WHO publications contain the following major data on TB detection in different countries;

- estimate of new TB cases and notification rate per 100,000 population (respective indicators are also calculated separately for TB and TB/HIV cases);
- estimate of new TB cases with sputum smear-positive microscopy (ss+) and ss+ TB notification rates (these indicators are presented separately for patients with TB and TB/HIV);
- total number of notified new TB cases and ss+ TB relapses, and the summarized TB notification rate for new TB cases and ss+ TB relapses per 100,000 population;
- number of notified new ss- and ss-unknown PTB;
- number of notified new extra-pulmonary TB cases (extra-pulmonary sites including intrathoracic lymph nodes, pleura, upper respiratory tract and bronchi).

According to WHO estimates, there were 9.3 million new TB cases worldwide in 2007, including 4.1 million ss+ TB cases.

In 1999, the new term ‘global TB burden’ was introduced, i.e. the burden inflicted by the disease to international community. This somewhat economic definition denotes the total number people suffering from TB throughout the world, not in individual countries calculated per population. This term was used to select 22 countries with high burden of TB [35], i.e. countries that contribute most of all to the global TB burden. The list of high burden

countries includes the countries that contribute 80% of new TB cases in the world according to WHO estimates[35] (Table 2.3, Fig. 2.40).

The Russian Federation is among the 22 countries with the highest TB burden (Table 2.3). The notification rate of new cases in Russia is not among most significant in the world (110 cases per 100,000 population, 2007). According to WHO estimates, Russia's contribution among the 22 high burden countries is not significant either – 2.1% of 7,423,000 cases and 1.7% of 9,273,000 – global number of new TB.

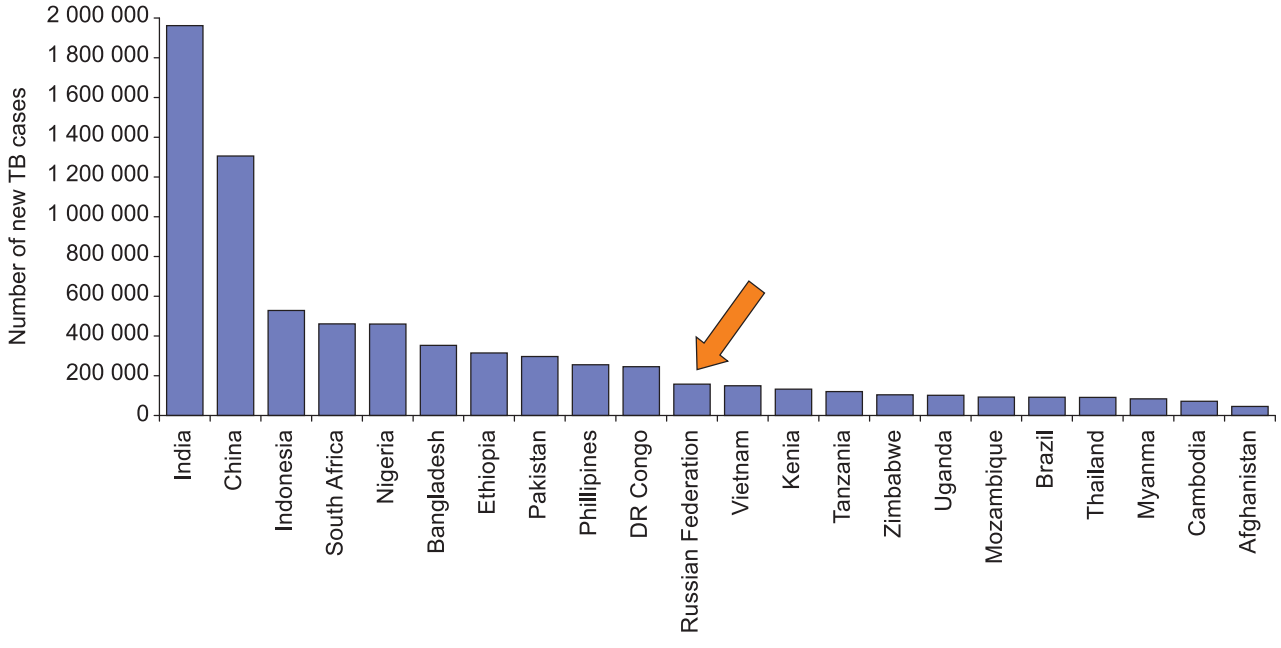


Fig. 2.40. Estimated number of new TB cases in 22 high TB burden countries, 2007 (Source: [41])

According to estimates, the largest number of new TB cases occurs in India and China with almost 40% of the worldwide number of new TB cases and ss+ TB relapses (2007). The highest TB incidence rates are registered in the African region. With the estimated average incidence on the African continent 363 cases per 100,000 population, in Swaziland and South Africa this indicator is up to 1000 per 100,000 population. High incidence rates are also registered in the countries of South-East Asia [181]. The lowest rates are registered on the American continent [32].

In the European Region, the contribution of the Russian Federation to TB spread is now very significant – 35% [41]. In Europe, Russia is among 18 high-priority for TB countries[36].

Russia does not only detect over one third of all new TB cases in the region, but it holds the seventh highest position (89.4[37] per 100,000 population, 2007) in terms of notification rates, after Kazakhstan (160.7), Moldova (128.0), Kyrgyzstan (114.7), Romania (105.4), Georgia (98.1), Tajikistan (93.5 per 100,000 population), Figure 2.41B. It is noteworthy that of the 15 countries with the highest notification rates in the region (more then 50 per 100,000), 14 are former Soviet Union (FSU) republics. In 1985, in terms of notification rates, Russia was only in the 20th position (Fig. 2.41A).

According to WHO estimates, highest TB notification rates in the European Region (over 120 cases per 100,000 population) are registered in Tajikistan (231), Republic of Moldova (141), Kazakhstan (129) and Kyrgyzstan (121).

In 1990s, notification rates increased in almost all the republics of the former USSR by almost 2–2.5 times (Fig. 2.42). At the same time, in all non-FSU countries of the former Warsaw Pact, with the exception of Romania and Bulgaria, there was a considerable decrease in TB notification rates over the same time period – by 1.5–2 times[38].

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35 The list of 22 countries with high burden of TB does not change very often. Following the initial list, in which Peru replaced Mozambique, not all the countries included in the list have the highest number of new TB cases as follows from WHO estimates. For example, Ukraine and Nepal are not included in the list, although they have more new TB cases than Afghanistan. Similarly, Sudan and Korean PDR are not shown in the list although these countries have more new TB cases compared to Brazil and Cambodia included in the list of countries with high burden of TB (See Table 2.3).

36 Plan to Stop TB in 18 High-priority Countries in the WHO European Region, 2007–2015, World Health Organization, 2007

37 Published in [41] levels of notification rate include both new cases and MbT+ relapses.

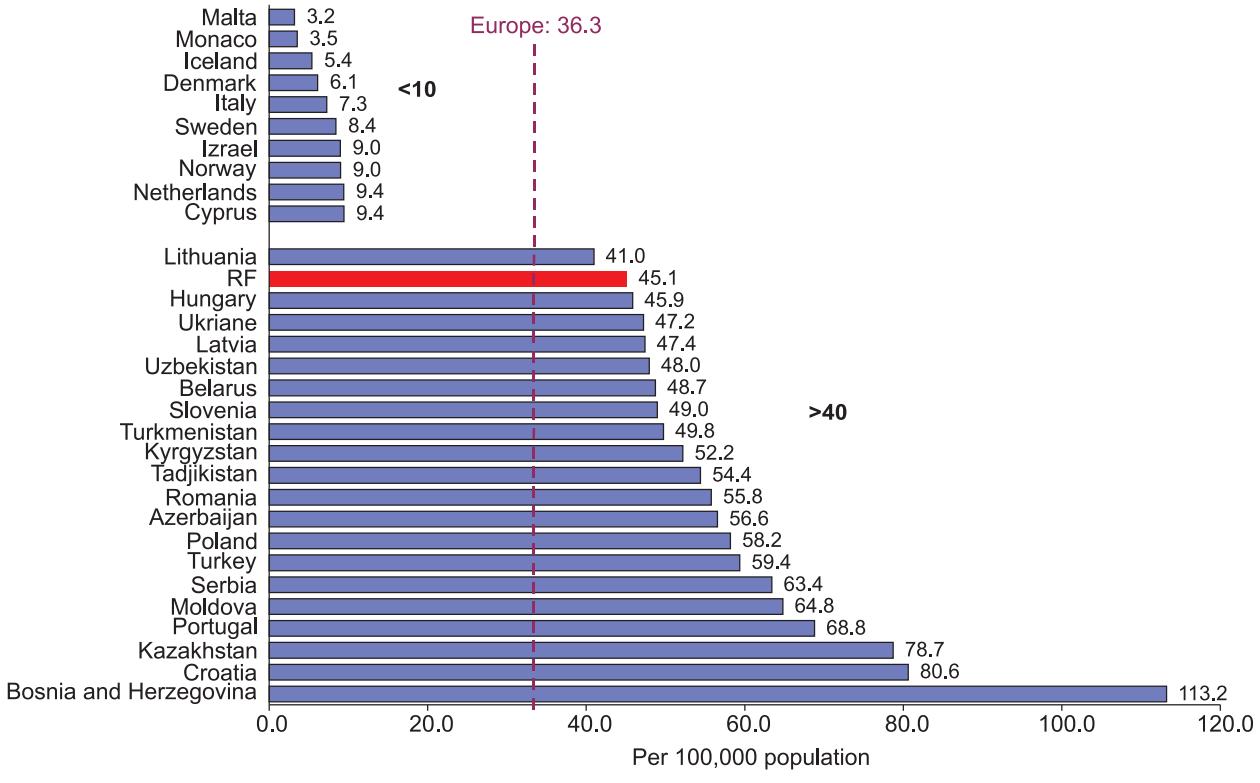
38 The definitions of a TB case in the FSU countries and the non-FSU Warsaw Pact countries have not changed substantially.

Table 2.3.

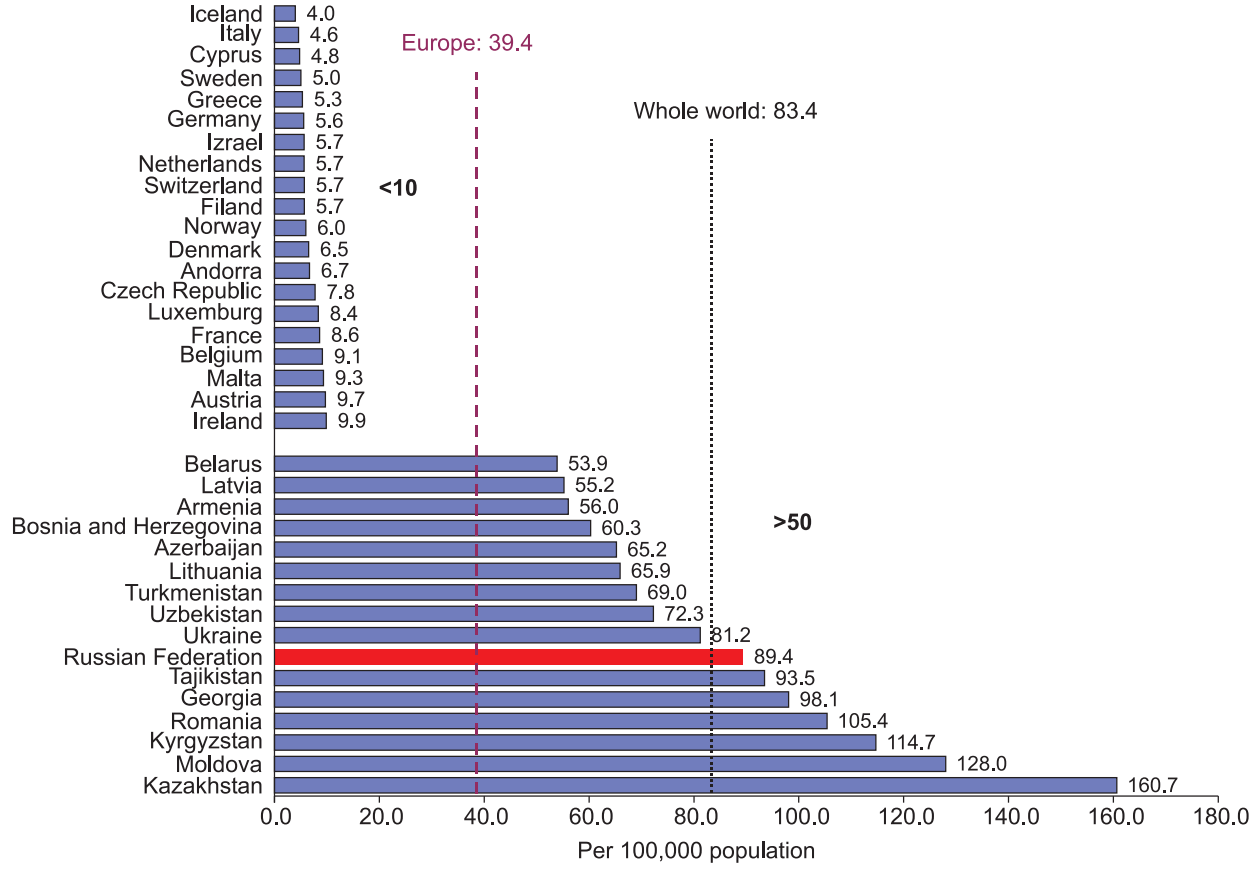
TB case detection in some countries and WHO regions, 2007 (Source: [41])

Countries	WHO estimates				TB notification				Case detection rate of ss+
	All new TB cases		New ss+ TB cases		New and ss+ relapse cases		New PTB ss+ cases		
	Number	Per 100,000	Number	Per 100,000.	Number	Per 100,000	Number	Per 100,000	%
World, total	9,272,799	139	4,062,013	61	5,572 062	84	2,580 700	39	64
Europe	431,518	49	189,951	21	350,529	39	105,288	12	55
Africa	2,879,434	363	1,187,713	150	1,251,735	158	561,149	71	47
America	294,636	32	157,225	17	218,426	24	119,838	13	76
India*	1,961,825	168	872,514	75	1,295,943	110.9	592,587	50.7	68
China*	1,305,770	98	585,126	44	979,502	73.7	465,877	35.1	80
Indonesia*	528,063	228	236,029	102	275,193	118.8	160,617	69.3	68
South Africa*	460,600	948	173,710	358	315,315	649.1	135,604	279.2	78
Nigeria*	460,149	311	194,731	131	82,417	55.7	44,016	29.7	23
Bangladesh*	353,103	223	158,797	100	147,342	92.9	104,296	65.7	66
Ethiopia*	314,267	378	135,311	163	128,844	155.0	38,040	45.8	28
Pakistan*	297,108	181	133,075	81	230,468	140.6	88,747	54.1	67
Philippines*	255,084	290	114,701	130	140,588	159.8	86,566	98.4	75
DR Congo*	245,333	392	108,957	174	99,810	159.3	66,099	105.5	61
Russian Federation*	**157,321**	**110**	**68,223**	**48**	**127,338**	**89.4**	**33,103**	**23.2**	**49**
Vietnam*	149,588	171	66,109	76	97,400	111.5	54,457	62.3	82
Kenia*	132,357	353	53,226	142	106,438	283.5	38,360	102.2	72
Tanzania*	120,291	297	48,508	120	59,371	146.8	24,520	60.6	51
Zimbabwe*	104,400	782	39,784	298	40,277	301.7	10,583	79.3	27
Uganda*	101,785	330	41,865	136	40,909	132.5	21,303	69.0	51
Sudan	93,808	243	41,221	107	29,270	75.9	12,627	32.7	31
Mozambique*	92,295	431	37,165	174	37,651	176.0	18,214	85.1	49
Brazil*	92,102	48	49,354	26	74,757	39.0	38,444	20.0	78
Thailand*	90,878	142	39,347	62	54,793	85.8	28,487	44.6	72
Myanma*	83,403	171	36,620	75	129,081	264.5	42,588	87.3	116
Korean PDR	81,944	344	36,857	155	58,802	247.2	23,575	99.1	64
Cambodia*	71,504	495	31,621	219	35,601	246.5	19,421	134.5	61
Zambia	60,337	506	22,956	193	46,320	388.5	13,378	112.2	58
Nepal	48,766	173	21,827	77	32,940	116.8	14,355	50.9	66
Malawi	48,144	346	18,386	132	24,461	175.7	7,608	54.6	41
Ukraine	46,916	102	20,163	44	37,517	81.2	11,028	23.9	55
Afghanistan*	45,676	168	20,554	76	28,769	106.0	13,213	48.7	64
Uzbekistan	30,813	113	13,801	50	19,779	72.3	6,326	23.1	46
Romania	24,635	115	11,026	51	22,590	105.4	9,425	44.0	85
Kazakhstan	19,894	129	8,896	58	24,777	160.7	6,195	40.2	70
Tajikistan	15,542	231	6,933	103	6,297	93.5	2,228	33.1	32
USA	12,718	4	5,575	2	13,299	4.3	4,864	1.6	87
Kyrgyzstan	6,451	121	2,884	54	6,098	114.7	1,720	32.4	60
Republic of Moldova	5,348	141	2,387	63	4,857	128.0	1,610	42.4	67
Georgia	3,703	84	1,654	38	4,310	98.1	1,867	42.5	113
Czech R.	893	9	401	4	790	7.8	267	2.6	67
Estonia	509	38	221	17	456	34.1	168	12.6	76

* 22 high-burden countries in accordance with WHO definition [41].



a) 1985



b) 2007

Fig. 2.41. TB notification rates in the countries of the WHO European region in 1985 and 2006. Rates include new TB cases and TB relapses. Countries with the lowest notification rates (< 10) and the highest notification rates (> 40 in 1985, and > 50 in 2006) are indicated. (Source: [41])

Case detection rate is another important indicator used in international publications, which is measured as percentage and indicates the difference between notification rate and the real TB incidence. Levels of all new detected TB patients and nes Ss+ PTB cases are used for this purpose. The latter is more often used in assessments of effectiveness of TB case-finding.

In compliance with one of the targets established by World Health Assembly («detect at least 70% of new sputum smear-positive TB cases»), the ss+ TB case detection rate must be not less than 70%. In the Russian Federation this indicator was only 49% in 2007 (Fig. 2.43), while in the WHO European region it was in average 55% and the average worldwide indicator was 64% [41].

It should be noted that this indicator (the WHO target to detect at least 70% of new sputum smear-positive TB cases with respect to estimated ones) is sometimes interpreted erroneously as to ensure the laboratory confirmation of TB diagnosis in 70% of all new TB cases. In reality, this target must be understood as detection of 70% of smear-positive TB cases in the existing number of ss+ TB patients in population calculated based on the estimation method described above. At the same time, as indicated in Section 2.6, the proportion of patients with confirmed ss+ among all TB patients is also very low in the Russian Federation (only 33%).

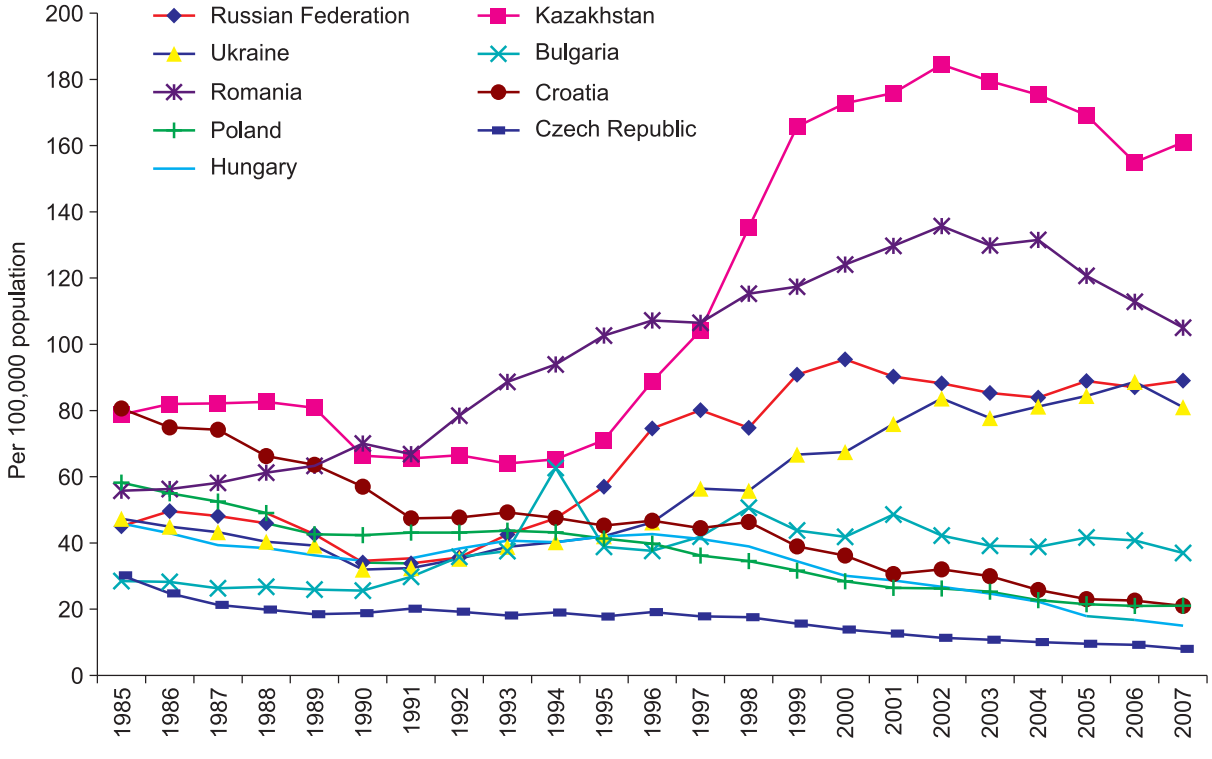


Fig. 2.42. Notification rates in select countries of the WHO European region, 1985–2007 (Source: [41])

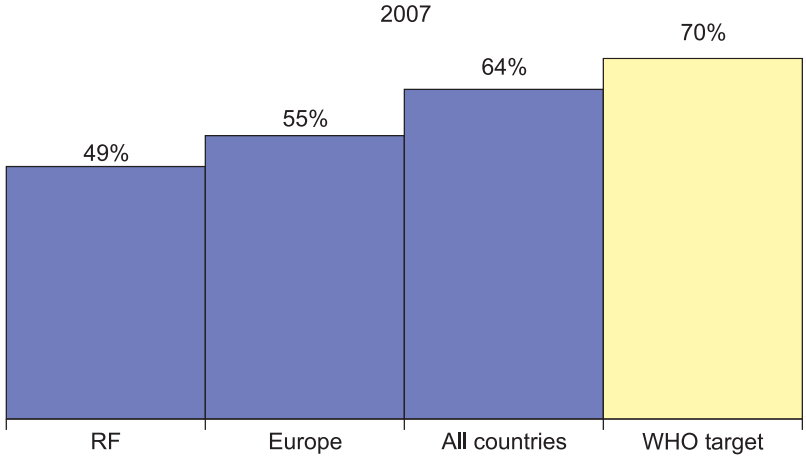


Fig. 2.43. Proportion of detected new ss+ TB patients (percentage of notified ss+ patients among the estimated new ss+ TB cases in the population). The Russian Federation, Europe and worldwide, 2007 (Source: [41])

3. TB mortality in the Russian Federation

Borisov S.E., Belilovsky E.M., Skachkova E.I., Son I.M., Danilova I.D.

3.1. General information. Recent trends and territorial differences in TB mortality rates

Information on patients who died of TB is contained in three forms: No. 52, No. 33, and No. 8.

The state statistical Form No. 52 includes data on all deaths with indication of the cause of death, including patients who died of TB. These data provide basis for calculating the mortality rate from tuberculosis in the Russian Federation. Reported data are based on the information contained in the registration form No. 106/y-98 «The medical certificate of death», which in sent for state system of vital registration and then to the Federal State Statistics Service. The data on each death is copied by the regional dispensaries in order to verify diagnoses and to control the numbers in each dispensary followed up group.

Form No. 8 contains information only on TB patients with a post-mortem diagnosis, regardless of whether the patient was followed up by regional TB dispensary of the administrative region (subjects) of the Russian Federation(regional TBD) or under another jurisdictional entity with its own TB service (FSIN, Ministry of Internal Affairs, etc.).

Form No. 33 contains information on all TB patients who died of TB and were registered at regional TBD. The data in this form are separate for patients who died of TB and those with other causes of death. This form allows for the calculation of the TB mortality rate for the resident population and the mortality rate among TB patients from other causes of death. In addition, the form contains information on patients who died of TB and were not registered at regional TBD.

Since these forms are filled out in various ways and by different facilities, the resulting data may differ to some extent.

Thus, in 2008, from Form No. 52, there were 25,388 registered cases of death from TB (17.9 per 100,000 population) compared to 26,114 cases (18.4 per 100,000) in 2007 [30]; and from Form No. 33 – 23,653 cases (24,703 cases in 2007)[39].

For a complete analysis, TB patients who died of TB and other causes should both be considered.

According to Form 33, in 2008, 42.1% of TB patients registered at regional TBD died of other causes (non-TB diseases and external factors). Over the last decade, this rate has been rather constant, in the range of 38–41%. According to 2008 data, the mortality rate of non-TB diseases and external factors among TB cases (52.0 per 1,000 TB cases registered at regional TBD, 14,161 cases) exceeds the overall mortality rate in the general population by approximately 3.6 times[40] (14.7 per 1,000 population, 2008). This shows that TB patients are in a high risk group of death not only from TB, but also from other causes; it is essential to pay special attention to studying and resolving this problem.

The problem of reducing the mortality rate of TB patients needs to be addressed in two ways – reducing mortality from tuberculosis and other causes. Addressing these challenges requires two different events: for the first objective, the organization of early detection and increasing of effectiveness of TB treatment are important, for the second objective – the effective treatment of co-morbidities (concomitant diseases), as well as social and psychological support of patients with tuberculosis.

Sometimes in assessing the success of TB treatment the indicator of overall mortality rate of TB patients is being used, regardless of the cause of death. This indicator is important in terms of monitoring changes in the number of infectious TB patients in the region. Besides, the cause of death is not always registered correctly, which leads to wrong classification of the cause of death – TB patients died from TB are classified as died from other cause and vice versa.

It is generally accepted that the emergency of the epidemiological situation with tuberculosis is significantly determined by mortality from TB. It is also suggested that this indicator depends on the quality of registration to a lesser degree than TB morbidity.

After a long period of decreasing the mortality rate from tuberculosis from the early 70s to the beginning of 90s (from 18.6 to 7.7 per 100,000 population, see Fig. 3.1), the rate began to rapidly increase and reached maximum in 2005 when the death rate from TB increased by more than 2.5 times compared with 1991 and was equal to 22.6 per 100,000 population.

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[39] Sum of numbers of persons who died from TB and who were and were not registered in regional TBD, and also residents postmortem detected as TB case (see Form No. 33).

[40] A more correct value of this parameter can be obtained by comparing the mortality rates among the general population and among TB patients, which are standardized by age and gender. It is not possible to do this simply on the basis of existing reporting forms, therefore, a special analysis is required. However, in general, such a modification will not change the conclusion about high mortality rate among TB patients who die of non-TB causes, compared to the overall mortality rate among the general population.

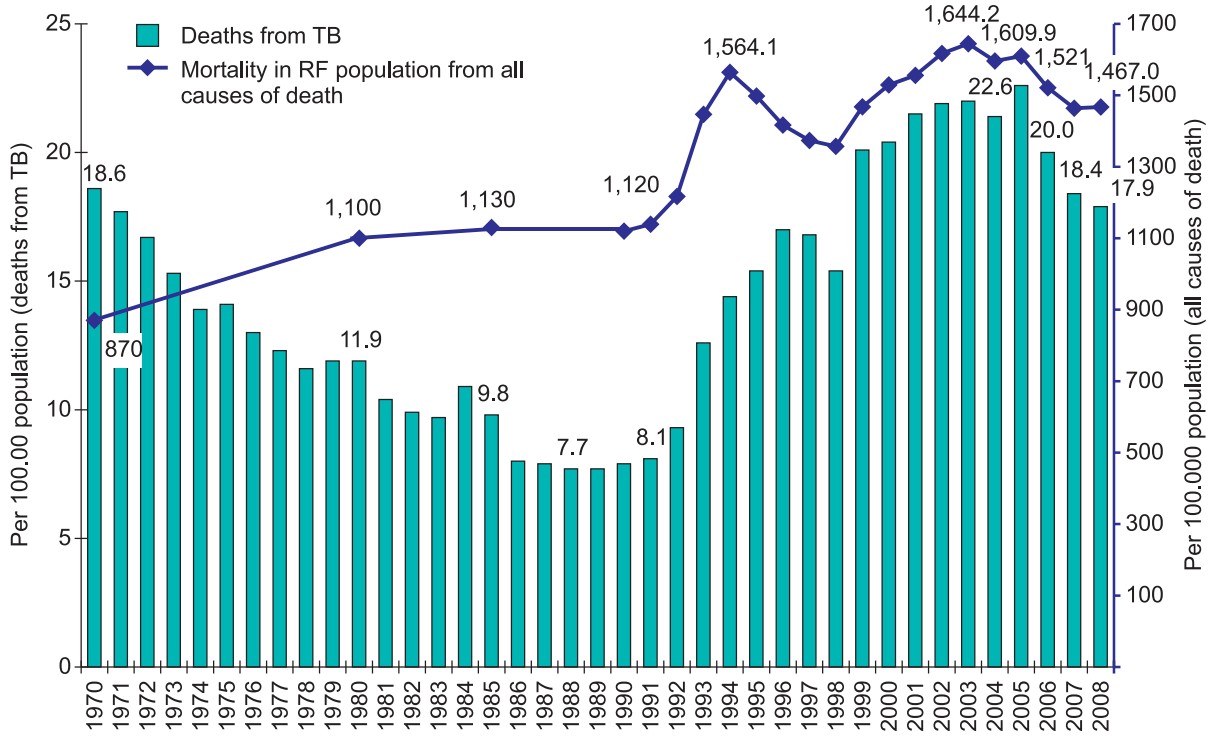


Fig. 3.1. TB Mortality rate and mortality rate for population (any causes of death) in RF (Sources: Form No. 52 [12, 13, 17])

Two periods could be distinguished in comparing the dynamics of the overall mortality and mortality from TB (Fig. 3.1). Before the 1991 decrease of mortality from TB, are paralleled increased overall mortality among the population, demonstrating the high efficiency of anti-TB interventions during those years. In the 1990s and in the beginning of the XXI century changes in both indicators took same direction. In those years, the mortality rate from TB had a greater influence from a general socio-economic situation in the country, rather than from efficiency of work of TB control services.

Since 2005, the mortality rate from tuberculosis started to decline significantly (20.0, 18.4 and 17.9 per 100,000 population in 2006, 2007 and 2008 respectively [19, 31, 38]), which was supposedly associated with to a significant reduction of overall mortality rate (any causes of death) in the country (from 16.1 in 2005 to 14.7 in 2008 per 1,000 population).

The level and the structure of the TB mortality rate in the Russian Federation once again prove the need to pay special attention to this disease. TB is the leading cause of death among infectious diseases in the Russian Federation, accounting for 76% (2007) of deaths from «several infectious and parasitic diseases» (A00-B99 by ICD- 10), reviewed in the reporting forms [13][41].

Mostly persons died of TB are productive (working) age (86%, Fig. 3.2). In all other registered classes of diseases which cause fatal outcome, on the other hand, the majority of patients (over 70%) who die are older persons. Persons who die from external causes[42] (76% of people of productive age) are the only exception. In 2007, the peak of the TB mortality rate fell in a broad age group of TB patients of 45–59 years – about 40 per 100,000 population in this age group (Fig. 3.3). Anyhow, in 2008, a more prominent peak was observed in the 45–54 years age group. At the same time, the maximum value decreased to 36.9 per 100,000 population in this age group (Fig. 3.3). The decreased mortality rates registered since 2006 were mostly among TB patients of 40–65 years of age.

It should be noted that in 2006 [12, 47] the overall proportion of deaths from TB in the Russian Federation was equal to 1.3% from all deaths, while the proportion of deaths from TB among men in the most socially active age groups 25–44 years was as high as 5.3–5.6%. For women aged 25–34 years, the proportion of deaths from TB was as high as 5.8%, which is comparable to the proportion of women's deaths in this age group from the leading cause of mortality in Russia – cardiovascular diseases (13.9%). According to the WHO estimate for

[41] Further on the list of infectious diseases according to 2007 data are: diseases caused by the human immunodeficiency virus (HIV) – 10.5% of patients who died of infectious diseases; septicemia – 4.2%, viral hepatitis – 3.3%, intestinal infections – 1.3%, and etc.

[42] The main part (63%) of external causes of death are poisonings including alcoholic intoxication, suicides, accidental injuries and road accidents.

1999 [45], in the world tuberculosis was the cause of deaths in 9% of women who died at the age of 15–44 years, while military conflicts accounted for women's deaths in only 4%, and cardiovascular disease – in 3% of deaths.

These facts emphasize that TB is not only a medical, but also is a social and economic problem, since it involves the most economically active segment of the population.

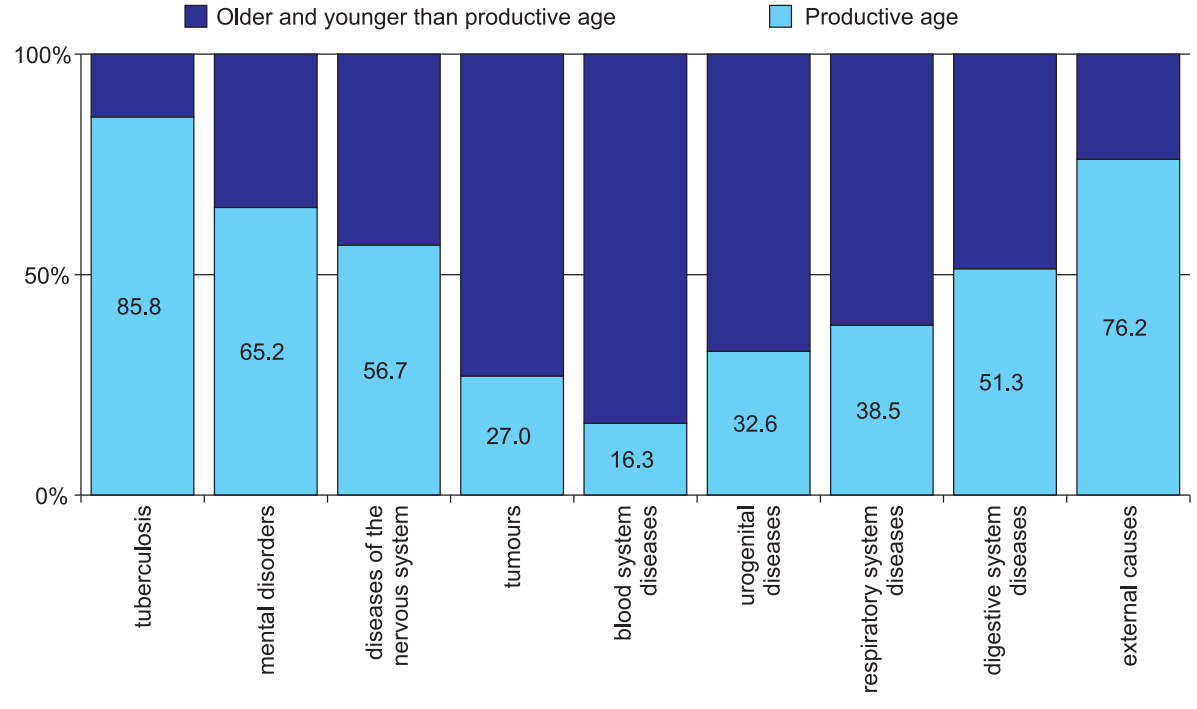


Fig. 3.2. Percentage of persons who died at productive age[43] by the main classes of cause of death, RF, 2007 (Source: [13]; population: Form No. 4)

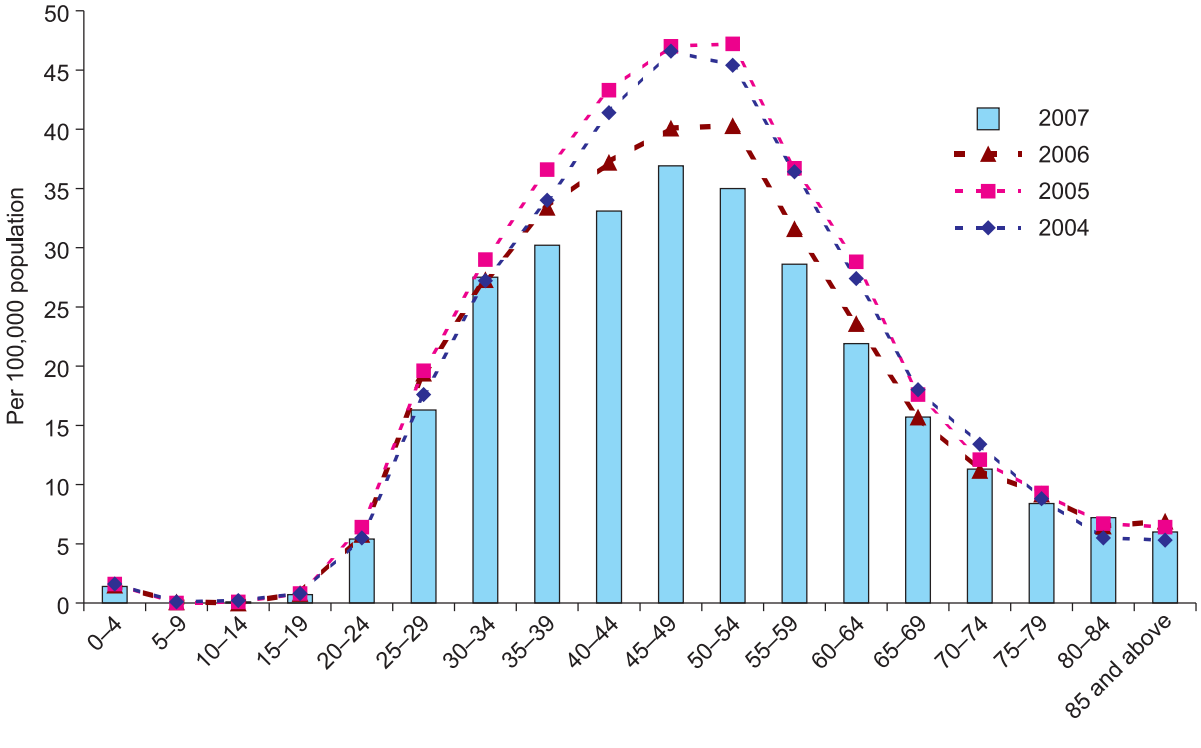
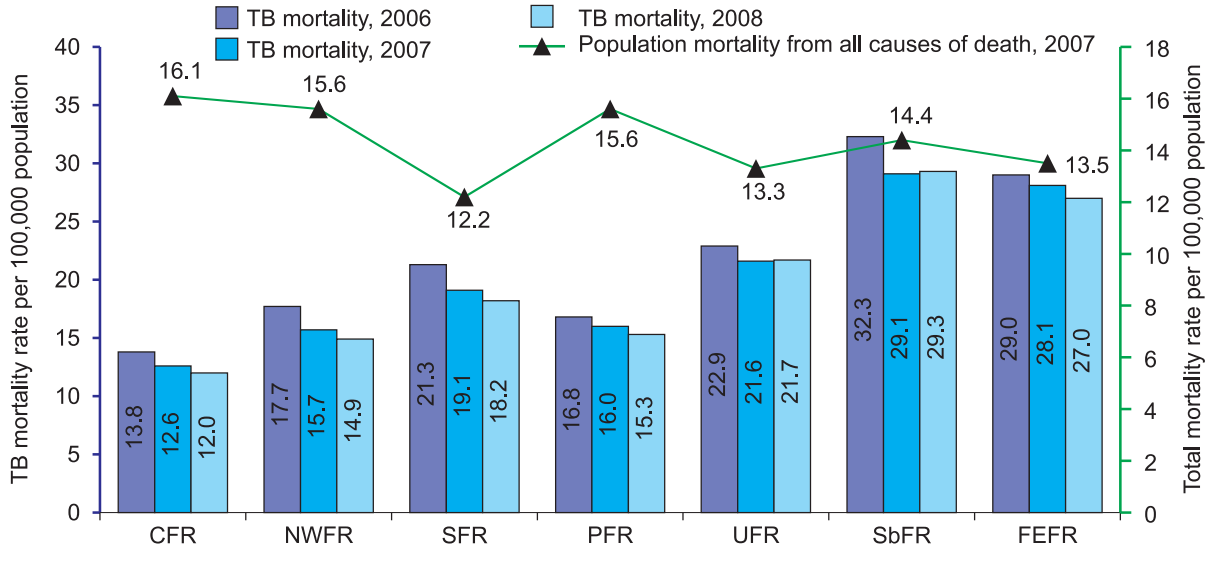


Fig. 3.3. Age-specific TB mortality rates, RF, 2004–2007 (Source: [12, 13])

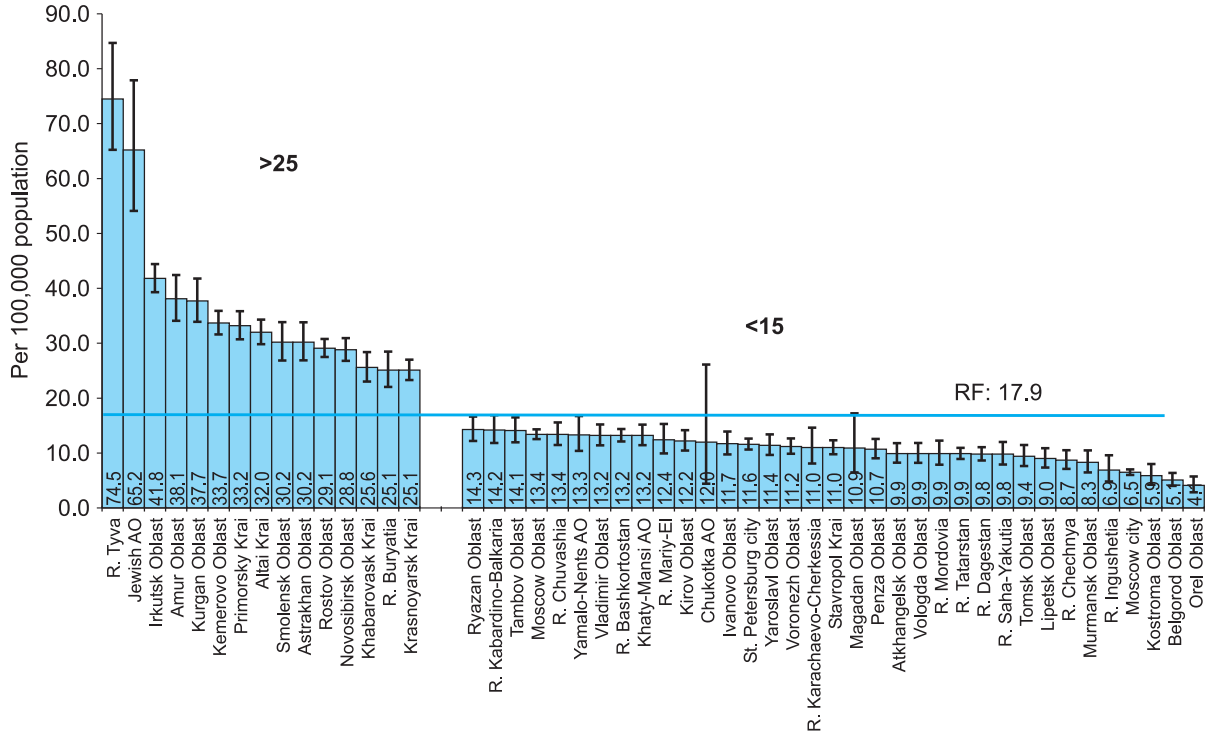
[43] Productive age: men – 16–59 years, women – 16–54 years.

Like the TB notification rate, the TB mortality rate gradually increases from the west to the east (from 12.0 to 27–29 per 100 thousand population – Fig. 3.4A). This does not correspond to the distribution of mortality rates for any causes of death, which is at its highest in the Central and North-West Federal regions (about 16 per 1,000 population).

The variance of registered TB mortality rates in the territories of the RF was significant in 2008 [13]. More than 10 times difference was observed for territories with low TB mortality rates (Orel Oblast. – 4.1, Belgorod Oblast. – 5.1, Kostroma Oblast – 5.9, Moscow – 6.5), and for areas with high rates of mortality from tuberculosis (Republic of Tuva – 74.5, Jewish AO – 65.2, Irkutsk Oblast – 41.8, Amur Oblast – 38.1, Kurgan Oblast – 37.1). Such variances may reflect the real and consistent patterns of TB mortality, as well as certain inadequacies in the registration of causes of death in the regions.



a) by federal regions



b) by territory (subjects of the Russian Federation)

Fig. 3.4. The distribution of TB mortality rates by federal region (A) and by territory (B) with mortality rates > 25 and < 15 per 100,000 population, 2008. (Source: [12, 13]). The vertical lines indicate 95%CI

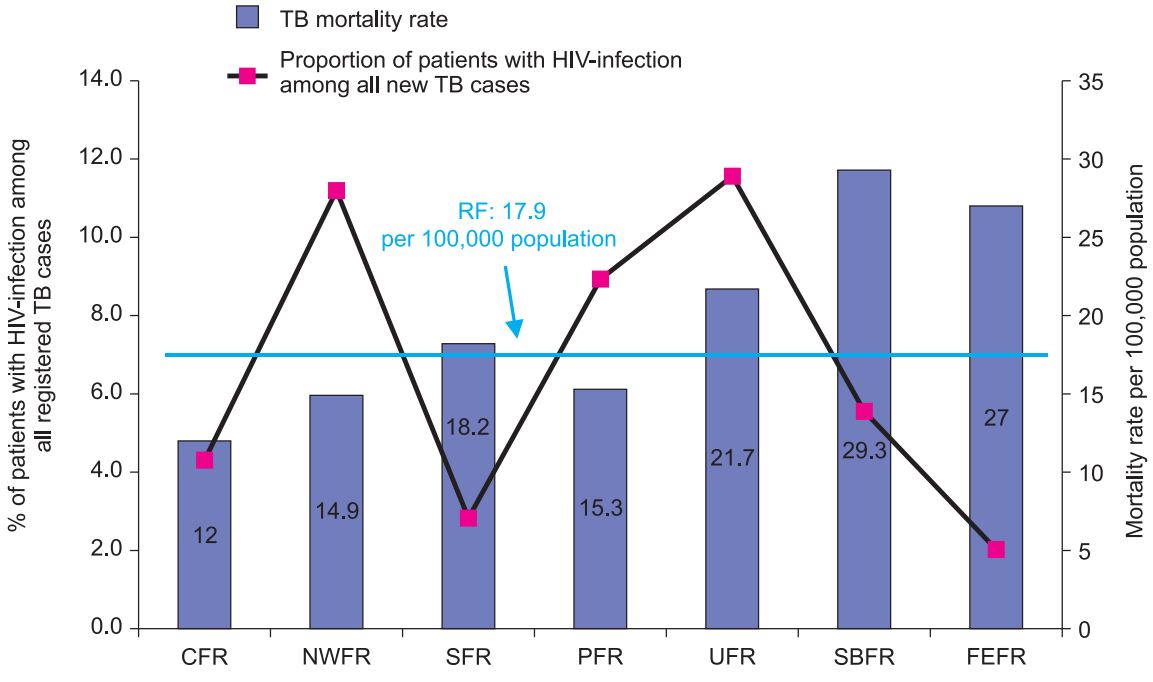


Fig. 3.5. Comparison of the Federal Regions by death rate from tuberculosis according to FSSS data [13], and the proportion of HIV-infected among all TB cases (Form No. 61). Russian Federation, 2008

With general decline in mortality from tuberculosis in 2008 in Russia, the mortality rate exceeded 40 per 100,000 population only in 3 regions, while in 2005 – in 13 regions.

The Fig. 3.5 compares the relationships between TB mortality rates in the Federal Regions of the Russian Federation and the spread of HIV infection among new TB cases, – the factor that potentially has important impact on population mortality. The figure demonstrates the lack of an apparent link between the prevalence of HIV infection and TB mortality rates.

3.2. TB mortality rate components

When analyzing TB mortality and determining strategies to decrease the rate, it is essential to consider the structure of this rate. TB mortality has three main components: 1 – patients with post-mortem diagnosis (previously not registered as TB case), 2 – patients who died within the first year after registration and 3 – the other (remainder) cases of death from tuberculosis (Fig. 3.6). Various factors affect each of the components, which require specific approaches to decrease the TB mortality rate.

The number of TB patients with postmortem diagnosis (8.3% in 2008) depends on timely detection and reveals possible inadequacies in the detection and diagnosis of TB in a region, and in particular – problems in the quality of activities at PHC facilities level, effectiveness of educational activities among the general public, and other factors.

The number of patients who died within a year following registration (19.0% in 2008) indirectly reflects the effectiveness of activities in detection, management and treatment of new cases.

And finally, the percentage of remaining patients who died of TB (slightly over 70% in 2008) depends on the effectiveness of treatment activities performed for relapse cases, re-treatment cases and chronic cases, as well as on the quality of dispensary work and prophylactic activities.

It should be noted that indicators calculated as a percentage of different patient groups that died of TB can be used as a source of information for defining different managerial activities in order to decrease the general mortality level. They can be used to define targeted resources to allocate for timely detection and adequate treatment activities (i.e. these indicators are of managerial and economic importance).

However, the correctness of using the percentage of cases with post-mortem diagnosis among patients died from TB and the percentage of patients who died within the first year following registration among patients died from TB for the comparison of territories and for the analysis of trends remains questionable. This is due to the fact that an increase in the percentage of one of the mortality components could occur either when the

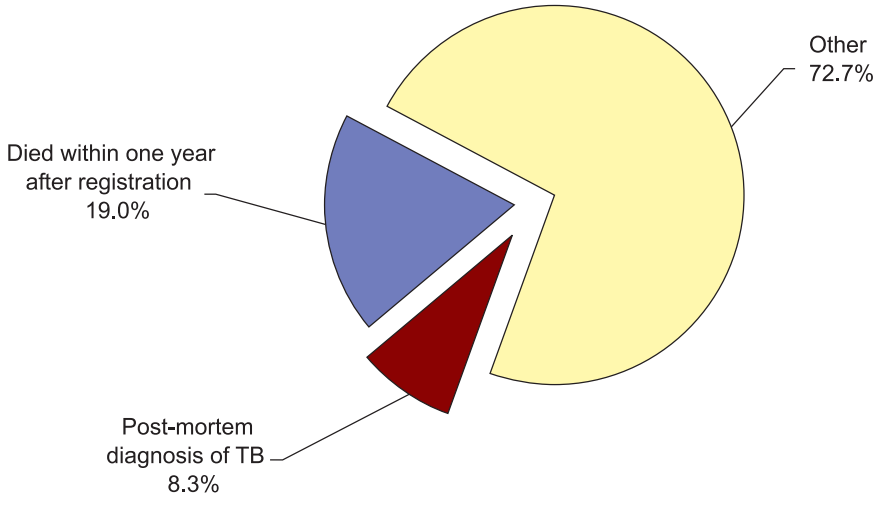


Fig. 3.6. Components of the TB mortality rate among the permanent resident population. RF. 2008. (Source: Form No. 33)

absolute number of this category of patients is increased or when the number of died patients in another category is decreased.

The change in the mortality structure that occurred between 2003 and 2004 in Orel Oblast can be used as an example. During those years, a considerable decrease in the number of patients who died from TB was reported in the oblast: from 40 to 26 persons. This happened due to a decrease in the third component – deaths among retreatment cases and patients with chronic TB. Therefore, although the number of patients who died within the first year following registration decreased from 15 to 13, and their proportion to the number of new cases also decreased from 3.4% to 3.0%, the percentage of deaths within the first year following registration increased from 37.5% to 50%. Also, the percentage of patients with port-mortem TB diagnosis among those who died of TB increased sharply (from 17.5% to 34.6%), although the number of such patients did not greatly increase: from 7 to 9 (within statistical error of measurement).

In order to compare territories by the number of cases who died within the first year following registration and the number of cases of post-mortem TB diagnosis, we review the relationship of these categories of deceased patients to the number of new cases registered the same year.

The ratio indicator of the number of cases who died of TB within the first year following registration to the number of new cases (see Fig. 3.7) for the civil population[44] (in Form No. 33) increased in the Russian Federation from 4.1% in 1999 to more than 5% in 2005 (see note to Fig. 3.7). The indicator decreased during last two years (to 4.1% in 2008); this may indicate improved diagnosis and treatment of tuberculosis. The 2007 increase in the proportion of TB patients who died within one year after registration in the FEFO was related to a sharp deterioration of this indicator in the Khabarovsk Krai region in the past two years (from 2.0% to 6.4%). In 2008, highest levels of this rate were observed in Leningrad (11.8%), Ulyanovsk (9.1%), Arkhangelsk (8.3%), Bryansk (8.0%), Tver (7.7%), Tula (7.7%), Pskov (7.2%) oblasts, and in the Republic of Karelia (8.9%). In general, half the territories of Russia have the value of this indicator in the range from 2.7% to 5.3% (25% and 75% quartiles).

At the same time, a low rate of this ratio indicator in a territory may indicate both successful treatment of TB patients and a lack of information in registration documents.

The similar indicator named as «proportion of new TB cases died from TB» (who died during treatment course) is more precise indicator which can be obtained with the help of cohort analysis with a well developed calculation technique, which enhances the quality of calculation as compared to that described above. This indicator is calculated as the one of a chemotherapy treatment outcomes based on reporting Form No. 8-TB. It allows for the calculation of the percentage of patients who died from the fixed cohort of new cases rather than the calculation of an abstract relationship of the number of patients who died within the first year following registration to the number of new cases (which are not directly related to each other). The results of processed data on the cohort of new pulmonary ss+ TB cases registered in 2007 show that death from TB occurred in 8.4% of cases for the given group of patients (see Chapter 5).

From 1999 to 2004 there was an increase in the percentage of cases with post-mortem diagnosis among new cases (from 2.2% to 2.8%, see Fig. 3.8). From 2006, this indicator started to decrease (to 2.8% in 2008, Form No. 8).

[44] The TB mortality rates for penitentiary system, see in the Chapter 6.

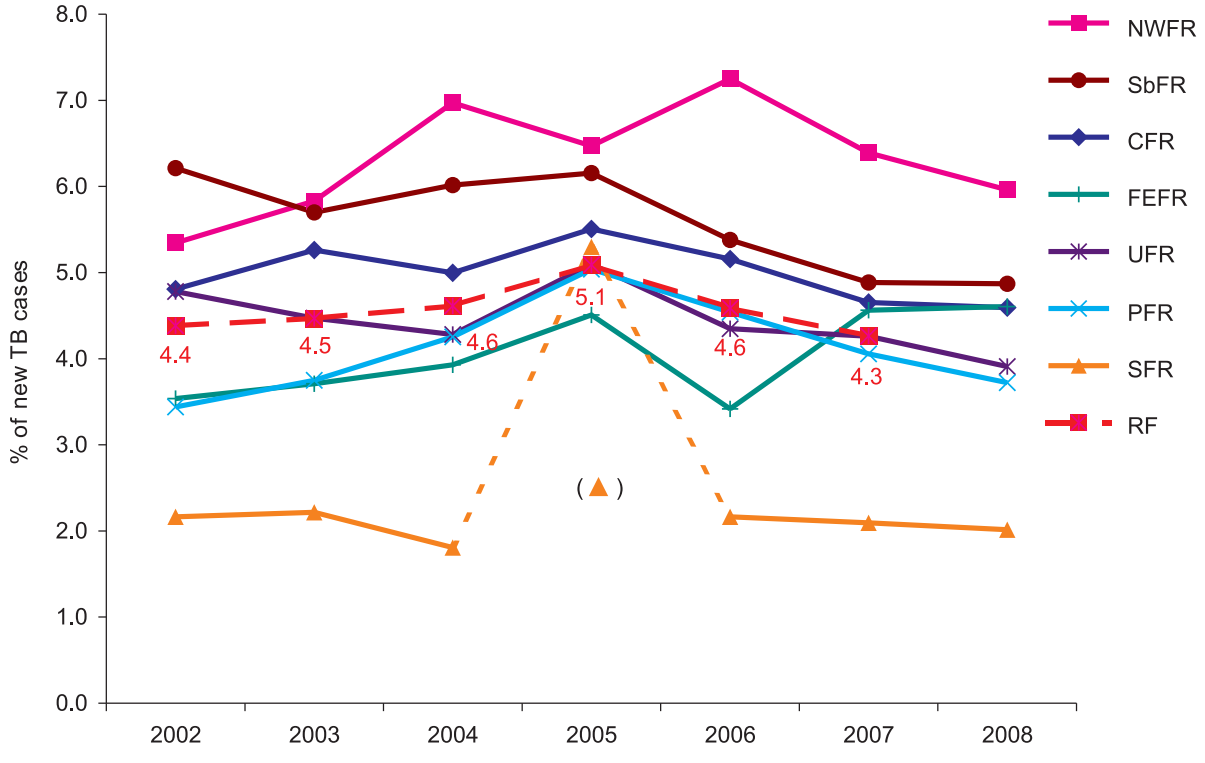


Fig. 3.7. The ratio of the number of patients who died of TB within the first year following registration to the number of new TB cases. Resident population, the Federal Regions and the Russian Federation[45]. Value in parentheses shows the value for the Region after averaging data from Rostov Oblast for 2005, based on data for 2004 and 2006. (Source: Form No. 33)

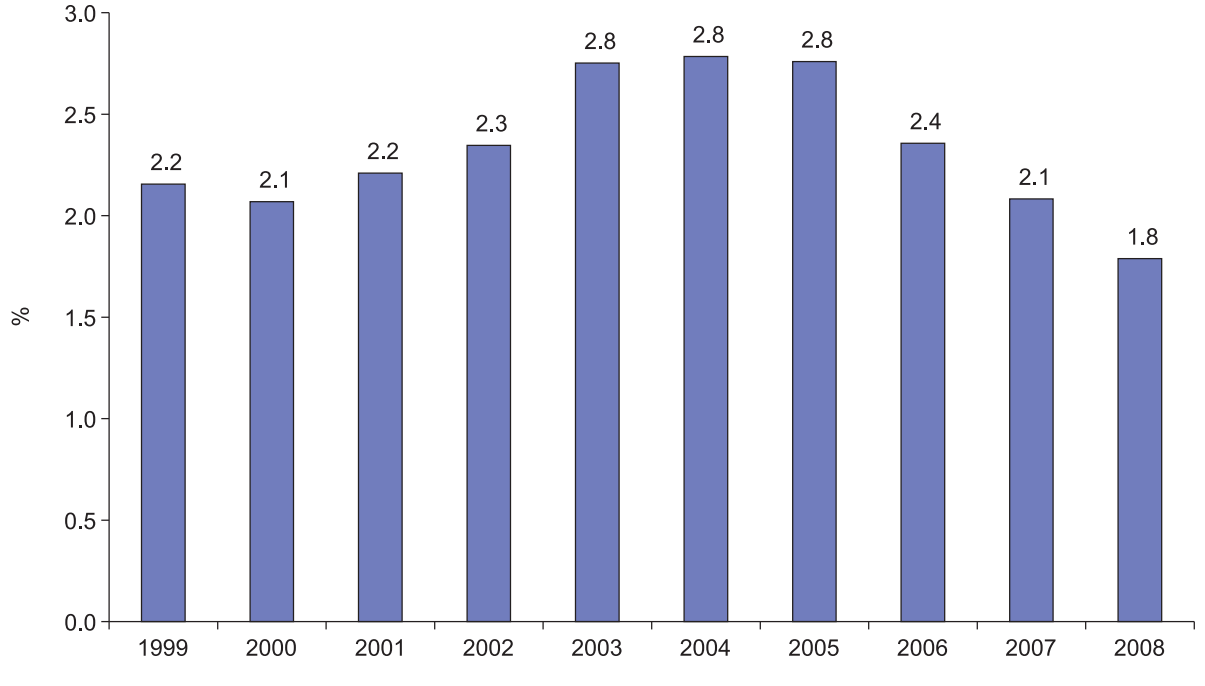


Fig. 3.8. Percentage of deaths within the first year following registration to new TB cases. Russian Federation (Sources: 1999–2004 – Form No. 33; 2005 and later – Form No. 8)

[45] Data for 2005 for SFR are dotted, since these data require clarification on number of deaths within the first year following registration in Rostov Oblast. Data for Rostov Oblast (Form No. 33): 2004 – 24, 2005 – 415, 2006 – 20 death cases in the first year after registration. The indicator value for SFR for 2005 was calculated after averaging data from Rostov Oblast for 2005, based on data for 2004 and 2006. The rate for the Russian Federation for 2005 (5.1%) is given after the noted above recalculation. Unfixed Form No. 33 for 2005 demonstrates the value 5.5%.

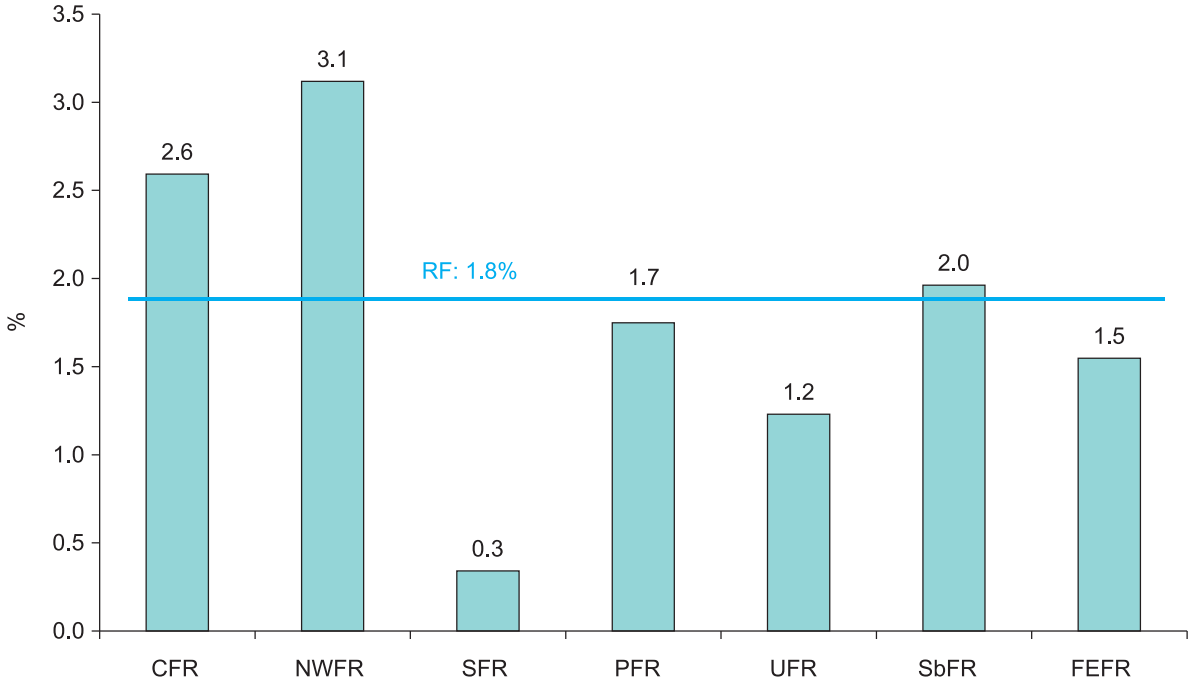


Fig. 3.9. The percentage of patients with post-mortem diagnosis among new TB cases, Federal Regions of the Russian Federation, 2008 (Source: Form No. 8)

According to Form No. 8, variation of this indicator is quite high in different subjects of the Russian Federation – from 0% in seven Regions (which may be due to inadequacies in registration of post mortem diagnosed cases) to more than 5% in Moscow (5.8, CI 95% 5.1–6.6%), Leningrad (5,4%, CI 95% 4.2–6.7%), Nizhni Novgorod (5.2% CI 95% 4.4–6.2%) oblasts, and in the Republic of Adygea (5.1%, CI 95%, 3.1–7.8%). A decline was observed in 47 regions out of 83 in 2008.

Fig. 3.9 presents the variability in the percentages of post-mortem TB cases by federal regions. It can be hypothesized that the data for the Southern FR are underestimated due to the traditionally low percentage of post-mortem examination (autopsy) of patients in this region. In addition, we should note a relatively high percentage of postmortem diagnosis in the permanent resident population in the North-West FR.

Therefore, it is evident that particular components of the mortality rate, similar to the TB mortality rate overall, can be effectively used for the purpose of TB control activities. The level of the rate proves that at the present time TB is a major socio-medical and economic problem in the country.

3.3. TB mortality rates in the Russian Federation and other countries

A high quality and complete registration of deaths from TB is a serious challenge in many countries.

To effectively use the TB mortality rate in TB control activities, it is necessary to establish an effective system of vital registration based on adequate registration forms with a broad coverage of death cases by system of registration and coding of causes of death in compliance with ICD-10.

In countries with free market economy and in most countries of the former USSR including the Russian Federation, effective national vital registration systems are being used, including vital registration statistics. Anyhow, in many countries TB patients deaths are currently registered and assessed as the one of treatment outcomes without differential analysis of causes of death (i.e. whether death resulted from TB or other causes). If this approach is used, it is the lethality of TB patients that is assessed, not the indicator of TB mortality rate in the population, although the latter is much more significant from the epidemiological point of view.

The Russian Federation, contrary to many other countries, in addition to the system of vital registration, has a well-developed system of dispensary follow-up of TB patients, which improves quality of TB mortality registration. Dispensary follow-up of patients allows for performing a differential analysis of death cases (including postmortem diagnosis) depending on the duration of the disease, and the diagnostic and curative interventions performed. This approach includes not only deaths from TB, but also from TB/HIV co-infection and other causes.

The data provided in the recent Global Report of the World Health Organization [41] show that in 2005 out of 196 countries of the world:

– only 93 countries had national systems of vital registration that cover more than 70% death cases in accordance with WHO estimates (coverage over 90% was registered in 57 countries, including the Russian Federation – 99%);
– medium and high quality systems of death coding were available in 76 countries (see Table 3.1);
– only 59 countries (including the Russian Federation) submitted information to the WHO data-base on death cases [47] for the last reporting year (2005 or 2006) in the required format (by cause of death, age and gender).

As a result, out of 196 countries only 35 (including the Russian Federation) have national vital registration systems covering over 90% of death cases with medium and high quality level of death coding, which enabled these countries to submit adequate information for 2005 and 2006 to the WHO data-base.

This is why WHO publications, including Global Reports [17[, and many other international publications do not contain data on registered deaths from TB but only mathematical estimates of mortality indicators. At the same time, the recommendations of the WHO Global Task Force on TB Impact Measurement pertaining to the assessment of the progress made in decreasing TB notification rates, prevalence and mortality, stress the need for improving and strengthening national systems of vital registration.

The WHO assessments of TB mortality are made based on yearly estimates of notification rates and lethality for 12 sub-groups of TB patients: combinations of HIV-positive and HIV-negative cases (TB patients with HIV positive/negative status) with positive or negative results of sputum bacterioscopy at the time of registration of patients who receive treatment with DOTS, without DOTS, and those who do not receive any treatment.

According to WHO estimates, in the world 1.32 million people died of TB in 2007 (19.7 per 100,000 population). This number does not include people with HIV—positive status. The estimates show that additional 456,000 people die of TB among people infected with HIV. So, according to the estimates, about 1.8 million persons die from diseases associated with TB (Table 3.1). It should be noted that the TB mortality estimates are calculated separately for people with HIV-positive and HIV-negative status because in compliance with the International Statistical Classification of Diseases (ICD-10) deaths from TB among HIV-positive patients are attributed to HIV-infection [41].

The 2007 estimates of the World Health Organization show that the highest TB mortality rates are registered in the African countries (overall 92.7 cases per 100,000 population). Over 200 deaths caused by TB per 100,000 population have been registered in Swaziland (317), Zimbabwe (265), Lesotho (263), and South Africa (230). The highest rates in the WHO European Region have been registered in the Central Asia countries – Tajikistan (45.5 per 100,000 population), Kyrgyzstan (17.9), Kazakhstan (17.4), Uzbekistan (16.4), and in the Republic of Moldova (19.0), the Russian Federation (17.8) and Romania (16.4).

The estimates of TB mortality rates showed a trend to decrease starting 2000 both in individual countries and in all 6 regions of the World Health Organization (Fig. 3.10).

One of the goals of the Stop TB Strategy was to reduce by half TB mortality rates by 2015 compared to 1990. But the most recent WHO Global Report [17] indicated that the African and European regions of the World Health Organization will in all probability not attain this goal by 2015.

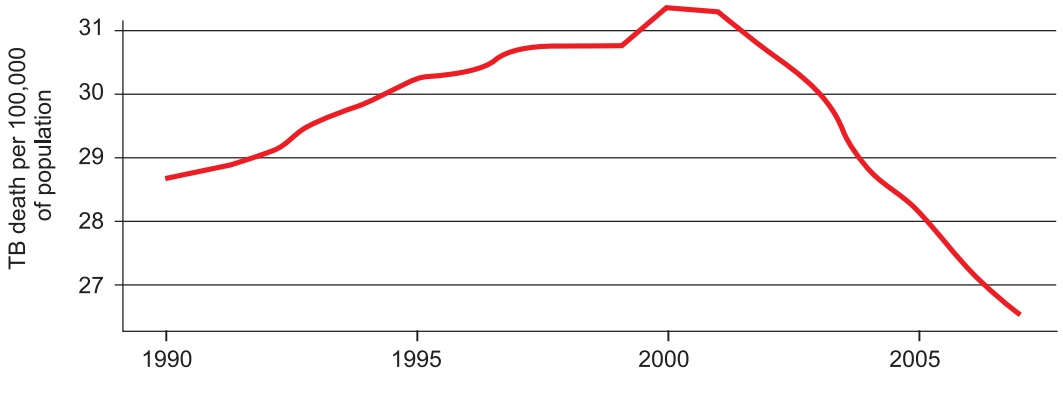


Fig. 3.10. TB mortality rates, including people with TB/HIV co-infection (per 100,000 population), according to WHO estimates (Source: [41])

Table 3.1

Estimates and registration of death cases caused by TB in different countries [41, 47]

Country, Region	WHO estimates of TB mortality rate				Number of registered deaths from TB[1]			Quality of registration of deaths from TB	
	Total number of individuals who died of TB		Including among HIV-positive		Year	Number of deaths	Per 100,000 population	Coverage[2] %	Data quality[3]
	Number of deaths	Per 100,000 population	Number of deaths	Per 100,000 population					
Whole world	1,771,733	26.6	456,218	6.8	–	–	–	–	–
Africa	734,891	92.7	377,535	47.6	–	–	–	–	–
America	40,616	4.5	7,892	< 1	–	–	–	–	–
Europe	63,765	7.2	8,096	0.9	–	–	–	–	–
India#	331,268	28.3	29,508	2.5	NDA	NDA	NDA	NDA	NDA
China#	200,614	15.1	6,774	0.5	NDA	NDA	NDA	NDA	NDA
South Africa#	111,924	230.4	93702	192.9	2005	73,752	153.8	79	L
Philippines#	36,305	41.3	271	0.3	1,998	28,038	38.4	85	M
Brazil#	8,419	4.4	2473	1.3	2,004	4,980	2.7	79	M
Thailand#	13,589	21.3	3,853	6.0	2002	6,751	10.8	87	L
Russian Federation#	25,355	17.8	5,105	3.6	2006	28,474	20.0	99	M
Armenia	313	10.4	12	0.4	2003	155	4.8	63	L
Azerbaijan	882	10.4	39	0.5	2004	813	9.8	68	M
Belorussia	799	8.2	38	0.4	2003	1,027	10.4	98	M
Estonia	81	6.1	18	1.3	2005	49	3.6	100	H
Georgia	408	9.3	19	0.4	2001	255	5.6	97	M
Republic of Moldova	722	19.0	35	0.9	2006	622	17.3	80	H
Kazakhstan	2,680	17.4	100	0.7	2006	3107	20.3	77	M
Kyrgyzstan	949	17.9	35	0.7	2006	840	16.3	70	M
Tajikistan	3,066	45.5	212	3.1	2005	622	9.5	54	L
Uzbekistan	4,497	16.4	159	0.6	2005	2784	10.6	73	H
Romania	3,516	16.4	129	0.60	2007	1606	7.5	100	H
Czech Rep.	103	1.0	1	0.01	2005	68	0.7	100	M
USA	1.267	0.4	143	0.05	2005	648	0.2	100	H

On the list of 22 countries with high burden of TB.

1 Information is provided for the last year for which data are available in the WHO data-base on TB mortality [44]. This publication contains separate data on mortality rates from respiratory and non-respiratory TB cases among men and women. Basing on this data and on the male and female populations provided in this data-base, estimates were calculated of the total numbers of deaths from TB and the mortality rates from TB per 100,000 population indicated in this table.

2 Based on WHO survey of 2005 [17]. The number is calculated as quotient of the number of registered deaths in national vital statistics to the WHO estimates for the same year. The coverage indicator is calculated for the last year for which respective data were available but not earlier than 2000.

3 Based on WHO survey of 2005 [17]. Data quality was assessed by WHO experts based on the applied systems of coding of death cases and on the proportion of deaths indicated with improper coding: L – low quality, M – medium quality, H – high quality.

NDA – no data available.

4. TB prevalence in the Russian Federation

Belilovsky E.M., Borisov S.E., Skachkova E.I., Son I.M., Danilova I.D.

4.1. General information. Structure of the indicator and recent trends

The indicator of TB prevalence is calculated based on the number of patients who at the end of the year are still considered to be TB cases, per 100,000 population. In this case, individuals previously registered as TB cases are considered irrespective whether or not they are included in one of the cohorts for treatment. By the end of the year, such patients are not yet cured; they are still alive and have not been transferred out. This indicator reflects the real TB prevalence among the population.

The prevalence of TB among the population is an important and integral indicator reflecting the effectiveness of treatment and follow-up activities. Due to the lack of a developed system of follow-up for TB cases, in most foreign countries, this rate, as a rule, is estimated only by means of mathematical calculations based on incidence data (see below).

In Russia, which has a developed system of dispensary follow-up of TB patients, the prevalence rate is calculated on the basis of the number of patients included in dispensary follow-up groups – DFG I and II, which include TB patients with so called «active» forms of TB[46]. Data on the number of cases of tuberculosis among the civilian population are reported in Form No. 33, while for the population of FSIN – in the Form No. 4-tub (see Chapter 6). This chapter provides information only on the civilian population based on Form No. 33.

Therefore, the prevalence rate depends entirely on the rules and the methodological approaches applied to the formation of the follow-up groups. The most recent major changes in the approaches to the formation of the follow-up groups occurred in 2004, in line with MoH&SD Executive Order No. 109 of 23 March 2003 [20].

Fig. 4.1 provides data on TB prevalence in the RF based on patient numbers in those follow-up groups which in the corresponding years included patients with «active forms» of TB. Until 2004, TB prevalence was calculated on the basis of patient populations of the DFG I and II defined by the MOH executive orders issued prior to 2004. During these years, DFG I included patients under basic and relapse courses of treatment (IA) and patients with chronic forms of TB (IB). Group II included patients with so called «abating» TB, which included patients with a completed course of treatment and could be seen as a group of individuals at risk of relapse. From the international perspective, those patients would not be considered as TB patients. In 2004, the «abating» TB patient group was abolished and a new system of dispensary grouping was introduced [20] (see Annex 1). According to this system, TB patients were distributed throughout the following groups: IA (newly registered cases*), IB (registered as relapses*), IC (patients with an interrupted course of treatment and evading evaluation) and lastly, DFG II – chronic TB.

The TB prevalence rate, calculated on the basis of DFG I and II as defined by MOH orders prior to 2004, decreased regularly until 1992, at which point it reached 172.1 per 100,000. The rate then began to increase sharply, and at the beginning of the 21st century it reached the level of 271.1 per 100,000 population, having returned to the level seen in 1979 [4].

Since 1999, the reporting forms have included a separate piece of information on the number of patients registered in DFG I only – i.e., those under treatment. This allows for the calculation of the prevalence rate close to the definition accepted internationally (see Fig. 4.1). In 2003, the prevalence rate, calculated on the basis of DFG I only, was 180.9 per 100,000 population.

After the revision of the follow-up groups in 2004, the prevalence rate decreased from 271.1 (2002) to 218.3 (2004) per 100,000 population. During recent years the prevalence rate steadily declined and reached 190.5 per 100,000 population in 2008 (at the end of 2007 according MoH&SD data there were 270,544 TB patients registered in regional TBD).

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[46] The calculation of TB prevalence does not involve follow-up groups with persons at risk of TB or at risk of TB reactivation (III, VI, V, IV and «0»), see Annex.

* The terms of «newly registered cases» and «registered as relapses» reflect here not treatment history but following up or registration history of patient. According rules of Russian followed up system, patient could be as «newly registered case» during one year (year of registration) and was involved during the year in few treatment couses – as «new TB case» and as «retreatment case» – notes for the English version of Review.

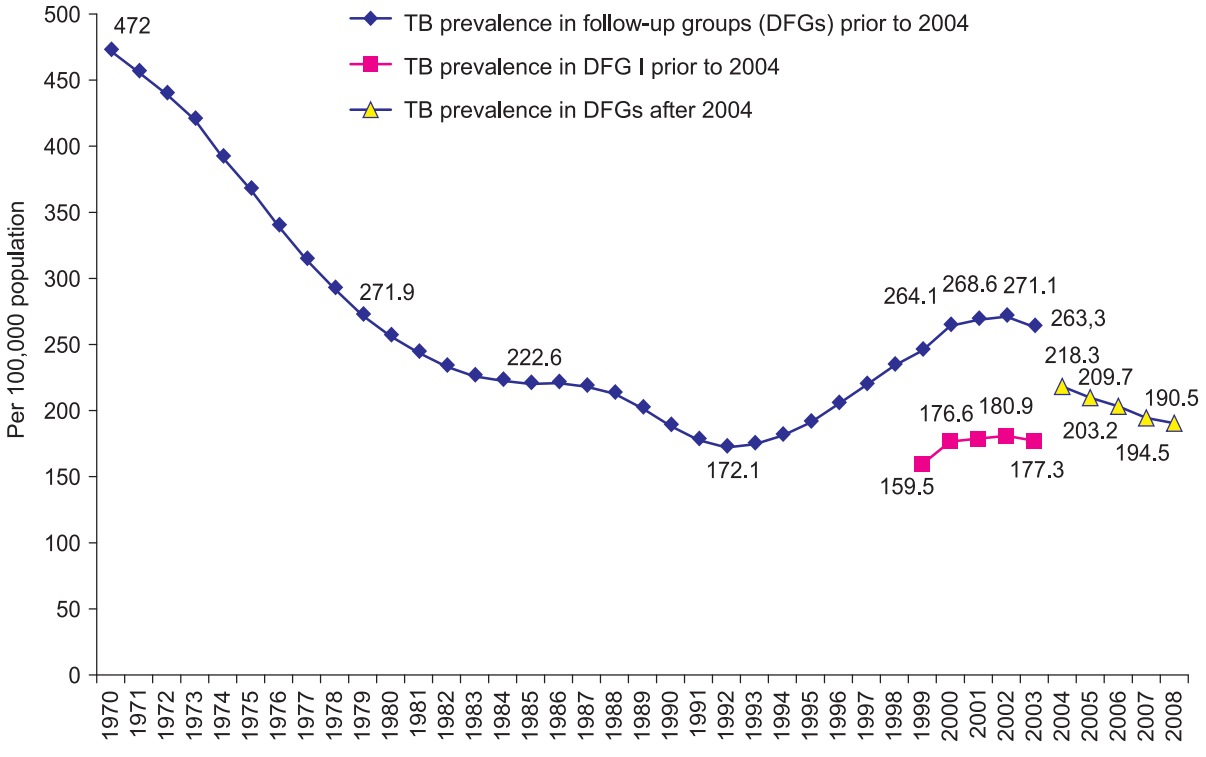


Fig. 4.1. TB prevalence among civilian population in the Russian Federation. Calculations are based on the size of all TB patient follow-up groups (DFG I and II), and only on DFG I before the 2004 revision of the follow-up groups (Source: Form No. 33)

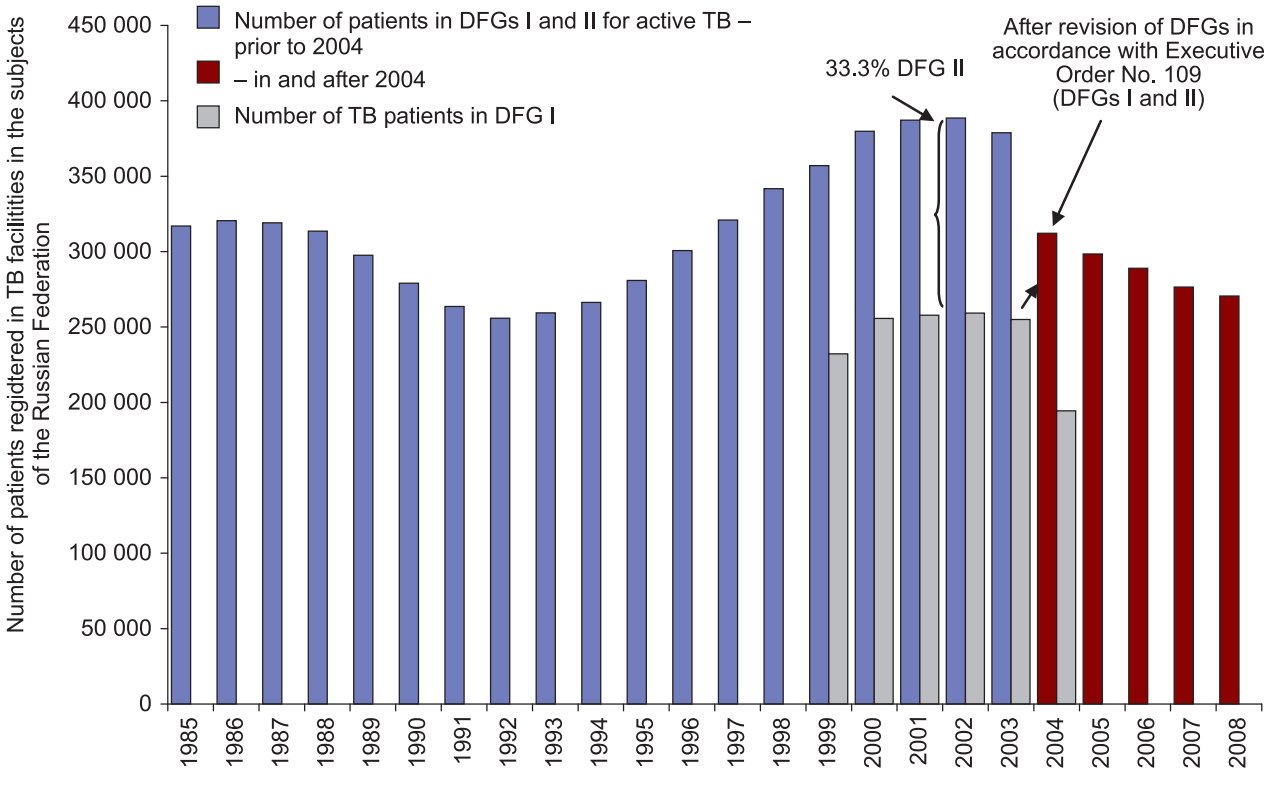


Fig. 4.2. Number of TB patients persons registered in some follow-up groups before and after the groups' revision in 2004 (see text), civilian population. (Source: Form No. 33)

Data on the absolute numbers of the follow-up group patient populations (Fig. 4.2) make evident several important issues regarding the formation over the last few years of the follow-up group for «active» forms of TB. The group of «abating» TB cases, abolished in 2004, accounted for one third of the prevalence rate (33.3% in 2001). After it was abolished, patients from the former group I were divided into two new groups – I and II (taking into account the flow of patient populations – detection, transfers in and out, cures, etc.). At the same time, analysis of the reporting forms demonstrates that after the revision of the follow-up groups in 2004, the number of patients with «active» TB (in compliance with definitions presented in [20]) and registered in Form No. 33 insubstantially increased. For the sake of comparison, the method of calculation of the number of active TB cases takes into consideration only group I before 2004, and both groups I and II after the revision). In 2003, in DFG I (i.e. active TB patients) there were 255,006 patients. After 2004, the number of active TB patients increased to 298,509 (DFG I and II in 2005). The phenomenon of the increase in the number of «active» TB patients by almost 22% since from 2003 requires additional analysis and evaluation.

The relationship of prevalence to incidence reflects the duration of the course of the disease and, to some extent, the duration of patient treatment. The relationship of prevalence to incidence in the world has decreased over the last 15 years from 2–2.5 to 1.2–1.7, which demonstrates the global trend towards a decrease in disease duration and treatment course duration. In the Russian Federation, this indicator is much more significant reaching 2.8.

4.2. TB prevalence in the Russian Federation territories

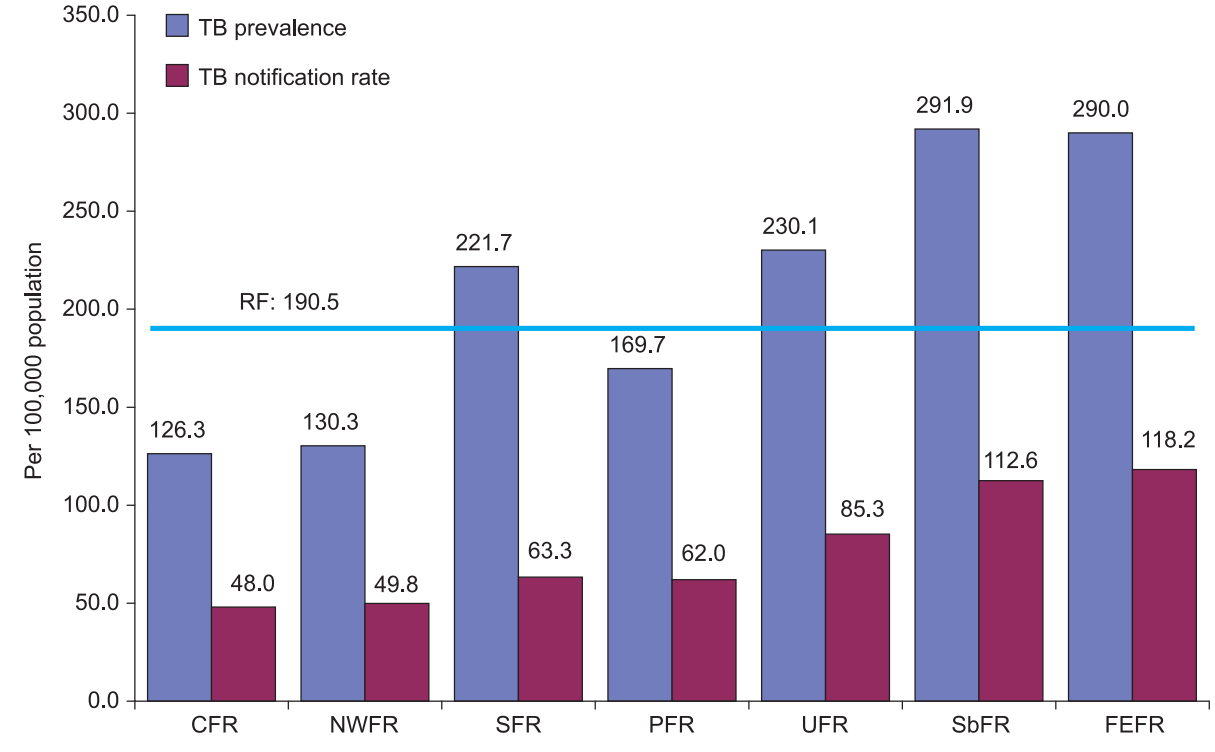
Similar to TB notification and mortality rates, TB prevalence rates also differ substantially by territory in the Russian Federation (Fig. 4.3).

As seen with notification rates, prevalence rates in general increase from west (126–130 per 100,000 population, 2008) to east across the country. In SbFR and FEFR, the rate reaches 291.9 and 290.0 per 100,000 population (2008), respectively. At the same time, a high level of TB prevalence and its great elevation over TB notification rates were reported in the territories of the Southern Federal Region (SFR) – 221.7 per 100,000 population (among permanent residents according to Form No. 33). If in the other federal okrugs prevalence rates exceed notification rates by 2.5–2.7 times, in SFR the proportion is about 3.5 with the notification rate 63.3 per 100,000 population in 2008. This may indicate significantly late discharge of TB patients from the active TB groups or, otherwise, inadequacies in effective detection and/or treatment.

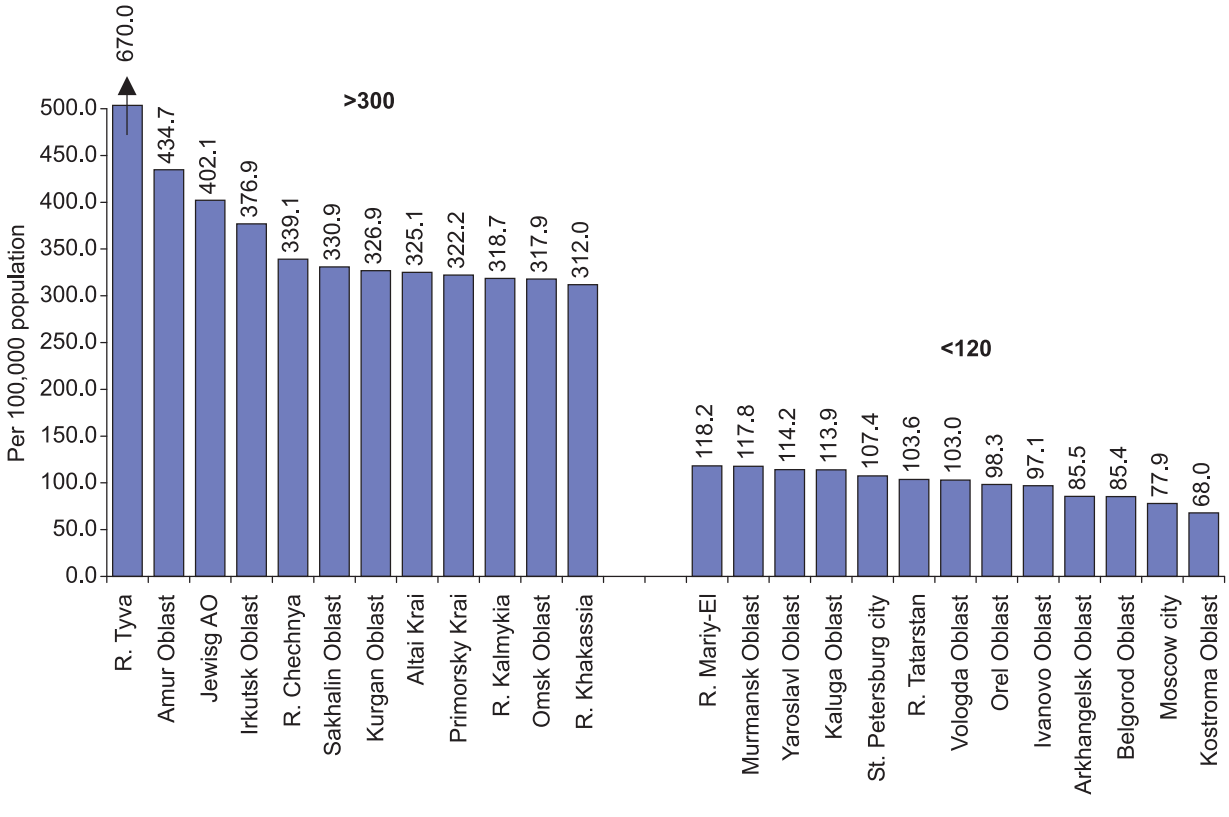
In 2007–2008, decreased prevalence rates were registered in all the federal regions except for SFR, where the prevalence rates stabilized, and for FEFR where this indicator increased by 5% (from 277 to 290 per 100,000 population).

Low prevalence rates were reported in 13 subjects of the Russian Federation, not exceeding 120 per 100,000 population – in the Republics of Mari-El and Tatarstan, and in Murmansk, Yaroslavl, Kaluga, Vologda, Orel, Ivanovo, Arkhangelsk, Belgorod and Kostroma oblasts and in the cities of Moscow and Saint-Petersburg. At the same time, in 12 territories the prevalence exceeded 300 per 100,000 population: in the Republics of Tuva, Kalmykiya, Chechnya, Khakassia, in Amur, Irkutsk, Sakhalin, Omsk, Kurgan oblasts, Altai Krai, Primorski Krai and in Jewish AO.

Some contribution to the overall prevalence of tuberculosis among the population of the Russian Federation has made the prison system (see Chapter 6). Anyhow, although in 2001 the TB patients registered at FSIN facilities contributed almost 28%, in 2008 – only 13.5% of the total number of 312,870 patients registered at the end of the year in the forms No. 33 and No. 4-tub. Prevalence of tuberculosis in the country taking into account these patients is 220.3 per 100,000 population.



A) by federal region



B) by territories with a prevalence < 300 or > 120 per 100,000

Fig. 4.3. TB prevalence in the federal regions and territories (subjects) of the Russian Federation, 2008. Comparison of the prevalence and notification rates for civilian population of the federal regions
(Sources: Form No. 33; population – Form No. 4)

4.3. Structure of TB patients registered in MoH&SD facilities

Fig. 4.4 shows the distribution of TB patients within DFG in 2008. As seen from the chart, patients with chronic RTB make a considerable proportion (36.2% among all patients), which is the result of ineffective treatment in previous years. A significant number of patients with chronic TB observed during many years is a permanent risk factor for the spread of tuberculosis and, above all, with MDR-TB (see Chapter 8). This indicates the persistence of challenging epidemiological situation with tuberculosis in the population of the Russian Federation.

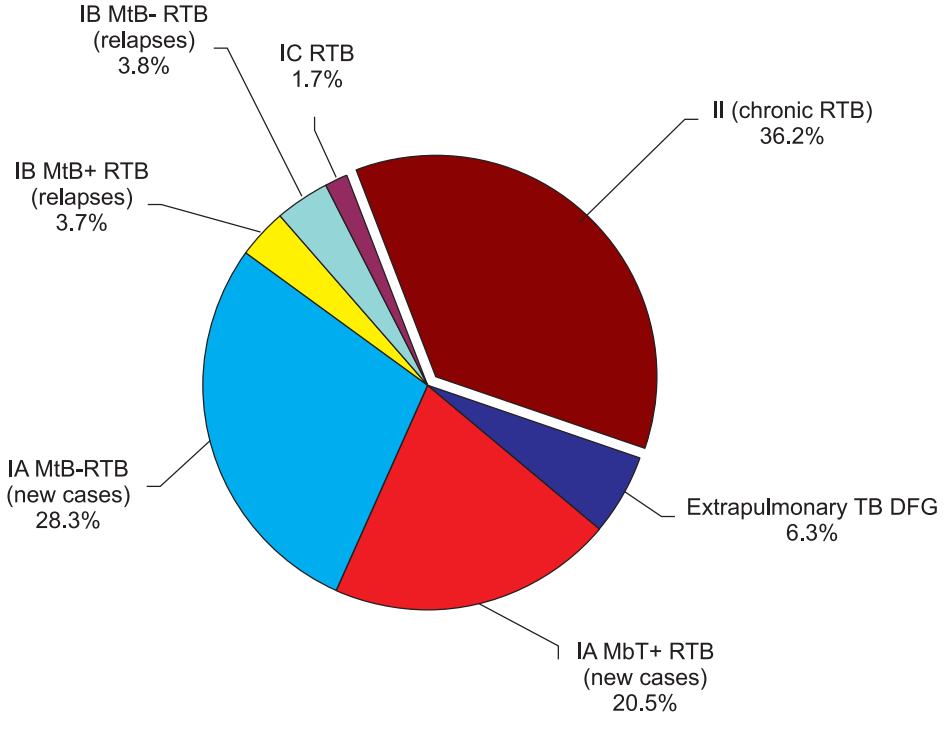


Fig. 4.4. The distribution of TB patients within the follow up groups, the Russian Federation, 2008. (Source: Form No. 33)

The proportion of patients with chronic RTB in the Russian Federation increased by 2006 from 40.4% to 43.1%, then it slightly decreased in 2008 to 38.4%. The decline of this rate was observed in 2008 in more 46 territories of the Russian Federation.

In 13 territories the proportion of chronic RTB forms is less than 25%: in the Republics of Chuvashia, Mari El, Karelia, Tatarstan, in Orel, Kirov, Belgorod, Tomsk, Ivanovo, Khabarovsk, Sakhalin, Murmansk and Vologda oblasts. In Yamalo-Nents AO, Chelyabinsk and Bryansk oblasts the proportion of RTB chronic forms exceeded 50%[47].

The prevalence of bacteriologically positive (MbT+) cases in the country is considerable (see Fig. 4.5 for RTB patients). The revision of the follow up groups practically did not have an impact on this rate, which has been declining since 2002 (88.0 per 100,000 population), and reached 79.5 per 100,000 population in 2008. The prevalence of MbT+ cases exceeds the notification rate of MbT+ cases by 2.6–2,7 times in 2008 (at the end of the 90's, by 3.3 times). Since the relationship of TB prevalence to TB notification rate should be about 1.5–2.0, the accumulation of so called «bacillary» patients' pool (registered MbT+ patients) indirectly demonstrates the insufficient effectiveness in the treatment of MbT+ patients. Noteworthy is that in some areas, including Orel oblast and the Republic Mary El, for patients with respiratory TB this relationship decreased from 2.4–3.0 to 1.1–1.6 in 2002–2008.

In addition, a gradual increase in the proportion of MbT+ patients among groups of patients with respiratory TB has been observed over the last years: from 35.1% in 2002 to 44.3% in 2008.

Similar situation has been observed among patients with destructive pulmonary TB forms (Fig. 4.6). The highest prevalence of destructive pulmonary TB forms was reported in 2002 (82.1 per 100,000 population), after that a decrease to 73.5 per 100,000 population in 2008 was observed. However, this rate is 2.5 times higher than the

[47] Data for Yaroslavl, Kaluga oblasts, Primorskiy Krai and the Republic of Ingushetia were not available at the time of preparation of this report.

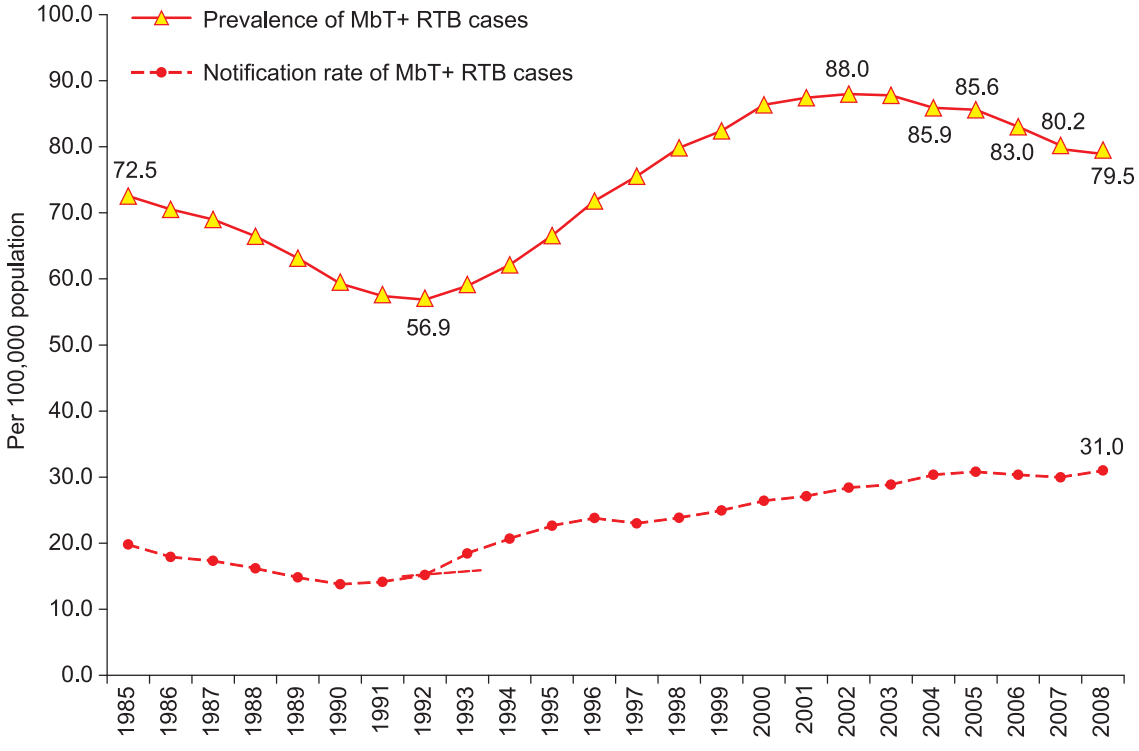


Fig. 4.5. MbT+ cases prevalence and notification rate in RTB patients, the Russian Federation.
(Sources: Forms No. 33; population – Forms No. 1 and No. 4)

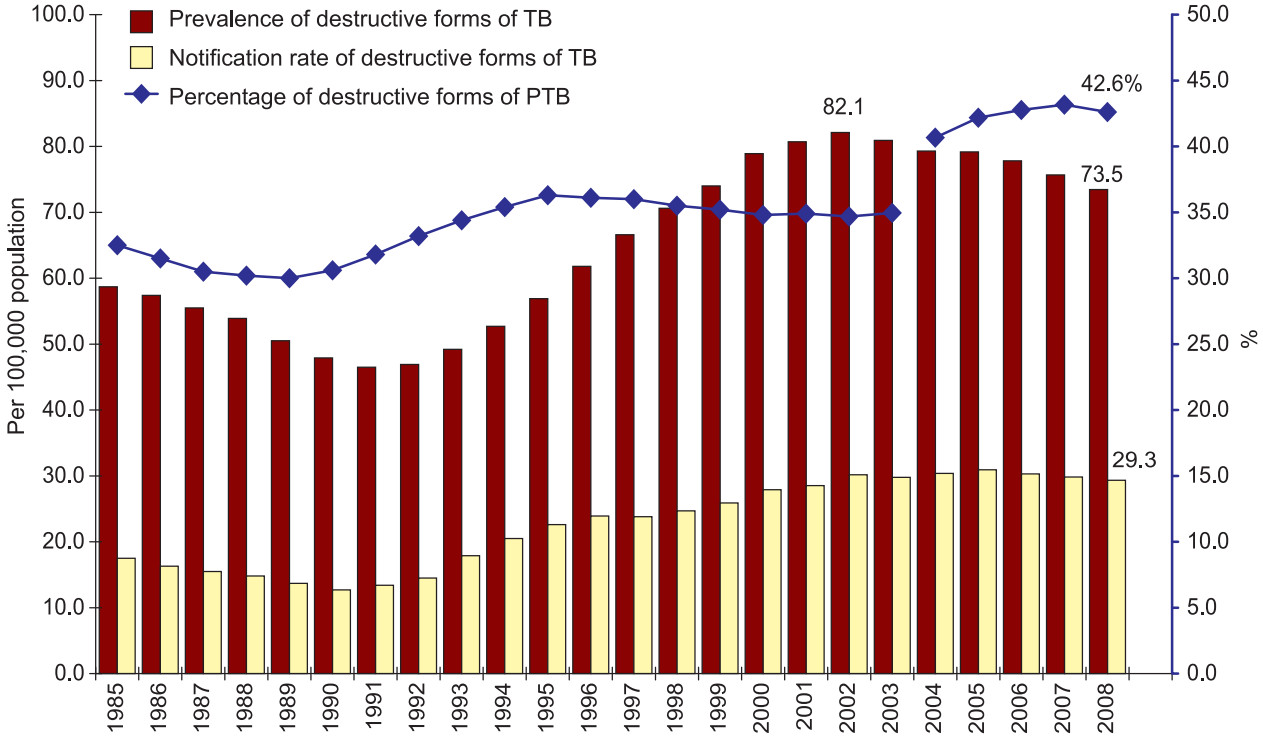


Fig. 4.6. Prevalence and notification rates of destructive forms of pulmonary TB and the proportion among pulmonary TB patients, the Russian Federation. Dispensary follow-up groups were revised in 2004 in line with MoH Order [20].
(Sources: Form No. 33; population – Forms No.1 and No. 4)

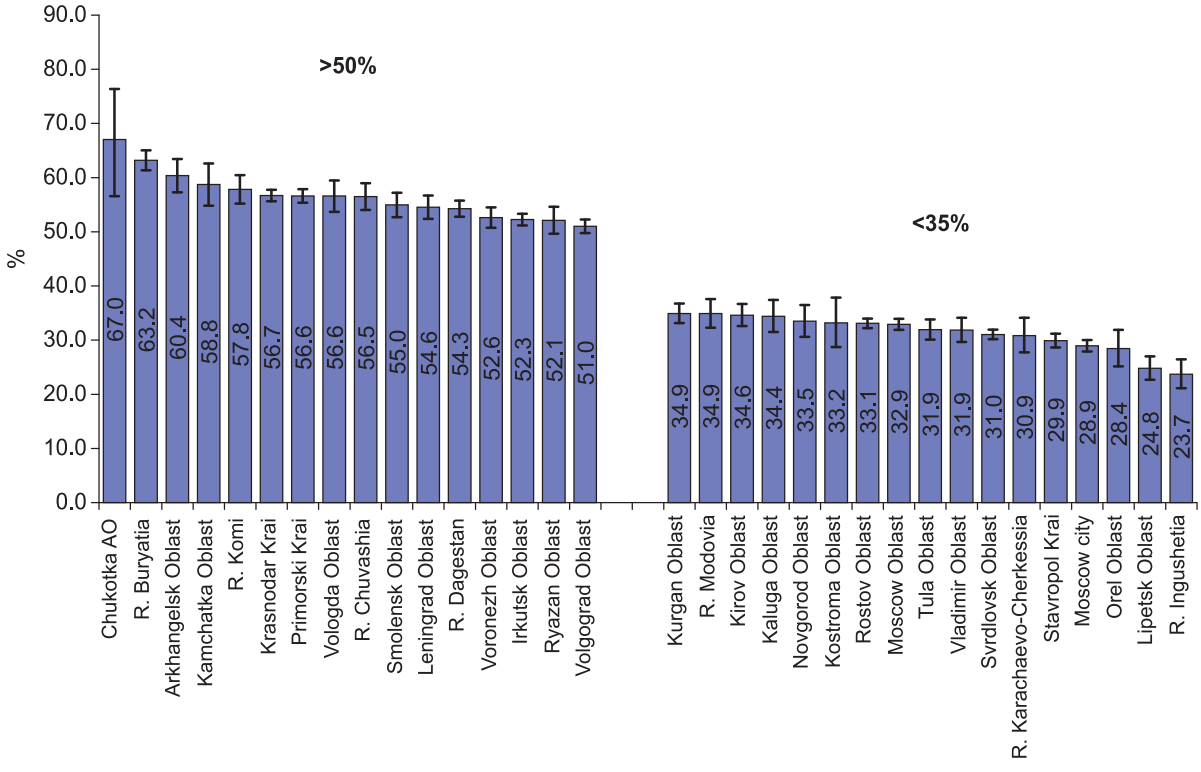


Fig. 4.7. The percentage of pulmonary TB patients having destructive TB forms, in the Russian Federation territories with rates > 50% and < 35%, 2008. The divergence lines indicate 95% CI. The data does not include the Republic of North Ossetia-Alania. (Source: Form No. 33)

notification rate for destructive TB forms in the Russian Federation. This is an indication of an excessive accumulation of severe pulmonary TB forms in the patient population due to problems in treatment and insufficient follow up activities. This may also be the result of the fact that after 2004 (revision of dispensary follow-up groups), an increase was observed in the percentage of pulmonary TB patients having destructive TB forms (from 40.7% to 43.2% в 2007).

The percentage of cases with destructive forms of pulmonary TB registered in TB dispensaries varies significantly by territory in the Russian Federation. The lowest rates in 2008 were reported in the territories of UFR and CFR (35.6% and 37.9%, respectively), the highest levels were registered in NWFR (47.4%) and in the east of the country (SbFR – 46.4%, FEFR – 50.1%). Fig. 4.7 shows the territories with the highest and lowest values of this rate (> 50% and < 35%).

In 2004–2008, over 13% of pulmonary TB patients were reported to have fibrous-cavernous TB, the most severe form of tuberculosis (13.2% in 2008). The presence of a large number of fibro-cavernous TB cases shows that there were problems in a regional service both with early detection and with treatment efficacy. The overall level of fibro-cavernous TB in the country reaches 23 per 100,000 population (2008). The greatest notification rate of this form of TB is registered in SFR, SbFR and FEFR – 30.2, 41.6 and 45.9 per 100,000 population, respectively.

At the same time it should be noted that in 2004–2008 there was a stable decline in the absolute number of patients with fibro-cavernous TB in the country (from 36,295 до 32,319 cases) and in the spread of this form of the disease in the population (from 25.4 to 22.8 per 100,000 population).

The proportion of fibro-cavernous TB cases among pulmonary TB patients (13.3%) is much higher than the proportion of this TB form among new TB pulmonary cases (2.1%), according to data from MoH&SD facilities[48]. As found in [33], a relatively large number of patients with fibro-cavernous TB (up to 70%) are formed during one year. Fig. 4.8 shows the prevalence and notification rates of fibro-cavernous TB over the past years to illustrate the problem of the accumulation of patients with severe TB forms in the process of treatment and follow-up. On the whole, the spread of fibro-cavernous TB cases exceeds notification rates of these forms by 16–18 times in recent years. Especially remarkable difference exists in this relationship in the Southern FR,

[48] Form No. 33.

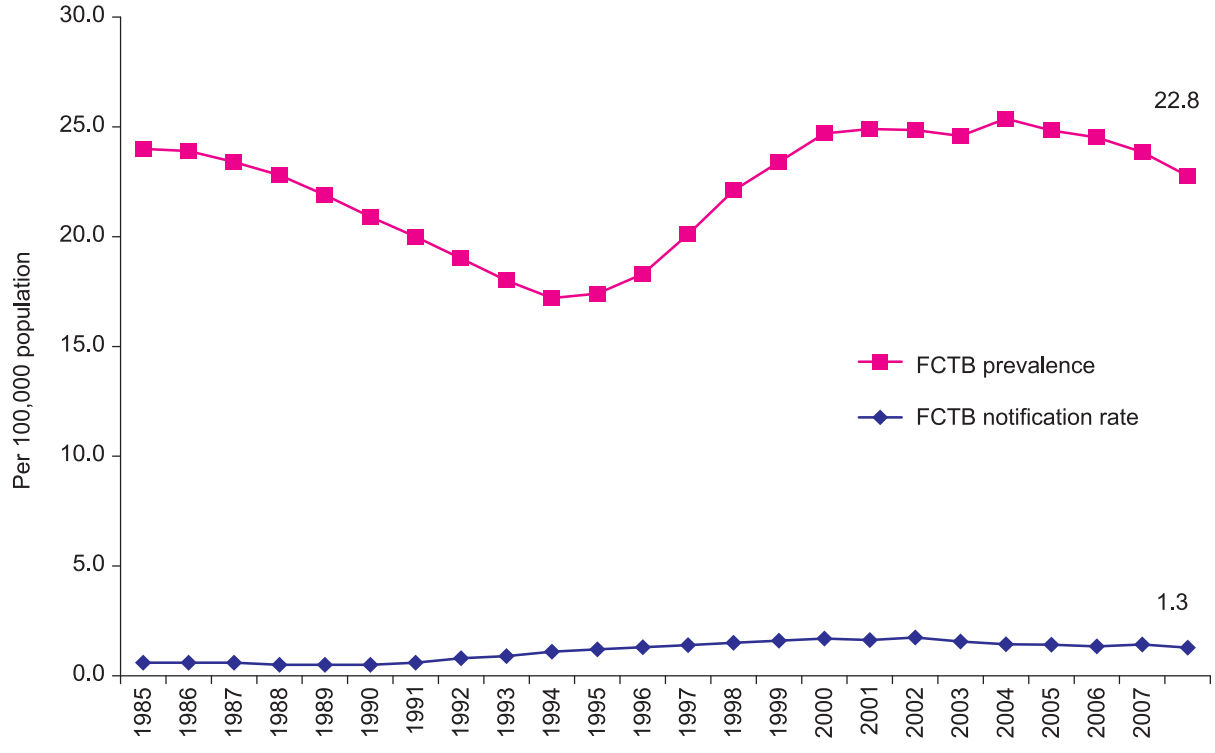


Fig. 4.8. Prevalence and notification rates of fibro-cavernous TB (FCTB) among the permanent resident population of the RF. (Source: Form No 33; population – Forms No. 1 and No. 4)

where the proportion of fibro-cavernous TB patients among all TB groups exceeds proportion of fibro-cavernous TB patients among new cases by 43 times, and in North-West and Urals federal regions, where this indicator increased sharply during recent years (up to 30 times). In the last five years more than 50 times exceeding of prevalence over notification rate of fibro-cavernous TB was registered in Rostov Oblast (789 registered fibro-cavernous TB patients at the end of 2008), Amur Oblast (568), Orenburg Oblast (251), Krasnodar Krai (2427), Perm Krai (720), Yamalo-Nents AO (135), Khanty-Mansi AO (194), in the republics of Bashkortostan (776), Sakha-Yakutia (111), Dagestan (902 registered fibro-cavernous TB patients). The smallest difference between prevalence and notification rate of fibro-cavernous TB (< 8 times) with low prevalence of fibro-cavernous TB (less than 12 per 100,000 population) was observed in such territories as Tomsk, Orel, Ivanovo, Arkhangelsk, Novgorod oblasts and in the Republic of Karelia.

Even considering some possible misrepresentations made in the registration of fibro-cavernous TB at the time of TB notification and registration, these data indirectly make evident the «extremely low TB treatment effectiveness» in recent 10–15 years [4] and emphasize the necessity to take additional measures to improve TB treatment effectiveness in many regions in Russia, particularly, with surgical methods of treatment.

The revision of the follow-up groups in 2004 had an impact on the registered TB prevalence among children aged 0–14 per. The rate dropped from 40.4 in 2002 to 23.5 in 2004 per 100,000 children population. In 2008 20.0 children were registered per 100,000 children population.

The extra-pulmonary TB prevalence rate has decreased in recent years from 14.2 in 2004 to 10.9 per 100,000 population in 2008. The proportion decreased during the past 15 years and reached 5.7% in 2008. The reason for decline in the EPTB rate, as in the case of the notification rate (see Chapter 2.5), at present can be linked not only to the epidemiological reasons, but mostly to incomplete registration of cases of EPTB due to the lack of qualified personnel and to the accepted practice of the registration of associated cases of EPTB and RTB as cases of «tuberculosis of the respiratory system». Note that the prevalence rate of EPTB more than 4 times exceeds its notification rate, which also reflects the accumulation of chronic forms of EPTB because of problems with the organization of its treatment, late removal of patients from dispensary follow-up after recovery.

4.4. TB prevalence and transfers of TB patients in the Russian Federation

Changes in the numbers of TB patients in each territorial unit (e.g., the number of patients registered at the end of the year) depend not only on the number of new detected and notified cases and relapses of the disease (see Chapter 2), the mortality rates (see Chapter 3), or cure (See Chapter 5), but also on the number of patients transferred to other territorial units and patients who were detected earlier in other territories and arrive from those territories, and also on the number of patients detected and transferred to/arriving from institutions other than MoH&SD facilities (e.g. penitentiary sector – FSIN).

Even though this information is very important for the assessment of inter-departmental coordination in performing TB control activities and required to avoid presentation of incorrect data on the number of notified new TB cases and relapses and for monitoring effectiveness of treatment, this aspect receives proper consideration in a limited number of publications [33].

On the whole, without TB patients transferred out from or leaving the penitentiary system (FSIN) and those transferred in FSIN, the numbers of arriving and transferred out TB patients in the Russian Federation is relatively close (15,269 and 16,561, respectively).

The number of TB patients transferred from other regions was 12.1% of TB patients notified during the year in 2008 (i.e. among transferred from other regions, new and relapse cases). This indicator reached almost 17% in SFR, which may be associated with a difficult socio-economic in this territory. Anyhow, high proportions of patients arriving from other territories in relation to all notified TB cases can be found not only in some territories of SFR (Krasnodar Krai, Astrakhan and Rostov oblasts, Republic of North-Ossetia – Alania), where the percentage of TB patients transferred from other territories reach 20–25% of the total number of notified cases. High proportions of 'arriving' TB patients were also registered in 2008 in the Republic of Bashkortostan (28.4%), Novgorod Oblast (27.1%) and Kursk Oblast (20.4%).

In 2005–2008, there was also a stable yearly decrease in the number of transferred out patients in the country – from 19,514 to 16,561 patients (without TB patients released from FSIN facilities). This may indicate an improved surveillance of patients in TB dispensaries due to the implementation of measures addressed at improved detection and treatment of TB patients based on the cohort approach [20, 21].

At the same time, as indicated in Chapter 6, there is a still insufficient coordination between regional MoH&SD supported TB control services and the respective institutions under the jurisdiction of the Ministry of Justice (FSIN). As shown below, the FSIN facilities register four times more TB patients than the number of registered patients transferred out to FSIN institutions from MoH&SD TB facilities (according to Form No. 33, 16,212 and 4,010 patients, respectively). Moreover, it will be shown in Chapter 6 that FSIN facilities detect a substantial number of TB cases that have not been detected in health facilities in the civilian sector. It may be assumed that the number of such cases amounts to 15–17 thousand if consider new cases and TB patients in SIZO (about 5,600 and 16,000, respectively without TB patients transferred out from MoH&SD facilities to FSIN according to MoH&SD reporting form No. 33 – about 4,000). On the other hand, only 60% of TB patients released from FSIN institutions get registered in MoH&SD TB control services.

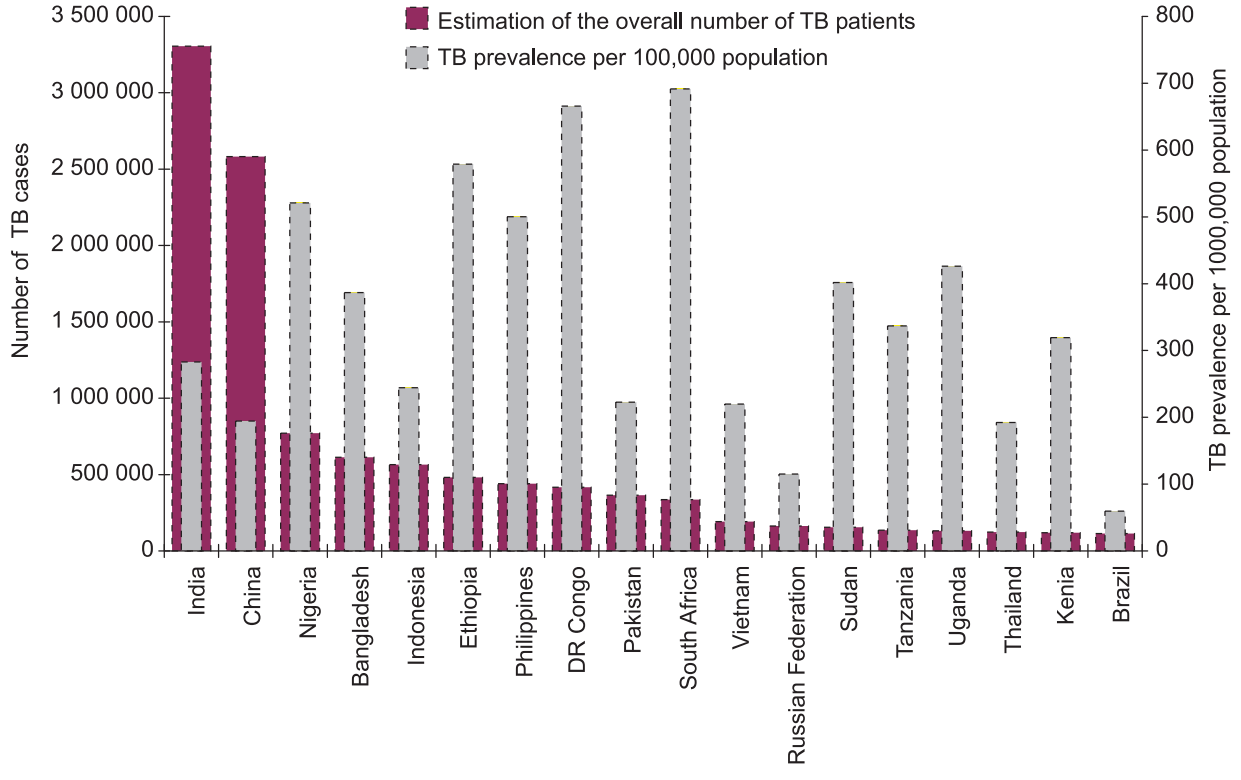
Therefore, in the Russian Federation, control of patient flow between territories, as well as between civilian and penitentiary sectors should become an important component of epidemiological surveillance of TB spread in the country.

4.5. TB prevalence in the Russian Federation compared to other countries

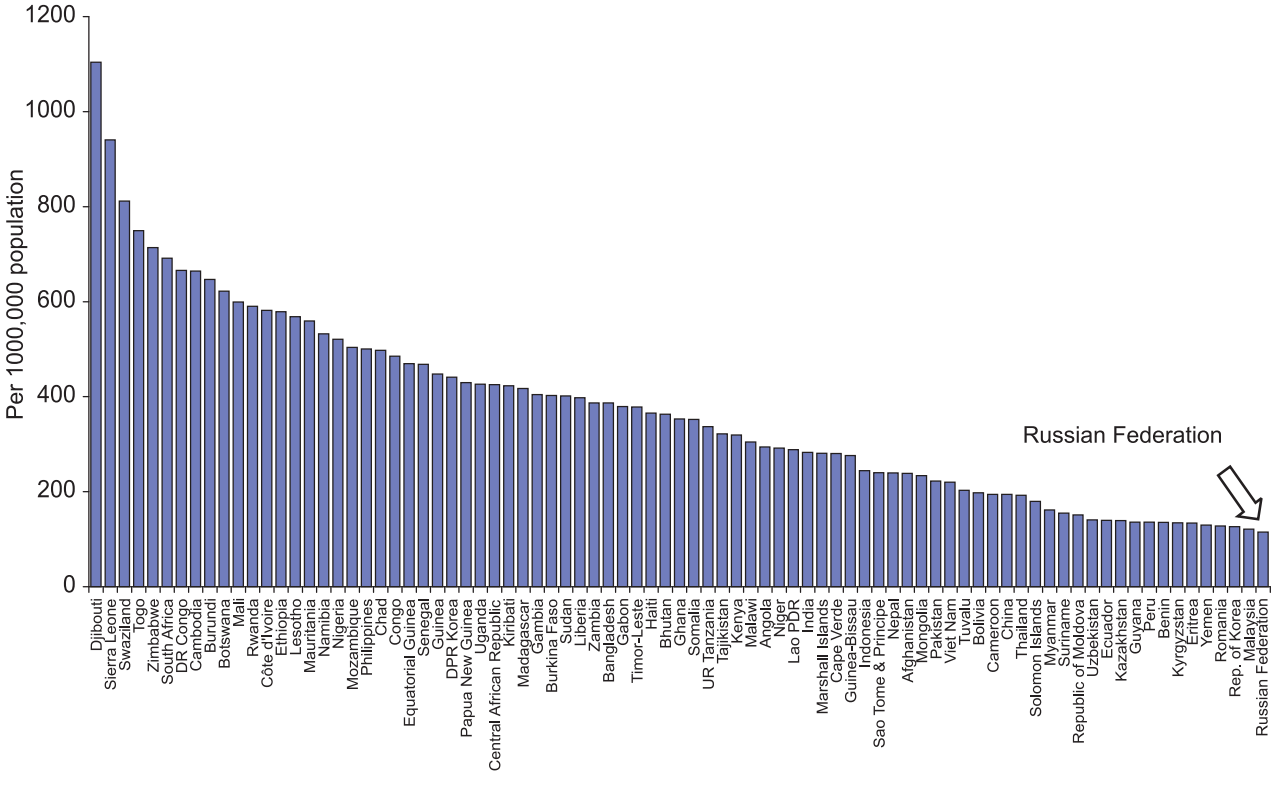
Most countries in the world do not have developed systems of follow-up of TB patients, so the TB prevalence indicator in these countries is calculated based on mathematical estimates.

The WHO estimates of TB prevalence for most countries[49] are calculated by multiplying the estimated notification rate (see Chapter 2) and the duration of the disease course. The latter is calculated based on expert estimates separately for 12 groups of patients with due account of the following conditions: absence or presence of TB/HIV co-infection; absence or presence of bacillary excretion determined by microscopy (ss- or ss+); whether treatment is performed with or without DOTS, or no treatment is provided (see Chapter 3). The total duration of the disease is calculated as a sum of average durations in each group.

[49] Results of special studies of TB prevalence rates were used for some countries.



A) Estimates of the number of TB patients and the disease prevalence in countries with the highest number of TB paitients. The diagram includes the countries that involve 80% of the total number of TB patients in the world



B) Estimates of TB spread in the countries that have higher rates of TB compared to the Russian Federation (115 cases per 100,000 population)

Fig. 4.9. WHO estimates of TB prevalence in the world. 2007 (Source: [41])

According to WHO estimates, at present there are 13,000,000 people with TB in the world, with the prevalence rate amounting to 206 per 100,000 population. In the European region, there are 456,000 TB patients (51 per 100,000 population). The highest numbers of people with TB live in India and China (almost 6 million TB patients, or 43%,). According to the WHO estimates, in the Russian Federation there is not more than 1.2% of the global TB burden (about 164,000 people with TB, or 115 cases per 100,000 population).

Fig. 4.9a shows countries that had in 2007 the highest estimated TB burden with over 80% of the total number of TB patients in the world. This list includes the Russian Federation. At the same time, if the prevalence rate is calculated per 100,000 population, Russia is approximately in the middle of the list of 196 countries, which were included in the WHO 2007 Global Report. The highest TB prevalence rates are in African countries – Djibouti (1,104 cases per 100,000 population), Sierra-Leone (941), Swaziland (812), Togo (750), Zimbabwe (714), and South Africa (692). In the European Region, the highest prevalence rates are registered in Tajikistan (322 per 100,000 population), the Republic of Moldova and the Republic of Uzbekistan (151 and 140, respectively).

According to WHO data, the ratio of prevalence to notification in the world decreased from 2.0–2.5 to 1.2–1.7 in the last 15 years, which indicates a global trend to reduced duration of disease and shorter courses of treatment.

Conclusion

The prevalence data stress the need for improving the effectiveness of treatment of TB patients in Russia. With high rates of TB mortality, there is also a significant accumulation of MbT+ cases and patients with severe forms of the disease (with cavernous destruction and fibrous-cavernous forms of TB), as well as the growing number of patients with MDR-TB (See chapter 8). The prevalence rate indicator (with due account of the specificity of its calculation in Russia) may be effectively used for TB control purposes, assessment of TB burden in individual territories, and for monitoring outcomes and effectiveness of TB control activities in the country.

5. Monitoring of treatment effectiveness in the Russian Federation

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5.1. General information on the indicators of treatment effectiveness

Treatment is one of the main components of TB control activities. Assessment of treatment effectiveness is a complicated multifactor task based on a system of indicators reflecting different stages of patient management which can be divided into several groups:

– indicators which reflect effectiveness of separate courses of chemotherapy;
– indicators which reflect effectiveness of separate stages of treatment, (inpatient, out-patient and sanatorium);
– indicators which reflect effectiveness TB patient management as a whole, from the time of detection to completion of the follow-up stage, which may serve for the assessment of the dispensary work with the patients (dispensary work means regular medical check-up activities – notes of translator),
– indicators of the effectiveness of treatment facility performance (effectiveness of the work performed in in-patient clinics and sanatoriums) and their departments,
– aggregated indicators that reflect the work of the service as a whole in the organization and management of treatment of TB patients.

To perform the necessary assessment of the effectiveness of the organization and conducting of treatment of TB patients and to establish adequate management decisions, indicators for effective monitoring of treatment should include the following information.

1. The basic conditions necessary for effective TB treatment management:

- ***Availability of trained medical personnel.*** The basis of all activities for treatment of TB patients is the availability of sufficient number of qualified TB physicians in order to ensure adequate and effective treatment of TB patients. Lack of motivated staff makes all the attempts to organize high-quality treatment for patients unsuccessful.
- ***Availability of TB treatment facilities.*** Providing high-quality in-patient and out-patient treatment for TB patients requires a well-organized, up-to-date network of TB treatment facilities organized in compliance with sanitary requirements.
- ***Adequate supply of anti-TB drugs in the territory (institution).*** Full or partial absence in the treatment facility of at least one TB drug makes impossible implementation of a standard treatment regimen, resulting in low efficiency of chemotherapy.
- ***Provision of a comprehensive treatment of TB patients.*** Chemotherapy alone can cure the majority of newly diagnosed patients. However, some patients are detected in late stages of the disease process, when fibrosis changes with reduction of the capillary bed are developed in organs and tissues, and the penetration of anti-TB drugs in sites of specific inflammation becomes impossible. Similar changes are formed in the lung tissue in patients after ineffective treatment. In addition, some patients have adverse reactions to anti-TB drugs and have specific features of the immune response. Some patients have slow repair of lung tissue. Therefore, effective treatment in addition to chemotherapy requires necessary conditions for providing pathogenetic treatment, collapse therapy, and surgery if indicated.

2. Characteristics of the course of chemotherapy.

Chemotherapy is one of the main methods of treatment for tuberculosis, which leads to recovery of a significant proportion of newly diagnosed patients and patients with relapse of the disease with various manifestations of TB development, thereby helping to prevent the spread of infection among the population. To evaluate the effectiveness of chemotherapy the indicators that reflect the following characteristics should be considered:

- ***Coverage of TB patients by treatment.*** One of the serious problems is the initial patients' denial to receive treatment, or impossibility of treatment due to different reasons. The proportion of patients who are not enrolled in treatment (especially new cases and relapses) is an important prognostic indicator of the situation with TB in the region.
- ***Adequacy of chemotherapy (doses and regimens).*** Administration of the necessary quantity of drugs and their doses with due account of the severity of the disease or patient group depending upon the previous treatment history (new case, relapse, etc.) is an important prerequisite to ensure treatment success, prevention of treatment failure and subsequent development of drug resistance. The introduction of standardized treatment regimens by MoH Order No. 109 [20] laid a solid basis to reduce errors in the administration of wrong drugs and doses of anti-tuberculosis medicines.
- ***Control over anti-TB drugs administration.*** Controlled anti-TB drugs administration guarantees compliance with the indications made by a physician. Therefore this component also needs to be evaluated.

- ***Duration of treatment and patient compliance.*** One of the most serious problems affecting treatment effectiveness is patient compliance to treatment (patient motivation to be cured) or compliance with the indications made by a physician. Evaluation of treatment interruptions during a course of therapy is an important element of treatment monitoring which requires constant control and evaluation. Completion of the indicated course of treatment without interruptions is one of the most important factors of treatment management.
- ***Continuity of treatment.*** As a rule, several types of facilities (in-patient and out-patient clinics, dispensaries, sanatoriums, TB cabinets, and others) are involved in planning, implementation and monitoring of the treatment process. In addition, institutions of general health care network can be involved in controlled distribution of anti-TB drugs (such as medical out-patient points, rooms or clinics, family doctors offices, district hospitals, etc). Also, TB patients may get transferred to TB control facilities in other territories or between different jurisdictional entities (e.g. transfer from a treatment facility in the civilian sector to one in the penitentiary system, and vice versa). In such cases, it is very important to evaluate and monitor the actual treatment continuation and its continuity when changing treatment facilities.

3. Treatment outcomes.

- ***Intermediate and final evaluation of treatment outcomes.*** The outcome of any particular treatment course should be evaluated and defined. The intermediate evaluation of treatment is also important, especially in epidemically dangerous TB patients. This could be estimated, for example, by indicator of bacteriological conversion at the end of intensive phase. Such data might be essential for the timely correction of a therapy course or approaches to treatment management in the region (at the facility level).

The indicators of treatment effectiveness must be evaluated separately before 2004 (inclusive) and after 2004, or before and after the implementation of MoH Executive Orders No. 50 and No. 109. These two periods differ both in the structure of the indicators and in the process and management of treatment outcomes evaluation.

The indicators of treatment effectiveness used by the Russian TB services before 2004 included only part of the above-mentioned information. They did not reflect the impact of a single course of chemotherapy (control, continuity, etc.) and its outcome, which should make the base for the effectiveness of the whole treatment course and follow up. Among the information required for monitoring treatment, the reporting forms received only interim and final integrated assessment of the effectiveness of treatment.

Before 2005, four indicators of the effectiveness of TB treatment were considered in the Russian Federation [11, 28]:

1. Bacteriological conversion confirmed by all methods among new TB cases
2. Closure of cavernous lesions among new cases
3. Clinical cure based on dispensary follow up
4. Taking off the register of dacteriological positive TB patients

The first two indicators reflected treatment effectiveness of new respiratory TB patients with bacillary excretion confirmed by all methods (microscopy and/or culture) for first indicator, and cavernous lesions in lung tissue – for the second indicator. Only patients registered within a year prior to the reporting year were considered. These indicators only partially used the cohort principle (annual cohort). For calculation, new TB patients transferred in from other territories were added into the cohort and some patients of the previous year (who died from causes other than TB, transferred out, etc.) were excluded from the cohort. Besides, these indicators did not reflect the effectiveness of treatment of all patients, but only the elimination of one of the signs of the disease in part of patients.

These four indicators were targeted at the evaluation of treatment effectiveness of a new TB patient over 12–24 months of treatment, without taking into account the number of courses of chemotherapy provided over this period of time, bringing them closer to the indicators of dispensary (follow-up) activities. Finally, these indicators confined to the evaluation of treatment effectiveness only for part of the whole cohort of new MbT+ cases and new cases with cavernous TB, not evaluating the effectiveness of treatment in other groups of patients, which excluded from the evaluation 50–60% of new cases and 80–85% of all registered patients.

After 2004, the data used for the calculation of the indicators of bacteriological conversion and closure of cavernous lesions were removed from reporting form No. 33, and these indicators were not used. Anyhow, starting 2009, the new version of reporting form No. 33 will include this data and these follow-up indicators will be used for the evaluation of effectiveness of treatment.

Indicators 3 and 4 were used before 2004 and are being used now. They cumulatively reflect the dispensary work effectiveness on the organization of treatment. The indicator of clinical cure considers transfer of a case from a dispensary follow-up group (DFG) with so called «active» forms of TB (DFG I and II, which include patients with confirmed TB), to the follow-up group which consists of groups previously had TB and followed-up as TB risk group (e.g., group III). The indicator of bacteriological conversion shows the removal of a patient from the registry of MbT+ cases a specified time after obtaining a number of negative laboratory test results.

These rates, which do not have analogs in other countries, are convenient for the cumulative demonstration of effectiveness of dispensary treatment management for all groups of patients – new cases, relapses, re-treatment and chronic cases. They also help in controlling the pool of MbT+ cases, indirectly evaluating the timeliness of TB detection, evaluating the results of the complex treatment of some patients with respiratory TB, and observing the flow of patients and their transfer to respective dispensary follow-up groups.

However, all these indicators do not allow for evaluation of treatment effectiveness of the main course of treatment and chemotherapy courses for all groups of patients, which should be regarded a prerequisite for clinical cure and success of all dispensary work [4].

Therefore, of all types of information essential for treatment monitoring defined in the beginning of Chapter 5, the treatment indicators used prior to 2004 were able to provide data only on the final outcome of treatment and not for all patient groups, not showing the effectiveness of the main (base) treatment courses and separate chemotherapy courses. In part, the preliminary results of treatment of MbT+ patients can be assessed using the information presented in Form No. 33 in 1999–2003 data on the number of patients who converted within 4 months (identified by microscopy method). However, the use of these data without the use of cohort analysis greatly reduced their value.

Noteworthy is that before 2004, international indicators of treatment outcomes were also used in the Russian Federation. They were introduced only in some regional pilot projects. This made it difficult and at times impossible to compare the effectiveness of treatment management in the Russian Federation with the results achieved in other countries. Moreover, it hampered the use in the Russian Federation of advanced expertise in the field from abroad. In particular, the lack of such indicators complicated rendering assistance to the Russian Federation by international agencies (IBRD Project, Global Fund grant, and others), since it was impossible to evaluate effectiveness of assistance.

At the same time, the statistical data reviewed in the previous sections of this review on TB mortality and prevalence in the Russian Federation in the 1990s indirectly show that treatment effectiveness was not particularly high: there was a high level of TB mortality, a substantial accumulation of MbT+ cases, patients with severe forms of TB and an increase in MDR TB cases.

Therefore, to stabilize the epidemiological situation with TB in the country, the RF Government adopted subprogram ‘Urgent measures to combat tuberculosis in Russia’ as part of the Federal Target Program ‘Preventiion and control of social diseases (2002–2006)’. MoH Executive Orders No. 109 issued in 2003 [20] and No. 50 [21] issued in 2004 laid a basis for effective TB detection and treatment outcomes evaluation. The new system introduced standardized treatment regimens, new recording and reporting forms based on cohort analysis and evaluation of effectiveness of a particular course of treatment. As a result, starting 2005 the possibility arose to effectively evaluate and monitor treatment regimens including control of individual chemotherapy courses [4] (see Appendix 1).

The organization of treatment monitoring and statistical reporting, adopted in the Russian Federation according to recent executive orders [20, 21], correspond to WHO fundamental recommendations, supplemented upon substantially based on long-term experience and existing capacities of TB services. The system of treatment monitoring currently applied in Russia, as compared to the basic WHO recommendations, includes also the assessment of effectiveness, which is performed on the basis of culture examination methods and clinical-radiological evidence. It performs a separate evaluation of cases that have died of TB and other causes and reviews cohorts of relapses smear-negative at the time of patient registration.

5.2. Evaluation of treatment effectiveness on the basis of indicators used in the Russian Federation prior to 2004

Treatment effectiveness of new TB cases, as defined by the criteria of closure of cavernous lesions and bacteriological conversion [20], declined from 1992 to 2004 by 1.2 times. Closure of cavernous lesions was reported in 76.6% of cases in 1992 and in 63% of cases in 2004. Bacteriological conversion was reported in 86.8% of cases in 1992 and in 73.5% in 2004 (Fig. 5.1).

In 2005–2006, due to the introduction of new Reporting Form No. 33, it was not possible to evaluate bacteriological conversion and closure of cavernous lesions for new TB cases due to the lack of corresponding data. However, in order to ensure continuity of the rates, it is planned to resume collection of this data in 2009.

The rates of clinical cure and bacteriological conversion before and after 2004 should be analyzed separately for the period of time prior to the revision of the DFG system in 2004 and for the period after it (see Fig. 5.2). Before 2004, the conversion rate indicator practically did not change, and the clinical cure rate of respiratory TB pa-

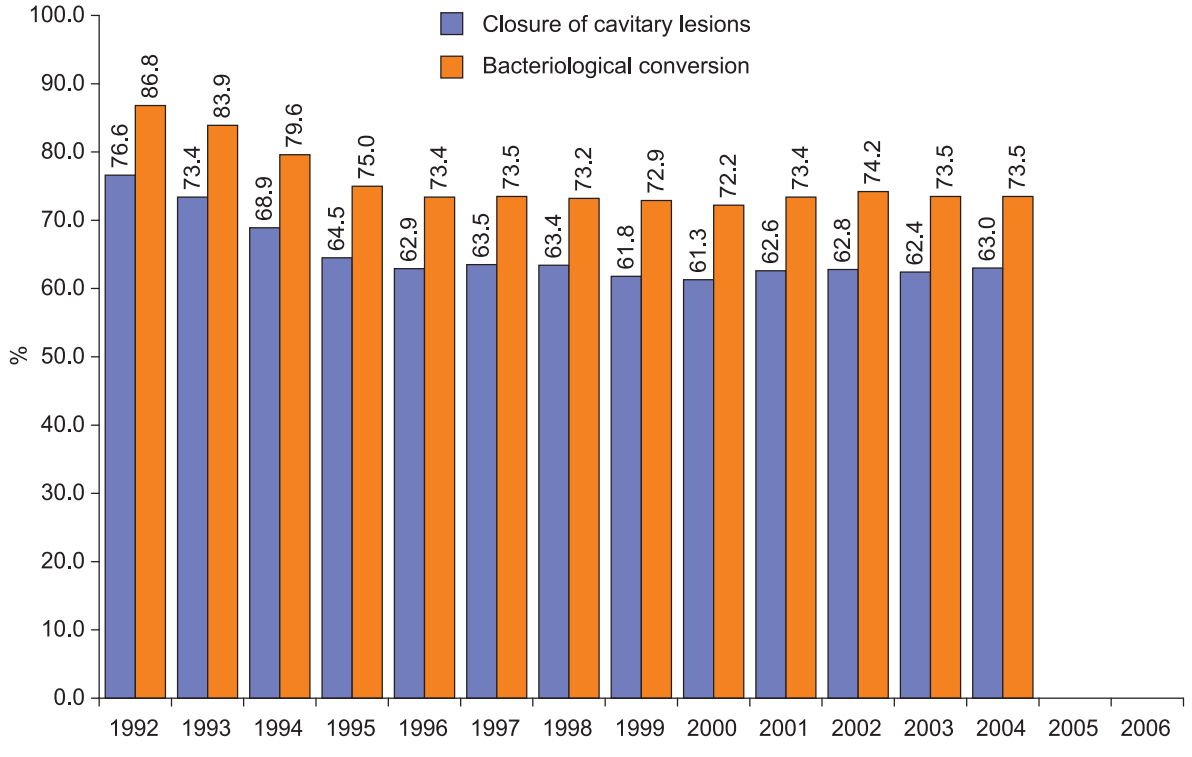


Fig. 5.1. Treatment effectiveness of new respiratory TB patients, 1992–2004. Data for 2005–2008 in the reporting forms are not available. (Source: Form No. 33)

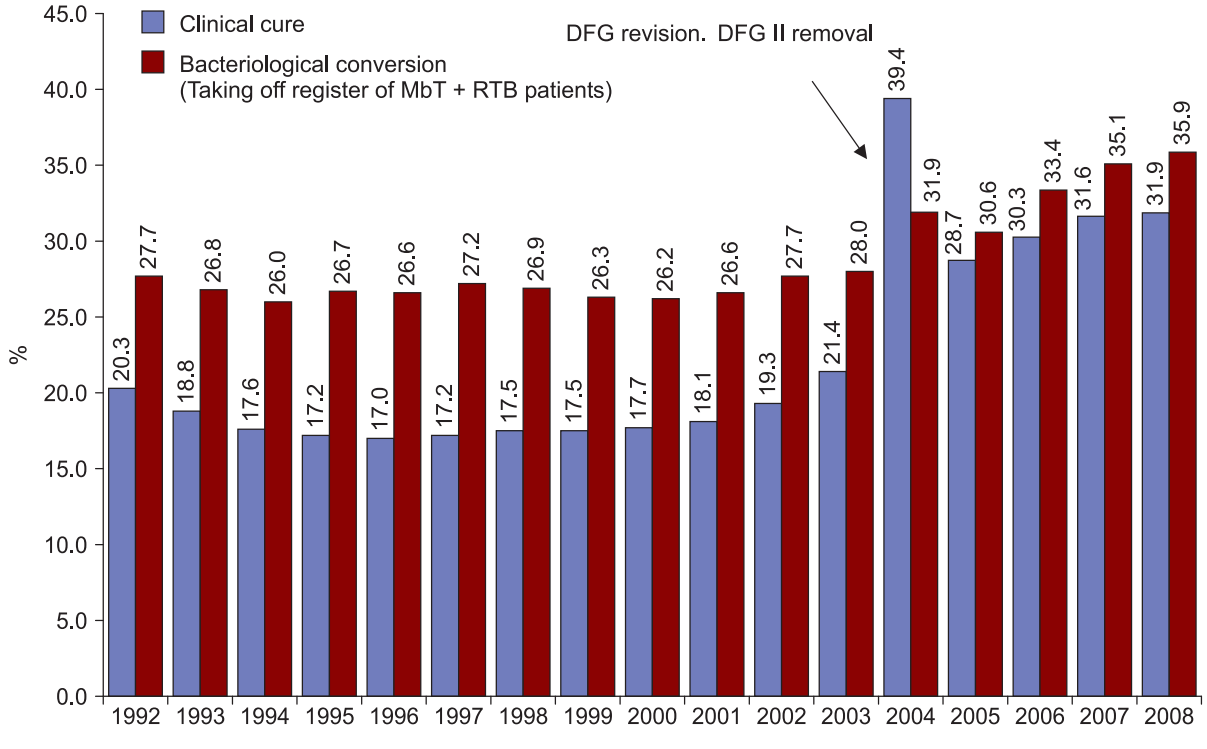


Fig. 5.2. Clinical cure and taking off register of bacteriological positive respiratory TB patients in the Russian Federation, 1992–2008. (Source: Form No. 33), DFG – dispensary follow-up group

tients after some decrease in the beginning of the 1990's started increasing slowly after 1998. After 2004 (year of the revision of the dispensary follow-up groups), these rates indicate an increase in effectiveness of the work performed with patients from follow-up groups of both MbT+ patients and TB patients with destructive processes in the lungs. In 2008, 35.9% of registered TB patients had bacteriological conversion, and 31.9% of respiratory TB patients were transferred to DFG III (clinically cured TB patient group) during the year. For new cases registered in IA dispensary follow-up group, this indicator increased from 40.7% in 2005 to 47.9% in 2007, and slightly (but statistically significantly) declined to 46.8% in 2008. However, it should be noted that the clinical cure indicator is underestimated in the Russian Federation (see Section 8.5), because it reflects not only clinical cure, but confirms timeliness of patient transfer to DFG III.

5.3. Evaluation of surgical treatment effectiveness

Data on surgical TB treatment present in the existing federal reporting forms allow only for the calculation of the coverage of patients receiving this type of treatment. Indicators that directly show the effectiveness of the given type of treatment are lacking in the MoH&SD forms.

The data from Form No. 33 indicate an increase in the proportion of patients with respiratory TB treated surgically, from 2.6% in 2001 up to 4.8% (12,278 patients) in 2008 (Fig. 5.3), and a statistically significant increase was reported in 2007 (from 4.4%, $p < 0,05$). After some increase in the proportion of patients with fibro-cavernous TB treated surgically in 2004–2006 from 4.2% to 4.7%, in 2007–2008 the number of such patients statistically not-significantly ($p > 0.05$) varied and reached 4.8% in 2008 (1,561 patients). In 2008, the proportion of patients surgically treated remained high among patients with TB of bones and joints (15.7%, 695 patients), urogenital TB (5.9%, 393 patients), and TB of peripheral lymphatic nodes (22.2%, 362 patients)[50].

Beginning 2006, the reporting forms allow for the calculation of the percentage of RTB patients who had surgical treatment within a year after diagnosis (6.3% in 2008).

The involvement of surgical interventions is uneven in different regions of the Russian Federation (Fig. 5.4). On the whole, surgical treatment of TB patients is more actively used in Povolzhsky and Far-East Federal Regions (5.9% and 6.4% patients, respectively). Newly detected TB patients are more often (within 12 months after diagnosis) operated on in Central, Povolzhsky and Far-East Federal Regions (7.3%, 8.0% and 8.2% of patients respectively). Over 10% of newly detected patients receive surgical treatment within one year after registration in the republics of Mordovia (34.4%) and Sakha (Yakutia), and in Tambov, Penza, Orel, Kirov, Magadan, Voronezh, Tula and Kostroma oblasts. The highest rates of surgical interventions (from 10% to 17%) in all RTB patients were reported in Magadan, Tambov, Penza oblasts, and in the republics of Mordovia, Sakha (Yakutia) and Tyva.

The low rates of surgical interventions in some regions are connected with inadequate health manpower and material and technical basis of TB control facilities.

It is advisable to develop and implement at the regional level indicators for sentinel monitoring (in some selected territories) of surgical treatment effectiveness which should include the following basic evaluations:

- assessment of portion of TB patients who need surgical interventions;
- coverage of TB patients who need surgical treatment;
- review and analysis of the reasons for inadequate coverage of TB patients who need surgical treatment;
- rates of post-surgical complications;
- post-surgical mortality;
- effectiveness of surgical interventions as measured by indicators of bacteriological conversion and closure of cavernous lesions;
- descriptive indicators by the types of surgical interventions performed.

It would be rational to process these data applying the cohort principle (for quarterly or annual cohorts) and separately for different patient groups (new cases, relapses, MDR-TB, etc.)

The analysis of such information from a representative part of Russian regions will substantially increase the effectiveness of monitoring and evaluation of surgical methods of TB treatment in the Russian Federation and will facilitate managerial decision-making to enhance the effectiveness of surgical treatment of TB patients.

[50] Form No. 33 for 2008.

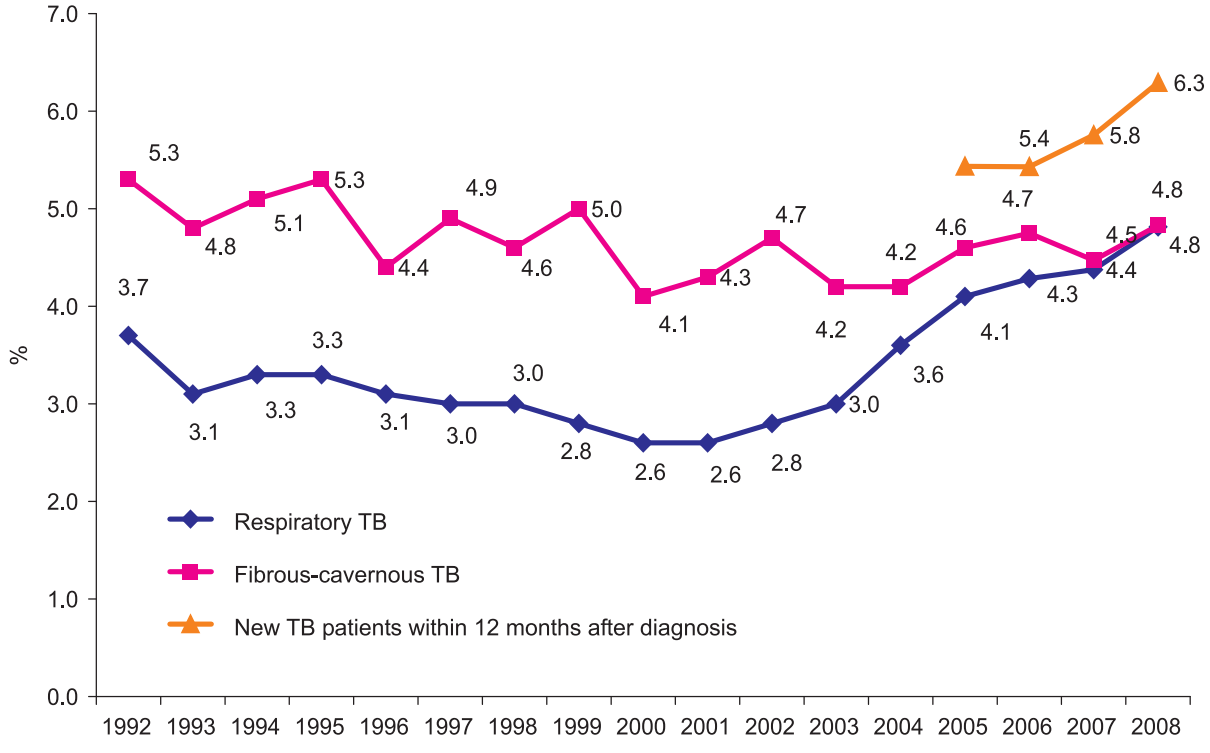


Fig. 5.3. The percentage of cases with respiratory TB (RTB), fibro-cavernous TB (FCTB), and new respiratory TB cases receiving surgical treatment within 12 months after diagnosis, the Russian Federation, 1992–2008. (Source: Form No. 33)

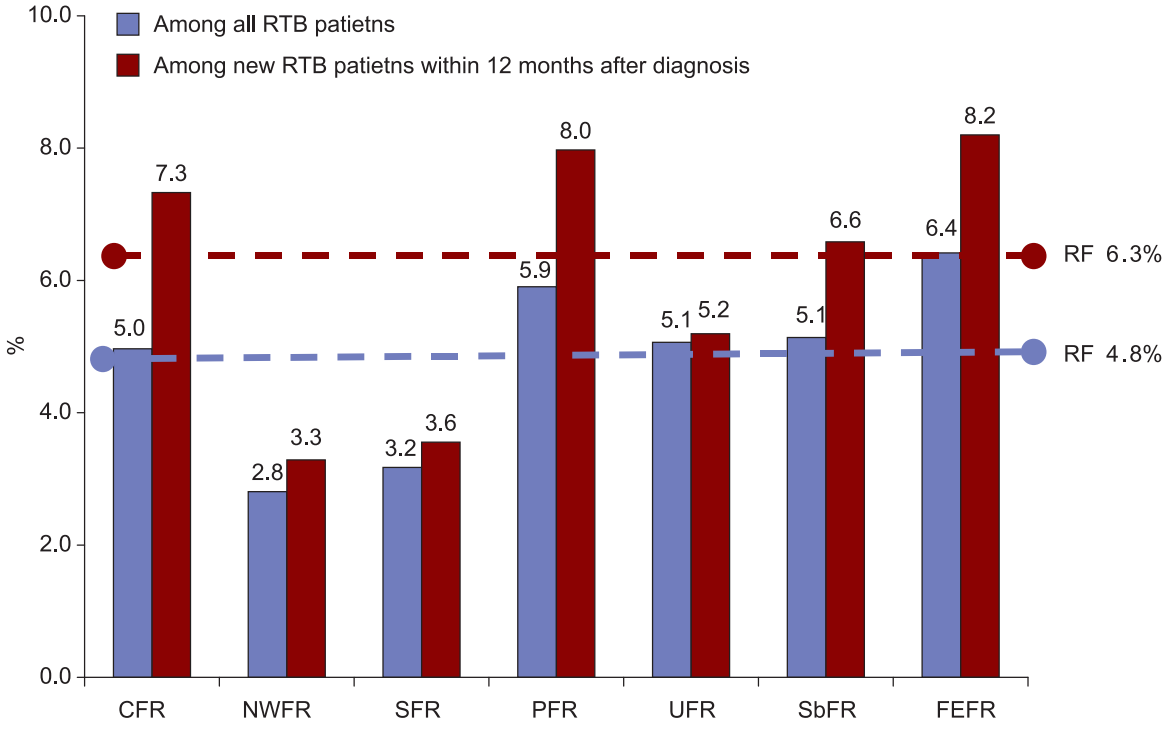


Fig. 5.4. The percentage of cases with respiratory TB (RTB) and new respiratory TB cases receiving surgical treatment within 12 months after diagnosis, the Federal okrugs of Russian Federation, 2008. (Source: Form No. 33)

5.4. Evaluation of chemotherapy effectiveness for patients registered in 2005–2007 on the basis of cohort analysis

In 2005–2007, practically throughout the country[51], a new methodology and statistical system of treatment monitoring based on cohort analysis was introduced [21]. Now it is fully consistent with the system of centralized control of treatment of TB patients that was earlier developed in the Russian Federation [20].

Implementation of the new system of treatment monitoring has been controlled by the research institutes of phthisiopulmonology and tuberculosis (Research Institute of Phthisiopulmonology of the Sechenov Moscow Medical Academy, Novosibirsk TB Research Institute, St. Petersburg Research Institute of Phthisiopulmonology, Central TB Research Institute, Russian Academy of Medical Sciences, and Urals Research Institute of Phthisiopulmonology). The WHO TB Control Program in the RF provided consultative and technical support to the implementation of the new system.

According to data [16] on the 2007 cohort (MoH&SD facilities), the main treatment course of **all new PTB cases (regardless of MbT status)** was evaluated as effective in 68.8% of cases (see Fig. 5.5). This indicator has statistically significantly increased from 63.9% ($p < 0.05$) in the 2005 cohort. Overall, the effectiveness of treatment above 80% was registered in 12 (14.5%) territories, above 70% – in 42 subjects of the Russian Federation. Chemotherapy courses' effectiveness below 50% was reported in 4 territories only. A similar trend was observed in cohorts of cases with PTB relapse and other re-treatment cases of MbT+ patients. Effectiveness of treatment of relapses and other re-treatment cases statistically increased compared to 2005 (in 2005, 2006 and 2007, for relapses – 49.9%, 55.9% and 54.3%, respectively, and for other re-treatment cases – 25.4%, 29.7% and 31.0%, respectively).

Since 2005, there has been a statistically significant increase in the effectiveness of treatment of new TB cases due to a reduced proportion of patients with unsuccessful chemotherapy outcomes, defaulters, transferred out patients and patients who died of TB (Fig. 5.5). In 2007, chemotherapy treatment was ineffective in 10.2% of new TB cases (13.5% in 2005); 4.5% of new PTB cases died of TB (5% in 2005), while TB was reported as the cause of death in 58.4% of died patients.

Treatment defaults had 9.1% of patients (10.3% in 2005) and transferred out 4.1% (4.5% in 2005). Of these two groups over one third of patients (36%) was ss+ at the time of registration. As compared to 2005, a statistically significant decrease was registered in all unfavorable outcomes, except for the rate of «other causes of death».

It should be noted that, compared to Form No. 33, cohort analysis provides more detailed information about the effectiveness of treatment of patients in Russian TB control facilities, because it ensures a broader assessment of majority of TB patients. For example, in 2007, the sectoral forms of cohort analysis included data on 88,011 new PTB cases, while Form No. 33 contained data on only 85,962 PTB patients. Form No. 33 does not include any information about homeless persons, foreigners and personnel of some other agencies.

In the new ss+ TB cases' cohort of 2007 **(patients with newss+ PTB cases)**, the main course of treatment, defined on the basis of all clinical, laboratory and radiological features, was effective in 57.8% of cases (58.2% in 2006, Table 5.1 and Fig. 5.6). The lowest levels of treatment effectiveness were reported in SbFR and FEFR (53.8% and 45.6% respectively), while the highest effectiveness was reached in South FR and Povolzhsky FR (63.7% and 62.5%, respectively).

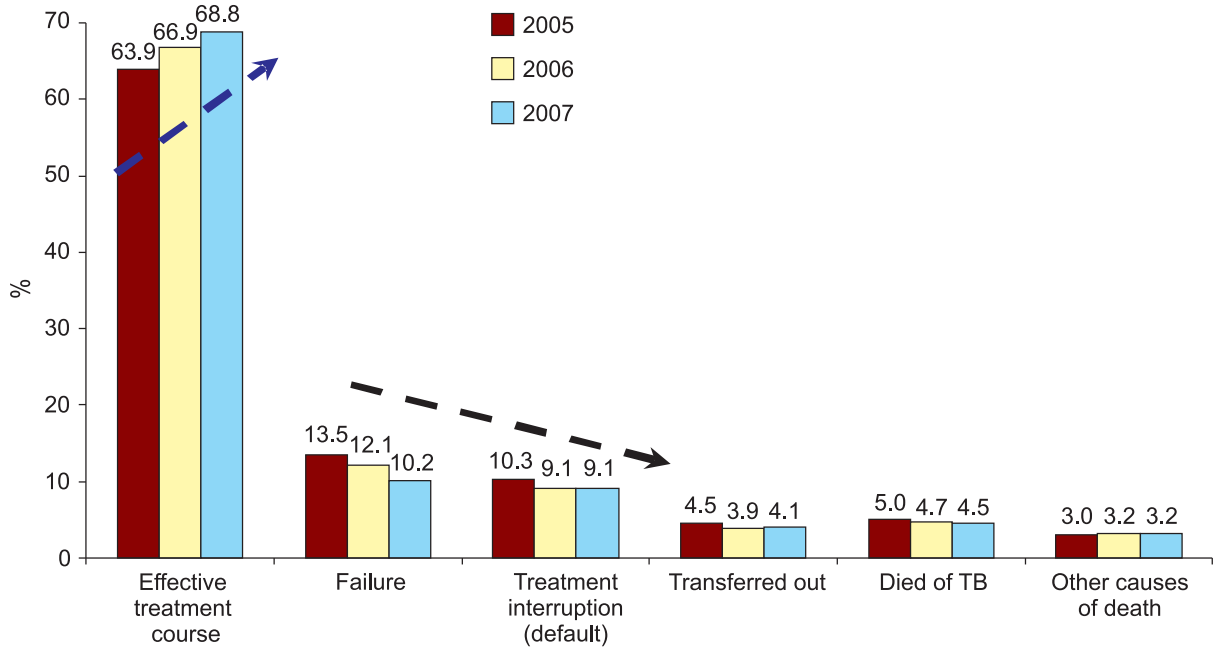
Treatment failures were registered in 15.5% of patients (14.5% in 2006), and this was confirmed by laboratory methods in 11% of the cases and only in 4.5% of patients treatment failures were confirmed by clinical and radiological techniques.

Treatment interruptions – in 10.0% (10.1% in 2006), died of tuberculosis – 8.8% (9.2% in 2006), died from other causes – 3.9% of patients. High rates of treatment failures were reported in NWFR (18.5%) and FEFR (19.2%), which may be attributable to high rates of MDR-TB in these regions. The latter necessitated a significant number of formal re-registration of MDR-TB cases as treatment failures (if MDR-TB was diagnosed in the process of treatment).

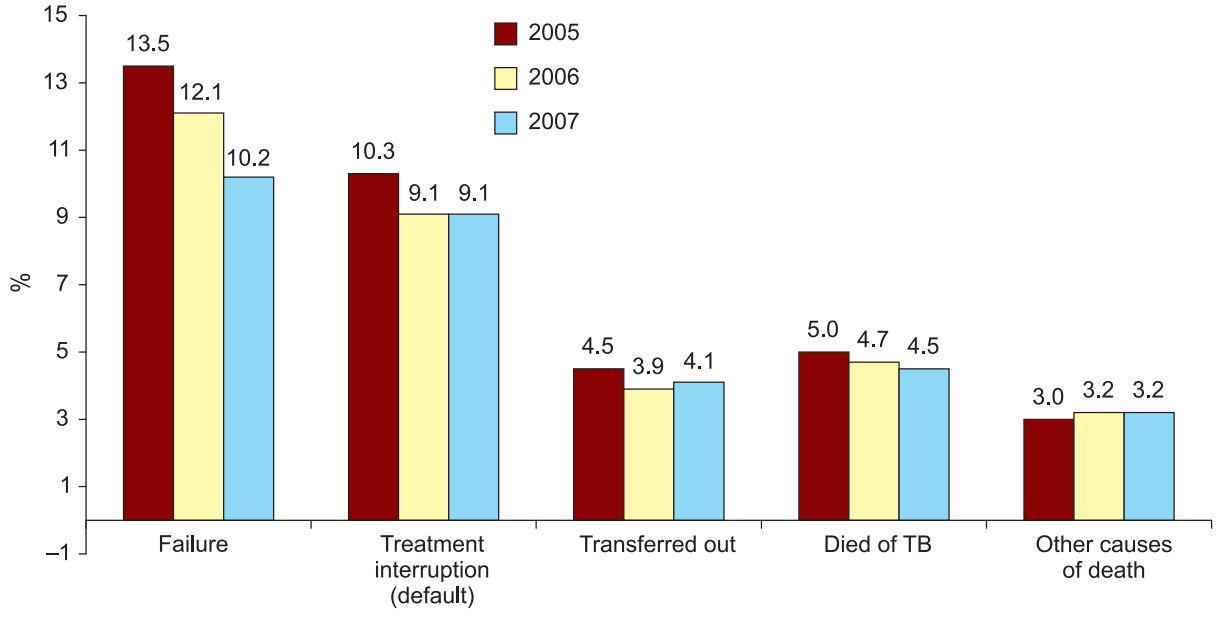
It should be noted that among organizationally and clinically «unsuccessful» treatment courses of chemotherapy (i.e. the outcomes that did not include courses of effective chemotherapy), failure outcomes constituted only slightly over one-third of such cases (Fig. 5.6b). Treatment failures that resulted in deaths of TB (20% of all «unsuccessful treatment» outcomes) were mostly connected with late detection and delayed start of treatment of such patients.

Therefore, in spite of the importance of effective chemotherapy with proper treatment regimens, more attention should be paid nowadays to the organizational approached directed at improving patient compliance, timely case-finding and broader coverage of TB patients in TB treatment facilities.

[51] In 2005– in 77 territories; in 2006 – in 87 territories of 89; in 2007 – all 86 territories of RF.



A) All treatment outcomes



B) Trends in unsuccessful treatment outcomes

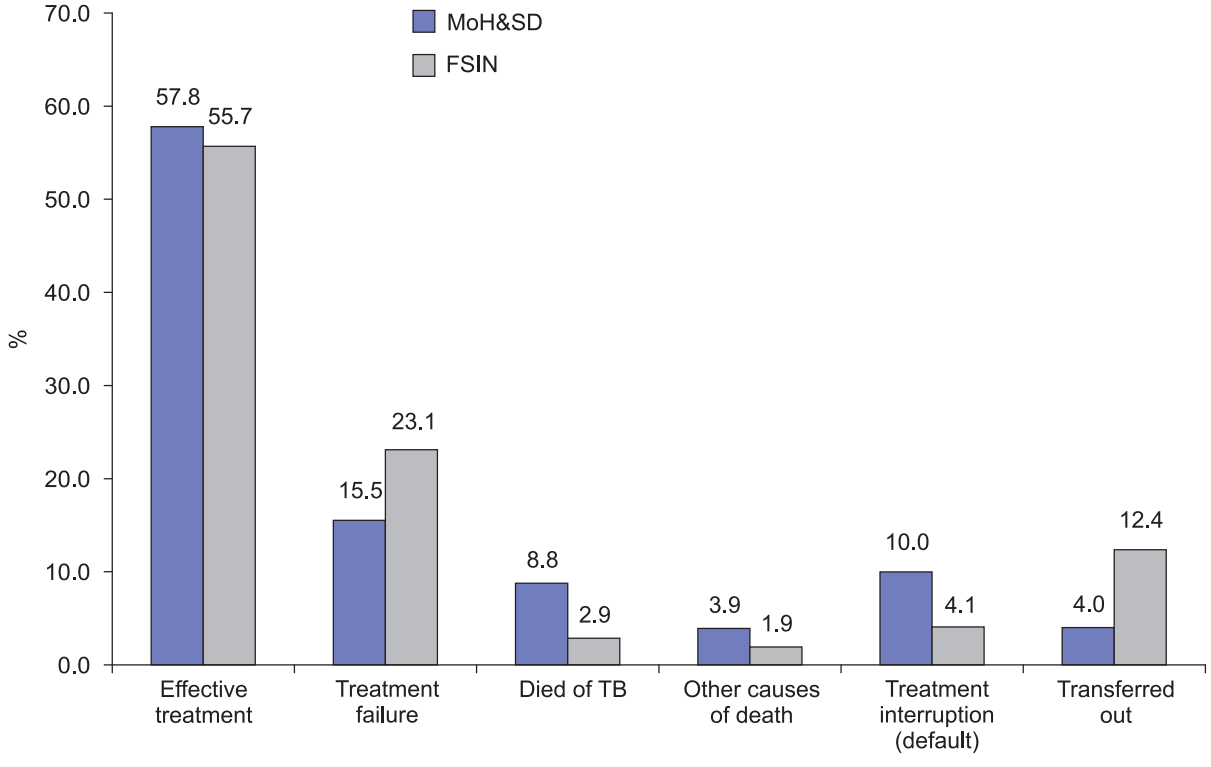
Fig. 5.5. Outcomes of courses of chemotherapy among the cohorts of new PTB cases registered for chemotherapy in 2005–2007 in MoH&SD facilities; the size of cohorts in 2004–2007 – 17,880, 74,078, 85,322, and 88,011 patients, respectively. The arrows indicate trends in changing the main chemotherapy course outcomes (Source: Form No. 8-TB)

Table 5.1

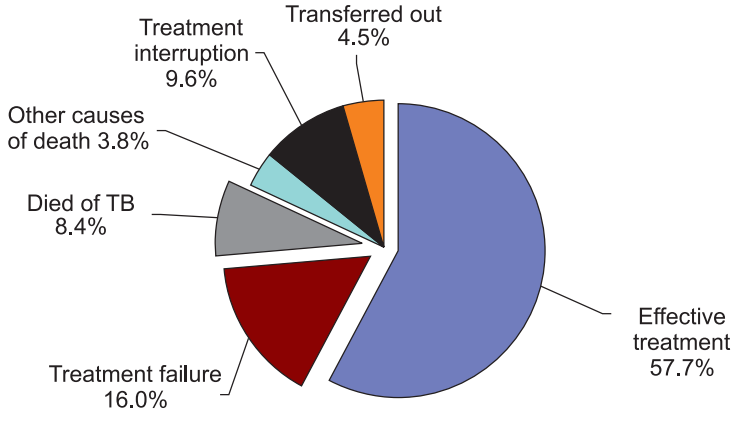
Effectiveness of treatment in the cohort of new ss+ PTB cases. Cohort of 2007

Sector	Cohort size	Effective course of chemotherapy	Failure	Died of TB	Other causes of death	Default	Transferred out
	abs	%	%	%	%	%	%
MoH&SD reports	29,851	57.8	15.5	8.8	3.9	10.0	4.0
FSIN (penitentiary system)* report	1,918	55.7	23.1	2.9	1.9	4.1	12.4
The Russian Federation overall	31,769	57.7	16.0	8.4	3.8	9.6	4.5

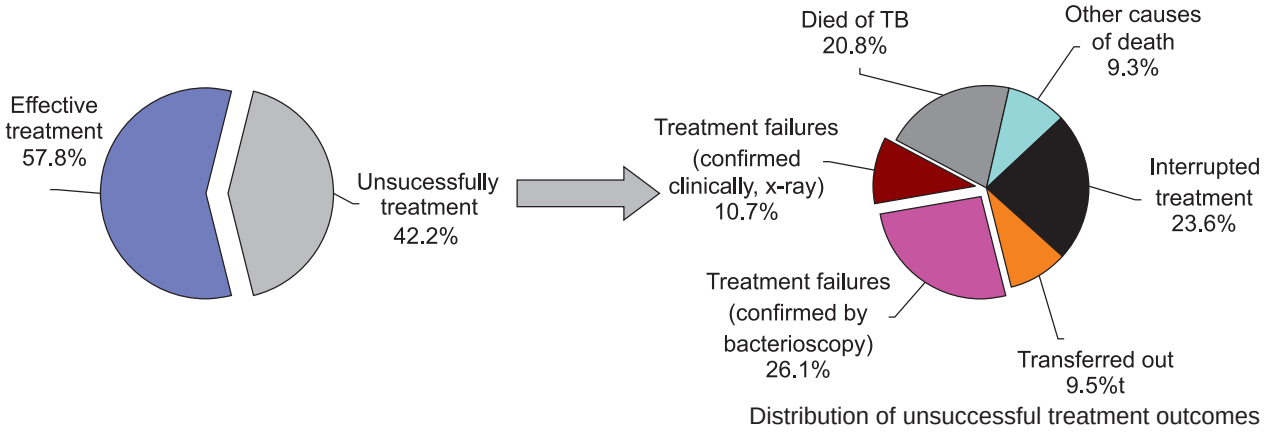
* Data from 52 subjects of the Russian Federation.



a) MoH&SD and FSIN facilities reports



b) Russia overall



c) MoH&SD report

Fig. 5.6. Chemotherapy treatment outcomes of new pulmonary ss+ TB cases. Cohort of 2007. MoH&SD: 29,851 patients, FSIN 1,918 patients. (Source: Form No. 08-TB)

Bacteriological conversion confirmed by culture in the cohort of new PTB cases with positive culture was registered in 60.3% of patients (61.4% in 2006); by federal regions – from 51.8% (FEFR) to 63.6% (PFR). Cavities closed in 53.3% of patients.

Overall in the Russian Federation (MoH&SD facilities and FSIN[52]), the effectiveness of the 2007 treatment of ss+ TB patients remained low (57.7%) (see Table. 5.2). In the civilian sector this was due to a high proportion of treatment interruptions (10.0%) and deaths from tuberculosis (8.8%), especially if compared to the prison sector. At the same time, the effectiveness of treatment in the prison sector is significantly underestimated due to the high percentage of transferred patients (12.4%) and treatment failures (23.1%). However, the results of treatment of patients in FSIN facilities do not have a significant impact on the effectiveness of treatment across the country because of the small size of cohorts in the prison system.

Compared to the cohort of new patients, the treatment effectiveness indicators in other groups of TB patients were much lower (Table 5.3). Effectiveness of treatment of relapses was 54.3%, and relapses in ss+ cohort were only 44.2% with 24.2% of treatment failures. Treatment of cohort of re-treatment ss+ TB cases was effective in 31% of cases and had failure outcomes in 27.3% casess. The latter cohort was characterized by high levels of defaults (19.5%) and death rate from TB (12.8%).

Treatment outcomes differ substantially by territory and region. (Fig. 5.7)

Fig. 5.8 presents data by territory with the highest and lowest percentages of patients with effective courses of chemotherapy, treatment interruptions and TB mortality[53]. Note that according to the independent monitoring

Table 5.2

Effectiveness of chemotherapy in the cohorts of re-treatment cases. Cohort of 2007, MoH&SD data

Cohorts	Cohort size	Effective course of chemotherapy	Failure	Died of TB	Other causes od death	Default	Transferred out
	abs	%	%	%	%	%	%
Relapses	12,257	54.3	17.9	6.7	4.3	13.1	3.7
Including ss+ relapses	4,572	44.2	24.2	11.0	4.7	12.9	2.9
Including other ss+ of re-treatment cases	10,959	31.0	27.3	12.8	3.3	19.5	6.2

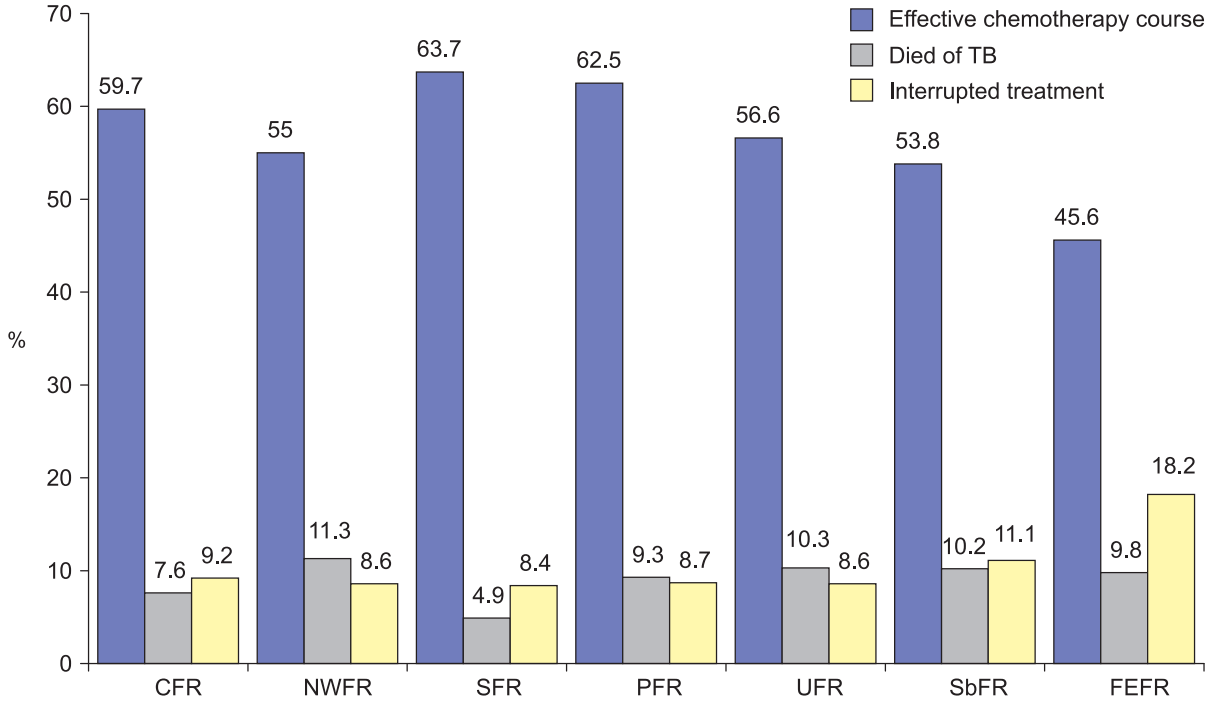


Fig. 5.7. Treatment outcomes by Federal region. 2007 cohort. New smear-positive (by microscopy) PTB patients MoH&SD: 29,851 patients, FSIN: 1,918 patients (Source: Form No. 8-TB)

[52] By the time this review was prepared, the Federal Public Health Institute presented data on FSIN facilities only in 52 subjects of the Russian Federation.
[53] Only RF territories with an annual cohort size over 50 are included in the analysis.

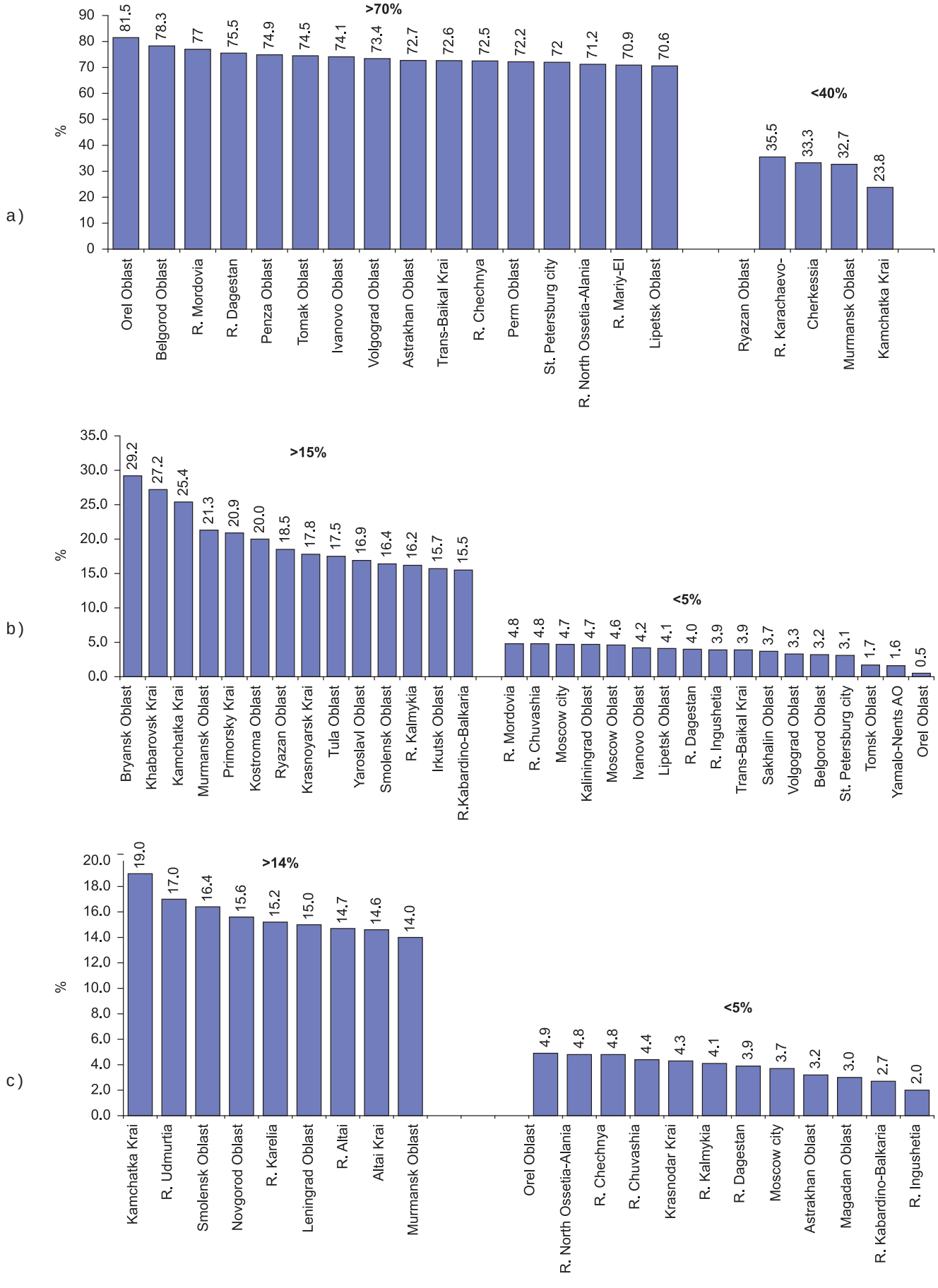


Fig. 5.8. Territories with the highest and lowest percentages of patients with an effective course of chemotherapy (A), treatment interruptions (B), and patients who died of TB (C). The cohort consists of new pulmonary smear-positive (by microscopy) TB cases detected in 2007. Only RF territories with an annual cohort size over 50 are included. MoH&SD report. (Source: Form No. 08-TB)

carried out by Russian experts and specialists from the WHO TB in the Russian Federation in frame of IBRD grant (23), it was shown that in some territories the effectiveness of treatment was somewhat overstated due to improper evaluation of the results. However, the quality of data obtained in 2005–2007 was already high enough for a generalized analysis of the monitoring of treatment in the country as a whole and in individual regions.

As seen in the figures above, only in one territory (four territories in 2006) the rate of effective treatment exceeded 80% and approached the internationally accepted standards (in Orel Oblast – 81.5%). Ineffective treatment in the territories was mainly due to the high percentage of treatment interruptions and mortality. In 6 subjects of the Russian Federation the proportion of patients with treatment interruptions exceeded 20% of all patients registered for treatment (11 territories in 2006). Only in 17 territories the treatment interruptions rates were registered below the desired 5% (14 territories in 2006). In nine territories, every 8th or even every 7th patient from the cohort of new pulmonary smear-positive (by microscopy) TB cases died. Only in 12 territories the proportion of died patients in cohort of 2007 was below the desired 5%.

It should be noted that prior to 2006 the deterioration of the effective treatment rates in new PTB cohorts was caused by the inclusion of additional RF territories in the implementation of MoH Executive Order No. 50 [21] (Fig. 5.8). In 2005 and 2006, the cohorts were actually of the same size (15% difference). In 2006, the effective treatment rate of the basic chemotherapy course increased in the Russian Federation by average 4.7%. This was mainly due to the 10–13% decline in the numbers of transferred out patients, defaults and treatment failures.

On the whole, this resulted from the efforts of the RF TB control facilities for the improvement of treatment monitoring. Additional input was received from the social support activities that were performed in 2007 in more than 50 subjects of the Russian Federation with the financial support from the budgets of individual territories, as well as from the Global Fund grant, WHO and other international agencies resources [42]. Presently, over 100,000 TB patients are covered with social support activities. In addition, a positive effected was also attained due to the implementation of the provisions stipulated in Section 10 of Federal Law No. 77-ФЗ of 18.06.2001 ‘On the prevention of TB spread in the Russian Federation’, which envisaged enforcement measures by court decision for mandatory treatment of persistent defaulters [3].

In conclusion, it should be noted that as the cohort method of monitoring of treatment and the inclusion of an increasing number of RF territories were implemented, indicators of effectiveness of treatment worsened until 2005 (Picture 5.8). It was a natural and temporary process associated with the inclusion of the territories, where at that time there was no enough trained personnel, and monitoring of treatment of patients was just started.

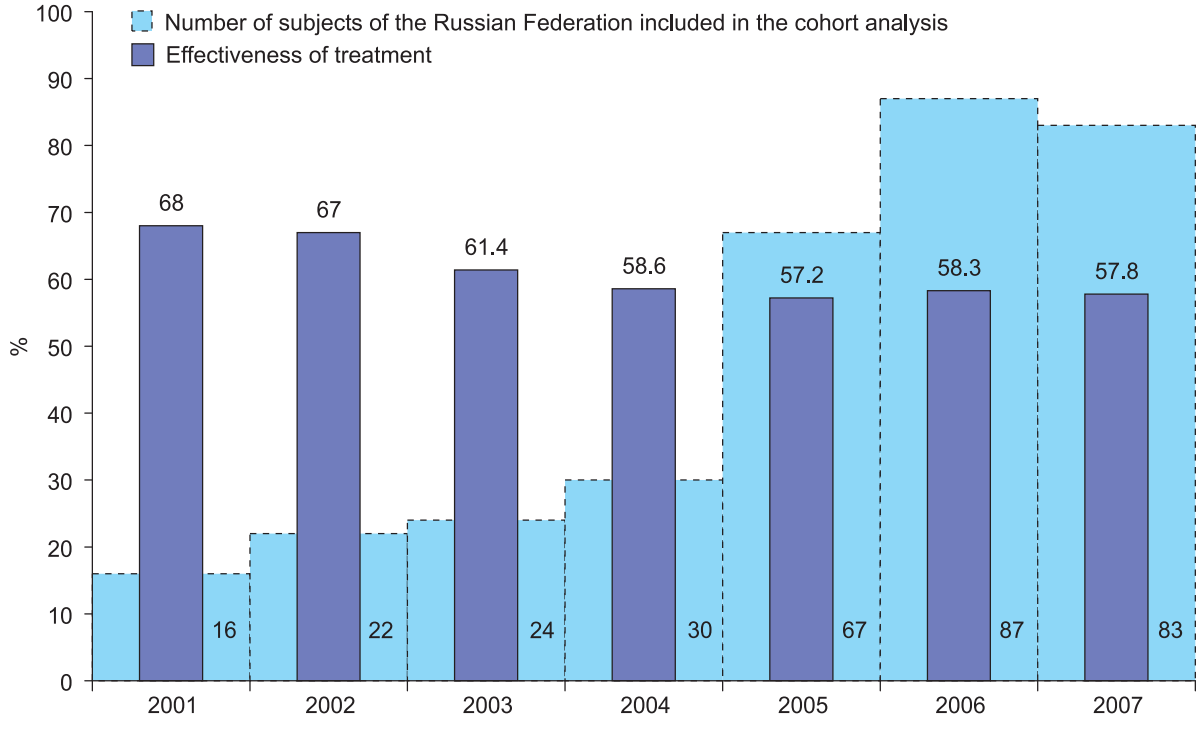


Fig. 5.9. Treatment outcomes in the territories which performed cohort evaluation of treatment effectiveness. Cohorts of 2000–2006, new ss+ TB cases. Light blue columns represent the number of territories performing the cohort analysis (Source: Form No. 08-TB)

5.5. Effectiveness of TB treatment in other countries compared to respective indicators in the Russian Federation

The WHO reports [13], as well as other international statistical data, contain information on the results of treatment of new ss+ TB cases and of re-treatment ss+ TB cases. For some countries the data are subdivided for relapses and other groups of TB patients.

Treatment outcomes in 2006 cohorts in WHO regions and individual countries are shown in Table 5.4.

The 2009 Global Report indicates that on the overage for all countries the indicators of effective treatment outcomes (including the indicators of sputum conversion, clinically cured and completed treatment) in the 2006 cohort of new ss+ cases have reached 85%, which meets the goal targeted by the World Health Assembly in 1991.

Table 5.3

Treatment outcomes in the 2006 cohort of registered TB patients in the Russian Federation and worldwide [41]

Cohorts	Notified new TB cases in 2006*	Registered in the cohort for treatment**	Treatment outcomes					
			Effective treatment outcomes	Died (all causes of death)	Failures	Default	Transferred out	Unspecified treatment outcomes
	patients.	patients.	%	%	%	%	%	%
New ss+ TB cases								
All countries	2,502,808	2,507,097	85	4	2	5	3	2
Africa	555,361	562,884	75	6	1	8	4	5
SAR	131,099	139,516	74	7	2	9	5	3
SEA countries***	938,572	937,764	87	4	2	5	1	0
USA	5,091	5,140	64	9	2		3	23
Europe	100,102	94,262	70	8	9	7	3	2
Russia	29,989	30,745	58	12	15	10	5	0
Ukraine	14,296	10351	59	12	12	9	4	4
Relapse ss+								
All countries	–	247534	74	6	6	9	3	1
Africa	–	44530	66	7	8	12	5	1
SAR	–	19930	58	5	15	17	4	0
SEA countries***	–	108887	74	7	5	12	2	0
Europe	–	19893	54	12	15	10	5	4
Russia	–	5238	46	15	22	11	6	0
Ukraine	–	2172	51	11	17	10	6	4

* «Notified».
** «Registered».
*** SEA – South-East Asia.

On overage, the proportion of patients who interrupted treatment did not exceed 5% in the world and the percentage of patients who died (all causes of death included) did not exceed 4%. The highest levels of effective treatment were shown in the South-East Asia region (87%). Both in the world in South-East Asia, the proportion of treatment failures was only in 2% of cases.

In the world, effective chemotherapy treatment courses in cohorts that included ss+ relapses were in 74% of cases with 6% of failures and deaths and 9% of defaults.

However, it should be clarified why in many countries with high mortality rates (from about 20 and more per cent of the notification rate: in South-East Asia region the TB mortality rate is 31 per 100,000 or 19.3% of the notification rate, in Bangladesh 45 and 20.2% respectively, and in Russia – 28 and 16.4% respectively), the lethality rate among smear-positive patients on treatment with 100% of DOTS coverage does not exceed 3–4% of newly detected cases and 5–7% of patients on repeated treatment[54].

[54] The ratio of mortality rate to notification rate is calculated based upon the death rate from TB, and the ratio of lethality rate – from all causes of death among TB patients. So, if the ratio of mortality to notification rate is considered as opposed to lethality of TB only, the difference will be still more significant.

In Russia, this indicator (TB mortality) varies from 15% to 22%, which is comparable with the proportions indicated above, even with a higher percentage of patients with chronic forms of the disease in this country.

Anyhow, the low effectiveness of anti-tuberculosis chemotherapy in Russia may be associated with different reasons. Among them it may be suggested that the high rate of treatment failures in Russia is explained by the fact that in Russia more often than in other countries patients with sputum conversion (by microscopy and culture) are attributed to treatment failures because the clinical and radiological signs are considered unsatisfactory. Such approach worsens the 'formal' indicator of treatment effectiveness in Russia compared to other countries.

But the proportion of such 'treatment failures' with sputum conversion against unsatisfactory clinical and radiological pictures is relatively insignificant. For example, in the cohort of ss+ TB patients registered in 2007 treatment failures were established on the basis of clinical and radiological signed after sputum conversion in only 4.5% of treatment outcomes against the overall rate of treatment failures in 15.5% of patients[55] (or 10% of all ineffective treatment outcomes, Fig. 5.5C). If these cases are added to the number of «effective outcomes» judging from the results of laboratory test, the level of effective treatment in Russia will increase by 4.5%, i.e. from 57.8% to 62.3%, which is, of course, still very low in comparison with the data from official reports in other countries.

Conclusion

The data received from the reporting forms of monitoring TB treatment outcomes show that in spite of some success achieved in the development of treatment monitoring, there are still significant problems in the organization and management of anti-tuberculosis chemotherapy in all subjects of the Russian Federation, which contribute to the persistent low level of chemotherapy effectiveness in the country. There are still high levels of defaults among TB patients with bacillary excretion and among those who completed treatment with failure. The presented data stress the need for reinforced monitoring of chemotherapy treatment of TB patients, in particular, for strengthening patient compliance to prescribed treatment regimens and a broad involvement of other methods of treatment as well as for ensuring a complex approach to the organization of treatment. The statistical data received from different sectors and departments in compliance with the provision of the MoH Executive Order No. 50 provide a solid basis for managerial decision-making and improving targeted interventions to increase the effectiveness of treatment of TB patients in the country.

[55] In the cohort of ss+ cases registered in 2007, the percentage of chemotherapy failures confirmed by only clinical and radiological signs was 5.9% with the overall percentage of ineffective treatment 24.2%.

6. TB control in the penitentiary system (FSIN)

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In Russia, like in many countries in the world, TB prevalence in the penitentiary facilities has a major impact on the overall TB epidemiological situation in the country. This is related to the factors of TB dissemination in the closed environments of prisons and pre-trial detention centers («SIZO»), particularly, due to high concentrations of socially disadapted persons in such facilities, who are more predisposed to social diseases as compared to general population.

The overall level of health indicators among inmates and those suspected and accused of crimes held in the penitentiary facilities of Russia, as well as persons in correctional facilities around the world, differ considerably from the respective national rates. This is related to the high concentration in the given facilities of antisocial population groups, who are more likely to suffer from socially transmitted diseases. It should be noted that most incarcerated persons previously were not covered by civilian healthcare services and find out about diseases only after medical evaluation in penitentiary facilities.

Today, the penitentiary facilities are subordinate to FSIN, which is under the jurisdiction of the Ministry of Justice (MoJ) of the Russian Federation. TB control activities are performed in close collaboration and on the basis of a compatible organizational–methodological and regulatory base with the MoH&SD, MoJ and Ministry of Internal Affairs (MoIA) (See Fig. 6.1).

Statistical reporting on TB in the penitentiary facilities is generated on the basis of the relevant MoH&SD and MoJ Executive Orders ([20], [21]; MoJ Executive Order No. 640/190 of October 17, 2005). The main TB epidemiological data in the penitentiary facilities and data measuring the outcomes of TB activities performed by FSIN medical services are contained in the annual aggregated Reporting Form 4-TUB, and starting in 2004, in the reporting cohort analysis forms (No. 7-TB, No. 08-TB, No. 2-TB and No. 10-TB) in accordance with the MoH&SD Executive Order No. 50 [21].

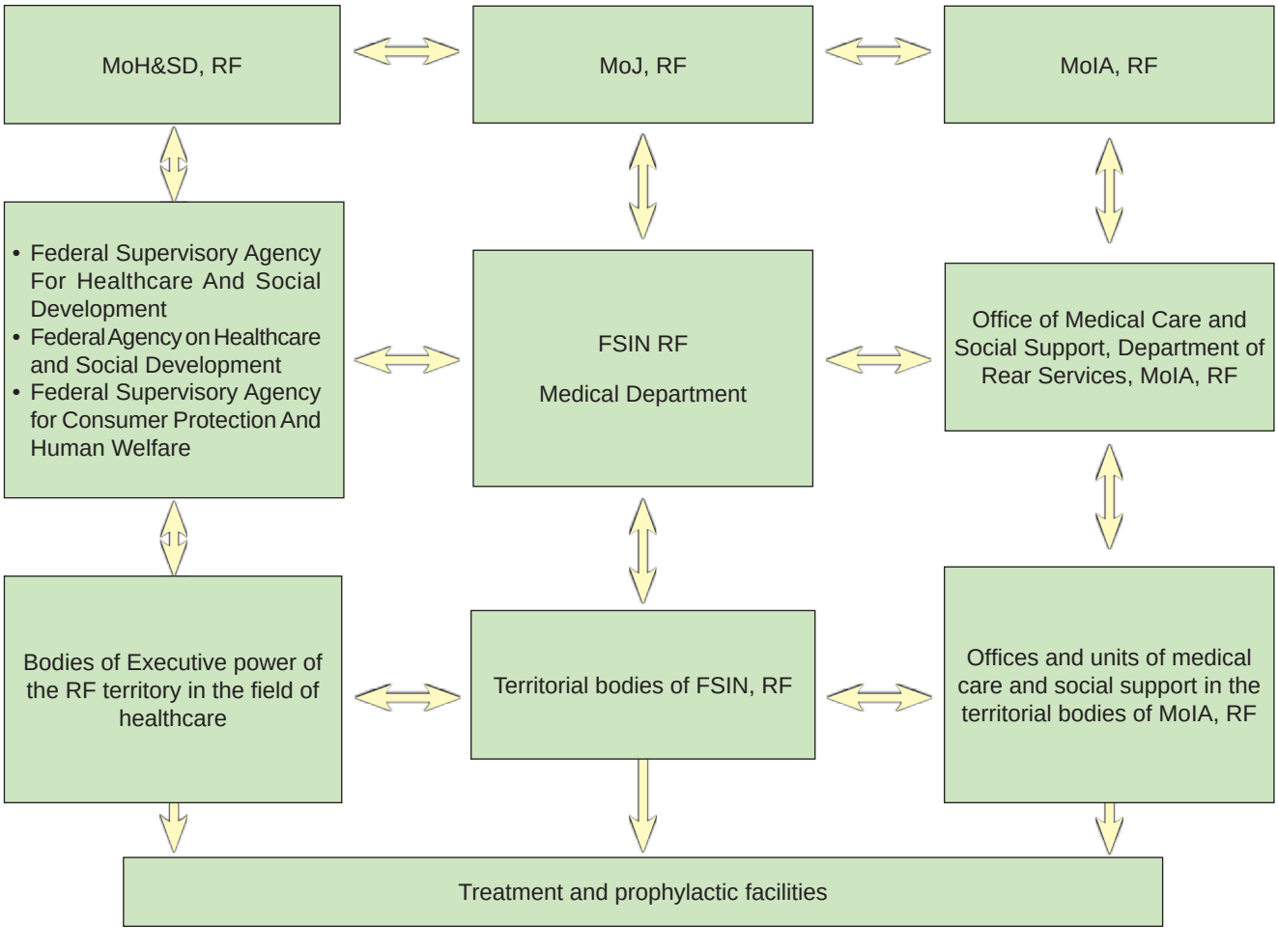


Fig. 6.1. The structure of interdepartmental interaction, MoJ – Ministry of Justice, MoIA – Ministry of Internal Affairs

Using data received from the medical departments of FSIN in each territory, the surveillance departments of the head territorial TB dispensaries fill in Reporting Form No. 8 for all new cases, which contains summary data from FSIN, civilian services and other departments involved in TB activities. These data go to the MoH&SD and FPHI for processing and analysis of the TB notification rate in the territory.

In Chapter 2.1, the major impact of the TB situation in the penitentiary system on the overall epidemiological situation in the RF territories was discussed. New TB cases detected in the penitentiary system accounted for up to 30% (1999) of all new cases in the RF.

Improvement in TB control activities in prisons and detention centers and the recent successful introduction of a system of interdepartmental interaction in the implementation of the up-to-date TB control strategy in the penitentiary system resulted in an improvement in TB indicator levels, including a decrease in TB notification rates, prevalence and mortality rates. By 2008, the percentage of new cases diagnosed in penitentiary facilities decreased to 12% of all new TB cases in the country.

Fig. 6.2 (Table 6.1) shows that according to FSIN reporting forms, over the last eight years there has been a more than three-fold decrease in the number of new TB cases detected and in the notification rates in the penitentiary facilities– from 4,347 in 1999 to 1,308 per 100,000 prisoners in 2008 (14,853 TB cases, including 5,636 in SIZO and 9,217 in correctional colonies).

At the same time, it should be noted that the notification rate in the correctional colonies and SIZO detention centers should be estimated and analyzed separately due to the fact that TB spread in these facilities are affected by varying factors, and different approaches are used when calculating notification rates in the detention centers and colonies[56].

Table 6.1

Number of new TB cases detected in FSIN facilities (Source: Form No. 1-MED and No. 4-tub)

Year / FSIN facility	2001	2002	2003	2004	2005	2006	2007	2008
SIZO			5,201	5,344	6,229	6,092	5,863	5,636
CC			12,361	10,887	9,248	9,131	9,564	9,217
Total in FSIN	24,500	21,718	17,562	16,231	15,477	15,223	15,427	14,853

The number of TB cases in the SIZO detention centers is largely determined by the TB epidemic among the civilian population. According to the RF Government Ordinance, all newly admitted detainees must undergo fluorography examinations before incarceration in the detention centre and 2 times a year thereafter. The percentage of TB cases detected at the time of incarceration at detention facilities is quite high. A considerable part of the cases detected in the SIZO detention centers are persons who developed the disease prior to detention. In recent years, the number of defined TB patients incarcerated at the detention centers is much higher than the number of patients transferred to the FSIN entities (according to MoH&SD Form No. 33, see Fig. 6.10) Therefore, it is wise to review data on TB detection rates in the detention centers as an integral part of the TB detection process in the civilian society. This is just another evidence for increased efforts in the detection of TB cases among socially desadapted persons.

From this point of view, the constant yearly increase in the proportion of cases detected in the detention centers (SIZO) among all new cases detected in correctional facilities FSIN is interesting. Over the last few years, this indicator has increased from 25.8% (1999) to 40% (2006). In recent years this indicator has stabilizes at 38% (Fig. 6.3).

The distribution of TB notification rates by federal region (Fig. 6.4) shows that the notification rate in SIZO may be considered as a marker of TB spread in the civilian population (see below). The highest indicators were registered in FEFR, SBFR and SFR (2,507, 2.080 and 1,810 per 100,000 new incarcerated persons, respectively).

At the same time, the highest notification rates among inmates (in correctional colonies) were registered in SbFR, UFR and SFR (1,417, 1,362 and 1,361 cases per 100,000 of the average total number of inmates in CC, respectively).

[56] In correctional colonies, the calculation of notification and mortality rates are performed per annual average number of inmates; the calculation of prevalence, per number of inmates at the end of the year. In the pre-trial detention centers, the notification rate is calculated per number of new individuals detained in the current year.

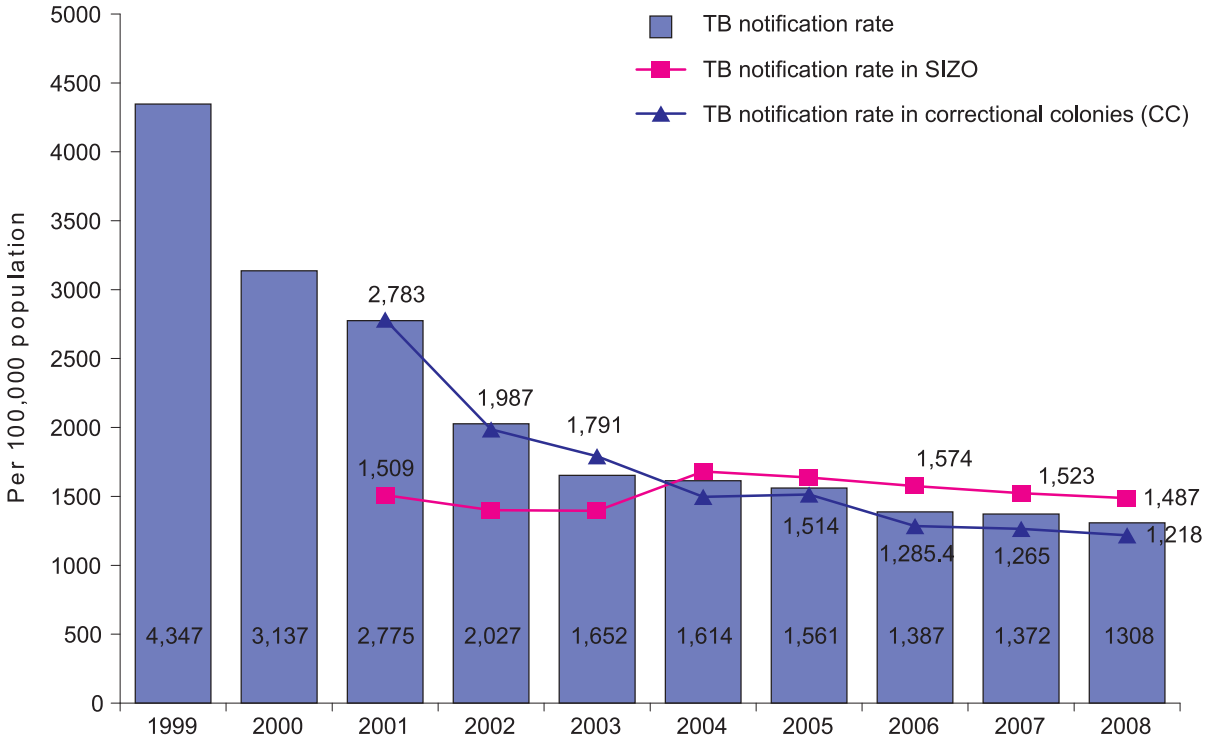


Fig. 6.2. TB notification rates per year in FSIN facilities: total, in SIZO (pre-trial detention centers) and CC (correctional colonies). Russian Federation (Source: Forms No. 1-MED and No. 4-tub. For calculation of TB notification rates, see footnote 56)

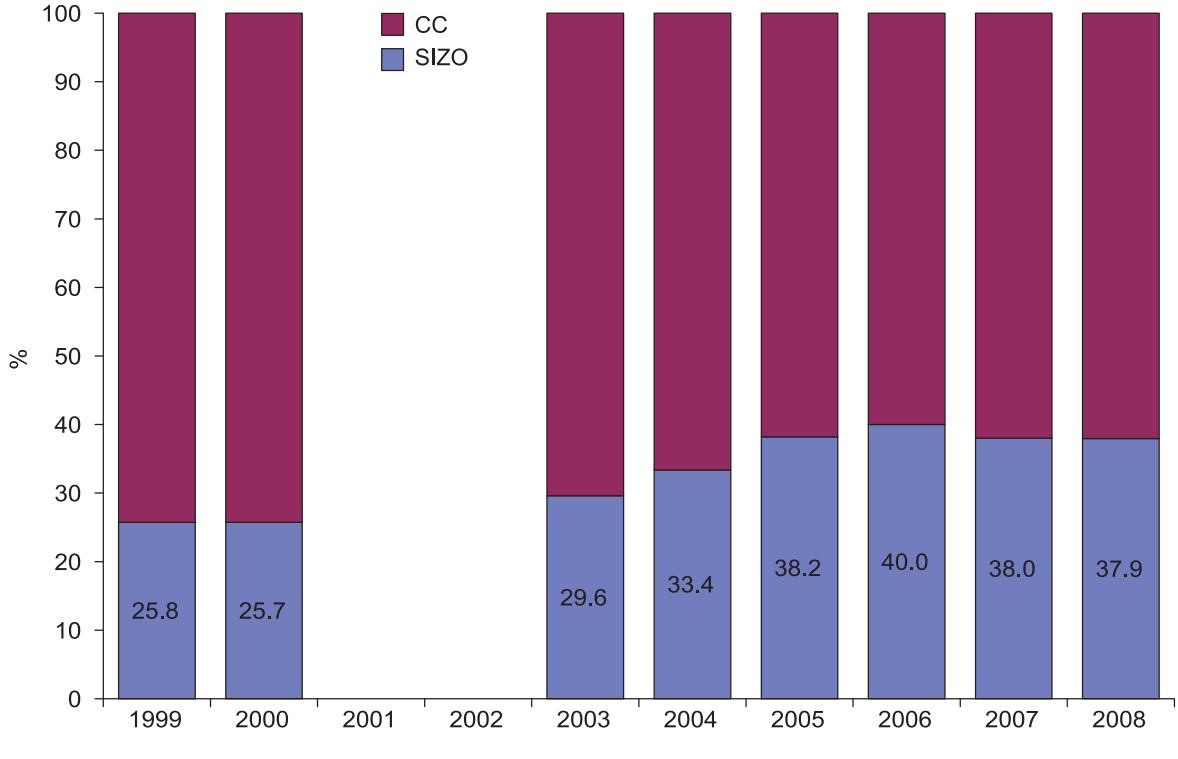


Fig. 6.3. The proportion of new cases detected in SIZO among all new TB cases detected in FSIN facilities, the Russian Federation (Source: Form No. 4-TUB.)

The structure of the new TB cases detected in the FSIN facilities to a large degree is determined by the diagnostic capacities of the FSIN service.

The percentage of RTB patients with destructive processes in the lungs is relatively low (Fig. 6.5). In 2008, 25.7% of patients were registered with pulmonary tissue destruction among patients with respiratory TB overall. In the last 3 years, the proportion of CV + cases has declined from 31.9% in 2006 to 26.3% in 2008. At the same time, the percentage of RTB patients with CV + increased from 20.2% in 2005 to 25.9% and 24.7% in 2007 and 2008 respectively. More analysis is needed to clarify the causes of such changes.

However, it should be noted that the decrease in the proportion of patients with destructive forms of respiratory TB was primarily due to earlier detection of the disease. Among convicts In FSIN facilities, chest fluorography is performed once in 6 months and among persons on trial – every 4 months.

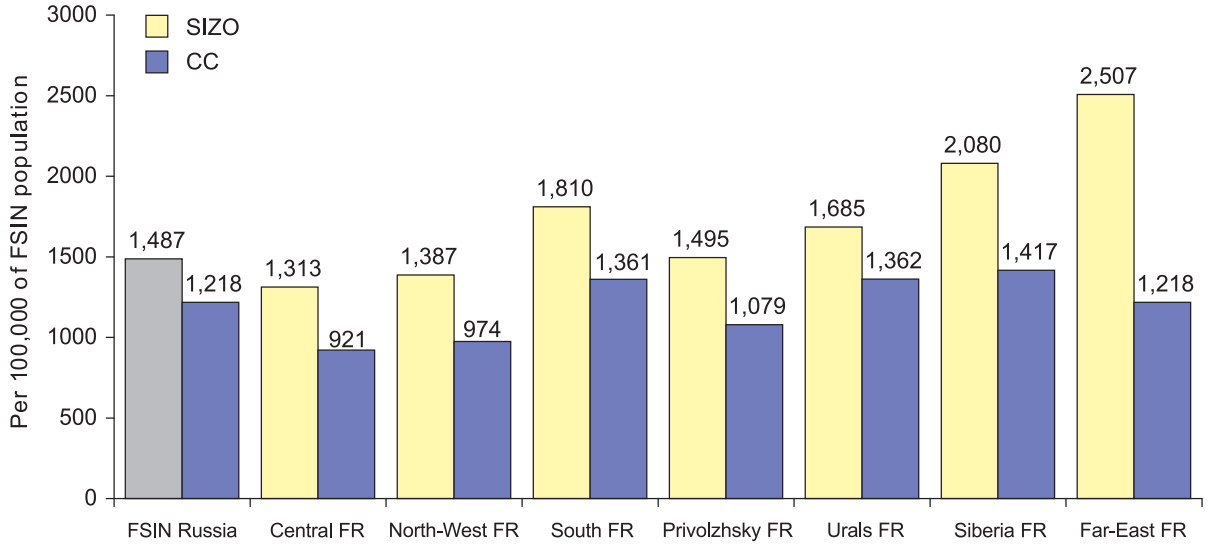
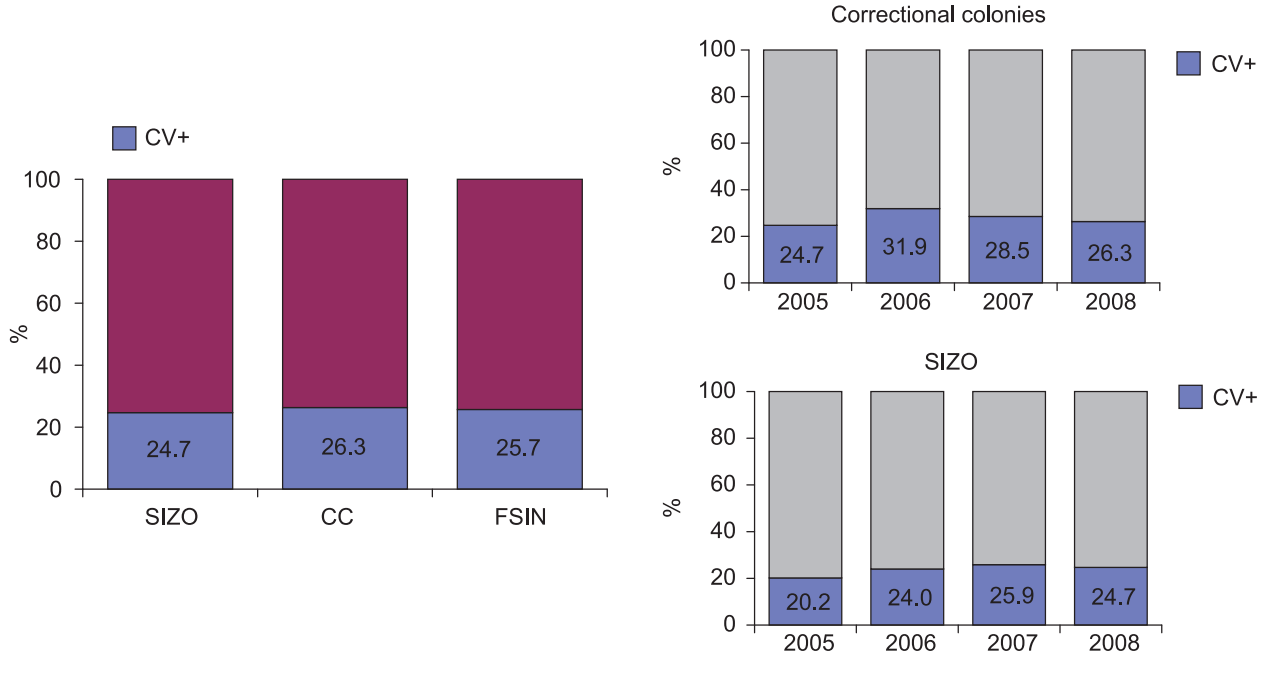


Fig. 6.4. TB notification rates registered in SIZO and correctional colonies in the Federal regions of the Russian Federation, 2008 (Source: Forms No. 1-MED and 4-tub and data on the number of FSIN population)



a) 2008

b) 2006–2008

Fig. 6.5. The proportion of destructive TB forms among new respiratory TB cases in the facilities of FSIN, Russian Federation (Source: Form 4-tub)

The percentage of extra-respiratory TB among new cases is small: 0.7% in 2008 (3.6% for the civilian population, see above).

Improvement of laboratory services in Russian FSIN facilities increased in testing of active TB patients by bacteriological methods from 58% in 2004 to 97.8% in 2008. Among new TB cases 55.7% were tested in 2004, and 91.1% in 2008 (See Table 6.2 and Fig. 6.6[57]). These results were achieved, in particular, through the provision of equipment for the IBRD loan. These funds allowed equipping of 518 clinical-diagnostic laboratories in correctional colonies and SIZOs, and additional equipping of 65 regional bacteriological laboratories for the diagnosis of tuberculosis. Global Fund grants were also used for additional equipping 25 bacteriological laboratories in correctional medical facilities and other health facilities. Therefore, it is expected that by the end of 2009 the FSIN TB control system will be equipped with 90 bacteriological laboratories for TB diagnosis.

Table 6.2

Implementation of the bacteriological testing of TB patients in the FSIN system. The data for all FSIN institutions. (Source: FSIN approved forms for laboratory tests)

	2005	2006	2007	2008
The proportion of TB patients tested by microbiological methods (%)	75.3	94.0	96.8	97.8
Of these new TB cases (%)	62.7	91.5	90.8	91.1
Confirmation of the diagnosis by bacteriological methods (% of tested)	42.2	51.8	40	37.7
Confirmation of the diagnosis by bacteriological methods among new TB cases (% of tested)	37	44	35.5	38.1
Drug resistance to any first-line drugs among new TB cases (%)	51	49.6	52.7	51.0
MDR TB cases among new TB cases (abs. number)	755	875	879	807
MDR TB among new TB cases (%)	17.8	20.3	21.2	18.6
Drug resistance to any first-line drugs among all patients (number of patients)	9,978	11,720	11,023	12,557
MDR TB among all TB patients (abs. number)*	4,243	5,720	5,229	6,801
MDR TB among all TB patients (%)*	42.5	48.8	47.4	37.6

* Prevalent type indicator calculated based on at the end of the year data – notes of translator.

Of patients with active TB evaluated by bacteriological methods, 37.7% of cases were bacteriological positive in 2008. Among new TB cases 38.1% were bacteriological positive in 2008 (35.5% in 2007). The slight decrease in the indicator of bacteriological confirmation of diagnosis in patients with TB in 2008 compared to 2007 was related to the reconstruction of bacteriological laboratories of FSIN, Russia, with GF grant funds.

M. tuberculosis being spread in the FSIN system has a high level of drug resistance to the main TB drugs. Thus, drug resistance among new MbT+ cases in 2008 was at 51.0%. MDR TB in this group of patient was at 18.6% (807 patients) against 21.2% (721 patients) in 2007. Among all patients, drug resistance was found in 12,557 TB patients registered in 2008; of them, 37.4% of patients had MDR TB (6,801 patients) against 35.6% in 2007.

A rapid decrease in mortality rates has been reported in FSIN facilities during last years (Fig. 6.7). After a threefold decrease in the rate since 1999, in 2006 it reached the level of 79.1 and relatively stabilized in the following two years (81.3 in 2007 and 80.0 in 2008 per 100,000 convicted, suspected and persons on trial (112.7 in correctional colonies, 15.0 in SIZOs per 100,000 FSIN population). Yearly changes in 2006–2008 were statistically non-significant ($p > 0,05$).

Over the last few years, TB prevalence has decreased to from 8,408 in 2002 to 4,745 per 100,000 FSIN population (5,040 in 2007). The number of patients with active TB in the system of FSIN decreased more than twofold from 98,767 in 2001 to 42,346 in 2008 (Fig. 6.8, Table 6.3).

[57] Information on FSIN laboratory services performance is collected by the FSIN, Russia, Chief Bacteriologist in compliance with approved Guidelines and Recommendations [14].

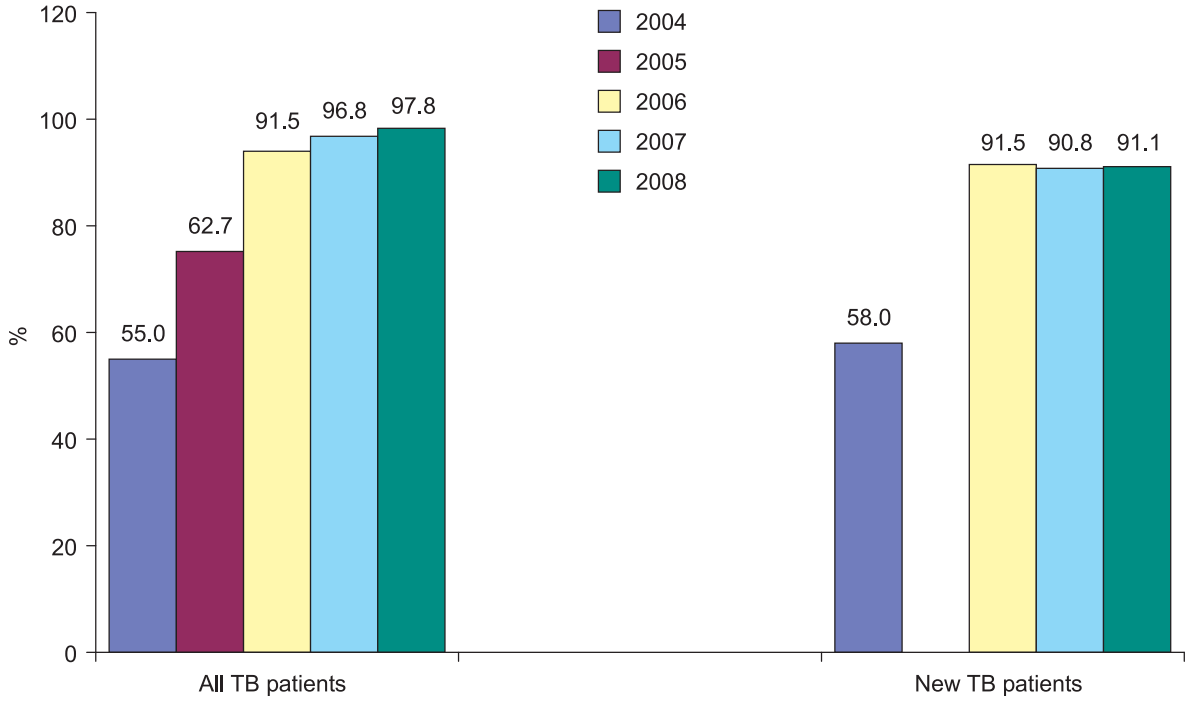


Fig. 6.6. Coverage by bacteriological testing of TB patients in FSIN institutions, Russia, 2004–2008 (Source: see text)

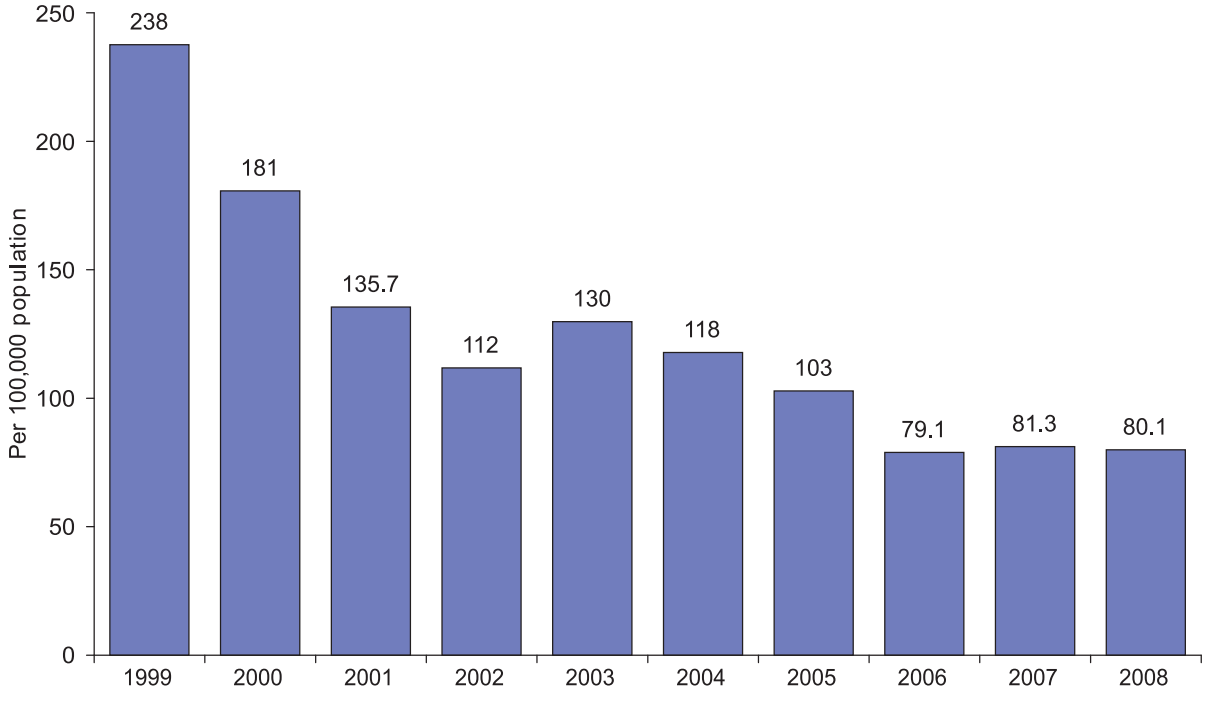


Fig. 6.7. TB mortality rates in FSIN facilities, Russian Federation (Source: Form No. 1-MED)

Table 6.3

The number of TB patients registered in FSIN facilities
(Sources: Form No. 4-tub and No. 1-MED)

Years / FSIN facilities	2001	2002	2003	2004	2005	2006	2007	2008
SIZO	12,138	6,072	6,011	5,392	5,061	4,969	4,830	3,762
Correctional colonies	86,629	79,068	64,089	45,523	43,309	42,462	39,874	38,584
Total in FSIN	98,767	85,140	70,100	50,915	48,370	47,431	44,704	42,346

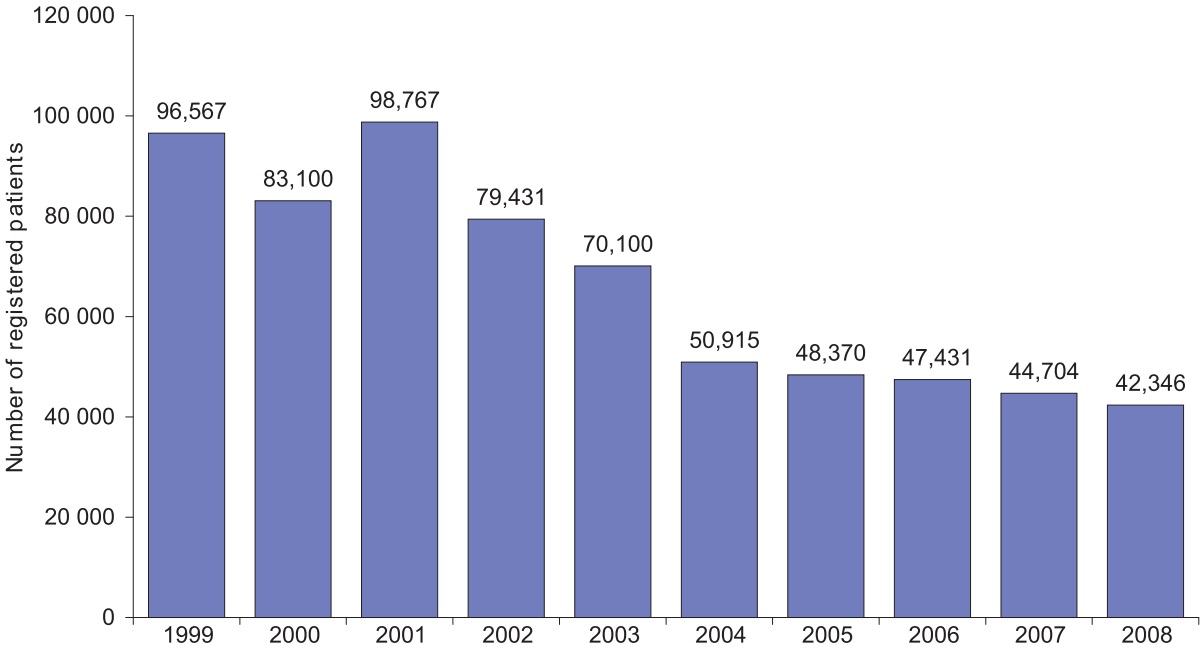


Fig. 6.8. The number of TB patients are registeredon follow up registers in FSIN facilities' (Source: Form No. 1-MED)

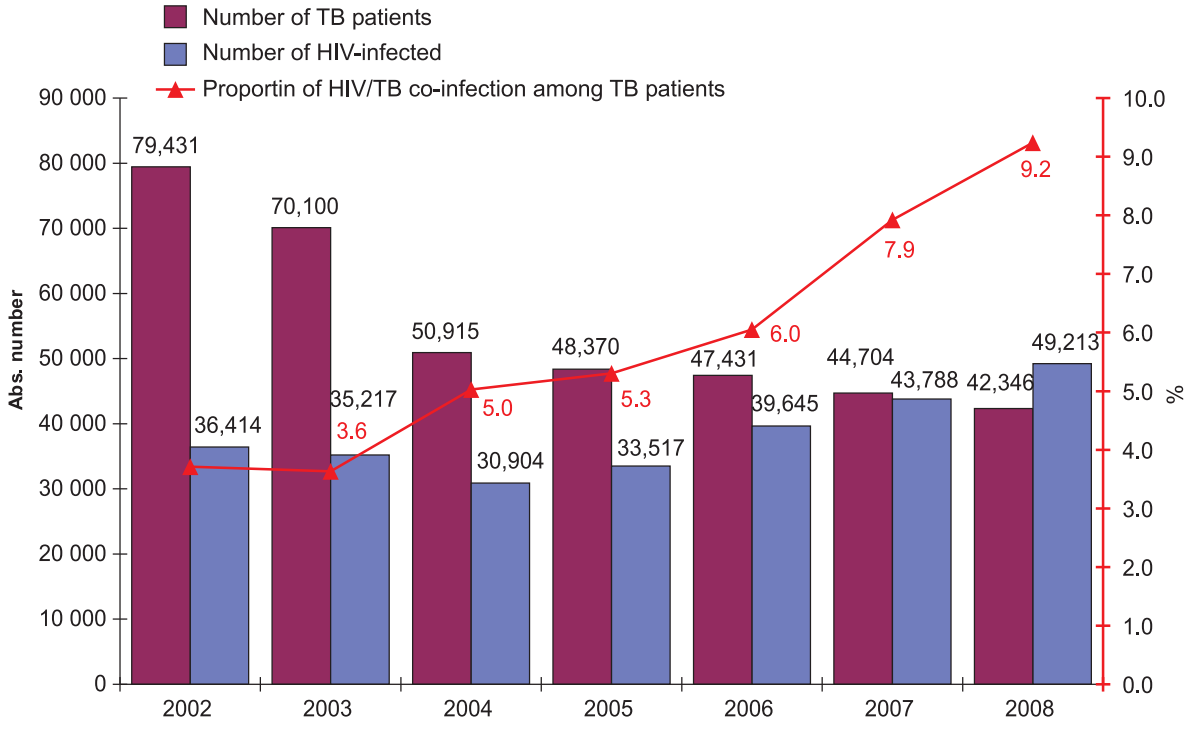


Fig. 6.9. The number of TB cases, HIV-infection cases, and the percentage of TB patients with HIV/TB co-infection in FSIN facilities, the Russian Federation (Source: Forms No 4-tub and No. 1-MED)

Noteworthy is the spread of TB/HIV co-infection among TB patients in the penitentiary system. It is evident from Fig. 6.9 that in recent years, while the number of TB patients has decreased, the number of HIV-infected individuals has increased and the percentage of co-infected cases among TB patients has increased from 3.7% in 2002 to 9.2% in 2008 (for information on TB-HIV co-infection see also Chapter 7).

An important component of TB activities is the continuity of work performed by different services. This is most relevant to the interaction between civilian (MoH&SD TB services in the subjects of the Russian Federa-

tion) and penitentiary (FSIN) services, due to the substantial number of TB patients who flow between the facilities of these services.

Every year over 21,000 cases of tuberculosis were coming in detention centers (in 2008, 16,212 patients were transferred to FSIN, and, according to the FSIN Chief Phthisiatrian's data, and 90% out of 5,636 new TB cases detected in SIZO detention centers were diagnosed either at the time of coming to SIZO facilities or within 1 month after coming to SIZO from the civilian sector). According to the MoHSD (Form No. 33) data, 4,040 TB patients were transferred to FSIN from the civilian sector in 2008. This means that the civilian sector TB control facilities did not have any information about 12,000 persons with TB who were arrested. In other words, the two sectors lacked continuity of work (see Fig. 6.10). Thus, according to MoH&SD and FSIN reporting forms, the SIZO detention centers admit almost 4 times as many TB cases than get officially transferred there from the MoH&SD facilities. On the other hand, over 5,000 patients diagnosed in FSIN facilities got TB before being arrested, but those cases had not been timely detected in the civilian sector.

From the other side, almost 40% of patients released from detention centers and correctional colonies do not get registered at TB dispensaries of the MoH&SD system (in 2008, 15,054 TB patients were released from correctional institutions and only 9,043 patients got registered in civilian sectors as transferred out from FSIN facilities.

These data demonstrate that in Russia there is still much work to improve the interaction between the two sectors.

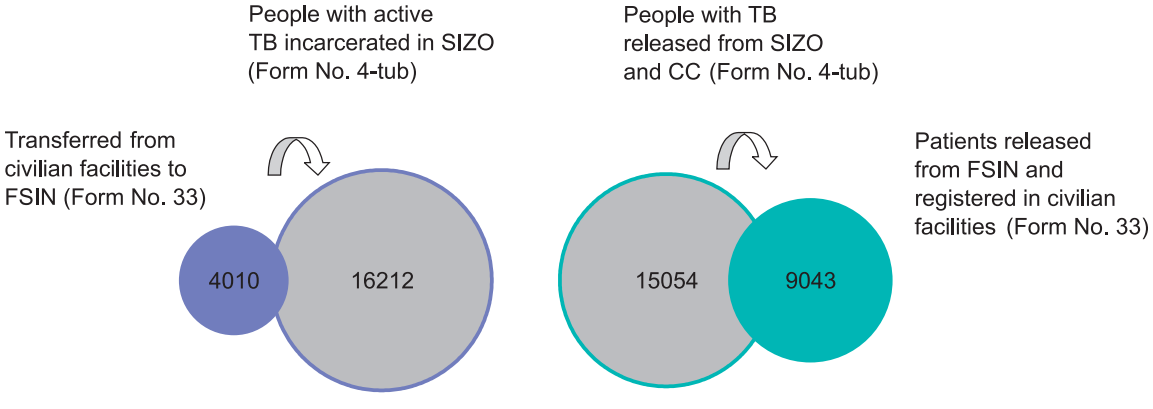


Fig. 6.10. TB patient flow between the facilities of MoH&SD and FSIN, 2008 (Sources: Form No. 33 and No. 4-tub)

As mentioned earlier in Chapter 5, the previous system of treatment effectiveness evaluation, as well as notification system, had certain limitations and drawbacks. Over the last four years in the Russian Federation, in both the civilian and penitentiary systems, introduction of new statistical reporting procedures on TB has been initiated based on the implementation of the modified strategy for TB detection and treatment, which was started in 2004.

The introduction of this strategy was initiated in the penitentiary system in 2005. The new recording and reporting forms issued upon Executive Order No. 50 [21] provide an opportunity to perform informative and online monitoring of TB detection and treatment on the basis of cohort analysis and adequate laboratory data.

Since 2007, data on TB notification according to the Form No. 07-TB were submitted from FSIN in 58 subjects of the Russian Federation (10,956 new detected cases in the 2008 cohort, or 74% of patients registered in accordance with Form No. 4-tub and No. 1-MED)[58].

Data from Form No. 7-tub has allowed for the calculation of the percentage of patients with the most epidemically dangerous TB form – pulmonary TB (98.5%) – and the percentage of ss+ TB patients– 18.1%.

Fig. 6.11 shows the territories with the highest (> 30%) and lowest (< 12%) percentages of TB diagnosis confirmation by microscopy by data from 2008. The fact that the number of territories with a low rate is considerable is an indication of both registration problems of MbT+ cases and inadequate organization of laboratory TB diagnostics.

[58] Information was collected by the five federal research institutes of TB and phthisiopulmonology.

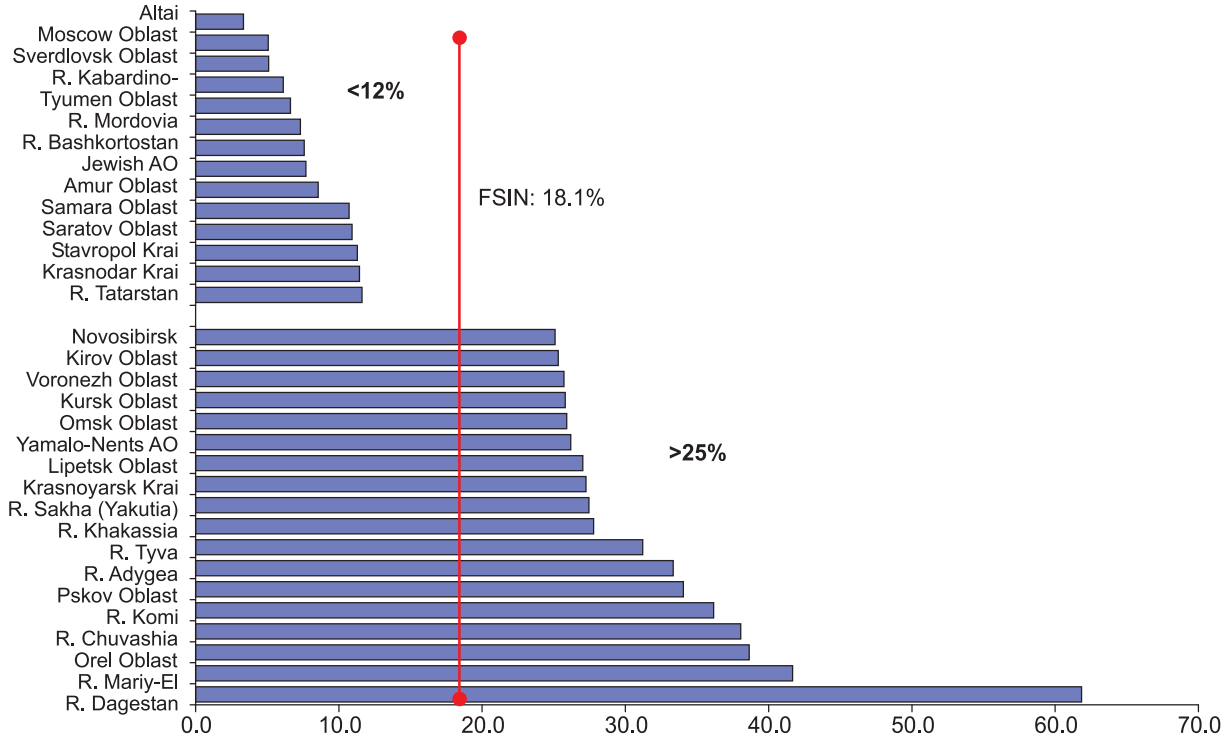


Fig. 6.11. The percentage of new ss+ TB cases among all new pulmonary TB cases. Data of FSIN in the Russian Federation territories, 2008. Shown are territories with rates > 25% and < 12% (Source: Form No. 7-TB)

The new reporting system has allowed for the obtainment of data on treatment effectiveness on the basis of cohort analysis. The treatment effectiveness among new ss+ TB cases in the 2007 cohort in FSIN facilities was 55.7% (57.82% in MoH&SD facilities)[59]. At present, the poor treatment outcome rates are also a reflection of the fact that the new approaches to treatment monitoring and evaluation are still in the initial implementation phase. At the same time, in the penitentiary facilities has been observed a relatively low rates of treatment interruption – 4.1% (compared to 10.0% at MoH&SD facilities) and low mortality rates, both of TB – 2.9%, and of other causes – 1.9% (compared to 8.8% and 3.9%, respectively, according to MoH&SD data). (See Chapter 5).

Therefore, the data show major improvements in the TB situation in the penitentiary system. The obtained results also indicate that in FSIN facilities, it is critical to continue efforts to improve diagnostic methods and case recording, increase treatment effectiveness, and strengthen interaction with civilian and other services.

[59] According to data from 52 territories.

7. HIV infection in the Russian Federation and its effect on TB incidence

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7.1. The recording and reporting system of TB/HIV co-infection in the Russian Federation

HIV infection was first recorded in Russia in 1987. Information on TB/HIV cases started to be reported from 1999 when the national statistical reporting form No. 61 «Data on patients with HIV-infection» was introduced.

Basic information for analysis of the epidemiological situation for TB/HIV co-infection (tuberculosis associated with HIV infection) can be obtained from the reporting form No. 61, in which the following types of information are available (values for 2008 are indicated in brackets):

1. The number of patients **included in dispensary HIV infection control follow-up registries**. This section includes information on followed-up persons with HIV infection including those who left the territory or died in the reporting year (301,251), on patients registered for follow-up in the reporting year (44,101) and the followed-up patients who died during the reporting year (9,851), including those who died from HIV infection (3,632). The reporting form also contains information on the number of HIV-infected patients were in follow-up register at the end of the reporting year (283,380).

2. The total number of people living with HIV infection. All people with detected HIV are included in the **reporting form irrespective whether or not they were on dispensary registration with infectious disease physician (included or didn't include in a follow-up register of HIV infected cases)**. This section provides information on the total number of persons in an administrative territory (subject) of Russian Federation with identified antibodies to HIV by immunoblotting (438,406 persons), the number of new cases of HIV infection reported during the reporting year (58,591), and on the number of deaths among patients with HIV infection during the reporting year (13,123).

According to the new regulation that has been submitted to MoH&SD for approval, starting 2008 the total number of patients would not include patients who left territories, but only those who are registered by the end of the reporting year and the patients who died during the reporting year.

Therefore prior to 2008, the analysis of estimates of HIV and associated infections prevalence in Russian publications used the total number of patients had been in register during the reporrting year, i.e. who was in register at the beginning of the reporting year plus who was registered during the reporting year, i.e. this number included patients who died and were transferred during the reporting year (until December 31)[60]. Starting 2008, the HIV prevalence rate calculation use data on alive TB patients at the end of the year with identified antibodies to HIV by immunoblotting.

Hereinafter in concordance with reporting form there are two groups of data will be reviewed in the chapter: – the «total number of TB patients» and «patients under dispensary follow-up by infection physicians for HIV infection».

Since 2005 data on the number of TB patients screened for HIV and results of screening of TB patients for HIV infection were included in Form No. 33 «Data on TB patients».

In order to assess the significance of the problem of HIV-associated tuberculosis in Russia, a uniform system of registration of cases of tuberculosis in patients with HIV infection was established in 2004. Since then, in accordance with the RF Ministry of Health Executive Order No. 547 (13/11/2003), new registration form «Personal registration card of patients with tuberculosis associated with HIV infection» has been was used in the country (registration form MoH Russian Federation No. 263/u-TB). This form is completed for all co-infection cases (regardless of place of diagnosis) and submitted to the responsible TB physician in respective subject of the Russian Federation for coordinating TB management of patients with HIV infection. These cards are also completed for death cases among patients with co-infection (Fig. 7.1).The responsible TB physician is mostly an employee of respective TB control services (in other cases – employee of the AIDS Center). Typically, a TB physician receives these responsibilities according regional executive order.

In compliance with MoH&SD Executive Order No. 547, responsible TB physicians send copies of cards (registration cards of TB/HIV co-infection with codes instead of patients' names) to the Center for TB Care of HIV patients, RF MoH&SD (FCTB-HIV). FCTB-HIV forms the unified register of TB/HIV co-infection cases. Based

[60] Epidemiological statistics uses two types of prevalence: (a) number of patients registered at specific time (i.e. at the end of the year), and (b) number of patients who were registered (or ill) at least once during the reporting period (i.e. reporting year). The former indicator shows the epidemiological pattern of disease prevalence in the population at a point in time, while the latter indicator includes transferred patients, defaulters and patients who died during the reporting year, i.e. the total number of infection sources in the territory during the reporting period.

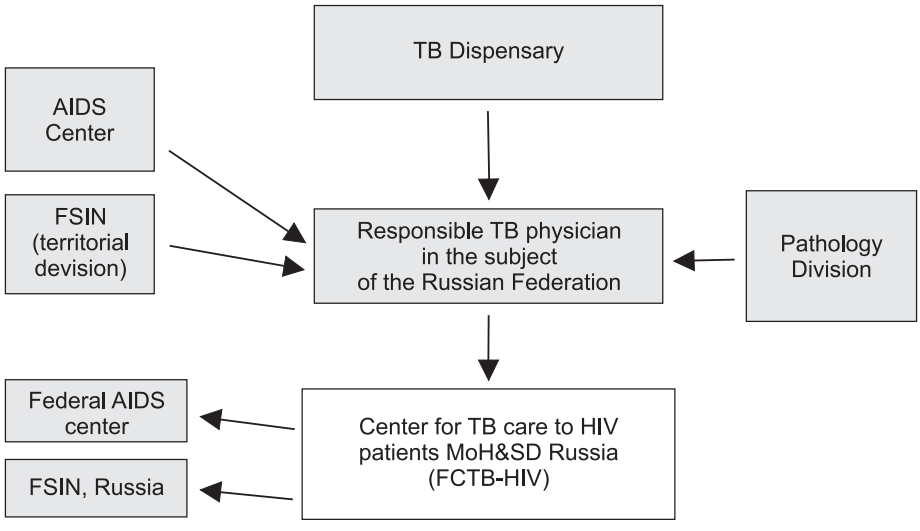


Fig. 7.1. The forms flow scheme related to registration forms on patients with tuberculosis associated with HIV infectionin Russia

on the analysis of the cards, evaluation and correction of TB/HIV control activities in the territories, analysis of patients with TB/HIV co-infection, and analysis of emerging trends and changes are done.

Since 2005, sections of AIDS centers' annual reports complied according to Form No. 61 and dealing with TB/HIV co-infection are filled in the subjects of the Russian Federation based of data received from the regional TB physicians responsible in Russian Federation subjects for coordination of care provided to TB patients with HIV infection.

In 2006, FSIN administration sent instruction to institutions within its jurisdiction (No. 1022–471 of February 22, 2006). This instruction obligated agencies to fill in and submit registration form 263/u-TB (on TB cases associated with HIV infection) to the unified registration system, which includes the above-mentioned TB physicians in the subjects of the Russian Federation.

The introduction of a unified system of registration and coordination of TB care to HIV-infected caused increased number of registered cases of co-infection (see fig. 7.3).

7.2. Problems of data collection on TB-HIV spread

Ways and means to obtain information on the number of TB cases associated with HIV infectionare quite complex worldwide, and do not fully reflect the true situation. This is due to the fact that the registration of such cases is being performed independently and without coordination by institutions (either institutions responsible for prevention detection and treatment of TB, or institutions dealing with HIV infection). Respectively, these institutions notify co-infection cases independently of each other. Such situation is observed in almost all countries because of the need to ensure confidentiality of data on patients with HIV infection, in particular, even the fact of HIV testing and its results. Therefore, presently more information is available on testing patients for TB than for HIV infection.

Besides, the difficulty with registration of TB/HIV co-infection cases is partly due to lacking of clear definitions for cases of HIV infection. For example, AIDS or HIV/AIDS are not included as separate units in ICD-10, and do not have clear definitions in clinical classifications by WHO and MoH&SD of the Russian Federation. This results into use of incompatible data in proportions and rates of TB/HIV co-infection prevalence.

Thus, the proportion of tuberculosis disease among HIV-infected patients is calculated in different ways (in some countries only cases of immunodeficiency caused by HIV infection is taken into account). So, published data are difficult to compare. This is why in the world for assessment of the number of cases of co-infection data on testing of TB patients for HIV infection are being used, not vice versa. Although, we'll show later that the total number of co-infection cases registered in Russian TB control institutions comprise only 46% of registered TB/HIV cases among the permanent population of the country.

7.3. General information on the spread of TB associated with HIV infection in the Russian Federation

According to Form No. 61, 425,283 HIV-infected persons were registered in Russia in 2008. HIV was newly diagnosed in 58,591 cases (41.3 per 100,000 population).

Fig. 7.2. demonstrates the dynamics in the HIV infection notification rate from 1999 to 2008 ([7], Form No. 61 for 2007–2008).

Analysis of the data from reporting form No. 61 shows that the number of TB patients with HIV co-infection in Russia is steadily growing (Fig. 7.3). In 2008, 7,387 new cases of TB/HIV co-infection were registered (2005 – 2,926; 2006 – 3,907, 2007 – 5,985), of which 1,304 were diagnosed in the FSIN system[61]. The total number of patients with co-infection reached 16,813 persons in 2008, and among the civilian population – 13,213[62].

Thus, in 2008, the proportion of TB patients with TB/HIV co-infection was 4.9% in the total number of TB patients registered in TB dispensaries of the subjects of the Russian Federation (Fig. 7.4).

The most important factor influencing the incidence of TB among patients with HIV is the growing number of people with HIV. The proportion of patients in late stages of HIV infection (stages 4Б, 4В and 5 [22]) was growing from 3.5% in 2005 to 9.1 in 2008. It should be noted that according to Form No. 61, almost half of HIV infection cases in 2007 (1,553 of 3,143) and one third of HIV infection cases in 2008 (1,572 of 4,894) were detected on late stages during diagnosis or treatment for TB.

The increased number of registered TB/HIV co-infection cases was also influenced by another factor –the improvement of registration and reporting system through coordinated efforts of the civilian and penitentiary systems.

Nevertheless, it should be noted that there is still lack of coordination in submitting data on TB/HIV co-infection cases. The data provided by penitentiary system facilities to Form No. 61 and in departmental registration forms No. 1-MED and No. 4-TB are incoherent. For example, the overall numbers of registered new TB/HIV co-infection cases and the number of new co-infection cases in Form No. 61 are 10–15% less than in the FSIN reporting forms.

To increase reliability of FSIN data, particularly, submitted to Form No. 61, a new reporting form «Report on patients with HIV» has been developed. This form will be introduced in 2010 to improve the quality of statistical data.

Among all patients with co-infections in 2008, about 67.5% of patients had late stage of HIV infection, and this proportion is increasing annually (2005 – 55.1%, 2007 – 64%). On the other hand, among the 27,145 patients with late stages of HIV infection (4Б, 4В and 5), tuberculosis was registered in 41.8% of cases (11,357), i. e., tuberculosis is one of the most common HIV-associated diseases.

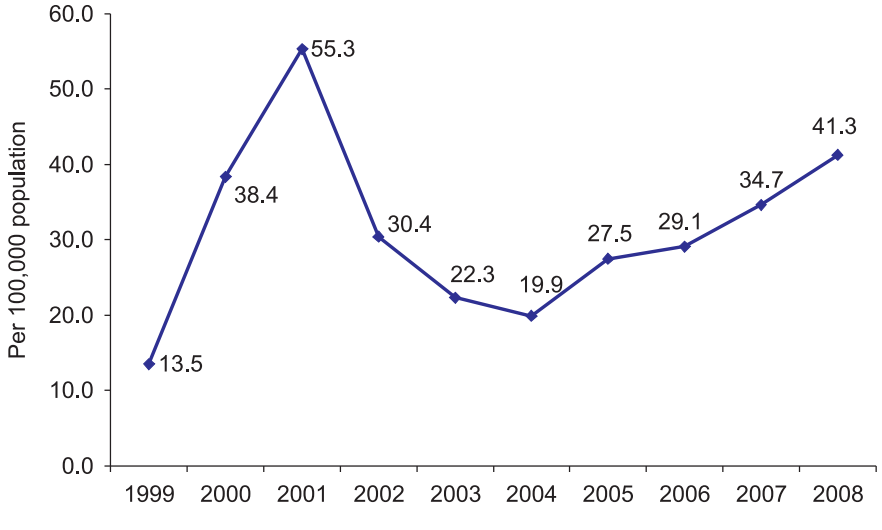


Fig. 7.2. Notification rate of HIV infection in the Russian Federation, 1999–2008. (Source: Form No. 61)

61 Information about TB/HIV co-infection in the prison system is given in Chapter 6.

62 See section 7.1 about the approach used in calculating the prevalence of HIV infection.

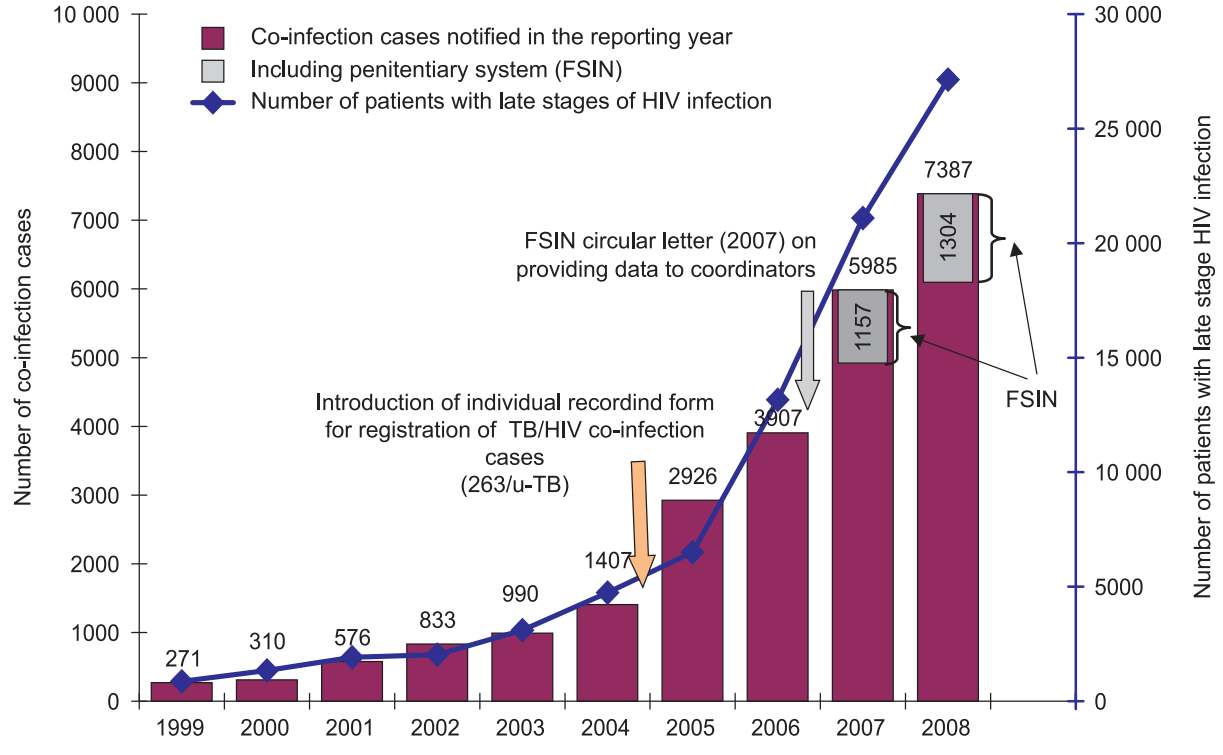


Fig. 7.3. Comparison of trends in detection of new cases of TB associated with HIV infection, and the number of patients with late stages of HIV infection in the Russian Federation. Data for 2007 and 2008 show the proportion of co-infections in FSIN. (Source: Form No. 61)

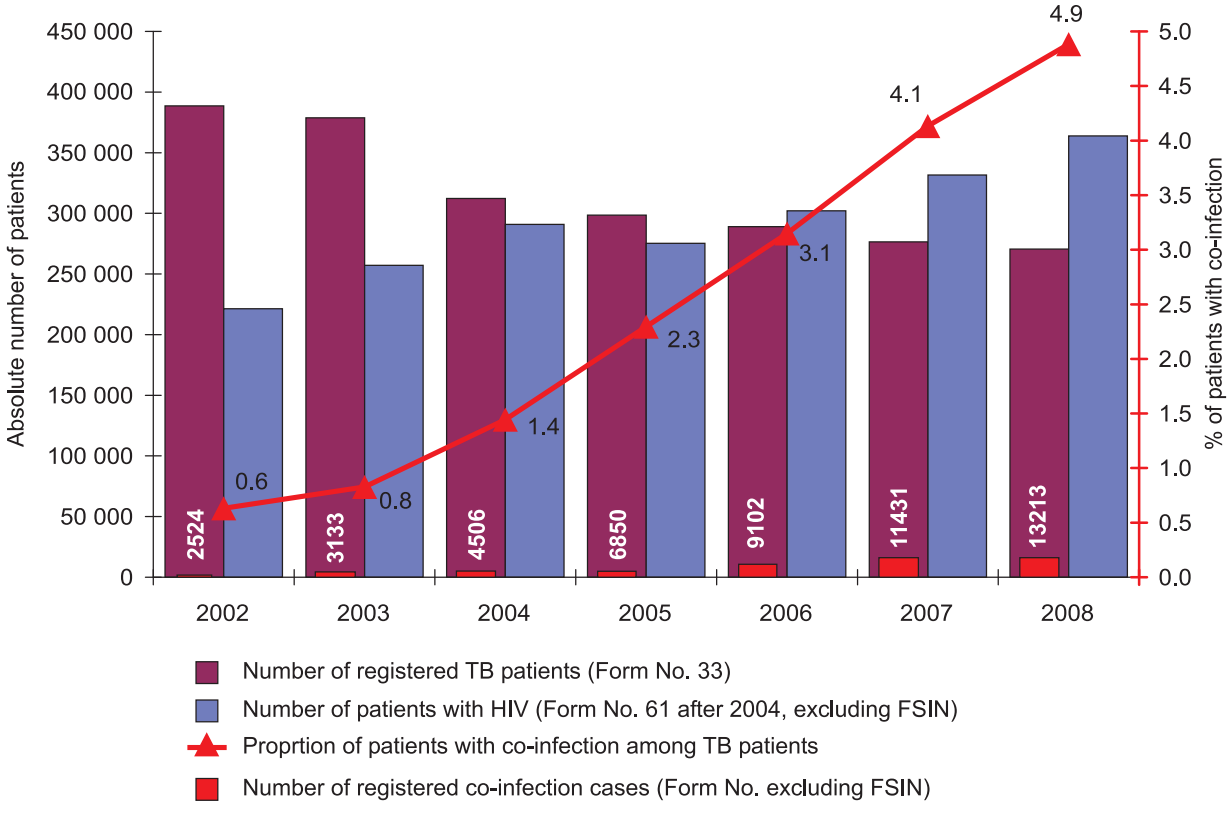


Fig. 7.4. Tuberculosis and HIV infection in the Russian Federation among the civilian population. (Source: Forms No. 61 and No. 33)

Given such epidemiological situation with HIV infection, as HIV disease would progress to later stages, the number of new cases of tuberculosis each year would increase by 10–15% (15,000–20,000). As a result, over the next 5–10 years about 150,000 additional people would get the disease. Therefore, additional measures are necessary to optimize the prevention, detection and treatment of HIV infection and tuberculosis associated with HIV infection.

As shown in Fig. 7.5 (according to the reporting form No. 61 for 2006 r.[63]), the majority of patients with HIV in Russia are dying of other causes (in 2008 – 63.1%, or 6,219 patients), mainly form injuries and drugs overdosing. This is explained by the fact that one of the main routes of HIV infection transmission is injection drug use. In turn, according to data from 2006, among those who died because of HIV infection, in 59.1% of cases the cause of death was tuberculosis [10][64].

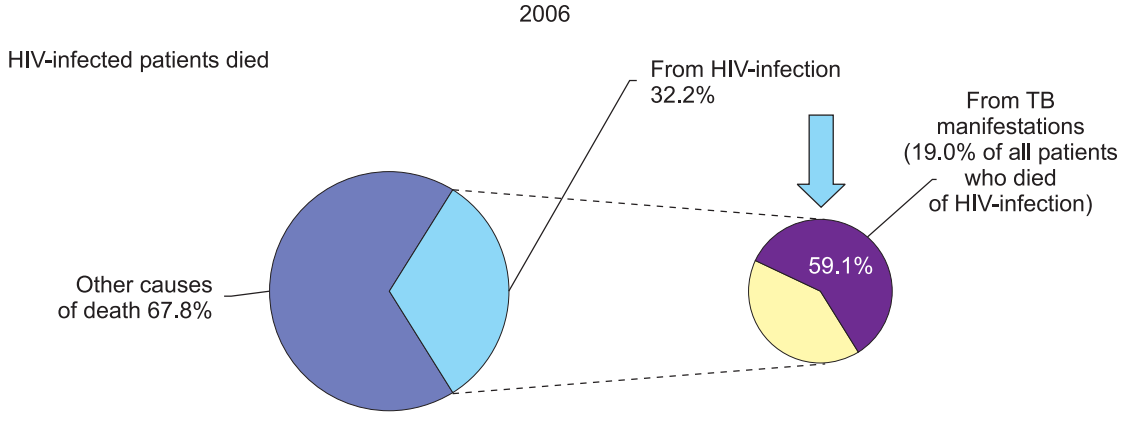


Fig. 7.5. Causes of death in patients with HIV infection in the Russian Federation, 2006 Figures indicated in white show the proportion of patients who died of TB infection among all HIV-infected patients (in the violet sector of the right circle) – (Source: Form No. 61)

Overall in 2008, 2,950 patients with tuberculosis and HIV co-infection died (in the civilian population), representing 22.3% of all reported cases of TB/HIV co-infection. Of these, TB was the main cause of death in 74% of cases (2,168 persons). Thus, among patients with co-infections, tuberculosis is the leading main cause of death. All this confirms once again the significance of TB and HIV co-infection problem in Russia.

In assessing the epidemiological situation with TB, it is important to bear in mind that data on deaths from TB, provided by Rosstat – 25,388 cases in 2008 (with code A15-A19 in ICD-10) do not include deaths indicated with B20.0 code in ICD-10. So, the total number of deaths due to «only tuberculosis» and «in combination with HIV infection» is about 10% more.

Since 2005, information on screening of TB patients for HIV infection was included in reporting form No. 33, which is completed by TB control institutions (TB dispensaries). Coverage of HIV screening among new TB cases in 2008 was 92.4% (2006 – 89.9%, 2007 – 90.9%). Of these, presence of antibodies to HIV was confirmed by the immunoblotting in 3.1% of cases (2,845 patients), in 2006 – 2.3%, 2007 – 2.7%, respectively.

The situation in Russia demonstrates good coverage of new TB cases on HIV injfection status examination[65].

Form No. 33 contains data on the coverage of all TB patients with examinations for HIV detection (82%, see Table 7.1). Presently, Form No. 33 provides only data on the coverage of TB patients with examinations for HIV detection, and may not be used to show the TB/HIV co-infection notification rate. This is due to the fact that when applying to TB facilities patients with HIV commonly do not inform health personnel about their registration in AIDS centers. So, the detection of HIV in TB patients very often cannot be considered as a new co-infection case. Therefore, the indicated above new system of registration of individual TB/HIV patients has been implemented and TB doctors have been appointed responsible for coordination of care for TB/HIV patients in close contact with respective AIDS centers. Thus, when assessing TB/HIV co-infection notification and prevalence rates, it should

63 After 2006, Form No. 61 did not include data on «patients who died of HIV-infection, including manifestations of mycobacterial infection» for notified but not registered in follow-up register patients. So, graph 7.5 has not be used after 2006.

64 In Form No. 61, this data is presented in section «died of HIV-associated disease with manifestations of mycobacterial infection» (stages 4Б, В, 5) – (ICD-10 code B20.0). In compliance with the regulations and technique of completing the form, this section shows only cases of death from TB infection.

65 In the WHO global reports, this information is provided under section «Collaborative TB/HIV activities» [41].

be more appropriate to use data from national statistical reporting form No. 61 («Data on HIV-infected patients», table 2002), which is completed by TB doctors responsible for coordination of care for HIV-infected patients.

Key indicators of co-infection based on national statistical reporting forms No. 61 and No. 33 are shown in Table 7.1.

Table 7.1

Basic data on TB/HIV co-infection in the Russian Federation in 2005–2008

Years	2005	2006	2007	2008	
Indicators	The Russian Federation				Ranges by territory, 25% и 75% quartiles[1]
Form No. 61					
Total number of active TB cases associated with HIV infection	6,850	9,102	14,293, including 11,431 – civil population	16,813, including 13,213 – civil population	
Proportion (%) of cases of TB associated with HIV infection, of the total number of registered TB patients	2.3%	3.2%	4.1% (civil population)	4.9% (civil population)	(1.0%; 5.1%)
Cases of TB associated with HIV infection notified in reporting year	2,926	3,907	5,985	7,387	
Excluding FSIN facilities	–	–	4,828	6,083	
Cases of TB associated with HIV infection notified in reporting year, per 100,000 population	2.1	2.7	4.2	5.2	(1.0; 6.2)
HIV-infected patients tested for TB	88,742	111,162	146,105	185,858	
Proportion (%) of registered HIV-infected patients tested for TB by all methods from of registered HIV-infected patients	37.8%	46.9%	54.6%	61.7%	(52.6%; 80.3%)
Form No. 33					
TB patients registered by the end of reporting year tested for antibodies to HIV	218,481	220,634	218,866	221,889	
Proportion (%) of all registered TB patients tested for antibodies to HIV	73.2%	76.3%	79.1%	82.0%	(73.8%; 93.3%)
The number of positive results to HIV antibodies by immunoblotting method	3,533	3,804	4,792	6,061	
Proportion (%) of positive results to HIV antibodies by immunoblotting method among all tested TB patients	1.6%	1.7%	2.2%	2.7	(0.4%; 2.6%)
New TB cases tested for antibodies to HIV	85,537	87,041	87,448	90,461	
Proportion (%) of new TB cases tested for antibodies to HIV in the total number of new TB patients	88.5%	89.9%	90.9%	92.4%	(89.5%; 98.8%)
New TB patients who had positive results of antibodies to HIV by immunoblotting method	1,544	1,979	2,401	2,845	

* According to statistical definitions of «25% quartile» и «75% quartile», 25% and, correspondingly, 75% of territories have indicator values less than those indicated by quartile values. Consequently, the shown in brackets data (25% and 75% quartiles) indicate the limits which include indicators' values for half of all subjects of the Russian.

Russian nationwide indicators of the prevalence of TB associated with HIV infection reflect only the situation in the country on the whole, while data on individual subjects of the Russian Federation may significantly differ from each other as well from the nationwide data. Table 7.1 shows the variation of basic indicators between the territories.

Fig. 7.6 shows 21 territories, in which 80% of all TB/HIV cases were registered in the country. This list should be taken into account during planning of the federal and regional programs.

Fig. 7.7 shows data from 21 territories with the highest proportion of co-infection cases (more than 5%) of all TB patients registered by TB control facilities in the subjects of the Russian Federation. In these territories co-infection with HIV has the greatest impact on the spread of tuberculosis, and regional TB services should pay special attention to the problem of TB/HIV co-infection.

7.4. The prevalence of tuberculosis with HIV co-infection in the Russian Federation

An analysis of the epidemiological situation in the federal regions shows that the highest incidence of co-infection is registered in the North-West (8.9% of TB patients) and Urals (8.8%). Federal Regions. Four of six subjects of the Russian Federation in the Urals FR are among the territories that make most the substantive contribution to the total number of TB patients with HIV co-infection in the country with the proportion in the total number of patients about 20%.

Fig. 7.8 demonstrates an association between the frequency of new TB/HIV co-infection cases and the prevalence of patients in late stages of HIV infection. The figure shows that in territories with the highest level of registration of new co-infection cases per 100,000 population, as a rule, highest levels of late stage of HIV infection are observed (as per 100,000 population). Similarly, in areas with the largest number of patients with late stages of HIV infection, the highest rate of co-infection is registered.

Consequently, it is important for TB specialists in territories, in which HIV infection started to spread at a later time, to bear in mind that in the coming years, this problem will also be significant.

In addition, these graphs show a significant scattering of the frequency of TB/HIV co-infection cases in territories with similar epidemiological situation for HIV infection. There are peaks on graph 7.8 that correspond to areas with the highest numbers of cases of co-infection. It may also be the result of effective notification of cases. On the other hand, it is necessary to take in account the specificity of HIV infection spread in these territories. For example, in the Republic of Kalmykia, a low prevalence of TB among HIV-infected persons is due to the fact that HIV infection transmission occurred in most cases in early childhood as a result of in-hospital transmission of HIV infection in the city of Elista. As a result, these patients were kept in a fairly isolated environment from childhood, reducing the likelihood of exposure to TB infection. In this regard, the development of immunosuppression in these patients does not lead to the development of tuberculosis disease.

In 2007–2008, a significant increase in the number of cases of TB/HIV co-infection among the permanent (civil) population (from 2 to 5 times) was observed in Voronezh, Lipetsk, Tambov, Leningrad, Pskov, Astrakhan, Rostov, Sverdlovsk, Novosibirsk, and Tomsk oblasts, in the Republics of Karelia, Chechnya, and Sakha (Yakutia). This increase is likely to be associated with the growing number of HIV-infected patients with late stages of HIV infection. In some regions, increased number of registered cases of co-infection is related to the release of the letter of FSIN that requires transfer of registration forms on TB-HIV co-infection to the TB specialists responsible

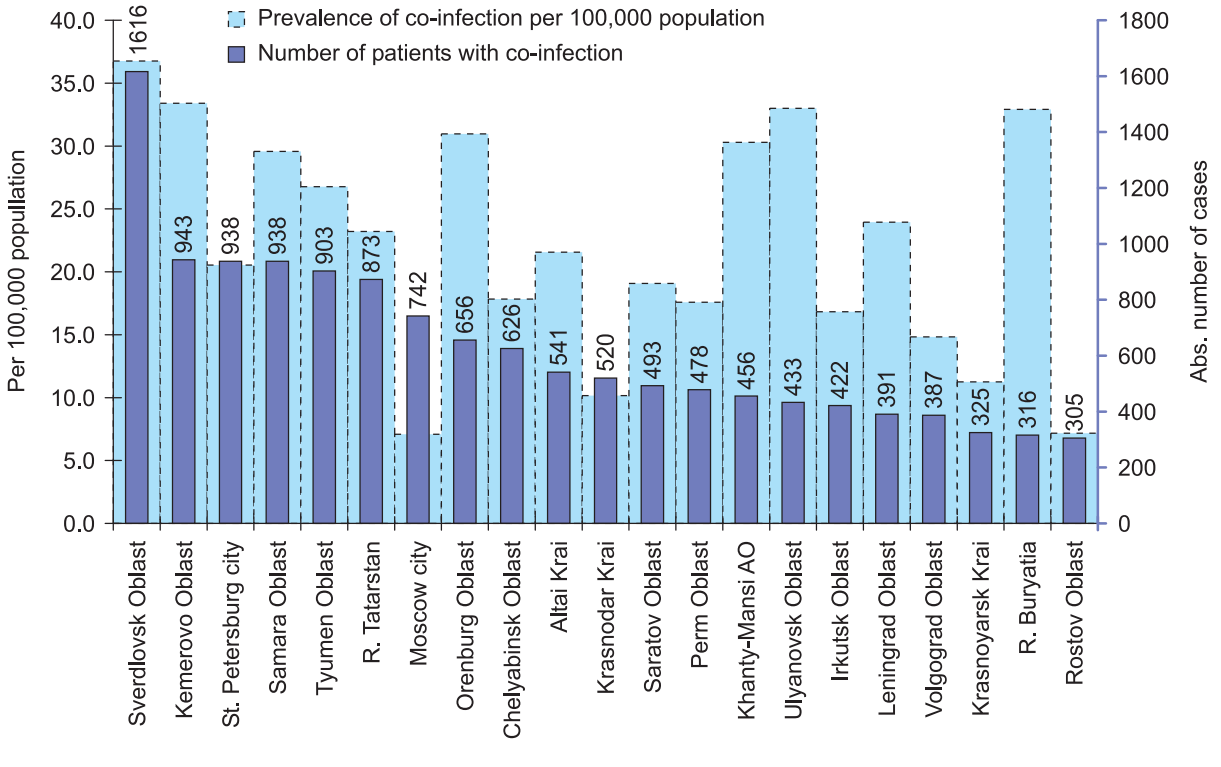


Fig. 7.6. Territories with the highest number of cases of TB-HIV co-infections (over 300), 2008. (Source: Form No. 61)

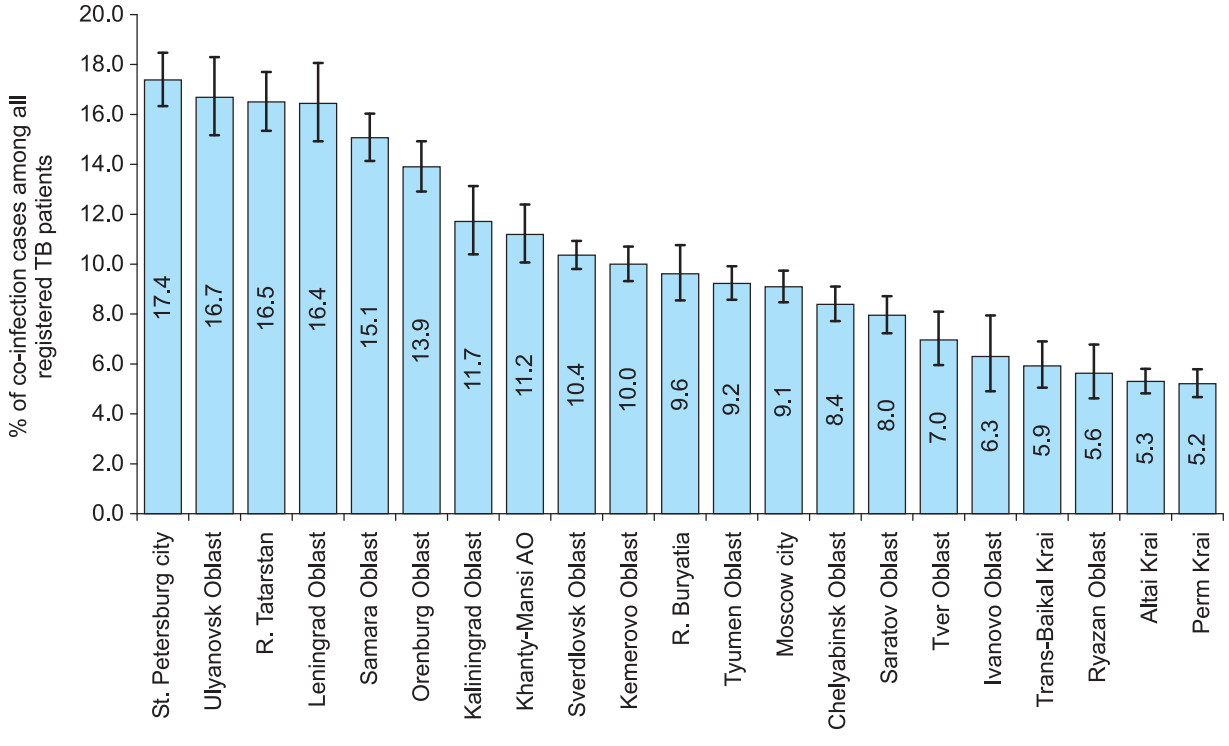


Fig. 7.7. Territories with the highest proportion of TB/HIV co-infection cases (more than 5%) among all TB patients registered in TB facilities in the subjects of the Russian Federation (excluding those diagnosed in FSIN institutions). 2007. Dispersion lines – 95% CI. (Sources: Form No. 61 and Form No. 33)

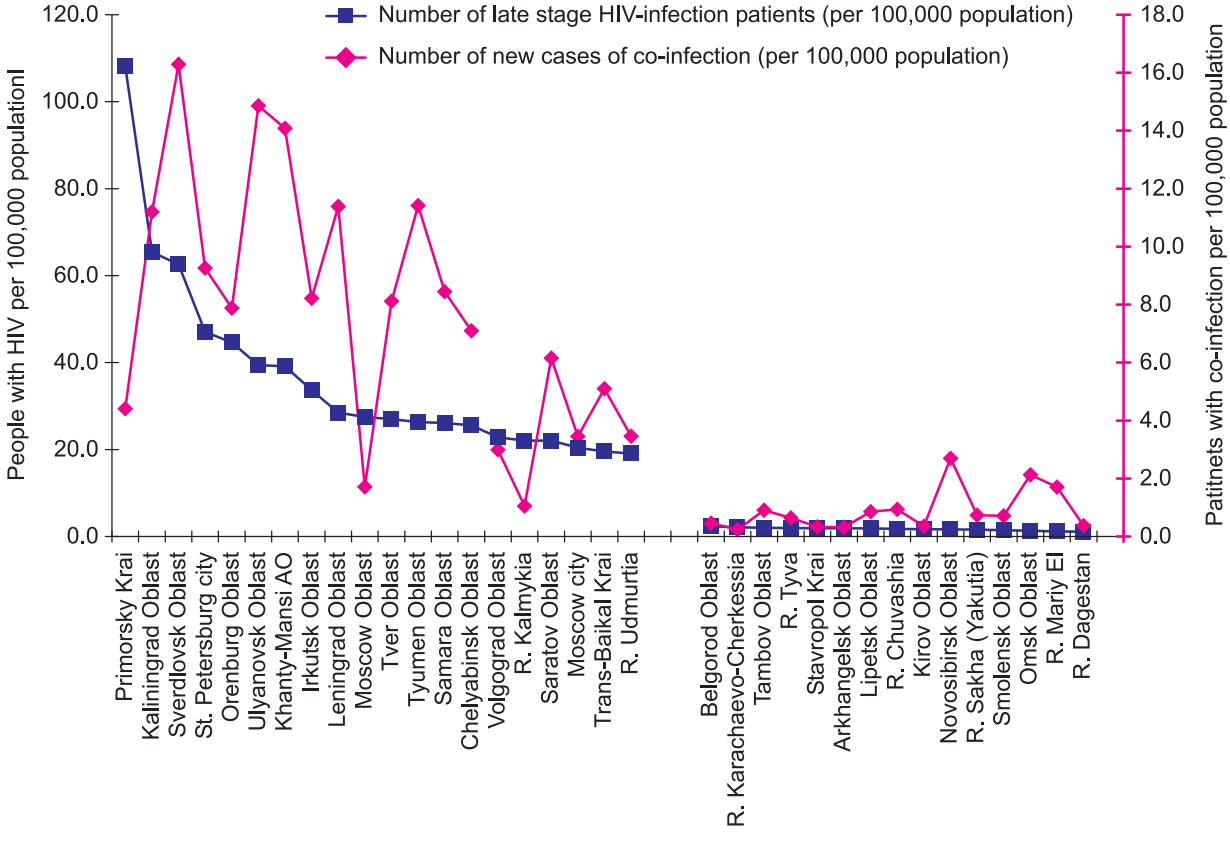


Fig. 7.8. Distribution of territories according to the notification rate of HIV infection at late stages (4б, 4в и 5) per 100,000 population. MoH&SD data (excluding FSIN). The graph shows subjects of the Russian Federation with HIV infection notification rates > 19 and < 2.5 patients per 100,000 population. 2008. (Source: Form No. 61; population – Form No. 4)

for coordinating TB care for HIV-infected patients in respective regions. Thus, the 2007 increase in the number of registered cases (from 1.5 to 5 times) due to with the FSIN data transfer was in Vladimir, Lipetsk, Bryansk, Novosibirsk, Tomsk, Ryazan, Vologda oblasts, and in the Republics of Karelia, Dagestan and Mari-El. In 2008, the list of these territories additionally included Kirov Oblast.

Fig. 7.9 shows the territories in which at least 17% patients with TB/HIV co-infection die because of manifestations of mycobacterial infection (code B20.0 in ICD-10). The high percentages of deaths may be an indication of late detection of TB in patients with immunosuppression, but on the other hand – these indicators must be assessed only in connection with the number of autopsies of patients who died from HIV infection. In several subjects of the Federation autopsies are not performed at all. The most «favorable» situation is observed in those territories of Russia, where autopsies after death from HIV infection are not performed, and where there are no trained TB physicians responsible for coordination of TB care to patients with HIV, so tuberculosis with atypical clinical course at the late stages of HIV infection is not diagnosed either in life or post mortem.

Given the significant scattering of indicators of TB/HIV co-infection in the subjects of the Russian Federation, it is appropriate to provide a differentiated approach to the organization of outpatient and inpatient care to these patients. It is important to take into account the prevalence of HIV infection in the territory, the duration of its registration in the region, and the prevalence of *M. tuberculosis* infection in the population. Such recommendations are given in the manual for TB doctors entitled: «Organization of TB care to patients with HIV» developed by the MoH&SD/WHO thematic working group in 2006 [15].

Regardless of the prevalence of HIV infection in a territory, it is also important to have a trained physician responsible for coordinating TB care to patients with HIV. Only specialists experienced in diagnosing TB with atypical clinical course at late stages of HIV infection can timely diagnose and effectively treat TB/HIV patients.

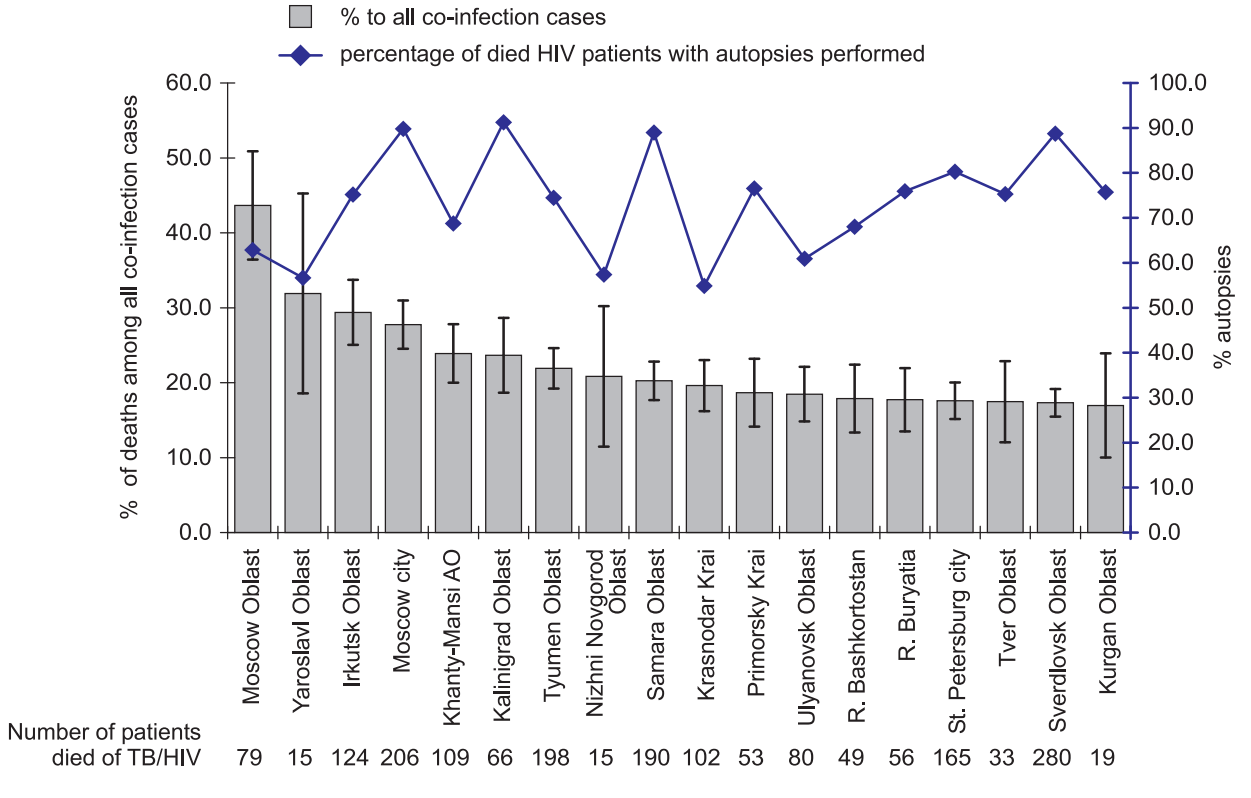


Fig. 7.9. The proportion of deaths from HIV infection with manifestations of mycobacterial infection (code B20.0 in ICD 10) among all reported cases of co--infection (only territories with the level of the indicator at least 17% and the number of deaths more than 9 patients are indicated), and the proportion of deaths of patients with HIV infection with autopsies performed. 2008. Divergence lines – CI 95% (Source: Form No. 61)

7.5. Comparison of definitions and systems for registration of cases of TB/HIV co-infection in Russia and other countries

In international studies of the spread of TB/HIV co-infection, estimated and notified indicators are used. Most commonly these include [41]:

– indicators related to estimates and registration of the proportion of HIV-infected patients among new and relapse TB cases (i.e. among the so-called «incident TB cases»);
– reports on the number of TB patients tested for HIV and on the number of positive test results among the total number of tested TB patients;
– the number of TB/HIV co-infection patients with under antiretroviral therapy (ART) and cotrimozazole preventive therapy (CPT).

The latter two indicators are considered in WHO reports [41] in the section on issues related to coordination between TB and HIV infection control services.

These indicators (2007) for the Russian Federation, some other countries and regions are shown in Table 7.2.

According to estimates, average 15% of all new and relapse TB cases notified throughout the world are associated with HIV infection. In African countries, this indicator reaches 38%, in Europe – 9.8%. In the world, only 16.4% of TB patients under treatment pass tests for HIV (Europe – 35.4%, USA – 61.2%). Unfortunately, the calculation of this indicator for the Russian Federation based on the data submitted to WHO seem incorrect, which can be explained by two reasons. First, the Russian Federation submits to WHO data on TB/HIV co-infection from two sources – Form No. 33 and Form No. 61, which are received from different services, although it was as far back as 2003 that the Russian Federation Ministry of Health issued executive order prescribing the use of the unified registration procedure. Secondly, there are now significant differences between internationally and Russian definitions of «all registered TB cases»[66].The real coverage of TB patients tested for HIV in 2007 r. was 79.1%, not 40.7% as indicated in Table 7.1.

In the world, the estimates of HIV-infection prevalence among new registered TB patients are based (a) on the UNAIDS[67] estimated indicator of HIV-infection prevalence in a country, and (b) on the assessment of the indicator showing to what extent TB incidence among HIV-infected patients is greater than that among people with negative HIV-status. In other words, this approach involves the incidence rate ratio (IRR) between these two population groups. It is considered that in countries with high HIV-infection prevalence (according to UNAIDS estimates, above 1% of the population) TB incidence among HIV-infected people is 20.6 times (CI95% 15.4–27.5) higher than that among people with negative HIV-status. In countries with HIV-infection prevalence from 0.1% to 1% (including the Russian Federation) this ratio is equal to 26.7 (CI95% 20.4–34.9). Finally, in countries with low HIV-infection prevalence (less than 0.1%) TB incidence among HIV-infected people is 36.7 times higher than that among people with negative HIV status (CI95% 11.6–116).

It should be noted that the indicator values of HIV prevalence among new TB cases increased significantly in 2007, as compared to the earlier published data (see the previous analytical review «Tuberculosis in the Russian Federation. 2007»). This was primarily connected with new results of direct assessments that have been received from studies performed in several countries, and due to the fact that UNAIDS has changed (increased) the estimated values of the TB incidence rate ratio between populations with positive/negative HIV status.

The international indicators of TB prevalence among HIV-infected population have several limitations. First, the registered number of co-infection cases reflects only the information that has been reported by TB control services. According to the Russian data, this number is less than half of the really diagnosed number of TB/HIV co-infection cases. This is why the Russian Federation has established a system that allows for coordination of the information flow on cases of co-infection from TB physicians, infectious disease physicians, pathologists, and FSIN physicians into a single database.

Secondly, with the most commonly used indicator – proportion of HIV-infected people among new registered TB patients – it is impossible to assess the significance of the TB-HIV co-infection problem in the region from the point of view of the population and the importance of this problem for HIV-infected people in the region. For example, when analyzing the data from Table 7.2, it seems that the problem of TB/HIV co-infection in Russia is not yet as serious as for the U.S. But in reality it is more important particularly for Russia, since the proportion

[66] This is why the Russian Federation submits data to WHO only on testing newly detected patients, not all patients tested for HIV infection.
[67] UNAIDS – The Joint United Nations Programme on HIV/AIDS.

of cases of TB/HIV co-infection in the United States is calculated using substantially lower absolute number of TB patients, compared to the number of TB patients in Russia. In the U.S., the number of new TB cases is about 13,000 per year, and in Russia – about 120,000. Therefore, the TB/HIV co-infection rate per 100,000 population in Russia was 4.2 in 2007 (5.2 in 2008), that is much more than in the U.S. – 0.3[68] [36].

Table 7.2

TB/HIV co-infection in the world, 2007 [41]

Region / country	Estimates of the number of new cases of TB-HIV co-infection	Estimates of the proportion of patients with HIV-infection among new registered TB patients (%)	TB patients tested for HIV infection		The number of positive results of testing of TB patients for HIV infection	Proportion of positive results of testing of TB patients for HIV infection (%)	Number and proportion of ART coverage among all TB/HIV patients (%)		Number and proportion of CPT coverage among all TB/HIV patients (%)	
			abs.	%			abs.	%	abs.	%
World	1,374,048	15	99,6043	16.4	296,995	29.8	90,492	30.5	196,933	66.3
Africa	1,080,328	38	491,755	37	250,546	50.9	76,547	30.6	186,941	74.6
S. Africa	335,598	73	136,247	38.5	87,764	64.4	31,040	35.4	58,801	67.0
USA	14,83	12	8,142	61.2	882	10.8	–		–	
European Region, WHO	42,322	9,8	169,397	35.4	6,710	4.0	138	2.1	405	6.0
Russian Federation	25,715	16	87,444	40.7*	2,401**	2.7	6,679***	39.7***	NDA	NDA

* The percentage of TB patients tested for HIV infection (40.7%) was calculated for the Russian Federation not entirely correctly, because of the inconsistency of requested data and the system of statistical recording in the country. At the same time, according to the reporting form No. 33, the coverage of HIV infection testing for newly diagnosed tuberculosis patients in Russia was in 2006 – 89.9%, in 2007 – 90.9%, and the coverage of all registered TB patients was, respectively – 76.3% and 79.1%.

** In the past two years data from the reporting forms No. 33 on the total number of TB patients with positive results of immunoblotting were forwarded to the Global Report.

*** The data were provided for 2008, because earlier the reporting forms did not include information on ART coverage. The percentage is calculated per the total number of TB/HIV co-infection patients (16,813 cases, Form No. 61).

*** NDA – no data available.

Conclusion

In summary, tuberculosis combined with HIV infection is of great importance for Russia. In the absence of adequate interventions, increase of co-infections can cause serious harm to the health of the country's population.

In order to improve the monitoring of TB associated with HIV infection, it is necessary to implement a uniform system of registration of TB/HIV co-infection. It should be based on universal definition of cases of HIV infection and take into account updated information in the field of HIV infection and tuberculosis.

[68] In 2007, the United States there were registered 884 new cases of TB associated with HIV infection [36]. These data include all states, except California and Vermont.

8. Multidrug-resistant tuberculosis

Son I.M., Belilovsky E.M., Skachkova E.I., Popov S.A., Danilova I.D., van Gemert W., Jakubowiak W.

8.1. The indicators used in the Russian Federation to evaluate the spread of multidrug-resistant TB

The spread of multidrug-resistant tuberculosis (MDR TB), when *M. tuberculosis* is resistant to at least two main anti-TB drugs – isoniazid and rifampicin from the results of drug-susceptibility tests (DST), attracts serious attention in recent years both in the Russian Federation and worldwide. MDR TB patients need substantially more expensive and long-term treatment with anti-TB drugs that may cause serious adverse effects. Moreover, MDR TB patients need significantly more thorough and prolonged monitoring, as well as social and financial support. The lethality rate of MDR TB case treatment is high. High levels of MDR TB have serious impact on the transmission of tuberculosis in the community through the accumulation of TB infection in the population because of decreased effectiveness of treatment.

In compliance with the regulatory documents currently used in the Russian Federation, drug resistance is classified into primary and acquired drug resistance [20]. Primary drug resistance (drug resistance among new TB cases) is defined as the resistance of *M. tuberculosis*, isolated from a patient who never used anti-TB drugs or received TB treatment for less than one month. In this case, it is considered that the patient was infected with drug-resistant strains of *M. tuberculosis*. Primary drug resistance is the characteristic of mycobacterial population circulating in the territory, and this indicator is important in assessment of the epidemiological situation. Acquired (secondary) resistance is defined as the resistance of *M. tuberculosis* detected in a patient during his/her treatment from TB. In Russia, as in other countries, secondary drug resistance is considered as an indirect indicator of ineffectiveness of ongoing treatment and *M. tuberculosis* bacteria resistance if the patient received anti-TB drugs for one month or more [34].

In recent years, in international statistical materials and guidelines on issues related to epidemiological surveillance, the definitions of primary and acquired drug resistance are used only for theoretical purposes [34, 39, 46] (see more information in Section 8.4). These definitions are used in scientific and training materials and publications, and for special research purposes, i.e. involving molecular fingerprinting. Two indicators are considered for epidemiological surveillance purposes: MDR TB diagnosed in patients who never received treatment from TB or received treatment for less than one month, and among patients who received treatment for more than one month (see the recent Global Report of the World Health Organization [46]).

This simplified approach is used due to the fact that patients who are on treatment from TB for over one month may have already been infected with MDR TB strains earlier. In practice, acquired drug resistance can be determined based on two conditions: (1) presence of resistance to anti-TB drugs during and after treatment compared to the beginning of the treatment course, and (2) re-infection is excluded with molecular fingerprinting methods (i.e. infecting with drug resistant strains from other patients, which may be associated with inadequate infection control during treatment). It was the methodological difficulty of confirmation of acquired drug resistance that led to the elimination of concept of secondary drug resistance from WHO and THE UNION guidelines and statistical reports (namely, from the reports of the WHO/THE UNION Global Project on anti-tuberculosis drug resistance surveillance in the world [39, 46], see Section 8.4).

Nevertheless, any treatment, especially ineffective, leads to increasing of drug resistance. Therefore, MDR TB in re-treatment patients and patients receiving treatment for more than one month is called secondary resistance in Russia, which is important from an epidemiological point of view.

The Russian national statistics data on MDR TB among the civilian population started to be registered from 1999 (Form No. 33). In addition, since 2005 data on MDR TB are included in Form No. 7-TB for cohort analysis. In FSIN institutions, information on the MDR TB was introduced in reporting Form No. 4-tub three years ago. Initially, the reliability of these data in the country was inadequate, and information on the MDR TB rate in the Russian Federation for the years 1999–2005 only approximately reflected the real rate and its change from year to year and by region. Conducted in 2005–2007 measures to improve the quality of laboratories and registration of MDR TB cases, bringing to the international standard laboratory techniques, correctness and accuracy of reporting data improved the quality and content of reported data. More recent data in the reporting forms more accurately reflect the prevalence of this form of TB, and this information may be used not only for assessment of the quality and completeness of MDR TB registration, but also for performing estimates of MDR TB prevalence in the population. Nevertheless, registered rates of MDR TB still may significantly differ from the actual proportion of patients with MDR *M. tuberculosis* in the population.

As a rule, currently in Russia and around the world for TB control «extensive» indicators reflecting the proportion of registered TB patients with MDR TB among different types of patients are used. As will be shown, in the Russian Federation four indicators are used:

– the proportion of MDR TB among new MbT+ RTB cases (from Form No. 33),
– the proportion of MDR TB among new PTB cases, with MDR determined prior to the start of treatment, in patients who have been examined by drug susceptibility test (DST) (from Form No. 7-TB),
– the proportion of MDR TB among relapse PTB cases, with MDR determined prior to the start of treatment, in patients who have been examined by DST (from Form No. 7-TB), and finally
– the proportion of MDR TB among all RTB patients registered by the end of the reporting year (from Form No. 33).

The first three indicators show the potential complexity of organization of the treatment of newly diagnosed patients, and can be used to predict the effectiveness of treatment and planning appropriate treatment plan.

Presently, no indicators are used in the country that would allow for the assessment of proportions of MDR TB among both all re-treatment cases and separate types of re-treatment TB patients registered for chemotherapy in compliance with the executive order [16] (patients with treatment failures, defaults, etc.). The proportion of MDR TB among all RTB patients (determined by Form No. 33) does not allow for differentiation data by re-treatment cases alone (i.e, excluding new cases), by re-treatment cases without relapses, etc. These data are not available in Form No. 7-TB either.

The features of Form No. 33, as well as the rules of the registration of MDR TB are such that in calculation of the percentage of MDR TB among new TB cases based on these, the denominator includes all new MbT+ RTB cases, regardless of whether drug sensitivity test was performed. As the proportion of MbT+ patients for whom DST was performed is significantly below 100% (see below), the evaluation of prevalence of MDR TB among new TB cases, calculated by data of Form No. 33 is underestimated. Moreover, calculation of this indicator is done among all MbT+ patients, regardless of whether they had culture, i.e. patients with MbT+ confirmed only by microscopy are also taken into account. Finally, instructions to the form do not indicate at what stage of treatment test should be done. As a result, the reporting form has data not only on new cases with primary MDR TB (i. e. who had DST before treatment, or within a month after the beginning of treatment) and those who had MDR TB diagnosed during the course of treatment (one month more after beginning of the treatment). Thus, Form No. 33 does not allow determining the countrywide rate of the primary MDR TB, defined as the proportion of MDR TB among new MbT+ TB cases not previously treated or treated with first-line drugs for less than 1 month [20, 46].

These drawbacks may be avoided if calculation of this indicator (proportion of MDR among new TB cases) is made by Form 7-TB, implemented in Russia according to the RF MoH executive order [16] in 2004–2005.

This form includes information on the number of patients who received DST, which is used as the denominator to calculate the proportion of patients with MDR TB. Besides, in accordance with the instruction and structure of the registration Form No. 01-TB, which is used as a baseline for reporting Form No. 7-TB, the latter includes data on the number of DST performed among new TB patients before treatment, or less than 1 month after the start of treatment, and on the number of new MDR TB patients detected before treatment, or less than 1 month after the start of treatment. This information reflects the level of primary MDR TB. In addition, the Form No. 7-TB allows calculating the proportion of MDR TB for the PTB, as is accepted in the world, not only for the RTB, as is the case when using the indicator of the Form No. 33.

This form is collected in TB control facilities in the subjects (territories) of the Russian Federation and in FSIN institutions (see Chapter 1); however, later in this chapter information is provided only on the basis of Form No. 7-TB from territorial institutions, i.e. for the civilian population. This is due to still insufficient use of the reporting Form No. 7-TB by FSIN for collection of data on DST. Information about MDR TB in FSIN institutions is collected using separate internally approved forms. The results of the analysis of the data from these forms are given in Chapter 6 of the review.

The fourth extensive indicator, the proportion of patients with MDR TB among all registered TB patients, reflects the overall severity of the spread of MDR TB in the population. This extensive indicator, as the absolute number of MDR TB, is important to know for the organization of treatment and assessment of the economic costs of treating patients in this category.

The proportion of patients with MDR TB among all TB patients can be evaluated in the Russian Federation only on the basis of the reporting Form No. 33. In accordance with the structure of the reporting form, the indicator can be calculated only for RTB patients, regardless DST performance for these patients. It is important to note that the quality of collected statistical data on MDR TB among all TB patients in the regions of the Russian Federation is still not high enough. This is due to the current problems in the laboratories, and the organization

of testing, use of the results, as well as registration of MDR TB cases. Currently there is no protocol and regulations on the rules of MDR TB registration. In Russia there are no approved instructions describing the required frequency of DST during TB treatment, or ensuring DST at registration for re-treatment courses and dispensary follow-up, particularly in patients with chronic forms of tuberculosis. No unified recording forms for registration of DST results, and, as noted above, there are contradictions in the reporting forms regarding patients with MDR TB. In these conditions, some regions can only provide information on the number of MDR TB strains obtained from patients, but not the total number of patients with MDR TB.

An analysis of extensive indicators, calculated as a percentage of MDR TB among the various categories of TB patients, have a great organizational and epidemiological significance. Their growth means that the region may have problems with the required level of effectiveness of treatment for TB patients. Solving these problems requires certain organizational and treatment interventions, as well as additional funding.

Recent publications in Russia note the use of intensive indicators (per 100,000 population): the number of patients with MDR TB among new TB cases patients detected by the end of the year and the number of patients with MDR TB among all registered patients at the end of the year [8]. These indicators are focused on the social significance of this form of the disease.

The number of patients with MDR TB among all new TB patients per 100,000 population is an epidemiological indicator showing the rate of occurrence of new cases of MDR TB among the healthy population from transmissibility resulting from the treatment of infections and as a result of inadequate measures of infection control.

And finally, the prevalence of MDR TB (the number of patients with MDR TB who are registered at the end of the year, per 100,000 population) allows to assess the extent of the source of MDR TB in the territory. Unlike the WHO/The UNION Global Project on anti-tuberculosis drug resistance surveillance (see below Section 8.4), in which this indicator is not calculated and includes only the estimation of the proportion of MDR TB cases among all TB patients, the TB dispensary-bases registration system in the Russian Federation allows for a more accurate calculation of the prevalence of MDR TB in the population. The value of this indicator (together with the absolute value of MDR TB, and their proportion in different categories of TB patients) for the reporting time is an essential information for planning of management and treatment activities and assessment of the financial costs for dealing with the current situation.

The applicability and value of some indicators can be illustrated by the scheme in Fig. 8.1. As has been said, in general, the speed of increasing of MDR TB rate depends on the adequacy of treatment and effective

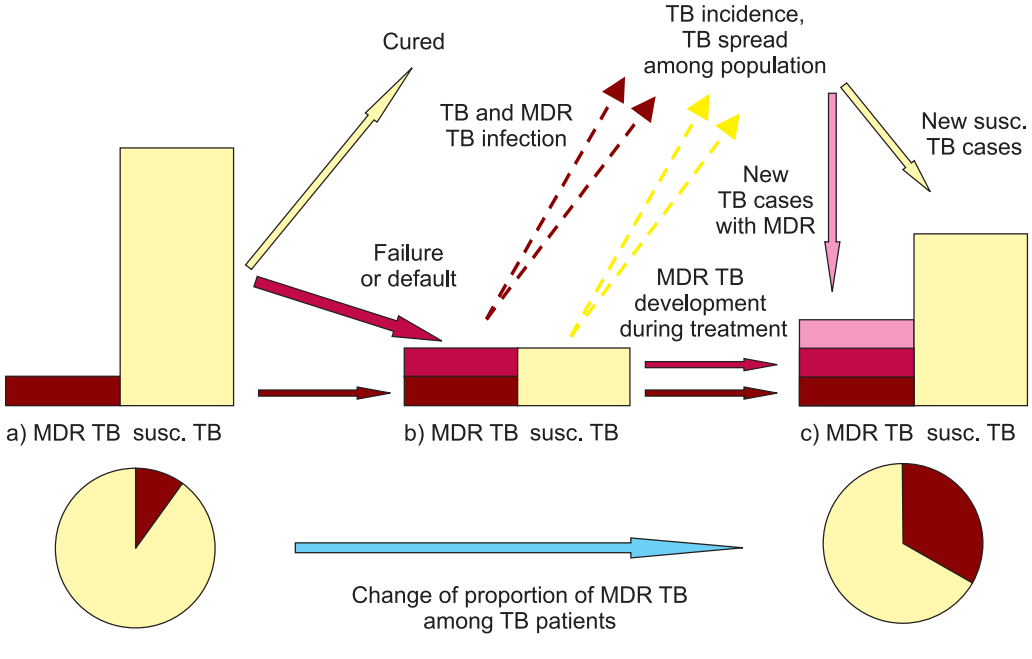


Fig. 8.1. The scheme of epidemic process of MDR TB transmission in conditions of effective treatment with first-line drugs. a) before treatment, b) the result of effective treatment of drug-sensitive TB patients with first-line drugs, c) the spread of MDR TB in the population. «susc.TB» drug susceptible TB

infection control. At the same time, increase of the proportion of MDR TB can occur not only because of inadequate and ineffective treatment, but even given the successful treatment of drug-sensitive tuberculosis because of elimination («washing out») of drug susceptible TB from the population of patients (see Fig.8.1a and Fig.8.1b). Figure 8.1b shows that, after f a certain number of patients with drug susceptible TB had been cured by first-line drugs, there are some MDR TB patients who remain in the region (excluding died and transferred), and cases of MDR TB (number of which depends on adequacy and efficiency of therapy) emerged as a result of treatment are added.

Then (see Fig. 8.1c), in the absence of appropriate treatment of patients with MDR TB and poor infection control, new patients with drug-sensitive TB emerge, and at the same time the proportion of new patients infected with MDR TB is increasing.

This scheme shows that the proportion of MDR TB spread among TB patients does not always reflect the real change in the situation. This indicator should consider combined with the absolute numbers of patients who got MDR TB and with the intensive indicators of MDR TB prevalence (per 100,000 population).

8.2. MDR TB among new TB cases

According to the Form No. 33 in the Russian Federation from 1999 to 2008 has been an increase in the proportion of MDR TB among all reported new MbT+ RTB cases (from 6.7% to 10.7%; Fig. 8.2). In 2008, 4,700 new MDR TB cases were registered (4.056 and 4,149 in 2006 and 2007, respectively). Increase of this indicator, particularly in early 2000, can reflect not only the increase in the proportion of TB resistant to the first-line anti-TB drugs, but also improvements in the quality of laboratories' work and registration of cases of MDR TB, i. e. improving of the detection of patients with MDR TB.

Primary MDR TB rates based on the MoH&SD reporting Form No. 7-TB, shows that in 2008 13.6% of new PTB patients had MDR TB before treatment (see Fig. 8.2). This form shows that 33,241 PTB patients had DST performed in the reported year in the Russian Federation, and 4,656 patients had MDR TB detected. Proportion of MDR TB among cases calculated from data on Form No. 33 and Form No. 7-TB has some difference, which is due not only to the fact that Form No. 33 contains data on MDR TB among RTB patients and Form No. 7-TB – among PTB patients, but also it is associated with some differences in the instructions about filling these forms, and with so far inadequate quality in collecting these data (see below).

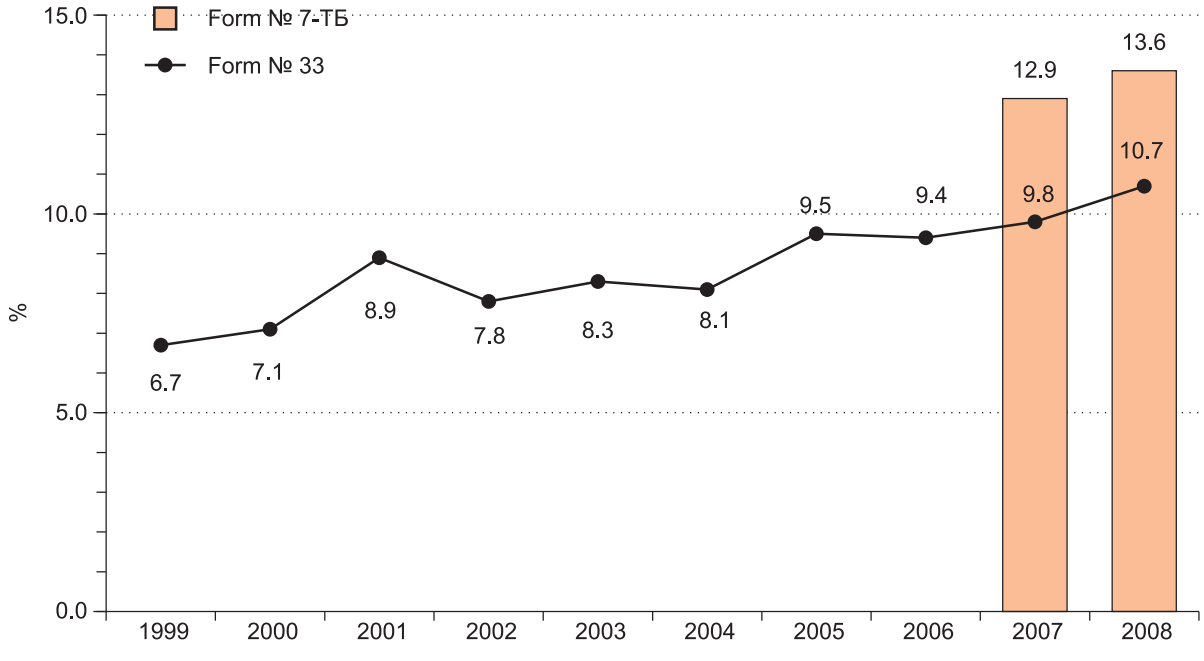
In penitentiary system facilities[69], this indicator was 20.2% (according to Form No. 7-TB, 405 MDR TB were detected in 2008 among new TB patients who had DST).

The proportion of MDR TB among new TB cases calculated from data on Form No. 33 and Form No. 7-TB has a significant variation in the territories (see fig. 8.2b and 8.3–8.6).

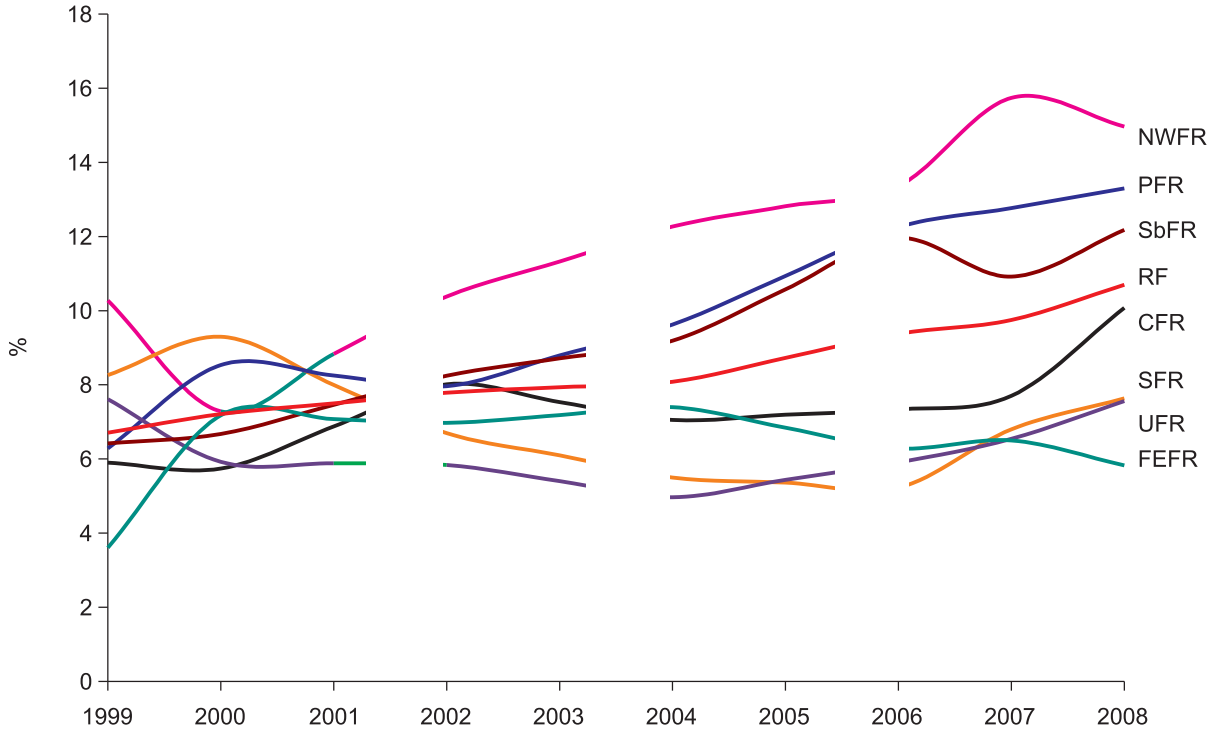
Thus, the highest rate of MDR TB in the subjects of the Russian Federation is registered in NWFR, PFR and SBFR. This indicator in these Federal Regions over the past 5–6 years exceeded the nationwide rates and determined its increase countrywide (Fig. 8.2b). In 2008, in NWFR, PFR, and SbFR the following rates of MDR TB among new RTB cases were registered (Form No. 33): 15.0%, 13.3% and 12.2%, respectively (Fig. 8.3). It should be noted respective high rates of MDR TB incidence in Siberia (more than 6 per 100 thousands) and in the territories of NWFR, PFR and FEFR (3–4 per 100 thousand population). This suggests high risk of MDR TB acquisition in these regions. The proportion of new PTB patients with MDR TB from new patients with performed DST in NWFR, PFR, and SbFR was 19.7%, 16.0% and 13.5%, respectively, in 2008 (see fig. 8.4).

In 2008, the highest rates of MDR TB among new MbT+ cases with performed DST (according to Form No. 7-TB) were registered in Murmansk (28.3%), Pskov (27.3%), Samara (27.2%), and Arkhangelsk oblasts (23.8%), in the republics of Karelia (29.9%), Tyva (27.7%), Komi (25.9%), Kalmykia (25%), Khakassia (24.2%), and Yamalo-Nents AO (26.3%). The territories in NWFR have the highest MDR TB rates among new TB patients. In 2008, among 11 subjects of the Russian Federation with the highest value of the indicator, four subjects were parts of NWFR (NW Federal Region includes total ten territories).

[69] Data from 62 subjects of the Russian Federation.



A) The Russian Federation (Sources: Forms No. 33 and No. 7-TB)



B) By the Federal Regions. (Source: Form No. 33)

Fig. 8.2. Changes in the proportion of patients with MDR TB in new TB cases. The Russian Federation and the Federal Regions, 1999–2008[70]. Source: Form No. 33 (the percentage to RTB MbT+ patients confirmed by culture), Form No. 7-TB (the percentage to patients with PTB MbT+ patients confirmed by culture and had drug sensitivity test performed)

[70] Data for the Federal Regions for 2001, 2003 and 2005 are not given since the value of the proportion of MDR TB in these Regions had a significant impact from inflated figures from the Form No. 33 in the following territories: in 2001 - Krasnoyarsk region (4 times excess of the usual value of indicator during one year), 2003 - Volgograd and the Chita region (iexcess of 2.5-4 times), in 2005 - Primorsky and Khabarovsk Krai (excess of 2 and 55 times). The validity of the registration of the above values of MDR TB in the form of #33 requires clarification.

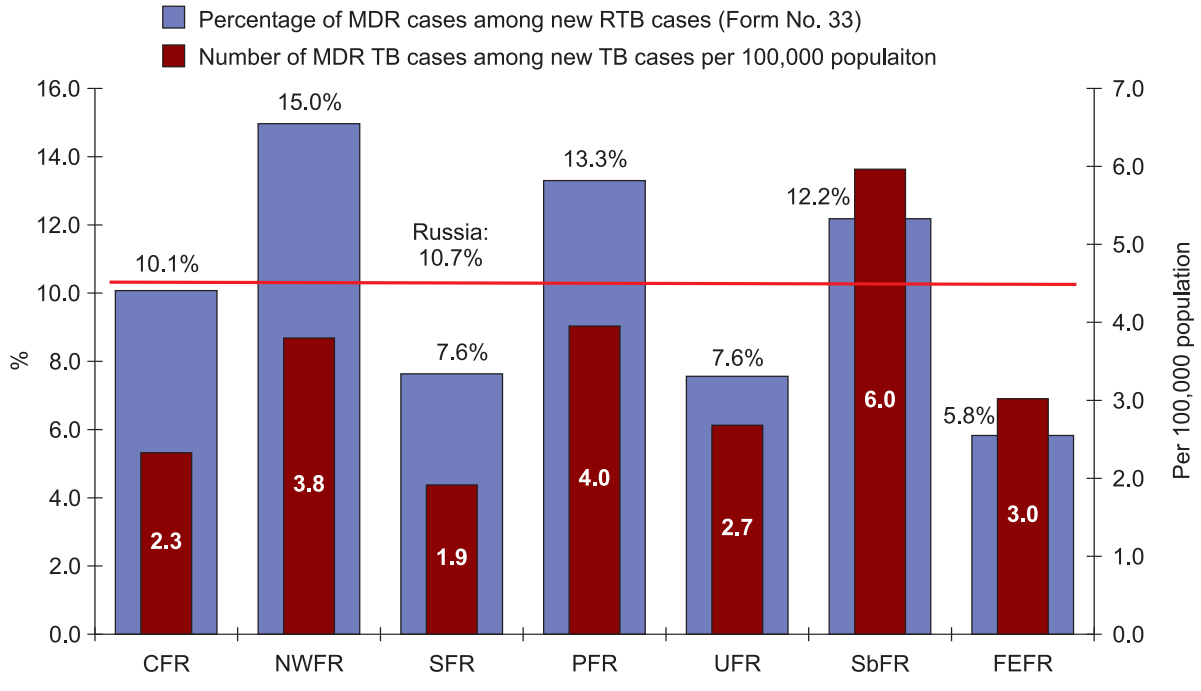


Fig. 8.3. MDR TB notification rate among new TB patients per 100,000 population and prevalence of MDR TB among new RTB cases, 2008, the Federal Regions of the Russian Federation. (Sources: Form No. 33, the population: Form No. 1)

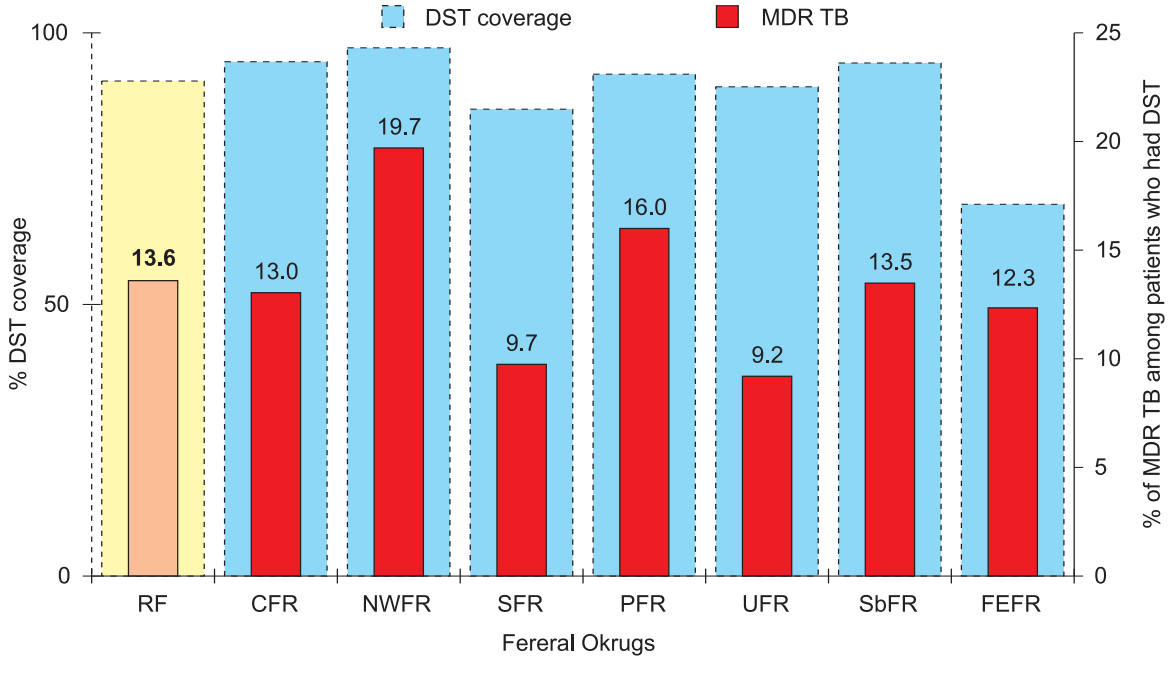
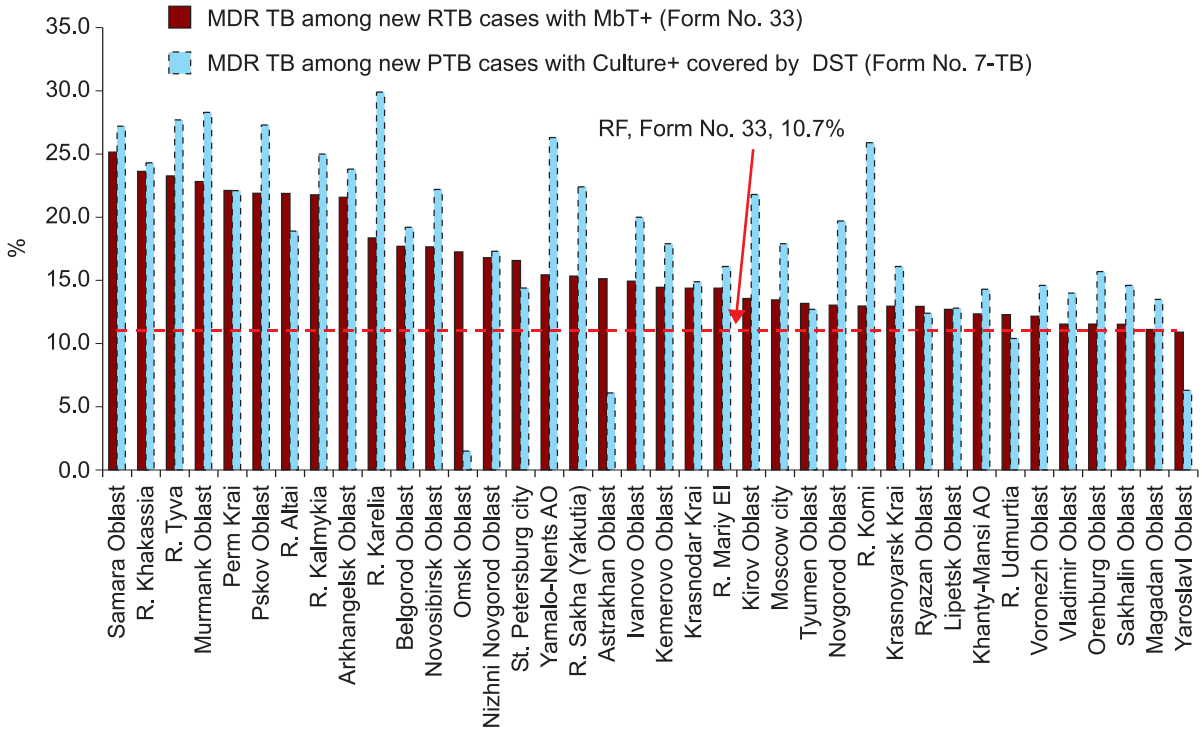
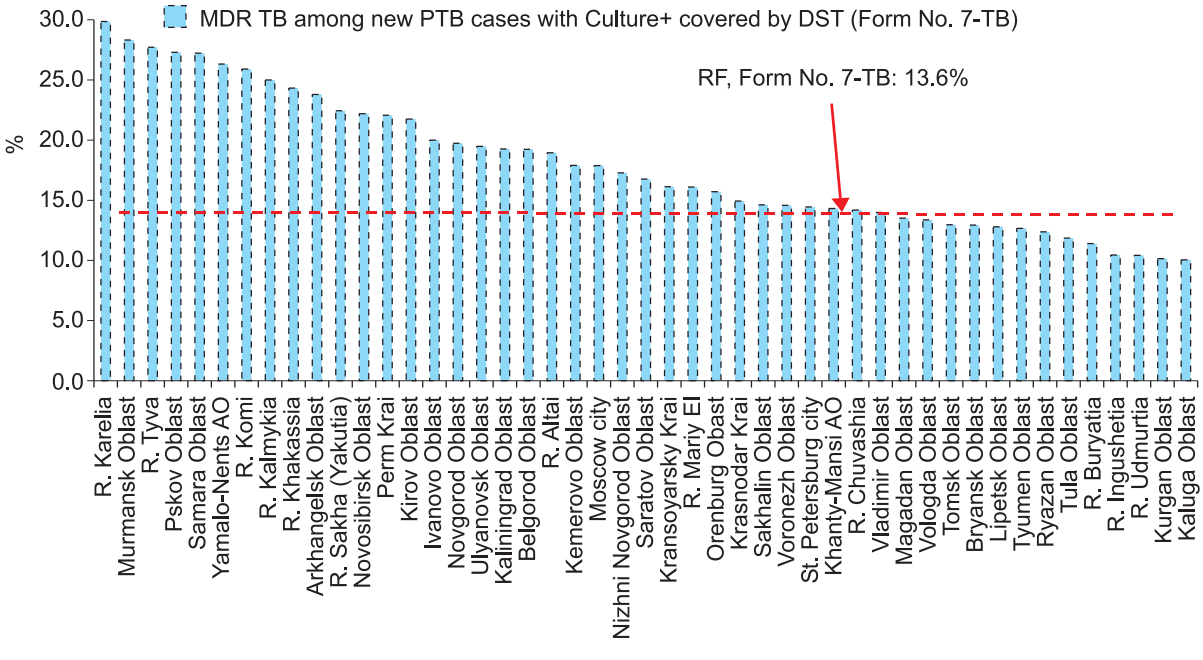


Fig. 8.4. Coverage for drug sensitivity tests (DST) of MbT+ patients and prevalence of MDR TB among new TB patients with pulmonary tuberculosis who had DST, 2008, Federal Regions and the Russian Federation. (Source: Form No. 7-TB)

Fig. 8.6 shows the subjects of the Russian Federation, in which 80% of total number of MDR TB cases among the new TB patients in the country are recorded. Given that the treatment of patients with this form of TB requires a significant investment in second-line drugs and specific activities for the management of treatment, shown information is important for planning the allocation of adequate financial resources and activities to enhance the skills of existing staff. Seven subjects are notable from this list, since more than a third of all patients with MDR TB in



A) Subjects of the Russian Federation with the proportion of MDR TB more than 10% among new RTB cases in comparison with data from form Np. 7-TB(Source: Forms No. 33 and No. 7-TB)



B) Subjects of the Russian Federation with MDR TB values more than 10% among new PTB cases with performed DST (Source: Form No. 7-TB). The graph includes territories with DST coverage of new PTB cases at least 60% and the proportion of MbT+ confirmed by culture in new PTB cases exceeding 30%

Fig. 8.5. The subjects of the Russian Federation with the highest prevalence of MDR TB among new TB patients[71], 2008. (Sources: Form No. 33 and Form No. 7-TB)

[71] The graph includes territories with more than 5 registered patients with MDR TB during 2008.

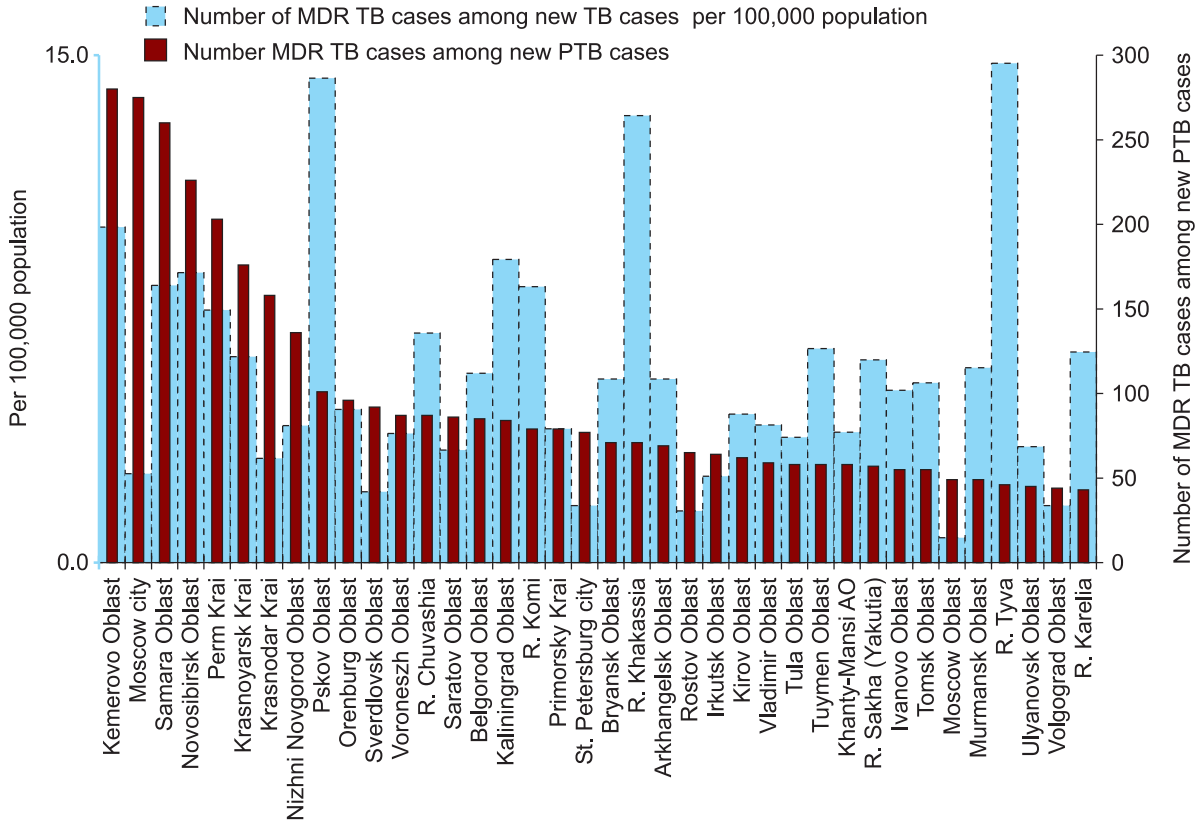


Fig. 8.6. Subjects of the Russian Federation, with the highest number of reported cases of MDR TB among new PTB cases before treatment (including 80% of all MDR TB cases among new TB cases in the Russian Federation). Blue columns indicate the MDR TB values for newly detected cases per 100,000 population in these territories. 2008. (Source: Form No. 7-TB)

the Russian Federation are registered there: Kemerovo, Samara, Novosibirsk oblasts, Krasnoyarsk and Krasnodar Krais and Moscow city (total for permanent population, migrants and homeless people).

The process of registration of new TB cases with MDR TB in the national reporting forms has not yet been polished, which affects the quality and variability of the data in Forms No. 33 and No. 7-TB. Due to various methodological approaches to data collection, Form No. 7-TB compared to Form No. 33 allows for more accurate calculation of the indicator of MDR TB spread among new TB patients in compliance with the internationally accepted practice (this also concerns the indicators used for assessments of the quality of laboratory confirmation of TB):

1) Form No. 7-TB contains information about the number of MDR TB cases among PTB patients and the number of new and relapse TB patients who had DST. The data from this reporting form can be used for an accurate calculation of the internationally accepted indicator – the proportion of new and relapse PTB cases among patients who had DST[72].

Form No. 33 is more limited, because it allows only for the calculation of proportion of MDR TB cases among MbT+ RTB patients, without selecting (a) PTB cases, (b) cases with MbT+ confirmed by culture (i.e. excluding MbT+ cases confirmed by bacterioscopy), and (3) patients who had DST.

2) Since report based on is prepared by the end of December of the reporting year, Form No. 33in the section on MDR TB may not include data on patients with MDR TB detected in the last 3 months of the year. The DST results for such patients will be received only in the next year after the report has been prepared and submitted. Meanwhile, the table in the annual reporting Form No. 7-TB, which includes data on MDR TB (No.2000), is prepared and submitted in the second quarter of the year following the reporting year, and Form No. 7-TB, contrary to Form No. 33, includes data on all the patients with MDR TB diagnosed and registered throughout the reporting year.

3) In accordance with the filling instruction for Form No. 7-TB, it contains information on the new TB patients who had DST performed BEFORE treatment. This allows for calculation of the noted above indicator in compliance with the international practices, which is epidemiologically significant and reflects MDR TB prevalence in the population, i.e. MDR before treatment. Such requirement is not included in the instruction on filling Form No. 33.

[72] In other words, among culture-confirmed MbT+ patients who had DST.

In reporting forms received from many territories Form No. 33 contains data on all the MDR TB cases among patients included in the category of «new detected cases», regardless of the time when the material was collected in which multi-drug resistant *M. tuberculosis* were detected – before or during the treatment course. Occasionally, Form No. 33 includes data on «suspected for TB» cases and patients with the so-called «clinical MDR TB».

The first two differences between these forms in the collection and presentation of data lead to the underestimation of indicators calculated by Form No. 33 as compared to Form No. 7-TB. The third difference causes overestimation of indicators completed in Form No. 33.

It should be noted that some underestimation of MDR TB data may be found in Form No. 7-TB, which may be caused by organizational and methodical problems because of the poor collaboration between the staff (statisticians), organizational and methodological divisions (OMD which are TB management and statistical departments of regional TB dispensaries) and laboratory services (information on DST coverage and DST results is received in OMD not complete or received late).

All these factors result in variations and inconsistency of new MDR TB patient data contained in Form No. 33 and Form No. 7-TB, i.e. the data presented in these report forms are different (Fig. 8.5a).

Nevertheless, it should be noted that in spite of all the drawbacks, the relatively stable structure of Form No. 33 allows for performing analysis of long-term trends in MDR spread among new TB cases and TB patients registered in TB control facilities in the subjects of the Russian Federation. Data received from Form No. 7-TB may be used for assessments of changes in MDR TB values only in the last 2–3 years.

This means that more efforts are necessary for improving the quality of work of bacteriological laboratories and improving the statistical system of registration and collection of information on MDR TB in Russia's regions and the implementation of the country's ongoing monitoring of the quality of laboratory examinations and data collection.

MDR TB rates in Russia's regions are quite high (the Russian Federation data compared to other countries – see Section 8.4). The main reasons for such high rates in the Russian territories include the following:

– Problems with TB treatment organization in previous years (see Chapter 5), in particular, the high level of treatment interruptions, and violation of standard regimens of treatment,
– A significant number of TB patients with chronic forms of the disease registered in the Russian territories (see Chapter 4), as a result of ineffective treatment,
– Inadequate infection control in healthcare settings and in the organization and implementation of anti-epidemic measures at the local level;
– The lack in territories of an effective drug policy on the availability and applicability of anti-TB drugs of proven quality.

8.3. Prevalence of MDR TB among TB relapse and all TB patients in the Russian Federation

In addition to the spread of MDR TB among new TB cases, the reporting forms used in Russia allow to calculate (a) spread of MDR TB among TB relapse patients at the time of diagnosis and registration for treatment, and (b) MDR TB spread among all TB cases at the end of reporting year.

With a high DST coverage of relapse cases (88.2%), in 2008 the proportion of MDR TB cases in TB control facilities in the subjects of the Russian Federation was 28.8% – 1580 MDR TB cases in 5,489 examined patients with TB relapse (Fig. 8.7, data from Form No. 7-TB). In the penitentiary system facilities – 34.9% (319 MDR TB cases in 915 examined patients with TB relapse, data from Form No. 7-TB).

As indicated above, in Russia the spread of MDR TB among all TB patients is calculated with the extensive indicator (the proportion of such cases among all RTB patients registered at the end of the year), and with the intensive indicator (MDR TB prevalence per 100,000 population).

According to Form No. 33, the number of all patients with MDR TB and their proportion among RTB patients continues to increase: in 2008 were registered 26,448 cases of MDR TB[73], and their proportion was 23.4% (Fig. 8.8 and 8.9). There is considerable variation in indicators' values in the country – from 3% to 66.7% of patients with MDR among RTB patients. Half the subjects of the Russian Federation have proportion of MDR TB from 17.8% to 32.2% (25% and 75% quartiles[74]). The highest proportion of MDR TB among RTB patients (from 41 to 45%)

[73] For technical reasons, data from Ivanovo Oblast was not included in here. With Ivanovo Oblast, the total number of MDR TB patients at the end of 2008 was 26,719.

[74] 25% and 75% quartiles indicate the limits of smaller values were registered in 25% and 75% territories, accordingly, i.e. values within 25% and 75% quartiles were registered in half the subjects of the Russian Federation.

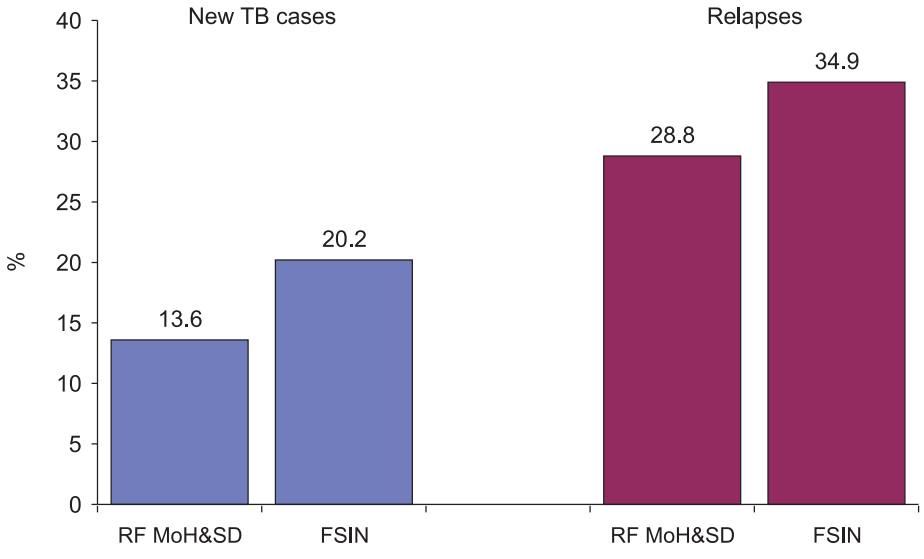


Fig. 8.7. The proportion of MDR among new and relapse PTB patients who has DST (Sourse: Forms No. 7-TB received from MoH&SD and FSIN)

were in Novgorod, Arkhangelsk oblasts, the Republics of Altai and Tyva, Murmansk, Pskov, Tomsk, Belgorod oblasts, and the Republic of Khakassia.

At the same time it should be noted that the value of this indicator depends not only on the number of MDR TB patients registered at the end of the year (the numerator), but also on the total number of TB cases including chronic patients (the denominator in the calculation formula). This is why a high value of the indicator (the proportion of MDR TB among all registered MbT+ RTB patients) may also be observed due to effective work of laboratory service in detecting MDR TB cases accompanied with successful treatment outcomes in dispensary facilities resulting in reducing the overall number of registered TB patients. Consequently, the proportion of MDR TB among registered TB patients may increase. In such cases it is worthwhile to use the intensive indicator, i. e. MDR TB rate per 100,000 population.

For example, although the above-mentioned high proportion of MDR TB among all TB patients in Belgorod Oblast (41.4%) significantly exceeds the countrywide indicator (23.4%), the number of MDR TB cases per 100,000 population is quite comparable with the nationwide data (21.9% and 18.6%, respectively).

It may be also assumed that the significant grow of the proportion of MDR TB cases among RTB patients in 2004–2008 (Fig. 8.8) may be associated with the a considerable decrease of the total number of TB patients during this period, which is denoted in the denominator of the calculation formula for this indicator (see Chapter 4). Anyhow, in Fig. 8.8 there is also a pronounced growth of MDR TB prevalence per 100,000. But this indicator does not depend on the total number of TB patients.

The highest proportion of MDR TB among RTB patients in 2008 were reported in NWFR (34.1%), PFR (27.2%) and SbFR (27.0%), whole the MDR TB prevalence in the population – in SbFR and FEFR – 33.8 and 22.8 per 100,000, respectively (Fig. 8.10).

Fig. 8.11 shows data on 38 subjects of the Russian Federation, which account for 80% of all MDR TB patients registered in the country at the end of 2008. This information is important for the allocation of resources for acquisition of expensive second-line TB drugs and for relevant activities in the organization of treatment for MDR TB patients. The graph shows marked in green 12 territories, whose applications for the purchase of medicines through international funds have been approved by the Green Light Committee (GLC)[75] (5,814 registered cases of MDR TB). In addition to the territories shown on the graph, another 13 areas (in which 12,063 MDR TB patients have been registered) will receive second-line drugs through the GLC, while application from 1 more territory is under consideration (78 registered MDR TB patients).

[75] GLC is a group of independent international experts on policy, research and clinical aspects of tuberculosis. One of the activities is to increase the availability of expensive second-line drugs needed to treat MDR TB. Reduced prices for these drugs has been made possible through close cooperation GLC with pharmaceutical companies.

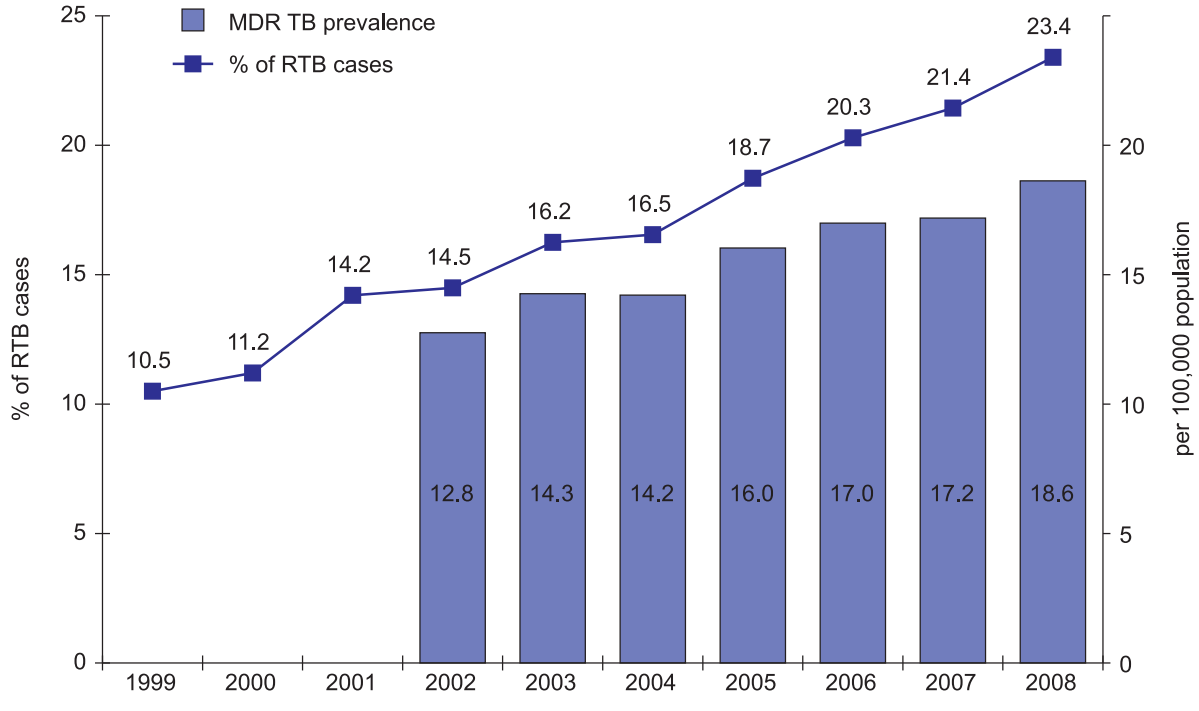


Fig. 8.8. Multi-drug resistance among all MbT+ RTB patients, the proportion among RTB cases and prevalence per 100,000 population, the Russian Federation, 1999–2008
(Source: Form No. 33)

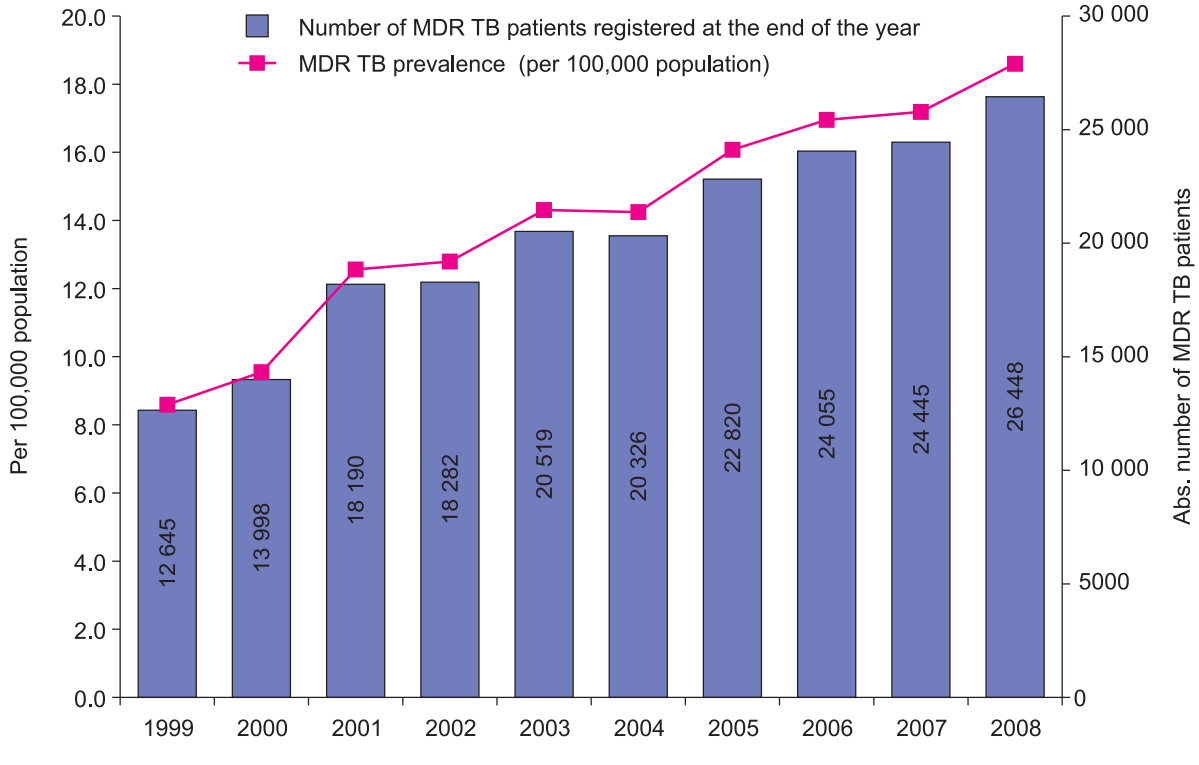


Fig. 8.9. The number of patients with MDR TB and MDR TB prevalence in the Russian Federation in 1999–2008
(Source: Form No. 33)

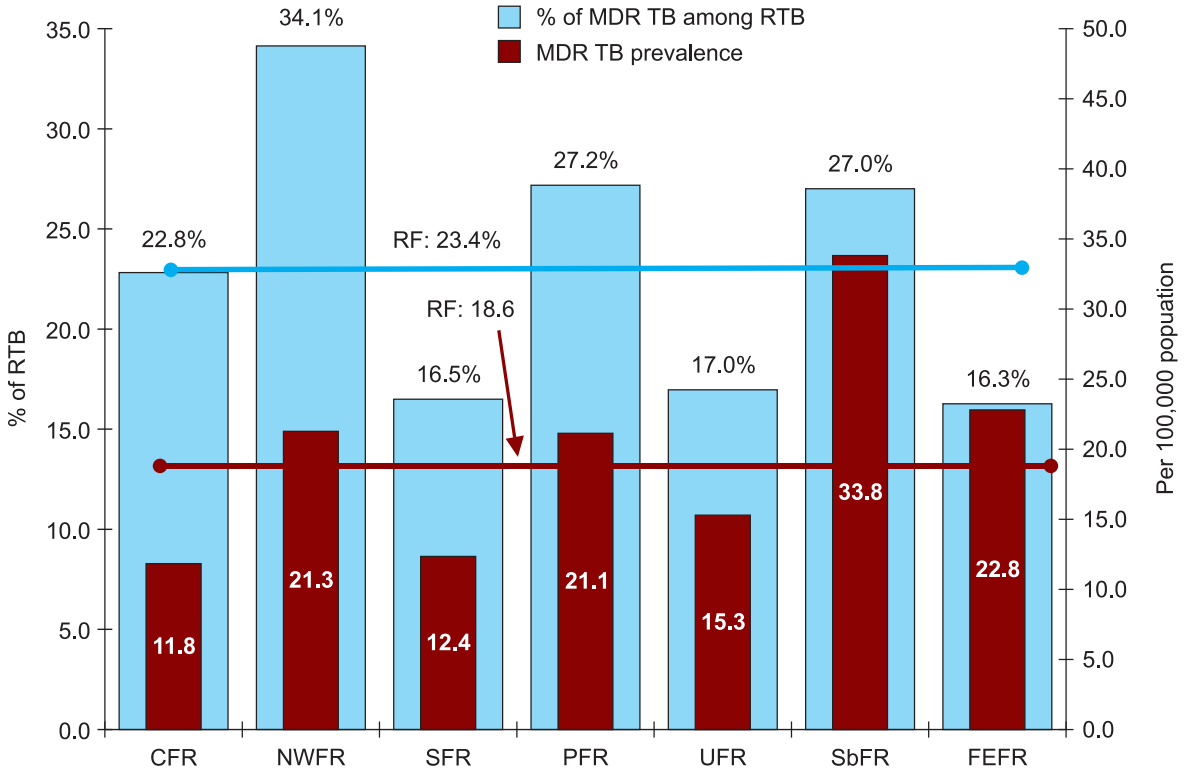


Fig. 8.10. The proportion of MDR TB among MbT+ RTB patients and prevalence of MDR TB in the Federal Regions of the Russian Federation, 2008. (Source: Form No. 33; population – Form No. 4)

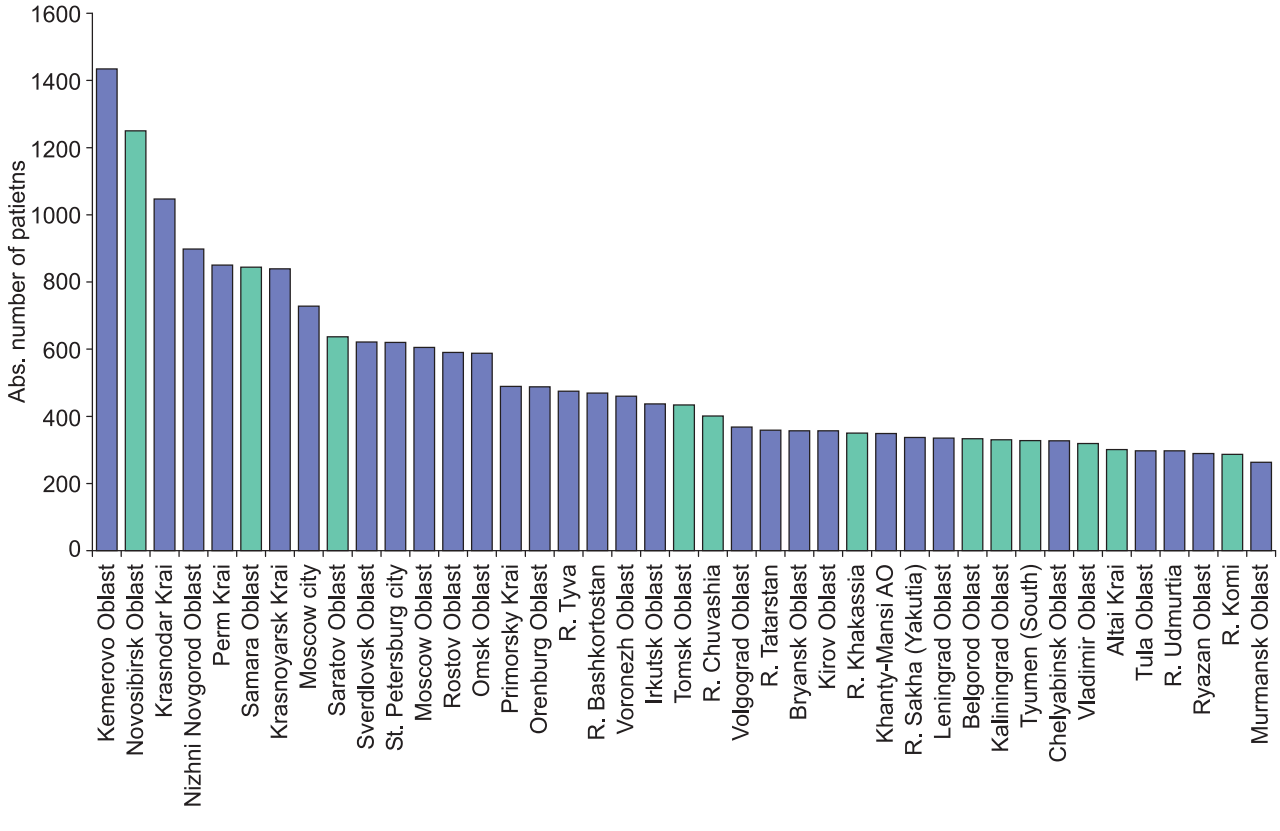


Fig. 8.11. Subjects of the Russian Federation with highest numbers of MDR TB patients registered at the end of 2008 (80% of all patients with MDR TB in the Russian Federation). Territories with applications approved by GLC by the end of 2008 are marked in green; territories applying to the GLC are marked in green. (Sources: the number of patients with MDR TB – Form No. 33; GLC applications data – WHO TB control program in the Russian Federation)

8.4. Estimation of MDR TB spread in the world

The calculation of indicators related to the spread of MDR TB (and the spread of drug-resistant TB in general) in different countries, regions and in the world is characterized by substantial limitations in terms of quality and completeness, as compared to the other basic indicators for TB. This problem is primarily connected with the fact, that most countries do not have necessary technical and financial resources for performing DST of the required quality and quantity.

This is why for calculations of MDR TB spread in the world the World Health Organization uses both data from special sampling surveys of DR TB spread and routine data collection by TB surveillance systems, and the mathematical estimation of MDR TB spread based on a special mathematical model.

In 1994, on the initiative of WHO and IUATLD (The UNION), the WHO/IUATLD Global Project on anti-tuberculosis drug resistance surveillance was started. The Global Project is aimed at the assessment of DR TB spread in the world («the global burden of drug-resistant TB») by special standardized methodologies, which allows for an adequate comparison of the situation with anti-tuberculosis drug resistance in different countries and regions. The Global Project controls trends in the drug-resistant TB spread, evaluates the effectiveness of anti-tuberculosis activities in combating MDR TB, and other aspects related to the DR TB problem. Global Project reports are published every three-four years. It is assumed that this period of time is required for planning, organization and implementation of studies on DR TB problem in individual countries. Four Global TB drug resistance reports have been issued since that time (in 1997, 2000, 2004 and 2008). If the first three reports included data on 35, 58 and 77 countries, respectively, the 4th Report includes data collected in 2002–2006 in 81 countries and 2 administrative territories in China. These countries contribute 35% of the total reported number of new ss+ TB cases.

In calculations of MDR TB spread in different countries, the Global Project considers 3 indicators:

– the proportion of MDR TB cases registered before treatment among new TB patients who never received treatment from TB or received treatment for less than 1 month (in addition to new TB cases this category also includes patients who got registered as TB case earlier in another reporting period, but never started treatment or received treatment for not more than one month before having DST)[76],
– the proportion of MDR TB cases registered before treatment among patients who received treatment earlier for more than one month (relapses, patients on treatment after treatment failure, treatment interruption, and other re-treatment cases),
– the summarized indicator calculated from the proportion of MDR TB cases registered before treatment among new cases and the number of patients registered for re-treatment..

In all cases the denominator shows the respective number of patients who had DST.

In should be noted that, according to WHO guidelines [39, 40], in the calculation of the first indicator (the proportion of MDR TB cases among patients who never received treatment or received treatment for less than 1 month), DST results are taken into account only if materials for tests were collected before treatment.

It is also important to note that considering the fact that most countries do not have developed systems of dispensary follow-up of patients, the calculations of MDR TB spread among patients on re-treatment include only test results with confirmed incident MDR TB (i.e. diagnosed for the first time) when the patient is registered for re-treatment course. This is why the Global Project methodology does not include calculations of drug resistance spread indicator for the total number of MDR TB patients regardless whether drug resistance was diagnosed in the beginning of treatment, during treatment or at the end of chemotherapy course. The lack of data on the overall number of MDR TB patients does not allow for the direct application of research results to the calculation of requirements in second-line drugs.

The Fourth Global TB drug resistance report WHO/IUATLD [46] published the latest data on the spread of drug resistant TB (particularly MDR TB) received from countries around the world on the basis of information ongoing routine data collection systems for MDR or special sampling studies. The survey data from 2,509,545 cases of TB from 114 countries[77] were obtained and processed, and the following weighted average population rates[78] of MDR were received: for new cases – 2.9% (95% CI[79] 2.2–3.6), for re-treatment cases –- 15.3% (9.6–21.1), for all cases – 5.3% (3.9–6.6).

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[76] Initially, ss+ TB patients are included in studies on DR TB spread in accordance with the protocol [46].

[77] Covered 49% of the world's population.

[78] In calculations, the notion of global population weighted proportion is used. Considering a significant population difference among countries, the calculation of MDR TB proportion among new cases in the WHO Regions and for all countries, the analysis does not include the actual number of registered MDR TB cases and DST coverage. Thus, if the global population weighted proportion is not uses, then according to the data in [41] (see Table.8.2), the worldwide proportion of MDR TB among new TB cases would be 7.8%, not 2.9%, as indicated in [46].

[79] CI – confidence interval.

According to WHO data [41], in 2007 the worldwide number of laboratory confirmed MDR TB cases was 29,708. Those included 16,062 cases (54%) registered in the WHO European Region and 8,772 (about 30%) in the African countries. It was noted in [41] that only 3,681 MDR TB patients started treatment in GLC-approved programmes and projects.

Fig. 8.12 and Table 8.1 show MDR TB rates among new and re-treatment cases of tuberculosis in areas where those exceed 6% and 30%, respectively. Among those areas three are the subjects of the Russian Federation (Tomsk, Ivanovo, Orel oblasts and the Republic of Mariy El). In these territories the studies on spread of drug-resistant TB were done in accordance with internationally accepted protocols under external quality control for laboratories.

The highest MDR TB rates among new cases in the Global Report were registered for the Republic of Moldova – 19.4% (16.5–22.6) and Baku city (Azerbaijan) – 22.3% (18.5–26.6). For re-treatment patients, the high levels of MDR TB was reported from Estonia – 52.1% (39.9–64.1%), Baku (Azerbaijan) – 55.8% (49.7–62.4%) and Tashkent (Uzbekistan) – 60.0% (48.8–70.5).

The WHO Global Report [41] also noted that the data received from special studies of MDR TB spread were significantly different from the reported data collected by routine systems of MDR TB registration (DR TB surveillance). Consequently, the implementation of such studies is very important for the assessment of the real spread of MDR TB in countries. An exception was the WHO European Region countries, where the results of the studies correlated with the data received from the ongoing routine MDR TB surveillance systems.

Table 8.2 shows data on MDR TB cases among new and re-treatment TB cases registered in national surveillance systems in 2007 [41].

As mentioned above, for most countries of the world, there are no data on MDR TB rates obtained from all the territory, but only some limited information from some areas, or otherwise, the quality of results received from laboratories is very low.

For example, in India and China contributing, according to WHO estimates, 50% of all MDR TB cases in the world, in 2007 there were registered only 146 and 79 MDR TB cases, correspondingly. This is why the World Health Organization uses the mathematical assessment of MDR TB spread among TB patients [48].

Estimation of the number and proportion of MDR TB cases are made among new TB patients (who never received treatment from TB or received treatment for less than one month), and among re-treatment cases (for patients who received treatment for 1 month and more), and in total among all TB cases. MDR TB rate is calculated based on a mathematical model, which includes the following factors in calculation MDR TB rates among new TB cases: epidemiological region (area), gross national income (per capita), proportion of re-treatment TB

Table 8.1

Proportions of notified MDR TB cases depending on the history of treatment in countries and WHO regions, and the territories of these countries. The data were received in a study of drug resistance conducted during preparation of the 4th Global Report of the World Health Organization [46], 1994–2007

WHO region, country	For new TB cases, %	For re-treatment TB cases, %	For all TB cases, %
All world**	2.9 (2.2–3.6)*	15.3 (9.6–21.0)	5.3 (3.9–6.6)
Africa**	1.5 (1.0–2.0)	5.8 (3.9–7.7)	2.2 (1.4–3.1)
America**	2.2 (0.6–3.8)	13.2 (3.5–22.8)	4.0 (1.7–6.2)
East European countries, including	10.0 (3.8–16.1)	37.7 (12.3–63.0)	22.6 (8.6–36.6)
Armenia	9.4	43.2	22.3
Azerbaijan, Baku	22.3	56.8	39.1
Estonia	13.3	52.1 (39.9–64.1)	20.4
Kazakhstan	14.2	56.4	34.1
Latvia	10.8	36.3	15.2
Lithuania	9.8	47.5	19.4
Republic of Moldova	19.4	50.8	41.8
Ukraine, Donetsk	16.0	44.3	25.3
Uzbekistan	14.8	60.0	28.4
Russia, Ivanovo Oblast	12.3	58.1	26.3
Russia, Orel Oblast	8.8	16.7	9.5
Russia, Republic of Mariy-El	12.5	–	–
Russia, Tomsk Oblast	15.0	–	–
Rest of Europe	0.9 (0.5–1.2)	7.7 (5.7–9.8)	1.5 (1.1–2.0)

* 95% confidence interval.

** Global population weighted proportion.

Table 8.2

MDR TB cases among new and re-treatment TB patients diagnosed (registered) in 2007 [41]

Country, WHO Region	Laboratory confirmed MDR TB cases among all TB patients			New cases			Re-treatment cases		
	Patients who had DST	Number of MDR TB cases	%	Patients who had DST	Number of MDR TB cases	%	Patients who had DST	Number of MDR TB cases	%
Whole world	NDA	29,708	NDA	104,281	8,137	7.8	37,263	12,252	32.9
Africa	NDA	8,772	NDA	523	47	9.0	7,043	709	10.1
Europe	NDA	16,062	NDA	76,601	7351	9.6	22,228	8,572	38.6
America	NDA	2,522	NDA	13,061	532	4.1	4,183	1,839	44.0
Armenia	642	125	19.5	429	50	11.7	213	75	35.2
Estonia	381	80	21.0	316	52	16.5	65	28	43.1
Kazakhstan	15,506	5,588	36.0	7,997	1596	20.0	7509	3,972	52.9
Latvia	975	98	10.1	810	58	7.2	165	40	24.2
Lithuania	1,682	314	18.7	1257	126	10.0	425	188	44.2
R. Moldova	2,245	896	39.9	1311	311	23.7	934	585	62.6
Ukraine	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Russian Federation	35,196	5,297	15.1	30,370	3,959	13.0	4,826	1,338	27.7
Germany	3,242	66	2.0	2,998	44	1.5	244	22	9.0
USA	NDA	119	NDA	9274	98	1.1	479	19	4.0
S. Africa	NDA	7,350	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Uzbekistan	848	484	57.1	385	119	30.9	463	365	78.8
India	414	146	35.3				414	146	35.3
China	286	79	27.6	50	13	26.0	236	66	28.0

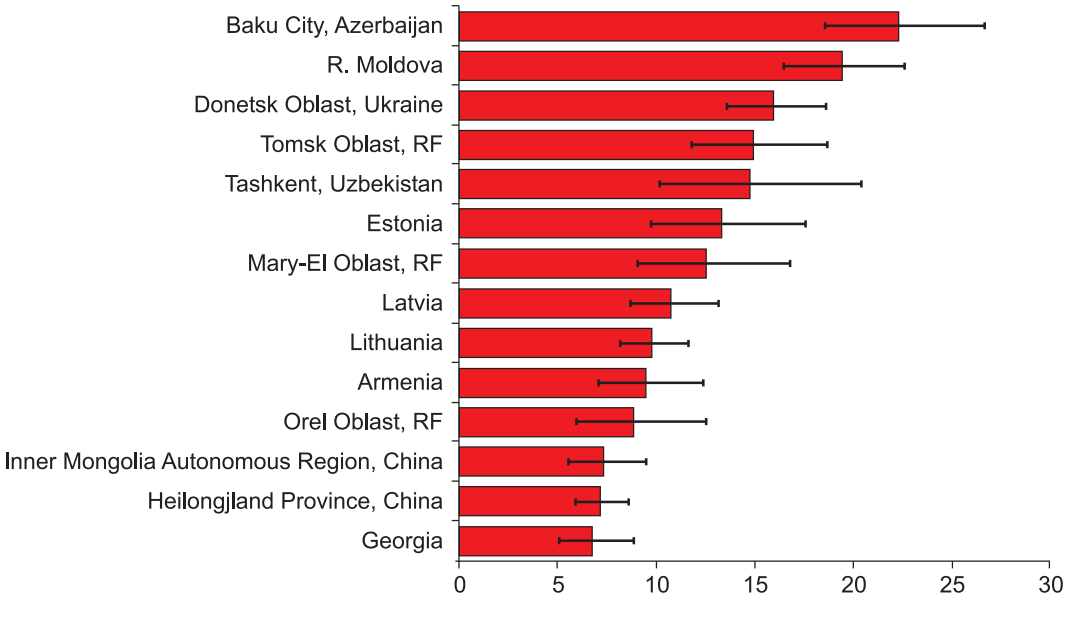

Fig. 8.12. The percentage of MDR TB among new TB cases. Data for 2002–2007 (Source: [46])

Table 8.3

Estimation of MDR TB rate by patient group in some regions and countries, 2007 (based on mathematical model) [41]

All countries, WHO Regions and countries	Percentage of MDR TB among			Number of MDR TB cases among	
	New cases	Re-treatment cases	All TB cases**	All cases	ss+ cases
All countries (113 countries with new TB and cases 102 countries with re-treatment TB cases)	3	19	4.9	510,545	348,602
Europe	10	43	17	92,554	67,440
America	2	14	3.2	10,214	7,261
Africa	2	8	2.4	75,657	45,029
India#	2.8	17	5.4	130,526	99,639
China#	5.0	26	7.5	112,348	76,154
Russian Federation#	13	49	21	42,969	31,397
S. Africa#	1.8	6.7	2.8	15,914	10,708
Kazakhstan#	14	56	32	11,102	9,540
Ukraine#	16	44	19	9,835	5,568
Uzbekistan#	15	60	24	9,450	6,936
Azerbaijan#	22	56	36	3,916	3,109
R. Moldova#	19	51	29	2,231	1,656
Kyrgyzstan#	13	41	17	1,290	813
Belarus#	10	44	16	1,101	758
Georgia#	6.8	27	13	728	590
Armenia#	9.4	43	17	486	373
Lithuania#	10	48	17	464	339
Latvia#	11	36	14	202	129
Estonia#	13	52	20	123	85
27 high burden MDR TB countries	–	–	5.7	435,470	300,496
Peru	5.3	24	–	3,270	2,428
USA	–	–	–	154	–
Germany	1.8	12	–	150	100
United Kingdom	0.7	2.6	–	74	39
Israel	5.7	< 0.05	–	30	13
Czech R.	1.2	30	–	26	20

On the list of 27 high burden MDR TB countries defined by WHO as priority countries, i.e. requiring improvements in the diagnosis and treatment of MDR TB. These countries contribute to 85% of the worldwide cases of MDR TB. In addition to the countries shown in the table, this list also includes Bangladesh, Pakistan, Indonesia, Philippines Nigeria, DR Congo, Vietnam, Ethiopia, Bulgaria, Tajikistan and Myanma.

** Data shown in this column are given from Table 2.10 in the Global Report [41], all other data – from Annex 3 A3.2 to the Global Report [41].

patients to new cases, For re-treatment TB cases, the model is based on the following factors: epidemiological region (area), HIV-infection rate among new TB patients and the rate treatment failure rate in the cohort of new TB cases. Only these factors have been considered statistically significant from the nine factors reviewed [48].

The assessment results are presented in Table 8.3.

The data provided in [41] suggest that in 2007 there were 510,545 MDR TB cases among patients registered for treatment, which constituted 4.9% of all patients registered for treatment. Among new TB cases, the proportion of MDR TB was 3%. According to WHO estimate, the worldwide number of MDR TB cases among ss+ TB patients was 348,602 [41].

Thus, national TB surveillance systems register only about 6% of all MDR TB cases in the world according to WHO estimate and about 8.5% of all MDR TB cases in the estimated number of ss+ TB patients.

Among new TB cases, only 3% of the estimated MDR TB cases are registered in the world. In the Russian Federation, the number of registered MDR TB cases is about 20% of the estimate.

The results of the mathematical estimation [46] suggest that the largest «MDR TB burden» globally has India and China – 48% of all cases of MDR TB in the world. The Russian Federation accounts for another 8% in the world (see Fig. 8.13).

Considering the comparison of the proportion of the Russian Federation in the number of MDR TB among new TB cases, the WHO estimation and the registration data in Russia differ significantly. According to WHO estimate, the Russian Federation has 7% of the estimated worldwide MDR TB rate among new TB cases, but Russia registers almost half of the number of MDR TB cases registered in the world among new TB cases (Fig. 8.14). This may be regarded as a result of the national surveillance system of registration of MDR TB cases, which is not available in many other countries.

Considering from the viewpoint of the local hazard for the population, the influence of MDR TB («local MDR TB burden») is better expressed in the intensive indicators, namely, through the number of MDR TB among new TB cases and MDR TB among all patients on treatment per 100,000 population (Fig. 8.13). These indicators (calculated based on WHO estimate of the number of people with MDR TB) have high rates in Kazakhstan, Republic of Moldova, Tajikistan, Ukraine, Azerbaijan, S. Africa, and the Russian Federation.

In recent years, more attention is paid to the emergence of another form of drug resistant TB – extremely drug-resistant tuberculosis (XDR-TB). XDR TB is caused by *M. tuberculosis* colonies, which in addition to the anti-tuberculosis drug resistance of MDR TB, are also resistant to any of fluoroquinolones and at least to one of injectable drugs from the second-line anti-tuberculosis drugs (capreomycin, canamycin and amikacin) [6]. Unfortunately, data about XDR-TB are now very limited. By the end of 2008, 55 countries registered at least one XDR-TB case. The Russian Federation has not yet included XDR-TB in the reporting forms.

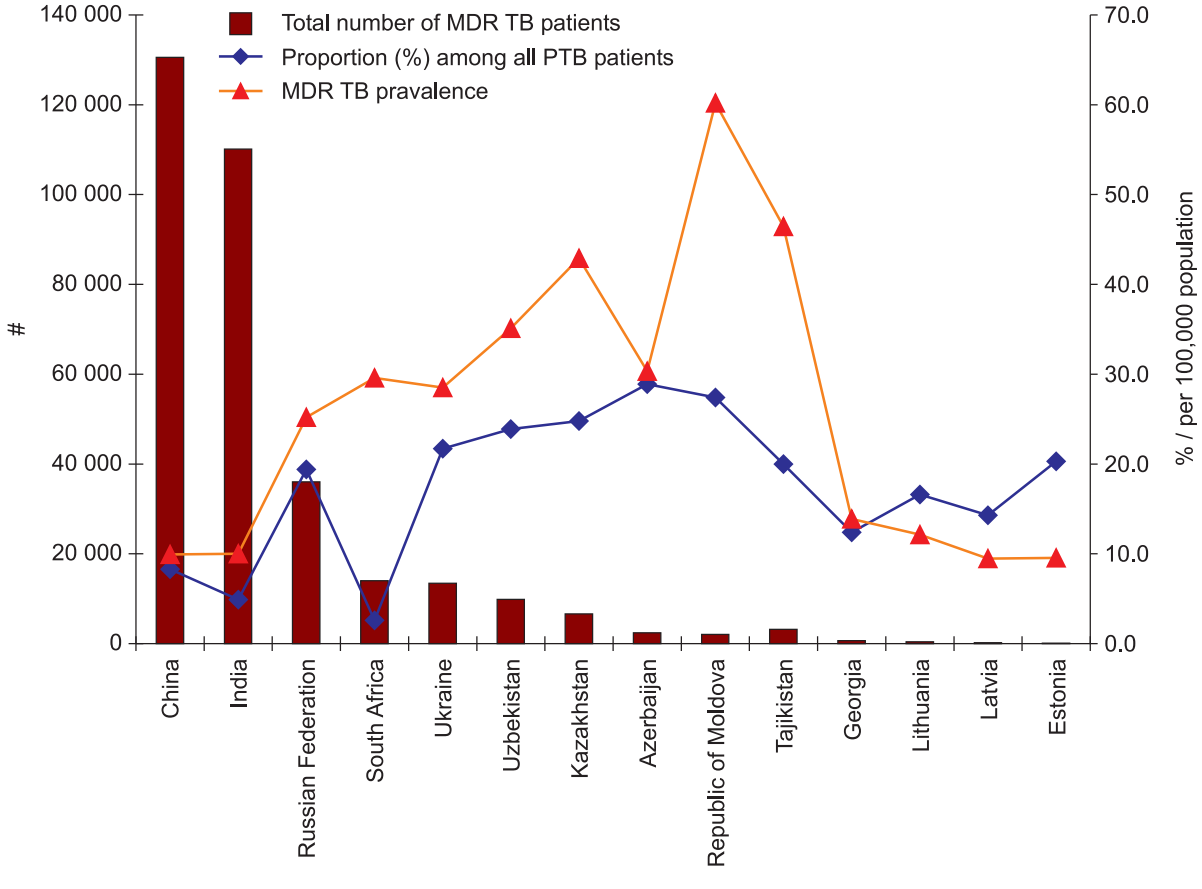

Fig. 8.13. Multidrug resistance among all (new and relapse) TB cases by country (WHO estimate for 2006) [46]. The number and proportion of MDR TB patients and the number of MDR TB patients among all TB cases per population (Sources: [46], population: WHO data)

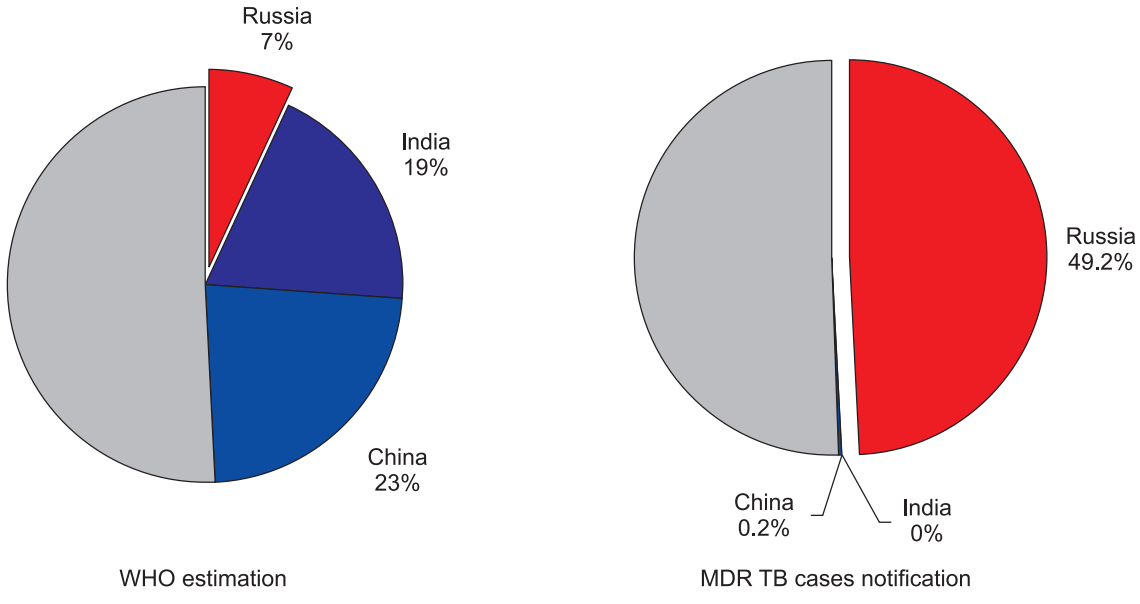

Fig. 8.14. Multidrug resistance among new TB patients in the Russian Federation, India and China according to WHO estimate and MDR TB case notification data (Source: [41])

Conclusion

The Russian Federation uses several different indicators, reflecting the spread of MDR TB. Despite the differences in forming the indicators, they all demonstrate increased MRD TB rates.

At the same time, the collected data, on the basis of which until recently the indicator were calculated, do not accurately enough reflect the real situation with the MDR TB spread. The implementation of new statistical tools in 2006–2007, based on the forms approved by the RF MoH&SD Executive Order No. 50, if used correctly, allows for a realistic assessment of the situation with MDR TB and improved effectiveness of MDR TB control in Russia.

9. External quality assurance of *M. tuberculosis* examinations and DST in the Russian Federation

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Laboratory tests for detection of the TB-causing agent and investigation of its properties are in the basis of TB diagnosis and clinical decisions. At the same time, the quality of laboratory tests directly influences the indicators used for assessment of the epidemiological situation for TB and for planning of TB control programmes. Therefore, this section of the analytical review includes data on assessment of the quality of laboratory tests by the Federal System of External Quality Control in Clinical Laboratory Examinations (FSEQC).

9.1. Organization of external quality assurance

The system of external quality assurance (EQA) of clinical laboratory examinations has been established in Russia since 1995 under FSEQC. The system currently consists of 141 sections, which are being implemented unilaterally or in collaboration with international systems of external quality assurance, and cover all types of clinical and laboratory testing. There are currently seven sections of FSEQC that focus on microbiological and molecular-genetic tests for diagnosis of tuberculosis. In 2007 and 2008, with the support of the Russian Health Care Foundation and by the Global Fund, FSEQC was assessing the quality of direct smear Ziehl-Neelsen (ZN) microscopy , fluorescent microscopy and culture methods, and drug susceptibility tests of *M. tuberculosis*. The support received from the Russian Health Care Foundation and the Global Fund contributed to increasing of the number of laboratories participating in the implementation of the respective section of FSEQC activities.

9.2. Quality of direct smear ZN microscopy

In 2008, control panel from FSEQC sections «Microscopic identification of *Mycobacteria* by Ziehl-Neelsen stain» and «Identification of *Mycobacteria* by fluorescent microscopy» were sent to 1,500 laboratories (1,090 in 2007) and 150 (105 – in 2007), respectively. In each from two control rounds, each laboratory received set of eight control panels (smears), consisting of non-stained negative smears and smears with high AFB (acid fast bacilli) content (42–320 AFB in 100 fields), as well as stained and not-stained smears with low AFB content (1–70 AFB in 100 fields) prepared from the same initial material (homogenized sputum collected from MbT+ patients). The availability of stained and non-stained smears in the set of panels allowed to assess quality of staining in tested laboratory. In sets for fluorescent microscopy, only non-stained smears were included. As distinct from the 2007 cycles, the number of smears with low AFB content was increased by adding two stained smears with low AFB content instead of two smears with high AFB content.

Based on the laboratory results, the following characteristics were identified:

– Sensitivity of laboratory tests (the percentage of detected positive smears) separately for samples with low and high AFB content,

– Specificity of laboratory tests (percentage of samples not containing AFB identified as negative),

– The quality of laboratory staining (based on the difference of the sensitivity of the detection of samples stained in the expert laboratory in FSEQC and samples stained in the tested laboratory for samples containing ABF).

Microscopic identification of acid-fast mycobacteria with Ziehl- Neelsen stain

Of the 1500 laboratories, to which the sets of control samples were sent, 1,407 (94%) of laboratories provided the results of testing of control samples (85% – in 2007), including 957 laboratories in general health care (GHC) institutions, 58 regional laboratories (leading regional TB control centers or TB dispensaries in the subjects of the Russian Federation), and 154 laboratories in local TB control facilities including sanatoriums in addition to municipal, rayon (district) and inter-rayon TB dispensaries (TBD) and TB hospitals. These also included 70 laboratories in the FSIN system institutions.

But not all the laboratories participated in two rounds of testing in 2008: in two rounds participated 821 (86%) GHC laboratories, 49 (84%) regional level laboratories, and 132 (86%) rayon laboratories.

The GHC laboratories represented 81% of the subjects of the Russian Federation. No laboratories participated in EQC from three Federal geographic regions. As indicated in the previous issue of the analytical analysis, the coverage of GHC laboratories conducting Ziehl-Neelsen tests and included in the testing in each of the subjects in 2008 was estimated as the number of such per 100,000 population of the territory (Fig. 9.1) and was equal to 0.7 per 100,000 population (0.4 in 2007). Nevertheless, in 31 regions this indicator was less than 0.5, i.e. one laboratory per more than 200,000 population.

Analysis of the results from the laboratories shows that, in general, the specificity of tests in the laboratories of all types of institutions is quite high – 94.6% and does not differ substantially from the 2007 indicator (95.8%).

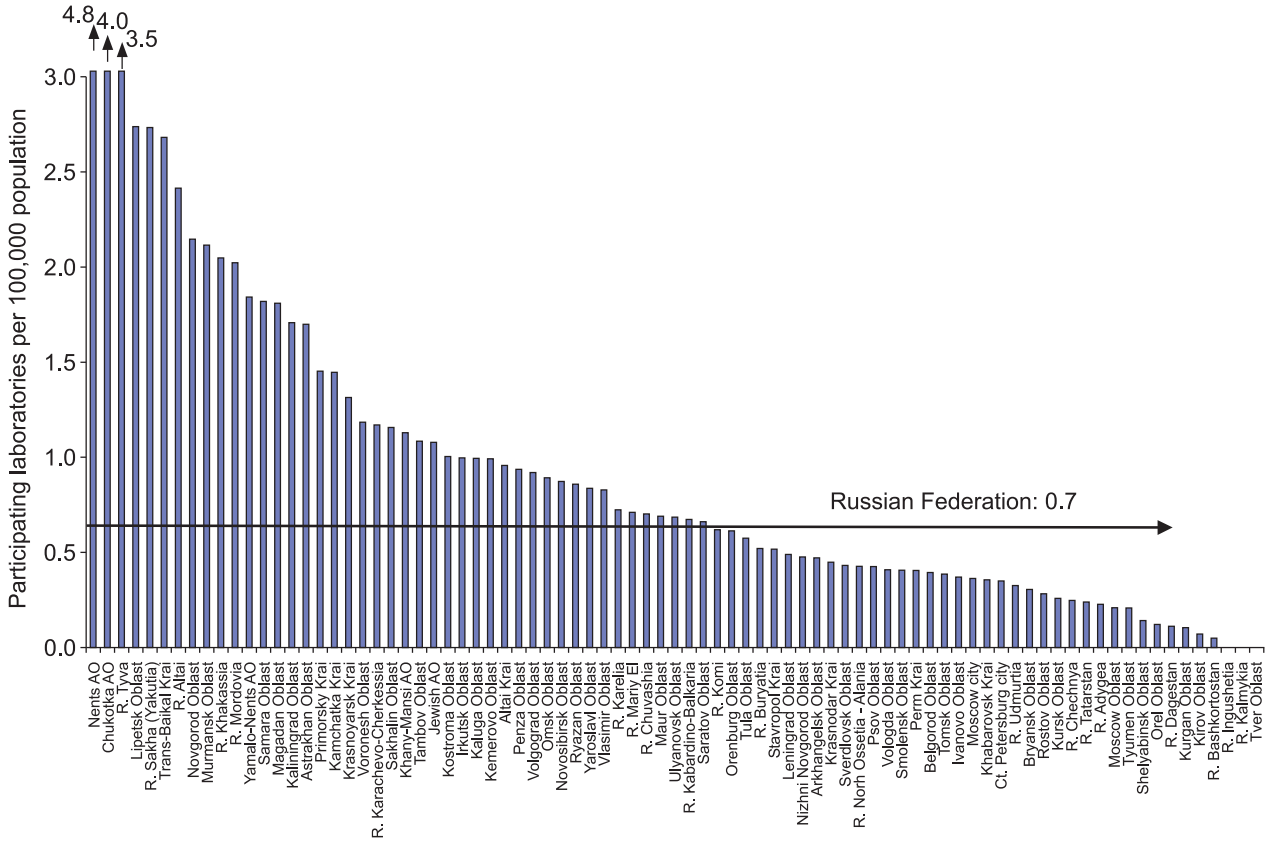


Fig. 9.1. Coverage by EQA of laboratories of GHC facilities in the subjects of the Russian Federation, the number of participating laboratories per 100,000 population, 2008

The average sensitivity of AFB detection in samples with high AFB content was 94.1%, which is higher than in 2007 (92.8%). The average sensitivity of AFB detection in samples with low AFB content was 86.2% in smears stained in the laboratories (83.5% in 2007) and 93.1% in smears stained in the expert laboratory.

As in 2007, GHC laboratories in 2008 (Fig. 9.2a) demonstrated a lower sensitivity in AFB detection in low AFB content smears stained in these laboratories as compared with the TB service laboratories (84.4 and 92.3%, respectively, $p < 0,01$). This value was higher in regional TBD laboratories as compared with those at the rayon level, although the difference was statistically insignificant (96.4% and 90.6%, $p > 0,05$). Anyhow, it should be noted that the sensitivity levels of AFB detection increased in laboratories of all types as compared with 2007.

In the tested FSIN laboratories, the average sensitivity of AFB detection in smears with low AFB content for smears stained in the laboratories was 93.4% and for smears stained in the FSEQC expert laboratory – 98.1%.

The differences in AFB detection sensitivity in smears stained in the tested laboratories and in the FSEQC expert laboratory are indicative of the quality of staining smears in the tested laboratories: the lower the sensitivity of detection of AFB in smears stained in the tested laboratories, as compared with the sensitivity detection in the samples stained in the expert laboratory, the lower is the quality of smear staining. In the GHC laboratories this difference was 7.7%. At the same time, in the regional TB laboratories this difference was only 1.4%. The value of this indicator in the rayon laboratories (5.1%) was lower than that in the TB service laboratories and higher than in the regional laboratories. In the FSIN laboratories this indicator was 4.7%.

The summarized results of external quality assurance received from TB control services, GHC and FSIN depend mostly on the data received from the territories, from which the biggest number of laboratories participated in EQA. These indicators do not allow for comparing the number of territories that have more laboratories with inadequate EQA testing results. Anyhow, this information may be important for assessing effectiveness of regional TB services and for improving laboratory diagnosis of TB.

To compare the work of GHC, regional and rayon TB services, there were used the proportions of territories with laboratories showing quality of a specific level, i.e. the territories whose laboratories showed summarized test results satisfying the defined criteria established by experts.

Thus, with respect to sensitivity criteria the AFB detection in smears with low AFB content, if smears were stained in the tested laboratories («sensitivity 1»), the proportion of territories which labs showed sensitivity over 90% were indentified (here and thereafter the sensitivity parameters are indicated as defined by the FSEQC experts as satisfactory results).

Similarly, terrritories were selected with laboratories which summarized AFB detection sensitivity level in smears with low AFB content stained in the FSEQC expert laboratory («sensitivity 2») was over 95%.

The group of territories with satisfactory average levels of AFB detection sensitivity in smears with high AFB content («sensitivity 3») stained in the tested laboratories included territories whose laboratories integrally provided this parameter exceeding 95%.

The group of territories with satisfactory staining of smears included territories whose laboratories demonstrated difference between sensitivity of smears stained in the tested laboratories and in the expert laboratory on average below 5%.

The group of territories with satisfactory specificity included territories with laboratories providing average specificity over 95%.

The FSEQC data across regions (Fig. 9.2b) show that the proportion of regions in which GHC laboratories' average indicators were higher than the established criterion was not that large and much smaller than the number of the subjects of the Russian Federation with regional TB control services laboratories with satisfactory results. Only in 39.5% of regions in GHC laboratories the average sensitivity indicator of low content AFB detection with smears not stained exceeded 90% (which was established as an acceptable indicator). The proportion of regions in which TB control services laboratories exceeded this criterion was statistically significantly ($p < 0.01$) higher – 75.0% (with 70.8% in rayon TBD and 86.0% in regional TBD). The percentage of regions in which GHC laboratories showed acceptable quality of staining was only 40.7%. In rayon TBD laboratories the quality of staining smears was in more territories – 68.8% ($p < 0.01$). The percentage of territories in which staining quality was acceptable was still greater as compared to rayon laboratories – 84.0% ($p > 0.005$). The proportion of regions with the satisfactory level of specificity was in GHC laboratories – 51.9%, in rayon TB control laboratories – 81.3% ($p < 0.05$), and in regional TB control laboratories – 90.0%.

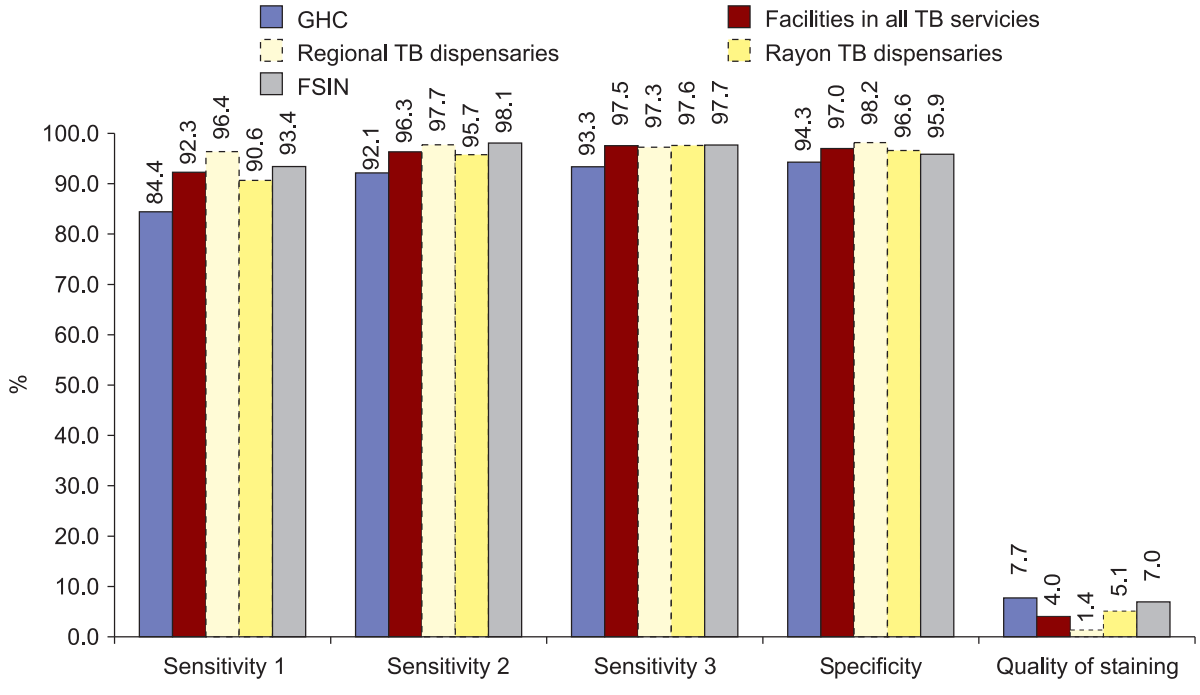
Anyhow, these results only approximately reflect the real picture of laboratory tests quality distribution in the subjects of the Russian Federation, particularly due to substantial differences in the numbers of laboratories in the territories (from 1 to 47 GHC laboratories and from 1 to 12 TB services laboratories). Nevertheless, if consider the 42 subjects of the Russian Federation which present more than 0.7 laboratories per 100,000 population, the regularities will be similar.

Identification of AFB by fluorescent microscopy method

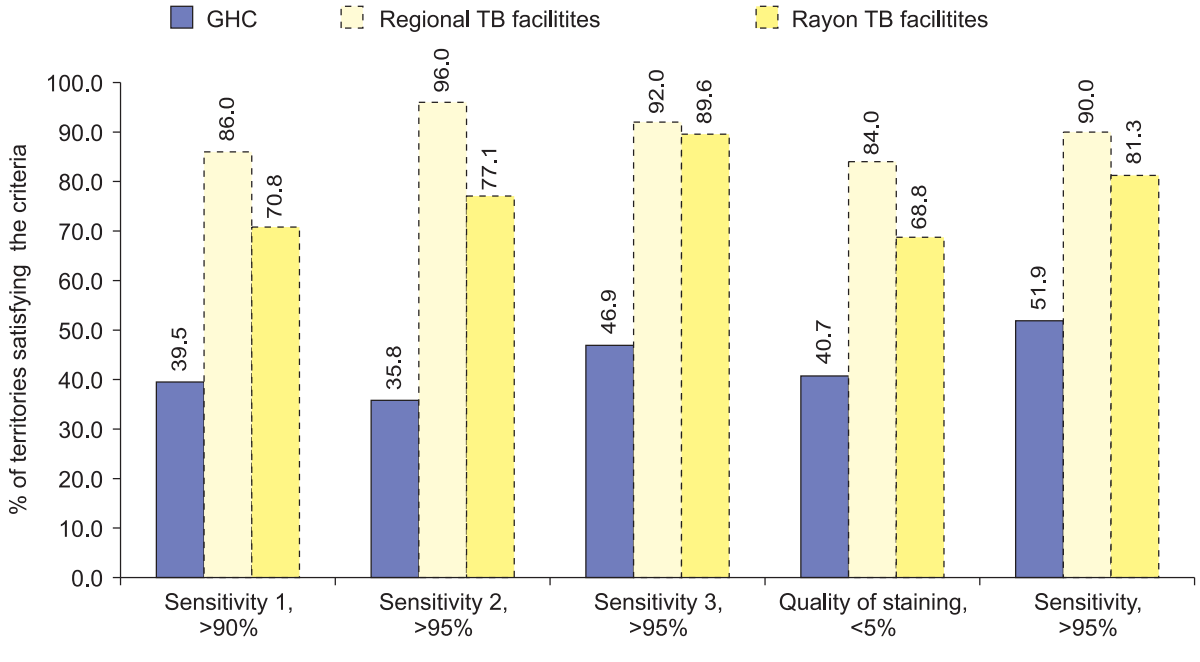
Control samples from FSEQC section «Identification of AFB by fluorescent microscopy method» were sent to 150 laboratories. Testing results were received from 136 laboratories (90.7%). Among them, there were 13 GHC laboratories from 6 subjects of the Russian Federation, and 123 laboratories were laboratories of TB Services from 49 subjects of the Russian Federation, among which 34 were from regional, and 89 – from rayon TB laboratory services.

Overall, the sensitivity of detection of AFB by fluorescent microscopy in control samples with both low and high AFB content was higher than that by the Ziehl-Neelsen stain method (88.5% versus 86.2% by the Ziehl-Neelsen method for samples with low AFB content stained in the tested laboratories and 98.4 % versus 94.1% by the Ziehl-Neelsen method in for samples with high AFB content, respectively). Similar ratios were observed for both laboratories of GHC and TB services.

The average specificity of testing was lower as compared with the specificity of testing by Ziehl-Neelsen – 91.2% and 94.6%, respectively ($p < 0.05$). There were no significant differences between GHC and TB Services laboratories.



A) Summary data on laboratories



B) Assessment of testing results by territories. The proportion of territories with laboratories meeting the criteria

Fig. 9.2. The results of the evaluation of microscopy testing with Ziehl-Neelsen stain, 2008. Laboratories of GHC and TB services in the territories of the Russian Federation. Sensitivity 1 – sensitivity of detecting smears with low AFB content; Sensitivity 2 – sensitivity of detecting smears with high AFB content with staining in the expert laboratory of FSEQC; Sensitivity 3 – sensitivity of detecting smears with high AFB content stained in tested laboratories; Quality of staining of smears defined as differences between «sensitivity 2» and «sensitivity 1»

9.3. The quality of culture examinations of *M. tuberculosis*

The FSEQC assessments of the quality of tests are aimed at detection of errors in culturing samples potentially containing *M.tuberculosis*. A set of control samples allows for assessments of the media used in the tested laboratories and the culturing techniques applied there. For this purpose, the sets included samples with *M. tuberculosis* in two concentrations – with high and low contents of colony-forming units (CFU). Because of the low sensitivity of culture tests performed in the 2007 EQA cycles the FSEQC expert group decided to increase, as compared to 2007, the CFU content in control samples with *M. tuberculosis* from 5 × 104 to 5 × 105 CFU in samples with low content of M. tuberculosis, and from 5 × 105 to 5 × 106 in samples with high content of *M. tuberculosis*.

In this review, non-detection of *M. tuberculosis* in 50% or more of samples with low content of *M. tuberculosis* (i. e. in 2, 3, or all 4 samples), or at least in one of two samples with high content of *M. tuberculosis* (less than 100%) are considered as an indicator of unsatisfactory cultural detection of *M. tuberculosis*.

The control panel also allowed for the assessment of the correctness of bacterial growth control in culture tubes (control of cultures on a weekly basis), and for preliminary identification of the *Mycobacterium tuberculosis* complex. For this purpose, the set included samples of fast growing non-tuberculosis *Mycobacteria*, similar to *M. tuberculosis* with regard to acid-fast staining and the morphology of colonies. To control the correctness of the algorithm used in the laboratory for identifying the resulting culture as AFB, the set also included bacteria *E. coli*. The results were considered satisfactory if in no sample not containing *M. tuberculosis* the conclusion was made «*M. tuberculosis detected*».

In 2008, sets of control samples were sent to 201 laboratories. The results of testing control samples were received from 163 laboratories (81.1%). TB Services laboratories, FSIN health facilities, the research institutes of tuberculosis or phthisiopulmonology, an[80]d other institutions participated in FSEQC testing (Table 9.1). In 2008, laboratories of 52% of the leading TB regional institutions (TB dispensaries) in the subjects of the Russian Federation participated in this section of the FSEQC activities.

Table 9.1

Participants of FSEQC section «Culture Identification of MbT»

Type of institution	Number of participants
Regional TBD	46
Rayon (district) TBD	66
Phthisiopulmonology or tuberculosis research Institutes	2
FSIN	45
Other	4
Total	163

Of the 112 laboratories of TB Services, only 16 (14.2%; in 2007 – 16.9%), and of the 45 FSIN laboratories only 4 (8.9%) correctly identified the contents of all 10 samples. The average sensitivity of detection of *M. tuberculosis* for samples with low content of *M. tuberculosis* was 64.7% in laboratories of regional TB Dispensaries, and 61.9% in the laboratories of rayon (district) TB Dispensaries. This indicator for the FSIN laboratories was 66.1%. The sensitivity of detection in samples with high content of *Mycobacteria* was 87.0% and 84.6%, in the regional and rayon laboratories, respectively. In the FSIN laboratories the sensibility indicator was much higher – 92.2% ($p < 0.05$). The ability of laboratories to correctly identify the fast growing non-tuberculosis *Mycobacteria – M. smegmatis* and *E.coli* (specificity) was 82.6 and 73.8%, respectively, for laboratories of regional and rayon TB Dispensaries. In the FSIN laboratories this indicator was 77.2%.

Fig. 9.3 shows the percentage of laboratories in regional and rayon TB Dispensaries, and of FSIN laboratories, which demonstrated satisfactory results in the identification of *Mycobacteria* in samples with low content of *M. tuberculosis* (*M. tuberculosis* detection in two and more samples of four – «sensibility 1») – 87.0%, 52.0%, and 84.0% for regional, rayon TB Dispensaries and FSIN laboratories respectively. In samples with high content of AFB in laboratories with satisfactory results (*M. tuberculosis* detection in two samples of two, or 100% – «sensibility 2) – 76.0%, 77.0% and 87.0% respectively for these groups of laboratories.

Only 63.0% and 43.0% of regional and district level laboratories did not detect *M. tuberculosis* in all samples that contained non-tuberculosis *Mycobacteria* and/or bacteria *E. coli*. In 2007, the percentage of such laboratories was 62.0% and 45.5%, respectively. The proportion of FSIN laboratories that avoided errors in testing samples not containing *M. tuberculosis* was 51.0%.

[80] TBD – TB Dispensary.

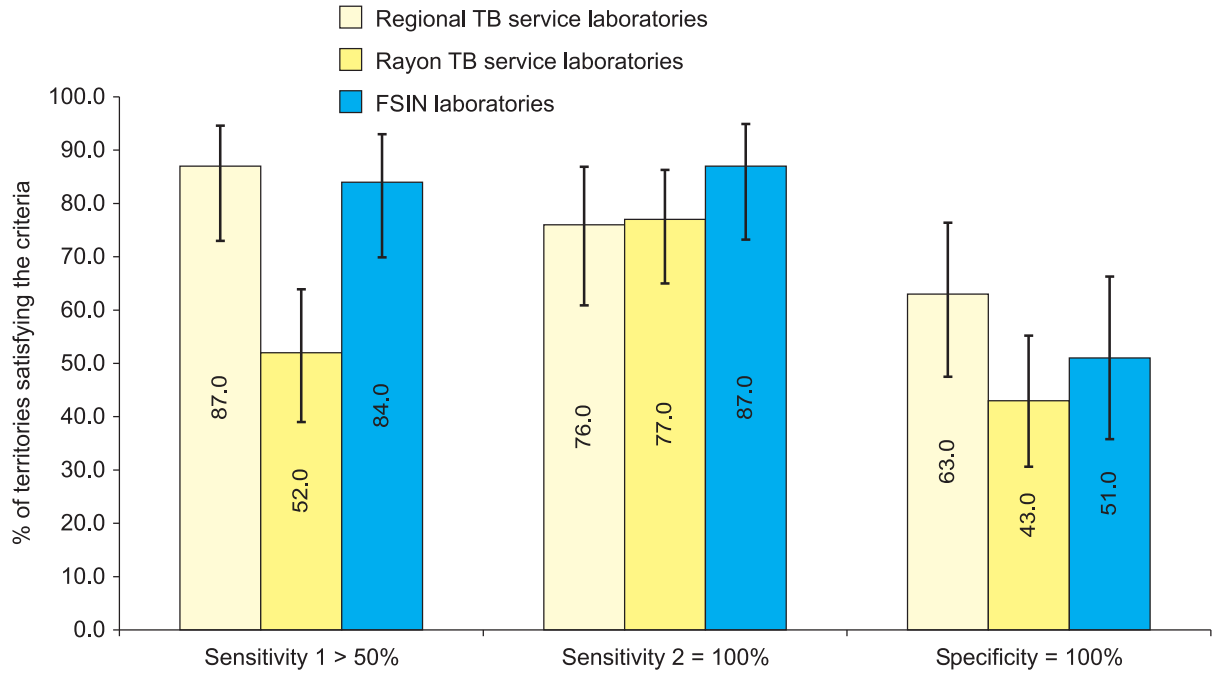


Fig. 9.3. Percentage of laboratories with satisfactory results of culture tests by the results of FSEQC. The Russian Federation, 2008. 157 laboratories of TB Services at rayon and regional levels, and FSIN laboratories. The divergence lines indicate 95% confidence interval. Sensitivity 1 – correct detection of *M. tuberculosis* in two and more of four samples with low concentrations of MBT; sensitivity 2 – correct detection of *M. tuberculosis* in each of two samples with high concentrations of MBT; the specificity – correct identification of the samples that did not contain *M. tuberculosis*

In 2008, questionnaires were distributed among the participating laboratories to assess the completeness and adequacy of internal control of tests performed in the laboratories. An analysis of completed questionnaires from 147 laboratories about media control showed that only 46% of the tested laboratories performed quality control of both sterility of media and their growing properties. 30% of laboratories did not provide excerpts from their quality control registers or indicated that the quality control of media was not performed.

Also, the questionnaires showed that 25 (17%) laboratories indicated in the graph on the control of media contamination levels that contamination were below 2% (the permissible level of solid media contamination is 2–5% [6, 43]), which indicates excessive decontamination of media resulting to a reduced detection of mycobacterial culture from diagnostic materials. In 17 laboratories (12%), the decontamination control was not performed.

9.4. Quality of drug susceptibility testing of *M. tuberculosis*

Since 2005, FSEQC has been coordinating the external quality assurance of *M. tuberculosis* drug susceptibility testing activities in close cooperation with the WHO supranational laboratories.

For the external assessment of the quality of drug susceptibility testing (DST), in 2008 sets of control samples consisting of 20 strains of *M. tuberculosis* were sent to 151 FSEQC participating laboratories. The results of control samples testing were received from 141 laboratories, including 45 TB Services laboratory facilities at the regional level (56% of regional TB Dispensaries), 43 – from rayon (district) TB Services laboratories, 48 – from FSIN laboratories, 3 – from three laboratories of the Research Institutes of Phthisiopulmonogy, and 2 – from the Federal Medical-Biological Agency.

In 2008, analysis of the results of testing of control samples in the laboratories of TB services showed that 10 (22.2%) regional laboratories showed excellent results – correctly identified the susceptibility patterns of all the control strains to all the first-line drugs (isoniazid, rifampicin, ethambutol and streptomycin). Another 9 regional laboratories and 13 rayon (district) laboratories demonstrated good results of the test of susceptibility to at least isoniazid (H) and rifampicin (R)[81] – 95–100% (in total, not more than one error per 20 results for isoniazid and 20 results for rifampicin received on 20 control strains). Overall, the proportion of laboratories

[81] Calculated as the proportion of strains with correctly identified susceptibility to all tested strains.

with EQA results to H and R from 95% and more was 42.2% among regional laboratories and 30.3% among rayon level laboratories.

The FSIN laboratories results were close to the results obtained at the rayon level, i. e. the 95% effectiveness of testing drug susceptibility to H and R was demonstrated in 15 laboratories (31.5%), and 4 laboratories correctly identified the susceptibility y of control strains to all the four anti-tuberculosis drugs.

Satisfactory results in determining susceptibility to isoniazid and rifampicin (in total, more than 1 error per 20 results for H and 20 results for R obtained from 20 control strains, but not less than 90% of correct results for each of the anti-TB drug) was received in 20.0% of regional laboratories,18.6% of rayon level laboratories and 18.8% among FSIN laboratories.

At the same time, the proportion of laboratories with unsatisfactory results of drug susceptibility testing to H and R (less than 90% of correct results for any of these anti-TB drugs) was 37.7% among regional laboratories , 51.2% among rayon level laboratories and 50% among FSIN laboratories (Fig. 9.4).

Conclusion

The external quality assessment of laboratory tests for TB diagnosis have been used in a significant number of laboratories in the last two decades, which provided a solid bases for the assessment of both the quality of laboratory testing techniques and the current trends in their development.

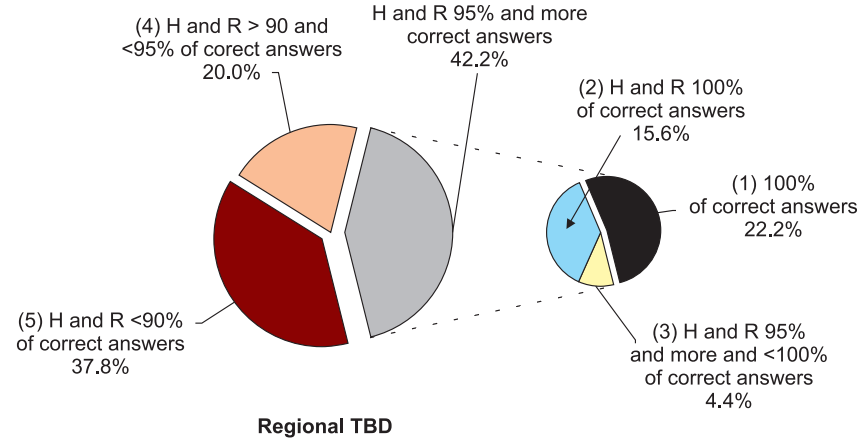
As compared with 2007, the proportion of laboratories with satisfactory results of microscopy by the Ziehl-Neelsen method has increased. Particularly, the quality of laboratory tests has been improved in GHC laboratories at the rayon level. At the same time, presently there are a significant number of regions in the country with unsatisfactory results of laboratory tests for TB diagnosis.

In 2008, analysis of the FSEQC results in assessment of the quality of laboratory tests revealed unsatisfactory quality of using the culture method, which may be related to the low quality of the culturing techniques used in these laboratories (high contamination and cross-contamination rates), as well as to the low quality of the media used. A significant number of laboratories that make errors in testing samples with non-TB *Mycobacteria* or *E. coli* may be indicative of both inadequate sterility in culturing techniques and non-compliance with the proper culturing techniques in the laboratory, as well as with the absence of preliminary identification of the cultures obtained.

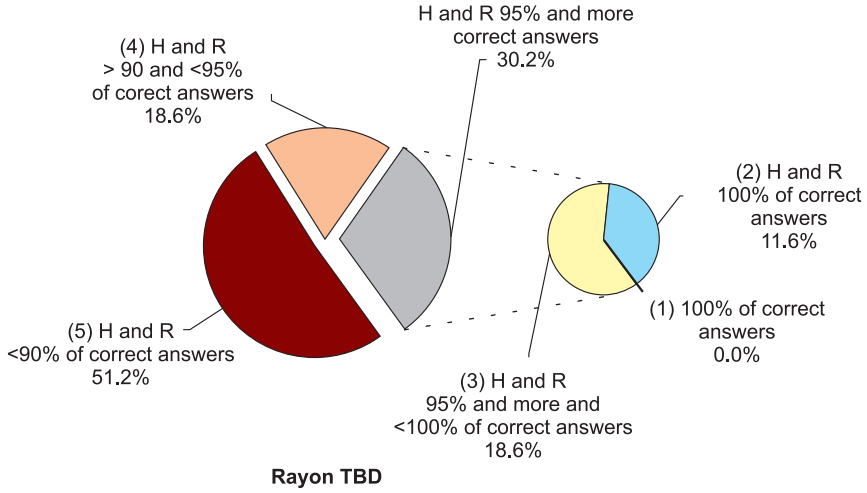
The questionnaires used in the participating laboratories in 2008 within the FSEQC section on using the culture method for detection of *M. tuberculosis* showed that in a significant number of laboratories measures to ensure the quality of culture tests were inadequate, which had resulted in the numerous errors detected during external quality assurance.

The external quality assurance of drug susceptibility tests in 2008, as well as in 2007, showed that along with laboratories demonstrating good results in the FSEQC cycles, from 30% to 50% of laboratories of different levels and jurisdiction showed sensitivity to isoniazid and rifampicin below 90%, which is regarded unsatisfactory [37].

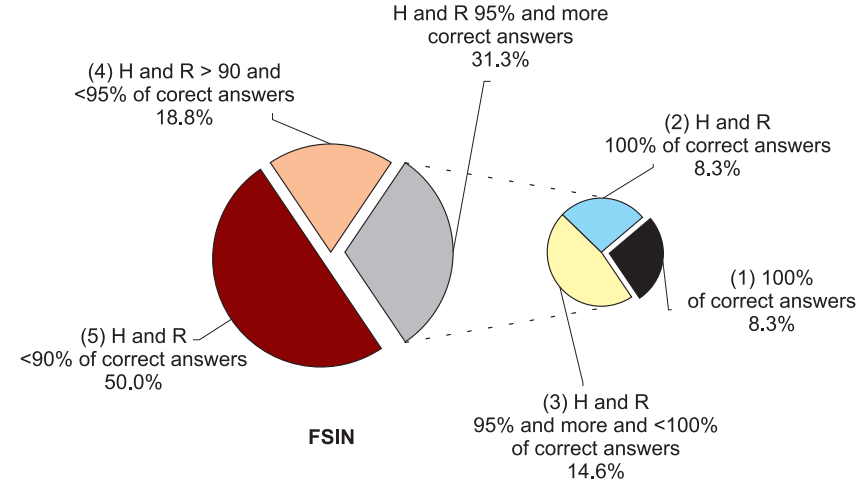
In 2008, the FSIN laboratories intensified their participation in all the sections of FSEQC on issues related to TB diagnosis, which contributed to the activities in the overall assessment of the quality of work in these laboratories. The analysis performed showed that, on average, the quality of work in the FSIN laboratories is on the level comparable with the work of laboratories in the civilian sector.



A)



B)



C)

Fig. 9.4. The results of EQA tests of drug susceptibility of *M. tuberculosisl* in 88 TB control facilities in the civilian sector and 48 laboratories in the penitentiary sector. The Russian Federation, 2008

Legend:

(1) All the results are correct in determining the susceptibility to all the 4 fi rst-line anti-TB drugs.
(2) 100% of correct results in determining the susceptibility to H (isoniazid) and R (rifampicin) with less than 100% of correct results for any of the other two drugs.
(3) At least 95% of correct results for H and R (in total, not more than 1 error per 20 results for isoniazid and 20 results for rifampicin obtained from 20 control strains), excluding cases with 100% percent of correct answers for H and R.
(4) At least 90% of correct results in determining the susceptibility to H and R (excluding the EQA results referred to groups 1–3).
(5) Less than 90% of correct results in determining susceptibility to H and R.

10. The network of TB service facilities. Resources

Skachkova E.I., Son I.M.

Changes in the TB epidemiological situation are directly related to the capacities of TB services to perform effective and comprehensive TB control activities. Therefore, it is important to know how many resources are being used by the TB services to fight the epidemic.

10.1. In-patient and sanatorium care

As of December 31, 2008, in the Russian Federation TB services there were 70,334 hospital beds for adult TB patients (1,952 hospital beds less than in 2005 and 1,024 hospital beds less than in 2007), and 6,655 hospital beds for children. In addition, there were 7,557 sanatorium beds for adults and 15,442 beds for children (table 10.1). TBD dispanseries have 54,919 beds (71.3% of the total number of beds in TB services).

With the adoption of the Federal Law of 06.10.2003 #131-FZ «On General Principles of Local Self-Government in the Russian Federation», local authorities refer to the level of the subject of the Russian Federation all specialized agencies of health, including the TB service. The process of building the relationship between municipal (local) and regional levels of health care is in the formative stage and requires the development of such a mechanism of interaction on all health management levels, where the availability and quality of care will be improved. At the same time, the TB service operates as part of the health care system, which for 15 years have had serious ideological and structural changes.

Currently, in the Russian Federation there is a process of transition from a decentralized model to a centralized service (zonal) model, where the manager and the sole financier of anti-TB institutions is the Government of the Russian Federation. Part of local TB dispensaries in the transfer of the ownership in the subject of Federation (from the municipal jurisdiction) have lost legal independence, becoming a branch of zonal or regional TB dispensaries (see Table 10.1). At the same time the number of beds in TB dispensaries has been decreasing. In 10 years before 2008, with increased incidence and prevalence of tuberculosis, the number of TB beds for adults was reduced by 28%. As a result, the number of patients with active tuberculosis per bed has increased by 3 times. But in 2008, TB dispensaries had 232 beds more than in 2007.

Simultaneously with the decrease in the number of beds the average number of days of bed use and the turnover of beds in the year should have increased, and the average length of patient stay in bed should have reduced. However, this did not happen. On average in 2008 a hospital bed for adults worked for 320.3 days per year (321.1 in 2006), for children – 308.3 (313.0 in 2006), the turnover of beds for adults was 3.8 (3.7 in 2006), for children – 3.4 (3.3 in 2006). The average length of stay of patients in 2008 was equal to 84.6 days for adults and 91.7 for children.

At the same time, the range in the indicator of average time of TB bed use in the subjects of the Russian Federation is more than 150 days for adult TB patients (Fig. 10.1) and 180 days for children patients.

The fact that the number of days of bed use per year has not increased and the average length of stay of patients has not dropped down cannot be explained by a reduction of the number of TB patients who needed care or by ineffectiveness of measures for TB patients involvement for treatment and persuading them to continue treatment. Most likely, that could be linked with the fact that some regions have surplus of hospital beds.

This consideration may be partly proved by the fact that if the RF has in average 0.3 beds for TB patients, in some regions this indicator is much higher – from 1.0 (Chukotka AO), 0.9 (Magadan Oblast), 0.8 (Ivanovo Oblast), and 0.6 (the Republic of Sakha-Yakutia). However, in some regions this indicator is exceedingly low – 0.1 (Republic of Komi and Republic of Chechya, Kirov Oblast, Kamchatka Krai, Jewish AO) – see Table 10.2.

Table 10.1

The number of TB dispensaries and the number of beds in the Russian Federation TB services, 2005–2008 as of 1 January of respective years (Source: the state statistical reporting form #47)

	2005	2006	2007	2008
Number of TB dispensaries	466	386	354	343
including those with permanent hospital beds	393	332	306	297
Number of TB hospitals	105	98	87	81
including those with dispensary departments	27	28	28	24
Number of permanent hospital beds for adults patients	72 286	71 994	71 358	70 334
Per 1,000 adult population (18 years and more)	0.51	0.51	0.50	0.50
Average number of days of hospital bed use by adult patients	320.8	321.1	316.4	320.3
Number of permanent hospital beds for children (0–17 years of age)	6 424	6 781	6 771	6 655
Per 1,000 children patients (0–17 years of age)	0.22	0.25	0.25	0.25
Average number of days of hospital bed use by children patients	309.9	313.0	307.2	308.3
Number of permanent beds for TB patients	78 710	78 775	78 129	76 989
Per 1,000 population	0.55	0.55	0.55	0.54
Number of beds for TB patients (sanatoriums for adult TB patients)	8 697	8 070	7 980	7 557
Per 1,000 population (18 years and older)	0.06	0.06	0.06	0.05
Average number of days of bed use for adult patients	241.7	259.4	258.3	269.2
Number of beds for TB patients (in-patients + sanatoriums for adults)	80 983	80 064	79 338	77 891
Per 100,000 population (18 years and older)	56.6	56.2	55.8	54.8
Number of TB sanatorium beds for children (0–17years of age)	16 306	16 130	15 555	15 442
Per 1,000 children (0–17 years of age)	0.57	0.59	0.58	0.58
Average number of days of TB bed use for children	267.6	267.4	263.7	262.6
Number of TB sanatorium beds – TOTAL	25 003	24 200	23 535	22 999
Per 1,000 population	0.17	0.17	0.17	0.16

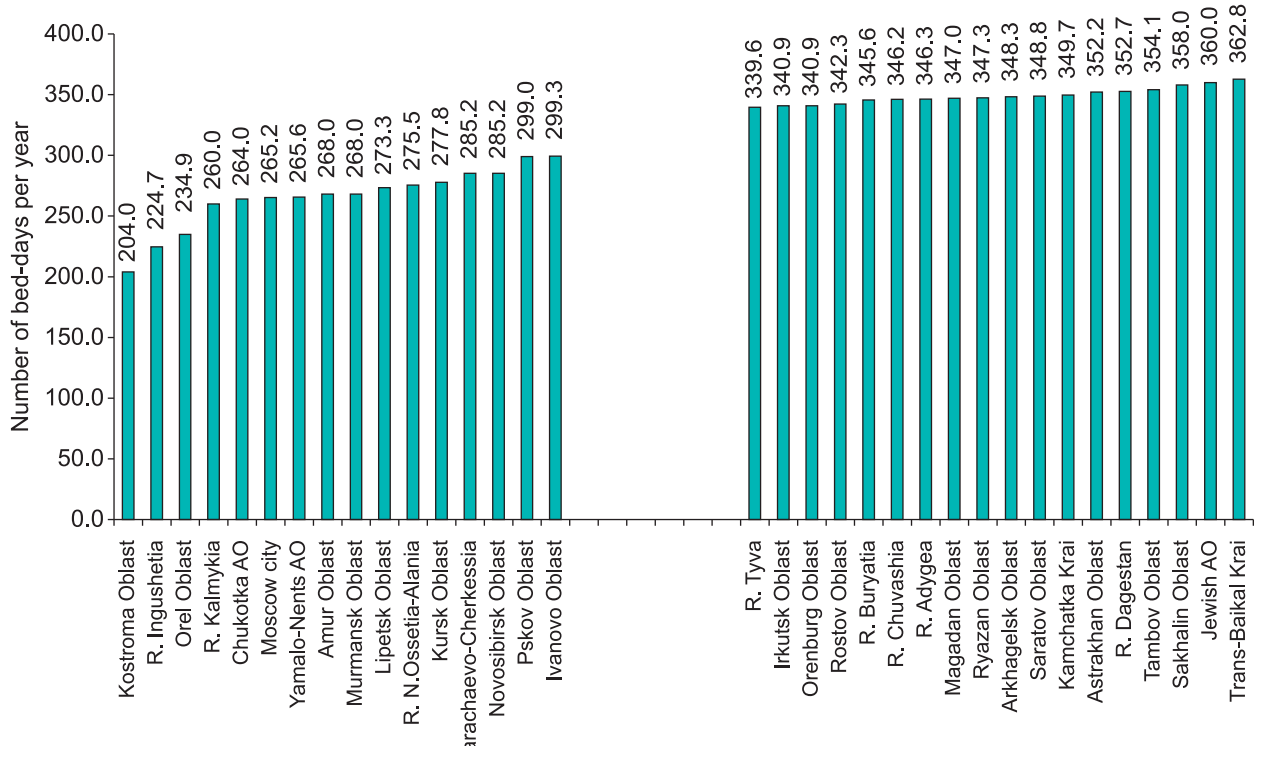


Fig. 10.1. Average number of days of bed use per year (for adults TB patients), subjects of the Russian Federation, 2008

Table 10.2

Distribution of TB beds in the subjects of the Russian Federation (per 1 patient with active TB), 2008

Russian Federation – 0.3 beds per 1 patient with active TB							
Central FR	0.4	**North-West FR**	0.3	**Privolzhsky FR**	0.3	**Siberian FR**	0.2
Belgorod Oblast	0.5	R. Karelia	0.1	R. Bashkortostan	0.4	R. Altai	0.2
Bryansk Oblast	0.3	R. Komi	0.4	R. Maryi El	0.4	R. Buryatia	0.2
Vladimir Oblast	0.3	Arkhangelsk Oblast	0.4	R. Mordovia	0.3	R. Tyva	0.3
Voronezh Oblast	0.5	Nents AO	1.8	R. Tatarstan	0.3	R. Khakassia	0.2
Ivanovo Oblast	0.8	Vologda Oblast.	0.4	R. Udmurtia	0.3	Altai Krai	0.2
Kaluga Oblast	0.5	Kaliningrad Oblast	0.2	R. Chuvashia	0.3	Trans-Baikal Krai	0.2
Kostroma Oblast	0.5	Leningrad Oblast	0.4	Kirov Oblast	0.1	Krasnoyarsk Krai	0.3
Kursk Oblast	0.3	Murmansk Oblast	0.2	Nizhni Novgorod Oblast	0.7	Irkutsk Oblast	0.2
Lipetsk Oblast	0.3	Novgorod Oblast	0.3	Orenburg Oblast	0.2	Kemerovo Oblast	0.3
Moscow Oblast.	0.2	Pskov Oblast	0.3	Penza Oblast	0.2	Novosibirsk Oblast	0.3
Orel Oblast	0.4	St. Petersburg city	0.4	Perm Krai	0.7	Omsk Oblast	0.2
Ryazan Oblast	0.3	**Southern FR**	0.2	Samara Oblast	0.2	Tomsk Oblast	0.4
Smolensk Oblast	0.2	R. Adygea	0.3	Saratov Oblast	0.2	**Far-East FR**	0.3
Tambov Oblast	0.5	R. Dagestan	0.2	Ulyanovsk Oblast	0.3	R. Sakha (Yakutia)	0.6
Tver Oblast	0.3	R. Ingushetia	0.2	**Urals FR**	0.3	Primorsky Krai	2.0
Tula Oblast	0.4	R. Kabardi-Balkaria	0.3	Kurgan Oblast	0.2	Khabarovsk Krai	0.2
Yaroslavl Oblast	0.3	R. Kalmykia	0.3	Sverdlovsk Oblast	0.2	Amur Oblast	0.2
Moscow city	0.6	R. Karachaevo-Cherkessia	0.2	Tyumen Oblast	0.3	Kamchatka Krai	0.1
		R. North Ossetia – Alania	0.3	Khanty-Mansi AO	0.2	Magadan Oblast	0.9
		R. Chechnya	0.1	Yamalo-Nents AO	0.4	Sakhalin Oblast	0.2
		Krasnodar Krai	0.3	Chelyabinsk Oblast	0.5	Jewish AO	0.1
		Stavropol Krai	0.2			Chukotka AO	1.0
		Astrakhan Oblast	0.3				

In total, in the Russian Federation there are 56 tuberculosis sanatoriums for adults, of which 50 are year-round, and 6 – seasonal. Tuberculosis sanatoriums for adult TB patients operate in less than half (37) subjects of the Russian Federation. This makes difficult the provision of sanatoria and rehabilitation measures for TB patients in the territories that do not have their own TB sanatoriums, and reduces the accessibility of sanatorium stage of treatment for TB patients.

The situation is exacerbated by the continuing decline in the number of tuberculosis sanatoria beds. In 2002, there were functioning 9,766 year-round tuberculosis sanatorium beds for adult TB patients and 17,126 for children. By 2008 the number of year-round sanatorium beds decreased by 14.5% (22.6% for adult TB patients and 9.8% for children). Overall in 2008, there were working 7,557 TB sanatorium for adults and 15,442 for children.

On average, in the Russian Federation in 2007 per 1 adult patient in the TB sanatorium there were 47.72 bed-days with the bed turnover 5.41 per year.

Alarming is the continuing decrease of TB offices (cabinets) from 2,050 in 2005 to 1,840 in 2007.

Hospital treatment substituting technologies are also on a very low level in TB services in the subjects of the Russian Federation. In 2008, there were only 2,371 patient places at out-patient facilities in Russia and 58 patient places in day patient facilities for children. Also in 2008, no home care opportunities were developed for children with TB.

Laboratory services

Unfortunately, the state statistics reporting data does not provide separated data on the number of laboratories engaged in performing microscopy, culture and drug susceptibility tests. Form No. 30 contains only information of the number of tests performed with each of these methods.

The data submitted for the WHO Global Report [41] contains information on the number of laboratories in 2007 (4048, 965 and 280 laboratories performing microscopy, culture and drug susceptibility tests, respectively), but this information only partially reflects the real situation. Thus, for example, in 2008 in 3.999 clinical-diagnostic laboratories engaged in performing microbiological tests and 970 bacteriological laboratories only 6,6% (about 9.2 million) of bacteriological tests were performed for *M. tuberculosis* detection and 6.6% of culture tests (9.3 million). This means that it is far from being that all the laboratories reported to WHO Global Report are involved in investigations for TB detection.

10.2. Human resources

Based on statistical reporting form # 30 as of December 31, 2008, according to the state statistics reports data, the Russian Federation TB services had 58,365 health personnel posts, including 17,709 physician posts, 12,481 TB physicians (including 7,954 posts in dispensary facilities), and 40,656 mid-level medical worker posts. Currently the TB service employs 8,817 physicians, including 8,430 in TB dispensaries (sharing efforts ratio 1.7) and 32,158 mid-level medical workers working in the service (Table 10.3).

The number of TB staff decreases year after year. From 2000 to 2008, the number of persons employed in TB services in the MoH system decreased by 8.3%, including physicians – by 14.2% (from 9.181 to 8.517). The TB physician to population ratio is 0.6 per 10,000 population. Among TB physicians, 63.6% have received certification of specialization, and 33.3% have received the highest category.

Table 10.3

Characteristics of human resource capacity of TB Services, the Russian Federation, 2005–2008
(Source: Form #17 «Information on medical and pharmaceutical personnel»)

	2005	2006	2007	2008
Number of TB physicians	9,027	8,813	8,565	8,517
per 100,000 population	6.3	6.2	6.0	6.0
Have qualification categories, total	5,521	5,542	5,451	5,492
% of TB physicians	61.2	62.9	63.6	64.5
Including TB physicians with highest category	2,647	2,712	2,773	2,838
% of TB physicians	29.3	30.8	32.4	33.3
% of TB physicians with qualification categories	47.9	48.9	50.9	51.7
First category	2,117	2,075	2,037	2,062
% of TB physicians with this category	38.3	37.4	37.4	37.5
Second category	757	755	641	592
% of TB physicians with this category	13.7	13.6	11.8	10.8

The structure of TB care provision at all levels can be presented as a scheme showing the functional responsibilities of the main treatment and prophylactic facilities involved in TB care.

10.3. Financing

In 2008, 32.3 billion rubles was allocated for TB control programmes in Russia from different financial sources, including budgets of the subjects of the Russian Federation and local budgets (29.5 billion rubles, or 91.3%), and from international support projects (4.9%) (Sources: the State statistical reporting form No. 62 – «The provision and financing of health care for the population»; the analytical report of the implementation of the Federal Target Progammme « Prevention and Control of Socially Significant Diseases»; and the Russian Health Care Foundation reports) – Fig. 10.2. as a results, about 78,000 rubles was allocated from all sources per one active TB patients.

This amount was allocated for support for TB control facilities (18.8 billion rubles, 58.2% of the total amount), salaries for physicians and paramedical personnel of TB control facilities (9.2 billion rubles, 28.5%), and drug procurement (2.3 billion rubles, 7.1%).

According to the WHO Global Report for 2009 [41], $3 billion will be allocated for TB control programmes throughout the world in 2009 (data for 94 countries which contribute 93% of all TB cases). In this amount, 87% will be provided from government budgets including loans, 9% by Global Fund, and 4% by other donor organizations.

The major part of funds for TB control activities is in the European Region ($1.4 billion). The most part this amount is provided in the Russian Federation, which confirms the Russian Government's strong commitment to the problem of TB control in the country. Next follow the countries of the African Region ($0.6 billion).

In total, according to the WHO Global Report [41], the complete implementation of TB control programmes in 94 countries will require $4.2 billion. The major components of TB control programmes requiring financial support have been determined as follows:

– MDR TB problem ($0.5 billion, or 12%, including 76% of this amount have been indicated for the Russian Federation and South Africa);
– measures for TB/HIV co-infection control ($120 million, or 3%);
– and activities related to strengthening of commitment and advocacy, social mobilization and information for combating TB ($100 million, or 2%).

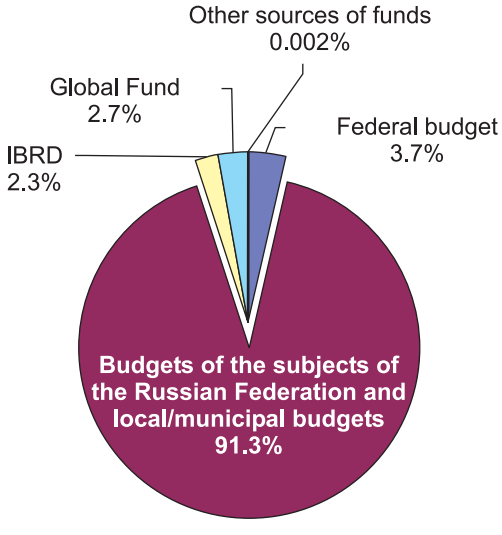


Fig. 10.2. Allocation of funds for TB control, Russian Federation, 2008

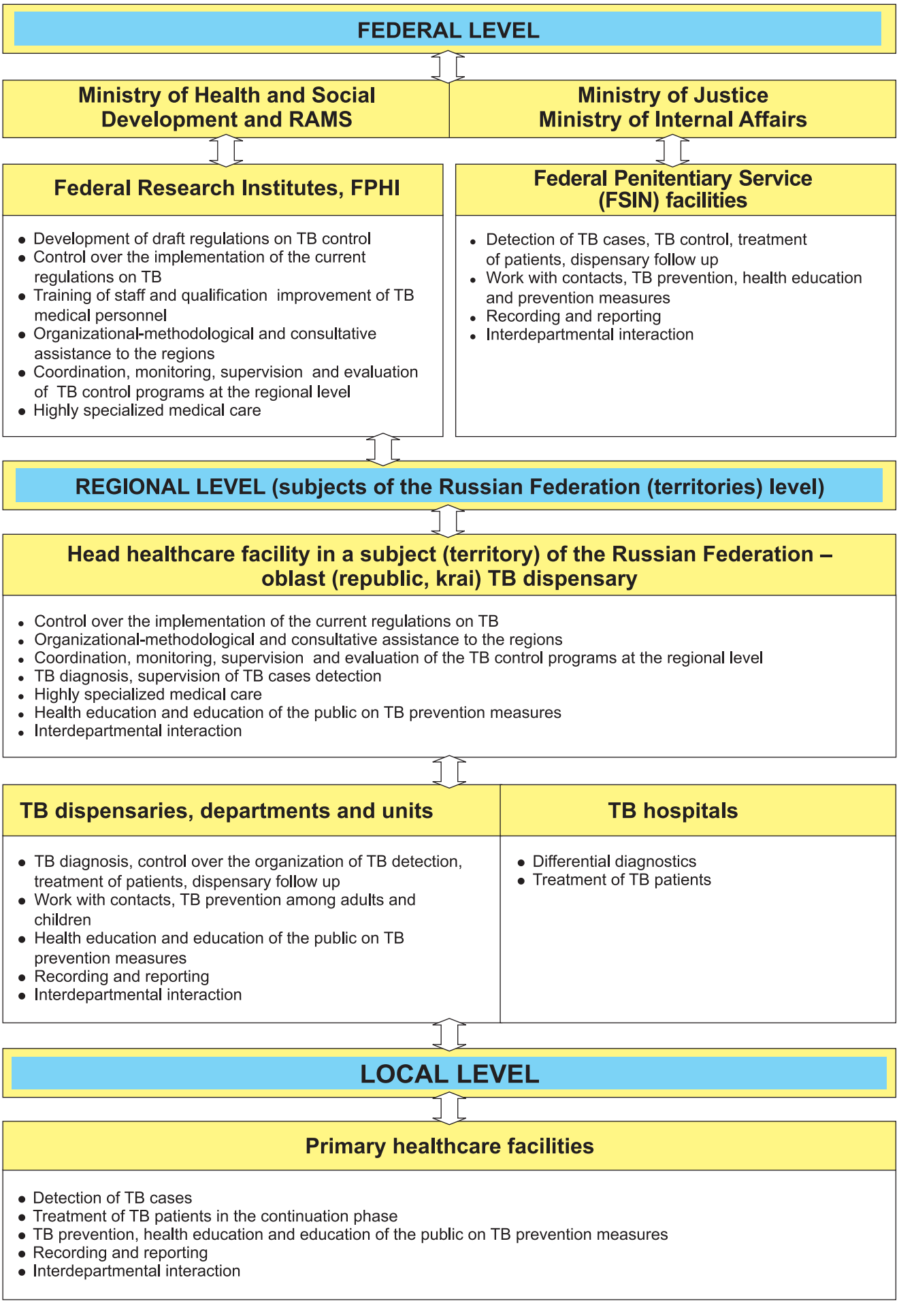
Conclusion

The first years of the 21st century in the Russian Federation have been characterized by a certain stabilization of the main epidemiological TB rates and indicators, reflecting the effectiveness of TB control activities. At the same time, the situation remains quite severe.

Numerous factors have an impact on the spread of TB and require thorough assessment. At the same time, the quality of data analysis depends substantially on effectiveness of statistical system functioning, which includes recording and reporting forms and indicators and ensures adequate measures and evidence based decision-making.

This review has been devoted to assessment the TB situation in the Russian Federation with an emphasis on the use of the current statistical reporting data on TB and the main available indicators, which, as we believe, have allowed us to conduct an adequate analysis of the information.

The facts revealed in this analytical review tell us that the TB situation in the Russian Federation is quite complex and that there is still a need for further improvement of TB control activities and implementation of modern strategies to fight the disease. In doing so, it is important to apply both the rich expertise of Russian phthisiology and the international experience, including experience of neighboring European countries.


FEDERAL LEVEL
Ministry of Health and Social Development and RAMS
Ministry of Justice
Ministry of Internal Affairs
Federal Research Institutes, FPHI
Development of draft regulations on TB control
Control over the implementation of the current regulations on TB
Training of staff and qualification improvement of TB medical personnel
Organizational-methodological and consultative assistance to the regions
Coordination, monitoring, supervision and evaluation of TB control programs at the regional level
Highly specialized medical care
Federal Penitentiary Service (FSIN) facilities
Detection of TB cases, TB control, treatment of patients, dispensary follow up
Work with contacts, TB prevention, health education and prevention measures
Recording and reporting
Interdepartmental interaction
REGIONAL LEVEL (subjects of the Russian Federation (territories) level)
Head healthcare facility in a subject (territory) of the Russian Federation – oblast (republic, krai) TB dispensary
Control over the implementation of the current regulations on TB
Organizational-methodological and consultative assistance to the regions
Coordination, monitoring, supervision and evaluation of the TB control programs at the regional level
TB diagnosis, supervision of TB cases detection
Highly specialized medical care
Health education and education of the public on TB prevention measures
Interdepartmental interaction
TB dispensaries, departments and units
TB diagnosis, control over the organization of TB detection, treatment of patients, dispensary follow up
Work with contacts, TB prevention among adults and children
Health education and education of the public on TB prevention measures
Recording and reporting
Interdepartmental interaction
TB hospitals
Differential diagnostics
Treatment of TB patients
LOCAL LEVEL
Primary healthcare facilities
Detection of TB cases
Treatment of TB patients in the continuation phase
TB prevention, health education and education of the public on TB prevention measures
Recording and reporting
Interdepartmental interaction

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Annex 1

Definitions used in the Russian Federation for dispensary groups and patient groups based on registration history and treatment outcomes

Definitions approved by the Russian Ministry of Health Executive Order #109 of 23.03.2003 «On improvement of TB activities in the Russian Federation» (20)

1. Groups of dispensary follow up and TB registration for adult patients in TB facilities

Group Zero (0) – for the follow up of persons with unspecified TB activity (cases suspected of TB) and in need of differential diagnosis of TB of any site; persons in need of specifying TB activity are included in group 0, subgroup A (0-A); persons in need of differential diagnostics of TB and other diseases are included in group 0 subgroup B (0-B).

I-A (MbT +)[82] – follow up of new TB cases MbT+ .

I-A (MbT-) – follow up of new TB cases MbT-.

I-B (MbT +) – follow up of TB relapses MbT+ .

I-B (MbT-) – for the follow up of TB relapses MbT-.

I-B – for the follow up of patients with treatment interruptions and patients avoiding evaluation. Patient transfer to group I-B occurs 1 month after a failed contact.

II-A – for the follow up of patients with chronic TB who need intensive treatment.

II-Б – for the follow up of patients with chronic TB in need of rehabilitation, symptomatic treatment and in need of TB therapy if indicated .

III – for persons with non-active TB indications after clinical cure.

2. Groups of dispensary follow up and registration of children and adolescents in TB facilities

Group Zero (0) – follow up of children and adolescents referred to TB services for specifying the nature of a positive sensitivity to tuberculin and/or for a differential diagnosis for the purpose of confirmation or exclusion of TB of any site.

Group I A – patients with active forms of disseminated and complicated TB of any site.

Group I B – patients with active TB of any site with small and non-complicated TB forms.

Group II – patients with active TB of any site with chronic disease manifestations.

Group III – children and adolescents at risk of TB relapse at any site. It includes 2 subgroups: **III-A** – new cases with residual post-TB changes; **III-B** – persons transferred from groups I and II, as well as from subgroup III-A.

Group IV – children and adolescents in contact with sources of TB infection. It has two subgroups: **IV-A** – persons in contact with MbT+ family members, relatives and household, as well as in contact with MbT+ individuals in facilities for children and adolescents; children and adolescents living in the territory of TB facilities; **IV-B** – persons in contact with active MbT- TB patients; from families of livestock farmers working at farms with unfavorable TB situations, as well as from families with livestock having TB.

Group V – children and adolescents with complications after TB vaccinations. It includes 3 subgroups: **V-A** – patients with generalized and extended lesions; **V-B** – patients with local and circumscribed lesions; **V-C** – patients with non-active localized complications, both new cases and transferred from groups V-A and V-B.

Group VI – persons at high risk of localized TB. It includes 3 subgroups: **VI-A** – children and adolescents at an early stage of primary TB infection (conversion of tubercular tests); **VI-B** – previously infected children and adolescents with hyperergic reaction to tuberculin; **VI-C** – children and adolescents with increasing tuberculin sensitivity.

3. General definitions

Chemotherapy regimen – The combination of TB drugs, duration of their administration, time and scope of follow up evaluations, as well as organizational forms of treatment, based on patient group.

[82] MbT – mycobacteria of tuberculosis, see the list of abbreviations.

Tuberculosis of uncertain activity – Uncertain changes in TB activity in the lungs and other organs.

Active tuberculosis – a specific inflammatory process caused by TB mycobacteria (MbT) which can be detected by a complex of clinical, laboratory and radiological evidences.

Chronic course of active TB forms – long-term (over 2 year), undulating course of the disease with the alternation of remissions and exacerbations, when the clinical, radiological and bacteriological evidence of TB process activity persists.

Clinical cure – disappearance of all evidence of the active TB process as the result of a performed basic course of the comprehensive treatment. Comfirmation of a clinical cure from TB and the moment of completion of the effective course of the comprehensive treatment are defined by the lack of evidence of any TB process developing within 2–3 months.

Criteria of treatment effectiveness are:

– disappearance of clinical and laboratory signs of TB inflammation;
– continued cessation of bacterial excretion confirmed by microscopy and culture tests;
– regression of radiological manifestations of TB (focal, infiltrative, destructive);
– rehabilitation of the patient's functional and working abilities

Patients with bacterial excretion (bacteriologically positive TB patients) – TB patients who have MbT detected in their biological fluids and/or pathological material. Among extrarespiratory TB cases, patients with bacterial excretion are those who have MbT detected in fistula discharge, in urine, menstrual blood and discharges from other organs.

Multi-drug resistance – MbT resistance to both isoniazid and rifampicin, with or without resistance to any other TB drugs.

Polyresistance – MbT resistance to any two or more TB drugs without resistance to both isonizid and rifampicin.

Bacteriological conversion (dispensary follow up definition) – disappearance of MbT from bodily fluids and pathological discharges excreted into the external environment. This requires confirmation by two consecutive negative microscopy and culture tests with an interval of 2–3 months after the first negative test result.

Residual post-TB effects – dense calcinated foci and foci of varying size, fibrotic and cirrhotic changes (including residual sanified lesions), plural thickenings, post-surgical changes in the lungs, pleura and other organs, as well as functional deviations after clinical cure. Single (as many as 3) small (up to 1 cm), dense and calcinated foci, circumscribed fibrosis (within 2 segments) are considered to be minor residual effects. All other residual effects are considered major.

Destructive TB – an active form of the TB disease course with cavitations confirmed by a complex of radiological methods of examination. The main detection method for destructive changes in the organs and tissues is x-ray examination (radiological – radiograms, tomograms).

Exacerbation (progressing) – appearance of new evidence of the active TB process after a period of improvement, and aggravation of the disease during follow up in groups I and II prior to the diagnosis of clinical cure. Exacerbation is evidence of failing treatment which requires treatment adjustment.

Relapse – appearance of new evidence of active TB in persons with a previous history of TB and cured; these are patients from follow up group III or purged from the registry due to cure.

Definitions approved by Russian Ministry of Health Executive Order # 50 of 13.02.2004 «On the introduction of recording and reporting documentation for TB monitoring» (21)

1. Groups of patients by their registration for treatment

New cases – patients who have never had treatment for TB or have taken TB drugs for less than one month[83].

Relapses – new episodes of disease in patients with a previous effective course of chemotherapy and new evidence of active TB, including positive results of sputum microscopy or culture tests and/or clear clinical-radiological evidence of TB.

Treatment after failure – treatment after a previous ineffective course of chemotherapy (persistent bacterial excretion or a new episode of bacterial excretion confirmed by any method at month 5 or later during treatment, or clinical and radiological confirmation of a failed course).

Treatment after default – treatment of patients after a treatment interruption for 2 months or more.

[83] According to Executive Order #109 (11), the Central Consultative Committee of Physicians makes decisions about the registration of new cases and patients' removal from the registry when a TB specialist or other expert from a TB facility (TB ward) presents the case to the Committee review.

Transferred out (for treatment continuation) – patients who have arrived from another administrative territory or another department (another registry), where they had initiated a chemotherapy course; these patients are registered for the continuation of treatment and the corresponding information on those patients is available.

Other – patients who do not meet any of the definitions given above, but for whom a decision has been made about provision of a chemotherapy course.

2. Treatment outcomes

Successful course of chemotherapy confirmed by smear microscopy – a treatment outcome, in which a patient had positive sputum smear microscopy results prior to treatment initiation, received all doses of the drugs indicated in the treatment regimen, and by the end of the course had at least two negative sputum microscopy results registered at month 5 and later during treatment.

Successful course of chemotherapy confirmed by culture – a treatment outcome, in which a patient had positive culture results prior to treatment initiation, and by the end of the course had at least two negative sputum culture results registered at month 5 and later during treatment.

Successful course of chemotherapy with clinical and radiological confirmation – a treatment outcome, in which a patient:

– had negative results of sputum smear microscopy and culture before treatment initiation, received all doses of the drugs indicated in the treatment regimen, and had negative sputum microscopy and culture results registered at all stages of treatment;
– had positive sputum microscopy and/or culture results prior to treatment initiation, received all doses of the drugs indicated in the treatment regimen, but did not have the necessary number of negative sputum microscopy and culture results registered at month 5 and later during treatment.

Failed course of chemotherapy – a treatment outcome when a patient remains smear positive or becomes smear positive at month 5 or later during treatment.

Failed course of chemotherapy confirmed by sputum culture – a treatment outcome when a patient had positive culture results at the beginning of treatment and the results remain positive at month 5 or later during treatment

Failed course of chemotherapy with clinical and radiological confirmation – a treatment outcome when a patient had negative smear microscopy and culture results at the beginning of treatment, and the results remained negative at all stages of treatment, but there was clear clinical and radiological evidence of progressive TB at month 5 or later during treatment.

Died of TB – a treatment outcome registered in the case of patient death from TB during the treatment course.

Died of other causes – a treatment outcome registered in the case of patient death during the course of treatment of causes other than TB.

Chemotherapy default (interruption) – a treatment outcome in which a patient has interrupted the course of chemotherapy for 2 or more months.

Transferred out – patients who have left the administrative territory or was transferred from one department to another (e.g.: released from a prison where TB treatment was initiated) and the final treatment outcome is unknown.

Cohort – patients registered during a specified quarter.

Basic course of chemotherapy of TB patients – a complex of treatment activities, which includes intensive and continuation phases for the achievement of clinical cure of the active TB disease course.

Annex 2

Major epidemiological and TB control effectiveness indices, the Russian Federation, 2004–2008

Table 1

TB notification rate in the Russian Federation in 2004–2008
(notification rate by territory, Form No. 8)

No.	Federal regions (okrugs) and territoties (subjects) of the Russian Federation	New TB cases (all forms of the disease)										Including respiratory TB cases										Including pulmonary TB cases			
		Number of cases					per 100,000 population					Number of cases					per 100,000 population					per 100,000 population			
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2007	2008	2007	2008
Russian Federation		118924	119226	117646	118367	120835	83,3	84	82,6	83,3	85,090	114504	114941	113509	114396	117066	80,2	81,0	79,7	80,5	82,4	106663	106663	75,1	77,3
Federal Region: Central		23266	22687	22012	23332	23727	61,8	60,6	59,0	62,7	63,9	22304	21719	21125	22482	22859	59,3	58,0	56,7	60,5	61,5	20996	20996	56,5	57,1
1	*Oblasts:* Belgorod	1077	879	942	879	960	71,2	58,2	62,3	58,0	63,2	1046	846	895	832	911	69,2	56,0	59,2	54,9	60,0	800	800	52,8	57,4
2	Bryansk	1156	1194	1168	1259	1287	85,4	89,2	88,2	95,9	98,4	1105	1116	1108	1204	1235	81,6	83,3	83,7	91,7	94,4	1131	1131	86,1	86,7
3	Vladimir	1084	1085	1189	1161	1167	72,5	73,3	81,1	79,8	80,5	1056	1058	1151	1133	1138	70,6	71,5	78,5	77,9	78,5	1037	1037	71,3	73,6
4	Voronezh	1588	1643	1509	1597	1576	67,8	70,7	65,5	69,8	69,1	1525	1566	1440	1512	1507	65,1	67,4	62,5	66,1	66,1	1441	1441	63,0	63,1
5	Ivanovo	587	647	672	578	610	52,3	58,4	61,4	53,3	56,5	562	612	650	561	583	50,1	55,3	59,4	51,8	54,0	525	525	48,4	51,2
6	Kaluga	745	827	741	721	735	72,7	81,2	73,2	71,6	73,1	688	774	695	681	707	67,1	76,0	68,7	67,6	70,3	633	633	62,8	66,0
7	Kostroma	401	352	327	304	297	55,6	49,4	46,3	43,5	42,6	391	342	312	298	296	54,2	47,9	44,2	42,6	42,5	274	274	39,2	37,6
8	Kursk	896	978	932	892	958	74,2	82,1	79,2	76,5	82,4	868	942	904	866	938	71,9	79,1	76,8	74,2	80,7	795	795	68,1	76,5
9	Lipetsk	831	850	877	943	902	69,5	71,7	74,5	80,5	77,2	787	808	833	904	876	65,8	68,2	70,8	77,2	74,9	892	892	76,2	73,7
10	Moscow	3677	3553	3483	3921	3770	55,5	53,6	52,5	58,9	56,5	3536	3433	3368	3814	3656	53,4	51,8	50,7	57,3	54,8	3590	3590	53,9	51,3
11	Orel	522	500	496	481	472	61,7	59,7	59,7	58,4	57,4	498	478	478	461	455	58,9	57,0	57,6	55,9	55,4	435	435	52,8	50,7
12	Ryazan	977	947	927	971	963	81,3	79,7	78,7	83,1	82,7	939	911	892	944	929	78,2	76,7	75,8	80,8	79,8	873	873	74,7	75,2
13	Smolensk	1040	975	1009	899	970	101,4	96,3	100,9	91,0	98,7	1005	937	979	876	941	98,0	92,5	97,9	88,6	95,7	802	802	81,1	89,3
14	Tambov	894	792	738	750	727	77,6	69,6	65,7	67,5	65,7	844	754	705	709	692	73,3	66,3	62,7	63,8	62,6	670	670	60,3	59,5
15	Tver	1118	1119	1138	1104	1093	77,9	79,0	81,4	79,7	79,2	1105	1102	1118	1089	1075	77,0	77,8	79,9	78,6	77,9	993	993	71,7	71,6
16	Tula	1756	1485	1261	1228	1295	107,5	92,2	79,3	78,0	82,7	1674	1419	1218	1166	1245	102,5	88,1	76,6	74,1	79,5	1070	1070	68,0	74,1
17	Yaroslavl	904	884	806	819	693	67,2	66,3	60,9	62,2	52,7	844	837	755	788	645	62,8	62,8	57,0	59,8	49,0	699	699	53,1	44,5
18	*Moscow city*	4013	3977	3797	4825	5252	38,6	38,2	36,4	46,1	50,2	3831	3784	3624	4644	5030	36,8	36,3	34,7	44,4	48,0	4336	4336	41,5	43,0
Federal Region: North-West		8993	8951	8684	8426	8624	65,3	65,4	63,9	62,3	63,9	8692	8641	8364	8135	8378	63,1	63,2	61,5	60,1	62,1	7257	7257	53,7	56,0
19	*Republics:* Karelia	532	527	477	491	437	75,4	75,3	68,6	71,0	63,3	505	500	459	468	424	71,5	71,4	66,0	67,6	61,4	435	435	62,9	57,2
20	Komi	843	862	796	926	882	84,2	87,0	81,2	95,3	91,1	807	817	744	879	835	80,6	82,5	75,9	90,5	86,2	827	827	85,1	80,9
21	*Oblasts:* Arkhangelsk	953	858	942	756	740	72,7	66,1	73,3	59,2	58,2	924	839	921	740	724	70,5	64,6	71,6	58,0	56,9	688	688	53,9	53,5
	Nents AO	20	21	23	17	18	47,7	50,0	54,8	40,5	42,8	17	19	23	17	17	40,6	45,3	54,8	40,5	40,5	15	15	35,7	40,5
22	Vologda	690	633	564	575	608	55,2	51,0	45,8	46,9	49,7	657	597	534	552	582	52,5	48,1	43,4	45,0	47,6	510	510	41,6	44,6
23	Kaliningrad	1206	1185	1265	1256	1105	127,3	125,7	134,8	134,0	117,9	1174	1165	1225	1227	1083	123,9	123,6	130,5	130,9	115,5	1088	1088	116,1	101,2
24	Leningrad	1201	1249	1207	1134	1302	72,5	75,8	73,6	69,3	79,7	1178	1225	1180	1104	1278	71,1	74,3	71,9	67,5	78,2	1027	1027	62,8	73,3
25	Murmansk	580	574	500	497	428	66,2	66,1	58,1	58,2	50,3	559	549	482	490	418	63,8	63,2	56,0	57,4	49,1	461	461	54,0	38,4
26	Novgorod	496	463	451	444	438	73,1	69,1	68,2	67,8	67,1	486	453	430	422	423	71,6	67,6	65,0	64,4	64,8	395	395	60,3	61,3
27	Pskov	574	641	623	642	669	77,3	87,7	86,6	90,5	94,9	562	620	607	631	663	75,7	84,9	84,4	89,0	94,0	603	603	85,0	91,0

No.	Federal regions (okrugs) and territoties (subjects) of the Russian Federation	New TB cases (all forms of the disease)										Including respiratory TB cases										Including pulmonary TB cases			
		Number of cases					per 100,000 population					Number of cases					per 100,000 population					per 100,000 population			
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2007	2008	2007	2008
28	*St. Petersburg city*	1918	1959	1859	1705	2015	41,6	42,7	40,6	37,3	44,1	1840	1876	1782	1622	1948	39,9	40,9	38,9	35,5	42,6	1223	1223	26,8	36,0
Federal region: South		16512	16346	16298	17521	17040	76,1	75,5	73,4	76,8	74,6	15852	15696	15621	16855	16472	73,0	72,5	70,4	73,9	72,1	15823	15823	69,4	68,4
29	*Republics:* Adygea	388	340	346	411	375	87,2	76,6	78,3	93,2	85,0	355	321	336	401	366	79,8	72,4	76,0	90,9	83,0	382	382	86,9	76,2
30	Dagestan	1599	1553	1644	1582	1596	61,2	59,0	62,0	59,2	59,4	1486	1463	1539	1485	1513	56,9	55,6	58,1	55,6	56,3	1371	1371	51,3	52,5
31	Ingushetia	289	246	183	214	157	60,4	50,8	37,4	43,1	31,4	280	236	180	209	151	58,5	48,7	36,7	42,1	30,2	192	192	38,7	26,0
32	Chechnya			912	1004	925			77,7	83,9	76,5			864	952	875			73,6	79,6	72,4	870	870	72,7	66,3
33	Kabardino-Balkaria	452	468	488	491	431	50,3	52,3	54,7	55,1	48,4	433	450	473	473	419	48,2	50,3	53,0	53,1	47,0	437	437	49,0	42,4
34	Kalmykia	372	376	369	365	349	128,2	130,0	128,2	127,5	122,2	356	353	347	348	343	122,7	122,0	120,5	121,5	120,1	307	307	107,2	110,3
35	Karachaevo-Cherkessia	266	246	212	219	233	61,1	56,8	49,3	51,2	54,5	244	222	189	207	216	56,0	51,3	43,9	48,4	50,5	188	188	43,9	48,7
36	North Ossetia-Alania	558	522	439	512	451	79,1	74,2	62,5	72,9	64,2	516	474	391	479	419	73,1	67,4	55,7	68,2	59,6	333	333	47,4	51,8
37	*Krais:* Krasnodar	3573	3276	3105	3676	3653	70,0	64,3	60,9	71,9	71,3	3482	3175	3015	3604	3578	68,2	62,3	59,1	70,5	69,9	3483	3483	68,1	67,7
38	Stavropol	1544	1888	1797	1828	1905	56,7	69,6	66,4	67,6	70,4	1414	1749	1645	1682	1759	51,9	64,4	60,8	62,2	65,0	1572	1572	58,2	61,7
39	*Oblasts:* Astrakhan	880	881	875	872	947	88,0	88,4	88,0	87,4	94,6	857	857	854	856	933	85,7	86,0	85,9	85,8	93,2	793	793	79,5	87,5
40	Volgograd	2969	3041	2807	3099	2843	111,4	115,0	106,8	118,5	109,0	2875	2939	2735	2985	2778	107,9	111,1	104,1	114,2	106,5	2879	2879	110,1	102,7
41	Rostov	3622	3509	3121	3248	3175	83,3	81,2	72,8	76,2	74,6	3554	3457	3053	3174	3122	81,7	80,0	71,2	74,4	73,4	3016	3016	70,7	70,2
Federal region: Privolzhsky		23286	23539	23815	22681	23166	75,6	76,9	78,3	74,9	76,6	22294	22555	22853	21774	22348	72,4	73,7	75,1	71,9	73,9	20494	20494	67,7	69,7
42	*Republcis:* Bashkortostan	2428	2300	2231	2114	1972	59,4	56,5	55,0	52,2	48,7	2290	2199	2109	2004	1856	56,1	54,0	52,0	49,5	45,8	1883	1883	46,5	43,3
43	Mariy-El	431	480	469	582	577	59,9	67,2	66,1	82,6	82,1	411	467	454	565	558	57,1	65,4	64,0	80,1	79,3	522	522	74,0	74,1
44	Mordovia	689	598	588	583	614	79,1	69,4	69,0	69,1	73,1	663	572	574	564	605	76,1	66,4	67,4	66,8	72,0	533	533	63,2	67,3
45	Tatarstan	2298	2308	2298	2207	2221	60,9	61,3	61,1	58,7	59,0	2160	2165	2171	2088	2119	57,3	57,5	57,7	55,5	56,3	1953	1953	51,9	53,1
46	Udmurtia	1347	1317	1269	1254	1251	86,5	85,0	82,3	81,7	81,6	1296	1277	1221	1222	1221	83,3	82,5	79,2	79,6	79,7	1152	1152	75,0	75,7
47	Chuvashia	1084	1054	1052	994	1087	83,2	81,3	81,6	77,4	84,8	1043	1017	1028	965	1068	80,1	78,5	79,7	75,1	83,3	931	931	72,5	80,9
48	*Oblasts:* Kirov	851	906	1014	911	1003	57,9	62,4	70,7	64,2	71,0	800	853	968	864	945	54,4	58,7	67,5	60,8	66,9	806	806	56,8	63,3
49	Nizhni Novgorod	2867	2918	2844	2512	2503	82,8	85,1	83,7	74,5	74,5	2763	2826	2754	2446	2453	79,8	82,4	81,1	72,6	73,0	2325	2325	69,0	68,5
50	Orenburg	1997	2124	2371	2312	2405	92,6	99,1	111,2	108,9	113,5	1911	2042	2297	2233	2344	88,6	95,2	107,8	105,2	110,6	2035	2035	95,9	100,4
51	Penza	1038	1056	1026	985	1070	72,6	74,6	73,2	70,8	77,1	997	1009	972	938	1039	69,8	71,3	69,3	67,4	74,9	886	886	63,7	71,0
52	Perm (Perm Krai)	3056	3048	3200	2827	2953	109,9	110,5	116,8	103,8	108,6	2961	2923	3075	2723	2870	106,5	105,9	112,2	99,9	105,6	2535	2535	93,0	98,9
	Komi-Permyatsky AO	193	159				144,4	119,7				190	154				142,2	231,9							
53	Samara	2230	2421	2535	2518	2647	69,5	75,8	79,6	79,3	83,4	2156	2327	2441	2395	2512	67,2	72,8	76,7	75,4	79,2	2290	2290	72,1	76,2
54	Saratov	2012	2019	1902	1771	1758	76,4	77,1	73,1	68,4	68,0	1929	1934	1819	1716	1701	73,2	73,9	69,9	66,3	65,8	1646	1646	63,6	62,9
55	Ulyanovsk	958	990	1016	1111	1105	70,6	73,7	76,5	84,4	84,2	914	944	970	1051	1057	67,3	70,3	73,0	79,8	80,6	997	997	75,7	75,7
Federal Region: Urals		12842	12656	12574	12717	12840	104,4	103,2	102,8	103,9	104,9	12380	12234	12149	12297	12431	100,7	99,8	99,3	100,5	101,6	11295	11295	92,3	93,8
56	*Oblasts:* Kurgan	1298	1252	1347	1320	1436	130,1	127,0	138,2	136,8	149,5	1234	1199	1291	1273	1381	123,6	121,6	132,5	131,9	143,8	1018	1018	105,5	125,1
57	Sverdlovsk	4435	4606	4620	4913	5270	99,9	104,2	104,9	111,7	119,9	4309	4470	4487	4789	5117	97,1	101,2	101,9	108,9	116,4	4461	4461	101,4	109,7

No.	Federal regions (okrugs) and territoties (subjects) of the Russian Federation	New TB cases (all forms of the disease)										Including respiratory TB cases										Including pulmonary TB cases			
		Number of cases					per 100,000 population					Number of cases					per 100,000 population					per 100,000 population			
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2007	2008	2007	2008
58	Tyumen	3991	3918	3949	3404	3184	121,0	118,2	118,4	101,3	94,4	3905	3835	3845	3290	3102	118,4	115,7	115,3	97,9	92,0	3060	3060	91,1	84,7
	Khanty-Mansi AO	1354	1389	1423	1299	1302	92,6	94,3	95,9	86,8	86,5	1331	1371	1400	1267	1281	91,0	93,0	94,4	84,6	85,1	1161	1161	77,6	79,1
	Yamalo-Nents AO	450	514	439	400	389	86,7	97,5	82,1	74,0	71,7	435	505	422	390	377	83,8	95,8	78,9	72,1	69,5	359	359	66,4	64,7
59	Chelyabinsk	3118	2880	2658	3080	2950	87,5	81,3	75,4	87,7	84,0	2932	2730	2526	2945	2831	82,3	77,1	71,7	83,8	80,6	2756	2756	78,4	74,0
Federal Region: Siberian		25581	26371	25888	25067	25988	128,9	133,6	131,9	128,1	132,9	24762	25617	25229	24429	25301	124,8	129,8	128,5	124,8	129,4	22817	22817	116,6	122,4
60	*Republics:* Altai	296	298	260	237	250	145,4	145,9	126,9	114,9	120,7	283	290	246	224	241	139,0	142,0	120,0	108,6	116,4	204	204	98,9	100,4
61	Buryatia	1474	1531	1672	1397	1527	151,7	158,5	173,9	145,5	159,1	1432	1490	1631	1362	1497	147,4	154,2	169,6	141,9	156,0	1269	1269	132,2	146,4
62	Tyva	782	769	759	731	751	254,7	249,6	245,7	235,4	241,0	725	715	703	690	701	236,1	232,1	227,5	222,2	225,0	653	653	210,3	216,9
63	Khakassia	752	736	637	548	605	138,8	136,4	118,5	102,1	112,6	735	714	625	544	591	135,7	132,3	116,3	101,3	110,0	513	513	95,5	104,8
64	*Krai:* Altai	3727	3716	3605	3317	3352	144,8	145,5	142,3	131,8	133,6	3622	3639	3546	3229	3265	140,7	142,5	140,0	128,3	130,2	3064	3064	121,8	123,2
65	Krasnoyarsk	3089	3199	3021	3009	3092	105,3	109,7	104,2	104,0	107,0	2960	3089	2926	2925	3005	100,9	105,9	100,9	101,1	104,0	2789	2789	96,4	99,2
	Taimyr AO	33	26	24			83,7	66,4	62,0			31	25	24			78,7	63,8	62,0						
	Evenk AO	24	26	22			137,4	149,9	128,4			23	25	21			131,7	144,1	122,6						
66	*Oblasts:* Irkutsk	3140	3126	3159	3439	3576	123,0	123,3	125,3	137,0	142,6	3059	3033	3077	3336	3465	119,8	119,6	122,1	132,9	138,2	3122	3122	124,3	130,9
	Ust-Ordyn-Buryat AO	196	255	210	226		145,9	190,3	156,9	168,5		193	255	206	223		143,7	190,3	153,9	166,3	0,0	199	199	148,4	
67	Kemerovo	3772	4478	4349	4041	4164	131,7	157,3	153,5	143,0	147,5	3681	4390	4242	3948	4079	128,5	154,2	149,8	139,8	144,5	3579	3579	126,7	132,5
68	Novosibirsk	3803	3774	3647	3501	3599	142,6	142,1	137,9	132,7	136,6	3711	3689	3572	3439	3511	139,1	138,9	135,0	130,4	133,2	3288	3288	124,6	128,8
69	Omsk	2419	2406	2466	2582	2642	117,9	117,9	121,5	127,7	130,9	2299	2301	2408	2520	2573	112,0	112,8	118,6	124,6	127,5	2383	2383	117,9	121,0
70	Tomsk	1099	1111	1115	1059	1050	105,8	107,3	107,9	102,4	101,5	1066	1076	1089	1033	1021	102,6	103,9	105,4	99,9	98,6	979	979	94,7	92,3
71	Trans-Baikal Krai (Chita Oblast)	1228	1227	1198	1206	1380	107,7	108,4	106,5	107,6	123,3	1189	1191	1164	1179	1352	104,3	105,2	103,5	105,2	120,8	974	974	86,9	116,1
	Aginsk Buryat AO	96	71	95	78		131,3	96,1	127,2	103,0		89	68	91	74		121,7	92,1	121,9	97,7		69	69	91,1	0,0
Federal Region: Far-East		8432	8670	8366	8614	9434	127,5	132,0	128,2	132,6	145,4	8209	8473	8162	8416	9262	124,1	129,0	125,0	129,5	142,8	7974	7974	122,7	136,0
72	*Republic:* Sakha (Yakutia)	877	798	782	736	859	92,3	84,0	82,3	77,4	90,3	826	767	734	697	822	87,0	80,7	77,3	73,3	86,4	633	633	66,6	82,2
73	*Krais:* Primorsky	3170	3354	3325	3586	3819	155,1	165,4	165,2	179,2	191,3	3124	3298	3267	3534	3766	152,9	162,7	162,3	176,6	188,7	3358	3358	167,8	179,0
74	Khabarovsk	1730	1838	1721	1806	1947	121,5	129,8	122,2	128,6	138,7	1693	1807	1701	1792	1927	118,9	127,6	120,7	127,6	137,3	1708	1708	121,6	132,3
76	Kamchatka Krai	326	342	288	281	321	92,2	97,5	82,7	81,1	92,9	320	335	284	279	316	90,5	95,5	81,6	80,5	91,4	240	240	69,3	82,7
	Koryak AO	87	106	98			361,1	450,8	428,3			86	106	97			356,9	450,8	423,9						
77	Magadan	144	143	138	130	142	81,6	82,6	81,2	77,8	85,6	130	140	130	124	140	73,6	80,9	76,4	74,2	84,4	108	108	64,6	76,6
78	Sakhalin	523	555	584	503	589	97,7	104,9	111,5	96,8	113,6	498	527	550	448	567	93,0	99,6	105,0	86,2	109,3	427	427	82,1	102,4
79	Jewish Autonomous Oblast	298	298	245	310	352	157,5	158,8	131,7	167,0	189,7	295	296	244	306	348	155,9	157,7	131,1	164,9	187,6	301	301	162,2	182,7
80	Chukotka AO	32	39	32	29	42	62,7	77,0	63,4	57,6	83,6	31	39	29	28	41	60,7	77,0	57,4	55,6	81,6	28	28	55,6	81,6

Table 2

Notification rate of extrapulmonary TB in the Russian Federation in 2005–2008
(notification rate by territory, Form No. 8)

No.	Federal regions (okrugs) and territories of the Russian Federation	All forms of extrapulmonary TB								CNS and brain memranes				Bones and joints				Urogenital			
		Number of cases				per 100,000 population				Number of cases		per 100,000		Number of cases		per 100,000		Number		per 100,000	
		2005	2006	2007	2008	2005	2006	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Russian Federation		4285	4137	3971	3769	3,0	2,9	2,8	2,7	204	205	0,1	0,1	1194	1121	0,8	0,8	1336	1339	0,9	0,9
Federal Region: Central		968	887	850	868	2,6	2,4	2,3	2,3	37	45	0,1	0,1	279	287	0,8	0,8	284	296	0,8	0,8
1	*Oblasts:* Belgorod	33	47	47	49	2,2	3,1	3,1	3,2	3	1	0,2	0,1	22	22	1,5	1,4	9	16	0,6	1,1
2	Bryansk	78	60	55	52	5,8	4,5	4,2	4,0	0	0	0,0	0,0	11	11	0,8	0,8	32	36	2,4	2,8
3	Vladimir	27	38	28	29	1,8	2,6	1,9	2,0	1	0	0,1	0,0	12	13	0,8	0,9	10	9	0,7	0,6
4	Voronezh	77	69	85	69	3,3	3,0	3,7	3,0	1	0	0,0	0,0	15	18	0,7	0,8	50	42	2,2	1,8
5	Ivanovo	35	22	17	27	3,1	2,0	1,6	2,5	1	1	0,1	0,1	4	11	0,4	1,0	7	8	0,6	0,7
6	Kaluga	53	46	40	28	5,2	4,5	4,0	2,8	0	0	0,0	0,0	3	1	0,3	0,1	32	19	3,2	1,9
7	Kostroma	10	15	6	1	1,4	2,1	0,9	0,1	0	0	0,0	0,0	5	0	0,7	0,0	0	0	0,0	0,0
8	Kursk	36	28	26	20	3,0	2,4	2,2	1,7	2	1	0,2	0,1	11	6	0,9	0,5	6	6	0,5	0,5
9	Lipetsk	42	44	39	26	3,5	3,7	3,3	2,2	1	1	0,1	0,1	12	12	1,0	1,0	10	5	0,9	0,4
10	Moscow	120	115	107	114	1,8	1,7	1,6	1,7	8	13	0,1	0,2	53	45	0,8	0,7	20	24	0,3	0,4
11	Orel	22	18	20	17	2,6	2,2	2,4	2,1	0	0	0,0	0,0	10	10	1,2	1,2	5	2	0,6	0,2
12	Ryazan	36	35	27	34	3,0	3,0	2,3	2,9	2	2	0,2	0,2	15	16	1,3	1,4	1	9	0,1	0,8
13	Smolensk	38	30	23	29	3,7	3,0	2,3	2,9	1	0	0,1	0,0	7	7	0,7	0,7	2	3	0,2	0,3
14	Tambov	38	33	41	35	3,3	2,9	3,7	3,2	1	0	0,1	0,0	3	5	0,3	0,5	25	22	2,2	2,0
15	Tver	17	20	15	18	1,2	1,4	1,1	1,3	0	1	0,0	0,1	5	9	0,4	0,7	5	4	0,4	0,3
16	Tula	66	43	62	50	4,1	2,7	3,9	3,2	0	0	0,0	0,0	15	12	1,0	0,8	38	29	2,4	1,9
17	Yaroslavl	47	51	31	48	3,5	3,8	2,3	3,7	3	3	0,2	0,2	9	4	0,7	0,3	8	12	0,6	0,9
18	*Moscow city*	193	173	181	222	1,9	1,7	1,7	2,1	13	22	0,1	0,2	67	85	0,6	0,8	24	50	0,2	0,5
Federal Region: North-West		310	320	291	246	2,3	2,3	2,1	1,8	15	22	0,1	0,2	83	61	0,6	0,5	84	70	0,6	0,5
19	*Republics:* Karelia	27	18	23	13	3,8	2,6	3,3	1,9	0	0	0,0	0,0	4	1	0,6	0,1	4	3	0,6	0,4
20	Komi	45	52	47	47	4,5	5,3	4,8	4,9	1	1	0,1	0,1	13	11	1,3	1,1	18	21	1,9	2,2
21	*Oblasts:* Arkhangelsk	19	21	16	16	1,5	1,6	1,2	1,3	0	0	0,0	0,0	5	6	0,4	0,5	6	4	0,5	0,3
	Nents AO	2	0	0	1	4,8	0,0	0,0	2,4									0	0	0,0	0,0
22	Vologda	36	30	23	26	2,9	2,4	1,9	2,1	0	1	0,0	0,1	5	7	0,4	0,6	8	5	0,7	0,4
23	Kaliningrad	20	40	29	22	2,1	4,3	3,1	2,3	0	1	0,0	0,1	14	12	1,5	1,3	5	7	0,5	0,7
24	Leningrad	24	27	30	24	1,5	1,6	1,8	1,5	5	5	0,3	0,3	7	6	0,4	0,4	4	2	0,2	0,1
25	Murmansk	25	18	7	10	2,9	2,1	0,8	1,2	2	1	0,2	0,1	2	1	0,2	0,1	2	2	0,2	0,2
26	Novgorod	10	21	22	15	1,5	3,2	3,3	2,3	0	2	0,0	0,3	2	2	0,3	0,3	11	4	1,7	0,6
27	Pskov	21	16	11	6	2,9	2,2	1,5	0,9	0	0	0,0	0,0	8	3	1,1	0,4	2	1	0,3	0,1

No.	Federal regions (okrugs) and territories of the Russian Federation	All forms of extrapulmonary TB								CNS and brain memranes				Bones and joints				Urogenital			
		Number of cases				per 100,000 population				Number of cases		per 100,000		Number of cases		per 100,000		Number		per 100,000	
		2005	2006	2007	2008	2005	2006	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
28	*St. Petersburg city*	83	77	83	67	1,8	1,7	1,8	1,5	7	11	0,2	0,2	23	12	0,5	0,3	24	21	0,5	0,5
Federal region: South		650	677	666	568	3,0	3,1	2,9	2,5	22	20	0,1	0,1	229	208	1,0	0,9	174	179	0,8	0,8
29	*Republics:* Adygea	19	10	10	9	4,3	2,3	2,3	2,0	1	0	0,2	0,0	0	3	0,0	0,7	5	5	1,1	1,1
30	Dagestan	90	105	97	83	3,4	4,0	3,6	3,1	8	6	0,3	0,2	38	33	1,4	1,2	5	12	0,2	0,4
31	Ingushetia	10	3	5	6	2,1	0,6	1,0	1,2	0	0	0,0	0,0	2	1	0,4	0,2	0	0	0,0	0,0
32	Chechnya	51	48	52	50		4,1	4,4	4,1	1	1	0,1	0,1	20	28	1,7	2,3	3	3	0,3	0,2
33	Kabardino-Balkaria	18	15	18	12	2,0	1,7	2,0	1,3	3	1	0,3	0,1	11	6	1,2	0,7	1	2	0,1	0,2
34	Kalmykia	23	22	17	6	7,9	7,6	5,9	2,1	0	1	0,0	0,4	4	1	1,4	0,4	7	3	2,4	1,1
35	Karachaevo-Cherkessia	24	23	12	17	5,5	5,3	2,8	4,0	0	0	0,0	0,0	1	3	0,2	0,7	2	5	0,5	1,2
36	North Ossetia - Alania	48	48	33	32	6,8	6,8	4,7	4,6	1	1	0,1	0,1	12	7	1,7	1,0	8	11	1,1	1,6
37	*Krais:* Krasnodar	101	90	72	75	2,0	1,8	1,4	1,5	5	8	0,1	0,2	17	26	0,3	0,5	27	27	0,5	0,5
38	Stavropol	139	152	146	146	5,1	5,6	5,4	5,4	1	0	0,0	0,0	19	27	0,7	1,0	72	73	2,7	2,7
39	*Oblasts:* Astrakhan	24	21	16	14	2,4	2,1	1,6	1,4	0	0	0,0	0,0	4	6	0,4	0,6	4	5	0,4	0,5
40	Volgograd	102	72	114	65	3,8	2,7	4,4	2,5	1	1	0,0	0,0	68	47	2,6	1,8	22	12	0,8	0,5
41	Rostov	52	68	74	53	1,2	1,6	1,7	1,2	1	1	0,0	0,0	33	20	0,8	0,5	18	21	0,4	0,5
Federal region: Privolzhsky		984	962	907	818	3,2	3,2	3,0	2,7	44	23	0,1	0,1	225	225	0,7	0,7	389	366	1,3	1,2
42	*Republcis:* Bashkortostan	101	122	110	116	2,5	3,0	2,7	2,9	1	0	0,0	0,0	29	39	0,7	1,0	42	36	1,0	0,9
43	Mariy-El	13	15	17	19	1,8	2,1	2,4	2,7	1	0	0,1	0,0	4	6	0,6	0,9	4	5	0,6	0,7
44	Mordovia	26	14	19	9	3,0	1,6	2,2	1,1	0	0	0,0	0,0	7	2	0,8	0,2	10	6	1,2	0,7
45	Tatarstan	143	127	119	102	3,8	3,4	3,2	2,7	5	2	0,1	0,1	45	32	1,2	0,9	33	35	0,9	0,9
46	Udmurtia	40	48	32	30	2,6	3,1	2,1	2,0	0	1	0,0	0,1	10	8	0,7	0,5	8	13	0,5	0,8
47	Chuvashia	37	24	29	19	2,8	1,9	2,3	1,5	5	1	0,4	0,1	9	2	0,7	0,2	7	10	0,5	0,8
48	*Oblasts:* Kirov	53	46	47	58	3,6	3,2	3,3	4,1	2	1	0,1	0,1	10	14	0,7	1,0	20	26	1,4	1,8
49	Nizhni Novgorod	92	90	66	50	2,7	2,6	2,0	1,5	3	1	0,1	0,0	16	8	0,5	0,2	34	28	1,0	0,8
50	Orenburg	82	74	79	61	3,8	3,5	3,7	2,9	11	6	0,5	0,3	20	18	0,9	0,8	26	15	1,2	0,7
51	Penza	47	54	47	31	3,3	3,8	3,4	2,2	0	0	0,0	0,0	16	12	1,1	0,9	22	15	1,6	1,1
52	Perm (Perm Krai)	125	125	104	83	4,5	4,5	3,8	3,1	4	2	0,1	0,1	4	13	0,1	0,5	64	48	2,3	1,8
	Komi-Permyatsky AO	5				3,8															
53	Samara	94	94	123	135	2,9	2,9	3,9	4,3	1	3	0,0	0,1	23	37	0,7	1,2	77	79	2,4	2,5
54	Saratov	85	83	55	57	3,2	3,2	2,1	2,2	3	2	0,1	0,1	13	16	0,5	0,6	30	35	1,2	1,4
55	Ulyanovsk	46	46	60	48	3,4	3,4	4,5	3,7	8	4	0,6	0,3	19	18	1,4	1,4	12	15	0,9	1,1
Federal Region: Urals		422	425	420	409	3,4	3,5	3,4	3,3	29	29	0,2	0,2	107	83	0,9	0,7	122	129	1,0	1,1
56	*Oblasts:* Kurgan	53	56	47	55	5,3	5,7	4,8	5,7	0	0	0,0	0,0	9	10	0,9	1,0	30	40	3,1	4,2
57	Sverdlovsk	136	133	124	153	3,1	3,0	2,8	3,5	6	3	0,1	0,1	26	29	0,6	0,7	37	54	0,8	1,2

No.	Federal regions (okrugs) and territories of the Russian Federation	All forms of extrapulmonary TB								CNS and brain memranes				Bones and joints				Urogenital			
		Number of cases				per 100,000 population				Number of cases		per 100,000		Number of cases		per 100,000		Number		per 100,000	
		2005	2006	2007	2008	2005	2006	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
58	Tyumen	83	104	114	82	2,5	3,1	3,4	2,4	19	19	0,6	0,6	24	12	0,7	0,4	20	16	0,6	0,5
	Khanty-Mansi AO	18	23	32	21	1,2	1,6	2,2	1,4	0	1	0,0	0,1	12	5	0,8	0,3	1	3	0,1	0,2
	Yamalo-Nents AO	9	17	10	12	1,7	3,2	1,9	2,2	1	3	0,2	0,6	2	1	0,4	0,2	2	3	0,4	0,6
59	Chelyabinsk	150	132	135	119	4,2	3,7	3,8	3,4	4	7	0,1	0,2	48	32	1,4	0,9	35	19	1,0	0,5
Federal Region: Siberian		754	659	638	687	3,8	3,3	3,3	3,5	45	58	0,2	0,3	203	204	1,0	1,0	198	234	1,0	1,2
60	*Republics:* Altai	8	14	13	9	3,9	6,8	6,3	4,3	1	0	0,5	0,0	2	3	1,0	1,4	3	1	1,5	0,5
61	Buryatia	41	41	35	30	4,2	4,3	3,6	3,1	0	1	0,0	0,1	17	9	1,8	0,9	10	13	1,0	1,4
62	Tyva	54	56	41	50	17,6	18,2	13,2	16,0	5	3	1,6	1,0	12	23	3,9	7,4	1	4	0,3	1,3
63	Khakassia	22	12	4	14	4,1	2,2	0,7	2,6	0	1	0,0	0,2	2	7	0,4	1,3	1	2	0,2	0,4
64	*Krai: Altai*	77	59	88	87	3,0	2,3	3,5	3,5	2	2	0,1	0,1	58	49	2,3	2,0	16	19	0,6	0,8
65	Krasnoyarsk	110	95	84	87	3,8	3,3	2,9	3,0	2	2	0,1	0,1	32	26	1,1	0,9	31	36	1,1	1,2
	Taimyr AO	1	0			2,5	0,0														
	Evenk AO	1	1			5,7	5,8														
66	*Oblasts:* Irkutsk	93	82	103	111	3,7	3,2	4,1	4,4	16	27	0,6	1,1	38	24	1,5	1,0	27	33	1,1	1,3
	Ust-Ordyn-Buryat AO	-	4	3		0,0	3,0	2,2		0	0	0,0	0,0	2	0	1,5	0,0	0	0	0,0	0,0
67	Kemerovo	88	107	93	85	3,1	3,8	3,3	3,0	6	3	0,2	0,1	10	10	0,4	0,4	40	41	1,4	1,5
68	Novosibirsk	85	75	62	88	3,2	2,8	2,3	3,3	3	9	0,1	0,3	11	26	0,4	1,0	19	21	0,7	0,8
69	Omsk	105	58	62	69	5,1	2,9	3,1	3,4	9	7	0,4	0,3	7	8	0,3	0,4	28	47	1,4	2,3
70	Tomsk	35	26	26	29	3,4	2,5	2,5	2,8	0	2	0,0	0,2	8	11	0,8	1,1	8	6	0,8	0,6
71	Trans-Baikal Krai (Chita Oblast)	36	34	27	28	3,2	3,0	2,4	2,5	1	1	0,1	0,1	6	8	0,5	0,7	14	11	1,2	1,0
	Aginsk Buryat AO	3	4	4	0	4,1	5,4	5,3	0,0	0	0	0,0	0,0	1	0	1,3	0,0	1	0	1,3	0,0
Federal Region: Far-East		197	204	198	172	3,0	3,1	3,0	2,7	12	8	0,2	0,1	68	53	1,0	0,8	85	65	1,3	1,0
72	*Republic:* Sakha (Yakutia)	31	48	39	37	3,3	5,1	4,1	3,9	2	1	0,2	0,1	16	15	1,7	1,6	5	6	0,5	0,6
73	*Krais:* Primorsky	56	58	52	53	2,8	2,9	2,6	2,7	2	0	0,1	0,0	31	22	1,5	1,1	15	24	0,7	1,2
74	Khabarovsk	31	20	14	20	2,2	1,4	1,0	1,4	3	1	0,2	0,1	2	3	0,1	0,2	4	7	0,3	0,5
75	*Oblasts:* Amur	39	28	25	28	4,4	3,2	2,9	3,2	3	3	0,3	0,3	11	10	1,3	1,1	8	10	0,9	1,1
76	Kamchatka Krai	7	4	2	5	2,0	1,1	0,6	1,4	0	0	0,0	0,0	1	1	0,3	0,3	0	0	0,0	0,0
	Koryak AO	0	1			0,0	4,3														
77	Magadan	3	8	6	2	1,7	4,7	3,6	1,2	0	0	0,0	0,0	1	0	0,6	0,0	3	2	1,8	1,2
78	Sakhalin	28	34	55	22	5,3	6,5	10,6	4,2	0	1	0,0	0,2	5	2	1,0	0,4	50	16	9,6	3,1
79	Jewish Autonomous Oblast	2	1	4	4	1,1	0,5	2,2	2,2	1	1	0,5	0,5	1	0	0,5	0,0	0	0	0,0	0,0
80	Chukotka AO	0	3	1	1	0,0	5,9	2,0	2,0	1	1	2,0	2,0	0	0	0,0	0,0	0	0	0,0	0,0

Table 3

TB notification and TB prevalence rate among children in the Russian Federation in 2004–2008
(notification rate by territory – Form No. 8; prevalence – Form No. 33)

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New TB cases among children (0–14)										Children (0–14) with TB registered by the end of the year									
		Number of cases					Cases per 100,000 population					Number of cases					Cases per 100,000 population				
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Russian Federation		3583	3530	3423	3422	3203	16,4	16,656	16,393	16,388	15,381	5229	4758	4653	4457	4164	23,5	22,1	22,3	21,3	20,0
Federal Region: Central		519	560	559	544	536	10,5	11,7	11,9	11,6	11,5	741	683	670	677	646	14,8	14,1	14,2	14,5	13,8
1	*Oblasts: Belgorod*	23	17	16	17	11	10,4	8,0	7,7	8,2	5,3	29	20	20	17	15	12,9	9,2	9,5	8,2	7,3
2	Bryansk	31	38	56	33	53	15,1	19,3	29,5	17,9	29,0	46	53	76	52	53	21,9	26,4	39,4	27,9	29,0
3	Vladimir	21	32	45	38	31	10,3	16,3	23,5	20,0	16,4	25	41	64	61	44	12,1	20,6	33,2	32,1	23,2
4	Voronezh	21	23	12	18	15	6,6	7,5	4,0	6,2	5,2	45	38	20	17	18	13,8	12,2	6,7	5,8	6,2
5	Ivanovo	12	13	20	11	9	8,0	9,1	14,4	8,0	6,6	29	18	26	20	15	19,0	12,3	18,5	14,5	11,0
6	Kaluga	16	28	17	32	27	11,3	20,4	12,7	24,3	20,5	34	37	24	32	39	23,5	26,6	17,8	24,2	29,6
7	Kostroma	8	14	6	16	19	7,7	13,9	6,1	16,6	19,7	12	8	4	14	20	11,3	7,8	4,0	14,5	20,7
8	Kursk	13	8	3	11	9	7,4	4,8	1,8	6,9	5,7	23	14	9	14	11	12,9	8,2	5,5	8,7	6,9
9	Lipetsk	19	20	16	7	10	11,1	12,1	10,0	4,4	6,3	39	26	23	13	14	22,4	15,5	14,2	8,2	8,9
10	Moscow	76	84	98	68	81	8,8	9,9	11,7	8,1	9,6	94	101	126	103	108	10,8	11,8	15,0	12,3	12,8
11	Orel	9	11	12	11	15	7,4	9,4	10,6	9,9	13,6	11	9	15	14	10	8,9	7,6	13,1	12,5	9,0
12	Ryazan	24	22	18	23	8	15,0	14,3	12,1	15,7	5,5	27	32	16	26	15	16,5	20,4	10,6	17,6	10,2
13	Smolensk	29	38	38	33	33	20,9	28,5	29,5	26,2	26,3	43	43	39	46	45	30,3	31,7	29,9	36,3	35,9
14	Tambov	13	8	6	7	9	8,0	5,1	4,0	4,8	6,2	14	10	9	7	10	8,4	6,3	5,9	4,8	6,9
15	Tver	22	12	26	19	17	11,1	6,3	14,0	10,4	9,3	33	19	27	28	29	16,4	9,8	14,4	15,2	15,8
16	Tula	39	24	32	39	37	18,8	12,0	16,5	20,5	19,5	85	69	50	58	63	40,0	33,9	25,5	30,3	33,3
17	Yaroslavl	37	36	26	31	25	20,7	20,7	15,3	18,3	14,7	51	39	29	33	22	28,0	22,2	16,9	19,5	13,0
18	*Moscow city*	106	132	112	130	127	8,8	11,1	9,4	10,8	10,5	101	106	93	122	115	8,3	8,9	7,8	10,2	9,5
Federal Region: North-West		396	371	343	315	281	20,9	20,2	19,1	17,7	15,8	512	450	367	330	282	26,5	24,1	20,3	18,6	15,9
19	*Republics:* Karelia	13	12	15	13	8	12,2	11,7	15,0	13,2	8,1	38	24	30	22	17	35,0	23,0	29,8	22,3	17,3
20	Komi	41	37	34	27	23	24,4	22,7	21,5	17,3	14,9	56	44	38	34	33	32,8	26,6	23,7	21,7	21,3
21	*Oblasts:* Arkhangelsk	27	45	27	24	18	13,1	22,6	13,9	12,5	9,4	30	47	31	31	22	14,2	23,2	15,8	16,1	11,5
	Nents AO	3	2	0	1	0	32,8	22,5	0,0	11,6	0,0	3	3	1	1	0	32,4	33,3	11,4	11,6	0,0
22	Vologda	39	21	21	23	12	20,5	11,4	11,6	12,9	6,7	37	31	28	22	9	19,1	16,6	15,4	12,3	5,0
23	Kaliningrad	106	101	105	91	83	77,1	76,0	81,2	71,2	65,0	97	80	68	61	49	69,2	59,3	52,0	47,7	38,4
24	Leningrad	57	40	32	39	26	26,2	19,2	15,8	19,6	13,1	85	54	30	38	28	38,3	25,4	14,6	19,0	14,2
25	Murmansk	8	7	4	11	4	6,0	5,4	3,2	8,9	3,3	10	11	6	12	10	7,3	8,4	4,7	9,7	8,2
26	Novgorod	5	8	6	10	8	5,2	8,7	6,7	11,4	9,1	12	15	12	14	13	12,3	16,1	13,3	15,9	14,8
27	Pskov	6	5	7	4	5	5,9	5,1	7,5	4,3	5,5	16	13	14	8	7	15,4	13,1	14,7	8,6	7,7

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New TB cases among children (0–14)										Number of children (0–14) with TB registered by the end of the year									
		Number of cases					Cases per 100,000 population					Number of cases					Cases per 100,000 population				
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
28	*St. Petersburg city*	94	95	92	73	94	17,4	18,0	17,7	14,0	17,9	131	131	110	88	94	23,8	24,6	21,1	17,0	17,9
Federal region: South		594	524	510	579	505	15,5	14,1	13,4	14,7	12,9	872	764	891	882	791	22,4	20,3	24,4	22,4	20,2
29	*Republics:* Adygea	4	3	2	5	5	5,4	4,2	2,8	7,2	7,2	7	2	0	3	4	9,3	2,7	0,0	4,3	5,8
30	Dagestan	111	133	105	99	81	15,8	19,4	15,7	15,1	12,5	192	213	173	155	125	26,9	30,7	25,7	23,5	19,2
31	Ingushetia	37	23	13	22	17	24,2	15,6	9,1	15,8	12,4	60	41	40	42	44	38,7	27,3	27,7	29,7	32,0
32	Chechnya			38	64	72			10,4	17,3	19,3			183	182	185			50,4	49,7	49,7
33	Kabardino-Balkaria	11	16	11	10	10	6,0	9,2	6,6	6,2	6,3	25	33	30	14	15	13,4	18,5	17,7	8,6	9,5
34	Kalmykia	11	27	31	32	14	18,0	45,8	54,3	57,4	25,3	21	36	42	39	18	33,7	60,0	72,5	69,4	32,6
35	Karachaevo-Cherkessia	12	11	12	10	9	14,1	13,4	15,1	12,9	11,7	29	26	25	29	22	33,4	31,0	30,9	37,1	28,6
36	North Ossetia - Alania	82	70	45	69	55	62,5	55,3	36,5	56,9	45,6	143	91	74	80	80	107,0	70,6	59,4	65,6	66,3
37	*Krais:* Krasnodar	91	45	37	56	45	11,4	5,8	4,8	7,4	5,9	83	51	37	59	47	10,3	6,5	4,8	7,8	6,2
38	Stavropol	43	45	44	46	43	9,7	10,5	10,5	11,2	10,5	72	77	67	74	75	16,0	17,7	15,9	17,9	18,3
39	*Oblasts:* Astrakhan	53	43	49	48	46	31,0	25,8	30,0	29,5	28,2	57	46	57	59	49	32,9	27,3	34,7	36,4	30,0
40	Volgograd	52	34	37	39	47	13,1	8,9	9,9	10,6	12,9	61	46	55	45	47	15,1	11,8	14,6	12,2	12,9
41	Rostov	87	74	86	79	61	13,8	12,1	14,5	13,6	10,5	122	102	108	101	80	19,0	16,5	18,0	17,2	13,8
Federal region: Privolzhsky		571	566	542	473	497	11,8	12,2	12,0	10,6	11,2	836	776	729	643	651	17,0	16,4	16,0	14,4	14,7
42	*Republcis:* Bashkortostan	48	46	48	47	44	6,6	6,6	7,1	7,0	6,6	104	87	85	82	76	14,0	12,2	12,3	12,2	11,4
43	Mariy-El	14	19	20	20	21	12,0	17,0	18,5	18,9	19,9	17	26	28	21	21	14,2	22,8	25,6	19,7	19,9
44	Mordovia	14	18	11	16	16	11,0	14,9	9,5	14,2	14,4	27	33	21	26	28	20,7	26,7	17,8	22,8	25,2
45	Tatarstan	71	72	62	51	59	11,3	11,9	10,5	8,8	10,3	87	78	58	42	46	13,5	12,6	9,7	7,2	8,0
46	Udmurtia	21	22	29	34	16	8,0	8,7	11,7	13,9	6,5	37	30	39	43	25	13,9	11,6	15,6	17,5	10,2
47	Chuvashia	12	12	16	13	13	5,6	5,8	8,0	6,6	6,7	27	27	27	20	26	12,2	12,8	13,3	10,2	13,3
48	*Oblasts:* Kirov	35	29	19	14	23	16,5	14,3	9,7	7,3	12,0	45	36	30	28	33	20,7	17,4	15,1	14,5	17,2
49	Nizhni Novgorod	83	70	63	65	70	17,4	15,2	14,1	14,7	15,9	155	131	115	107	120	31,9	28,1	25,5	24,1	27,2
50	Orenburg	41	49	45	42	42	11,3	14,0	13,2	12,6	12,6	45	63	63	60	56	12,1	17,7	18,3	17,9	16,9
51	Penza	28	26	26	17	17	14,0	13,7	14,2	9,5	9,5	19	23	24	14	13	9,3	11,8	12,9	7,8	7,3
52	Perm (Perm Krai)	51	40	52	23	36	11,2	9,1	12,1	5,4	8,4	65	59	63	34	47	14,1	13,2	14,5	8,0	11,0
	Komi-Permyatsky AO	4	3				15,1	23,2				4	5				14,9	19,3			
53	Samara	63	90	77	73	73	13,7	20,2	17,7	16,9	16,9	81	97	101	90	87	17,4	21,5	23,0	20,8	20,1
54	Saratov	50	44	48	36	55	13,0	11,9	13,4	10,2	15,7	80	47	49	51	59	20,3	12,4	13,5	14,4	16,8
55	Ulyanovsk	40	29	26	22	12	20,0	15,3	14,4	12,5	6,9	47	39	26	25	14	22,9	20,1	14,1	14,1	8,0
Federal Region: Urals		278	267	261	258	257	14,1	13,9	13,8	13,7	13,6	428	420	458	435	396	21,3	21,6	24,1	23,2	21,0
56	*Oblasts:* Kurgan	52	46	43	28	34	32,7	30,2	29,2	19,4	23,7	76	64	76	52	37	46,8	41,2	50,9	35,9	25,8
57	Sverdlovsk	97	98	93	118	114	14,8	15,3	14,8	18,7	18,1	137	162	177	210	194	20,6	25,1	28,0	33,5	30,7
58	Tyumen	83	78	90	78	76	13,6	13,1	15,3	13,3	12,9	141	114	129	110	99	22,8	18,9	21,8	18,8	16,8

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New TB cases among children (0–14)										Number of children (0–14) with TB registered by the end of the year									
		Number of cases					Cases per 100,000 population					Number of cases					Cases per 100,000 population				
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
	Khanty-Mansi AO	15	16	15	18	12	5,3	5,8	5,5	6,6	4,4	21	22	22	26	17	7,4	7,9	8,0	9,5	6,2
	Yamalo-Nents AO	32	26	31	19	25	29,1	24,1	29,2	18,0	23,7	46	37	42	26	24	41,4	34,0	39,3	24,6	22,7
59	Chelyabinsk	46	45	35	34	33	8,3	8,4	6,7	6,5	6,4	74	80	76	63	66	13,2	14,7	14,4	12,1	12,7
Federal Region: Siberian		852	865	924	941	835	25,8	27,0	29,5	30,3	26,9	1293	1176	1136	1137	1050	38,5	36,2	35,9	36,6	33,8
60	*Republics:* Altai	20	18	12	14	20	43,8	39,8	26,7	30,9	43,8	36	20	17	14	25	78,2	44,2	37,7	31,1	54,8
61	Buryatia	45	77	94	79	61	23,7	41,8	52,1	43,8	33,7	87	83	83	65	58	44,9	44,5	45,7	36,2	32,0
62	Tyva	46	36	30	33	25	53,4	42,7	36,2	40,0	30,1	87	68	50	52	39	100,0	79,8	59,9	63,3	46,9
63	Khakassia	32	39	21	20	17	34,0	42,7	23,6	22,6	19,2	29	35	19	27	18	30,3	37,8	21,1	30,6	20,3
64	*Krai: Altai*	80	88	98	80	84	20,3	23,1	26,3	21,7	22,9	99	100	96	76	74	24,8	25,8	25,5	20,6	20,1
65	Krasnoyarsk	148	136	126	113	99	30,3	28,9	27,5	25,0	22,0	181	160	165	148	138	36,4	33,4	35,6	32,7	30,7
	Taimyr AO	4	3	6			45,6	35,2	72,8			6	7	7			67,5	80,9	83,5		
	Evenk AO	1	1	1			24,6	25,3	26,0			1	1	1			24,2	25,0	25,6		
66	*Oblasts:* Irkutsk	117	70	126	130	102	25,4	15,7	29,1	30,3	23,8	269	182	185	221	199	57,5	40,3	42,2	51,5	46,4
	Ust-Ordyn-Buryat AO	11	6	7	15		32,3	18,5	22,3	48,8		26	18	8	17		74,7	54,2	25,2	55,0	0,0
67	Kemerovo	144	200	214	271	229	32,4	46,2	50,3	63,9	53,9	165	226	238	263	229	36,5	51,6	55,6	62,1	53,9
68	Novosibirsk	59	52	70	49	57	15,1	13,7	18,7	13,2	15,3	96	75	82	61	58	24,2	19,5	21,8	16,5	15,6
69	Omsk	101	79	67	79	76	30,9	25,0	21,8	26,2	25,3	161	135	120	123	114	48,3	42,1	38,7	40,6	37,9
70	Tomsk	29	36	27	38	31	18,3	23,3	17,8	25,1	20,4	51	53	49	55	60	31,8	34,0	32,1	36,4	39,5
71	Trans-Baikal Krai (Chita Oblast)	31	34	39	35	34	13,8	15,6	18,2	16,5	16,1	32	39	32	32	38	14,0	17,6	14,8	15,1	18,0
	Aginsk Buryat AO	1	8	5	4	0	5,3	43,6	27,7	22,1	0,0	2	8	3	3	0	10,4	43,0	16,6	16,7	0,0
	Federal Region: Far-East	372	376	283	311	292	33,2	34,7	26,8	29,8	28,1	546	488	401	352	348	48,0	44,3	37,5	33,6	33,4
72	*Republic:* Sakha (Yakutia)	128	105	96	65	62	58,3	49,0	45,8	31,4	30,1	154	115	96	72	54	69,3	53,0	45,4	34,7	26,2
73	*Krais:* Primorsky	61	79	62	83	108	19,6	26,3	21,2	28,9	37,7	94	94	67	78	115	29,6	30,7	22,7	27,0	40,1
74	Khabarovsk	52	43	30	39	32	23,7	20,2	14,4	18,9	15,6	64	42	39	39	24	28,8	19,5	18,6	18,9	11,7
75	*Oblasts:* Amur	35	31	12	31	29	22,6	20,7	8,2	21,5	20,2	68	67	49	37	40	43,3	44,0	33,2	25,6	27,9
76	Kamchatka Krai	55	54	34	36	30	96,6	97,7	62,9	67,5	56,4	97	79	53	39	39	167,4	141,1	97,2	72,8	73,4
	Koryak AO	19	34	15					321,3			40	56	37			769,4	1118,9	772,1		
77	Magadan	16	23	12	16	10	55,4	82,9	44,8	61,4	38,7	25	31	21	14	12	84,9	109,6	77,2	53,2	46,5
78	Sakhalin	17	35	29	37	15	20,1	42,8	36,3	46,8	19,0	33	51	68	69	57	38,3	61,4	84,4	87,1	72,1
79	Jewish Autonomous Oblast	4	6	7	4	4	11,9	18,6	22,3	12,9	12,9	5	8	7	3	5	14,7	24,3	22,1	9,7	16,2
80	Chukotka AO	4	0	1	0	2	38,5	0,0	9,9	0,0	19,7	6	1	1	1	2	57,1	9,7	9,9	9,9	19,7

Table 4

Notification rate of MbT + TB in the Russian Federation in 2004–2008
(notification rate by territory, Form No. 8)

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New MbT+ TB cases										Proportion of MbT+ cases to all new TB patients					New ss+ TB cases									
		Number of cases					per 100,000 population					%					Number of cases				per 100,000 population				% of PTB	
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008	2007	2008
Russian Federation		49265	50116	48938	48567	50168	34,5	35,3	34,3	34,2	35,327	41,4	42,0	41,6	41,0	41,5	32605	32335	33103	33949	23,0	22,8	23,3	23,9	31,0	30,9
Federal Region: Central		10410	10336	9916	9770	10306	27,7	27,6	26,5	26,3	27,741	44,7	45,6	45,0	41,9	43,4	6765	6582	6611	6709	18,1	17,7	17,8	18,1	31,5	31,6
1	*Oblasts:* Belgorod	483	454	472	460	522	31,9	30,0	31,2	30,3	34,362	44,8	51,6	50,1	52,3	54,4	282	298	293	308	18,7	19,7	19,3	20,3	36,6	35,3
2	Bryansk	686	671	625	623	740	50,7	50,1	46,9	47,4	56,6	59,3	56,2	53,5	49,5	57,5	439	399	410	434	32,8	30,1	31,2	33,2	36,3	38,2
3	Vladimir	565	599	578	473	567	37,8	40,5	39,2	32,5	39,1	52,1	55,2	48,6	40,7	48,6	442	396	383	422	29,9	27,0	26,3	29,1	36,9	39,6
4	Voronezh	785	873	803	817	768	33,5	37,6	34,7	35,7	33,7	49,4	53,1	53,2	51,2	48,7	436	426	456	417	18,8	18,5	19,9	18,3	31,6	29,0
5	Ivanovo	355	389	424	352	374	31,6	35,1	38,5	32,5	34,6	60,5	60,1	63,1	60,9	61,3	246	275	223	229	22,2	25,1	20,6	21,2	42,5	41,4
6	Kaluga	417	437	393	370	323	40,7	42,9	38,7	36,7	32,1	56,0	52,8	53,0	51,3	43,9	323	305	280	254	31,7	30,2	27,8	25,3	44,2	38,3
7	Kostroma	171	178	180	157	138	23,7	25,0	25,4	22,4	19,8	42,6	50,6	55,0	51,6	46,5	120	111	105	92	16,8	15,7	15,0	13,2	38,3	35,1
8	Kursk	428	404	462	418	481	35,5	33,9	39,0	35,8	41,4	47,8	41,3	49,6	46,9	50,2	263	323	298	310	22,1	27,4	25,5	26,7	37,5	34,9
9	Lipetsk	355	359	367	364	335	29,7	30,3	31,1	31,1	28,7	42,7	42,2	41,8	38,6	37,1	171	187	197	116	14,4	15,9	16,8	9,9	22,1	13,5
10	Moscow	1169	1195	1121	1209	1187	17,6	18,0	16,9	18,2	17,8	31,8	33,6	32,2	30,8	31,5	971	876	976	988	14,6	13,2	14,7	14,8	27,2	28,8
11	Orel	349	356	361	335	339	41,2	42,5	43,3	40,6	41,2	66,9	71,2	72,8	69,6	71,8	262	265	215	213	31,3	31,9	26,1	25,9	49,4	51,1
12	Ryazan	397	303	295	403	431	33,0	25,5	25,0	34,5	37,0	40,6	32,0	31,8	41,5	44,8	250	265	305	309	21,0	22,5	26,1	26,5	34,9	35,3
13	Smolensk	405	401	385	304	338	39,5	39,6	38,3	30,8	34,4	38,9	41,1	38,2	33,8	34,8	147	196	150	168	14,5	19,6	15,2	17,1	18,7	19,1
14	Tambov	525	445	370	432	392	45,6	39,1	32,7	38,9	35,4	58,7	56,2	50,1	57,6	53,9	270	259	276	253	23,7	23,0	24,8	22,9	41,2	38,4
15	Tver	461	494	431	378	445	32,1	34,9	30,6	27,3	32,3	41,2	44,1	37,9	34,2	40,7	276	344	338	410	19,5	24,6	24,4	29,7	34,0	41,5
16	Tula	741	642	619	603	633	45,4	39,9	38,7	38,3	40,4	42,2	43,2	49,1	49,1	48,9	405	360	386	413	25,1	22,6	24,5	26,4	36,1	35,6
17	Yaroslavl	289	333	272	295	243	21,5	25,0	20,5	22,4	18,5	32,0	37,7	33,7	36,0	35,1	174	152	212	148	13,1	11,5	16,1	11,3	30,3	25,3
18	*Moscow city*	1829	1803	1758	1777	2050	17,6	17,3	16,9	17,0	19,6	45,6	45,3	46,3	36,8	39,0	1288	1145	1108	1225	12,4	11,0	10,6	11,7	25,6	27,2
Federal Region: North-West		4057	4050	4000	3945	4085	29,4	29,6	29,4	29,2	30,3	45,1	45,2	46,1	46,8	47,4	2855	2795	2646	2742	20,9	20,6	19,6	20,3	36,5	36,2
19	*Republics:* Karelia	239	249	235	241	198	33,9	35,6	33,7	34,8	28,7	44,9	47,2	49,3	49,1	45,3	198	192	174	163	28,3	27,6	25,1	23,6	40,0	41,3
20	Komi	395	388	370	490	458	39,5	39,2	37,6	50,4	47,3	46,9	45,0	46,5	52,9	51,9	296	283	392	352	29,9	28,9	40,4	36,4	47,4	45,0
21	*Oblasts:* Arkhangelsk	461	415	493	411	397	35,2	32,0	38,2	32,2	31,2	48,4	48,4	52,3	54,4	53,6	322	374	300	288	24,8	29,1	23,5	22,6	43,6	42,4
	Nents AO	10	11	17	14	6	23,9	26,2	40,5	33,3	14,3	50,0	52,4	73,9	82,4	33,3	6	10	9	1	14,3	23,8	21,4	2,4	60,0	5,9
22	Vologda	311	293	284	263	276	24,9	23,6	23,0	21,5	22,6	45,1	46,3	50,4	45,7	45,4	171	184	174	187	13,8	14,9	14,2	15,3	34,1	34,3
23	Kaliningrad	563	525	595	529	558	59,4	55,7	63,3	56,4	59,5	46,7	44,3	47,0	42,1	50,5	400	377	355	384	42,4	40,2	37,9	41,0	32,6	40,5
24	Leningrad	516	592	525	459	604	31,2	35,9	31,9	28,1	37,0	43,0	47,4	43,5	40,5	46,4	379	309	247	356	23,0	18,8	15,1	21,8	24,1	29,7
25	Murmansk	301	266	232	248	197	34,3	30,6	26,8	29,0	23,2	51,9	46,3	46,4	49,9	46,0	180	160	170	96	20,7	18,6	19,9	11,3	36,9	29,4
26	Novgorod	276	241	229	234	228	40,7	36,0	34,4	35,7	34,9	55,6	52,1	50,8	52,7	52,1	202	190	193	172	30,2	28,7	29,7	26,4	48,9	43,0

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New MbT+ TB cases										Proportion of MbT+ cases to all new TB patients					New ss+ TB cases									
		Number of cases					per 100,000 population					%					Number of cases				per 100,000 population				% of PTB	
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008	2007	2008
27	Pskov	302	362	353	376	427	40,7	49,5	48,7	53,0	60,5	52,6	56,5	56,7	58,6	63,8	258	257	226	269	35,3	35,7	31,9	38,1	37,5	41,9
28	*St. Petersburg city*	693	719	684	694	742	15,0	15,7	14,9	15,2	16,2	36,1	36,7	36,8	40,7	36,8	449	469	415	475	9,8	10,2	9,1	10,4	33,9	28,9
Federal region: South		6801	6270	6182	6813	6356	31,3	29,0	27,1	29,9	27,8	41,2	38,4	37,9	38,9	37,3	4292	4482	5282	5089	19,8	20,2	23,2	22,3	33,4	32,6
29	*Republics:* Adygea	174	177	146	162	151	39,1	39,9	33,0	36,7	34,2	44,8	52,1	42,2	39,4	40,3	169	142	160	149	38,1	32,1	36,3	33,8	41,9	44,3
30	Dagestan	591	504	606	634	732	22,6	19,2	22,9	23,7	27,2	37,0	32,5	36,9	40,1	45,9	216	550	627	681	8,2	20,8	23,5	25,3	45,7	48,3
31	Ingushetia	143	144	91	115	71	29,9	29,7	18,7	23,2	14,2	49,5	58,5	49,7	53,7	45,2	122	84	102	67	25,2	17,1	20,6	13,4	53,1	51,5
32	Chechnya			341	353	350			29,3	29,5	28,9			37,4	35,2	37,8	218	341	353	350	37,5	29,1	29,5	28,9	40,6	43,7
33	Kabardino-Balkaria	164	149	187	188	149	18,3	16,6	20,9	21,1	16,7	36,3	31,8	38,3	38,3	34,6	124	154	172	145	13,8	17,3	19,3	16,3	39,4	38,4
34	Kalmykia	110	67	90	118	133	37,9	23,2	31,2	41,2	46,6	29,6	17,8	24,4	32,3	38,1	13	35	79	81	4,5	12,2	27,6	28,4	25,7	25,7
35	Karachaevo-Cherkessia	100	59	63	89	81	23,0	13,6	14,6	20,8	19,0	37,6	24,0	29,7	40,6	34,8	11	15	28	28	2,5	3,5	6,5	6,6	14,9	13,5
36	North Ossetia - Alania	170	171	193	171	144	24,1	24,3	27,5	24,4	20,5	30,5	32,8	44,0	33,4	31,9	149	156	150	135	21,2	22,2	21,4	19,2	45,0	37,1
37	*Krais:* Krasnodar	1297	1274	1130	1395	1349	25,4	25,0	22,2	27,3	26,3	36,3	38,9	36,4	37,9	36,9	780	653	975	907	15,3	12,8	19,1	17,7	28,0	26,2
38	Stavropol	743	543	575	723	637	27,3	20,0	21,2	26,7	23,5	48,1	28,8	32,0	39,6	33,4	364	407	588	534	13,4	15,0	21,8	19,7	37,4	32,0
39	*Oblasts:* Astrakhan	311	342	320	321	276	31,1	34,3	32,2	32,2	27,6	35,3	38,8	36,6	36,8	29,1	283	266	312	267	28,4	26,8	31,3	26,7	39,3	30,5
40	Volgograd	1466	1247	1264	1453	1102	55,0	47,1	48,0	55,6	42,2	49,4	41,0	45,0	46,9	38,8	784	781	906	835	29,6	29,7	34,7	32,0	31,5	31,2
41	Rostov	1532	1593	1176	1091	1181	35,2	36,9	27,3	25,6	27,8	42,3	45,4	37,7	33,6	37,2	1277	898	830	910	29,6	20,9	19,5	21,4	27,5	30,5
Federal region: Privolzhsky		9713	10068	10127	9856	10148	31,5	32,9	33,2	32,5	33,6	41,7	42,8	42,5	43,5	43,8	5955	6045	6001	6127	19,5	19,9	19,8	20,3	29,3	29,1
42	*Republcis:* Bashkortostan	788	879	779	661	634	19,3	21,6	19,2	16,3	15,6	32,5	38,2	34,9	31,3	32,2	503	492	452	460	12,4	12,1	11,2	11,4	24,0	26,2
43	Mariy-El	297	333	316	377	320	41,3	46,6	44,4	53,5	45,5	68,9	69,4	67,4	64,8	55,5	182	183	225	218	25,5	25,8	31,9	31,0	43,1	41,8
44	Mordovia	286	210	250	208	217	32,8	24,4	29,2	24,6	25,8	41,5	35,1	42,5	35,7	35,3	202	156	129	87	23,4	18,3	15,3	10,4	24,2	15,4
45	Tatarstan	920	905	916	876	847	24,4	24,0	24,4	23,3	22,5	40,0	39,2	39,9	39,7	38,1	515	537	538	480	13,7	14,3	14,3	12,8	27,5	24,0
46	Udmurtia	643	650	576	609	564	41,3	42,0	37,3	39,7	36,8	47,7	49,4	45,4	48,6	45,1	395	355	369	339	25,5	23,0	24,0	22,1	32,0	29,2
47	Chuvashia	521	614	660	674	748	40,0	47,4	51,1	52,5	58,3	48,1	58,3	62,7	67,8	68,8	551	493	492	516	42,5	38,2	38,3	40,2	52,8	49,7
48	*Oblasts:* Kirov	471	508	538	507	523	32,0	35,0	37,3	35,7	37,0	55,3	56,1	53,1	55,7	52,1	264	290	306	321	18,2	20,2	21,5	22,7	38,0	35,9
49	Nizhni Novgorod	1181	1105	1130	1147	1217	34,1	32,2	33,1	34,0	36,2	41,2	37,9	39,7	45,7	48,6	761	707	696	821	22,2	20,8	20,6	24,4	29,9	35,7
50	Orenburg	607	809	861	801	842	28,1	37,7	40,3	37,7	39,7	30,4	38,1	36,3	34,6	35,0	168	373	374	482	7,8	17,5	17,6	22,7	18,4	22,7
51	Penza	559	517	474	483	554	39,1	36,5	33,7	34,7	39,9	53,9	49,0	46,2	49,0	51,8	311	308	330	342	22,0	22,0	23,7	24,6	37,2	34,7
52	Perm (Perm Krai)	1349	1323	1396	1290	1268	48,5	48,0	50,8	47,3	46,6	44,1	43,4	43,6	45,6	42,9	722	879	725	584	26,2	32,1	26,6	21,5	28,6	21,7
	Komi-Permyatsky AO	154	123			0	115,3	185,2				79,8	77,4				70				105,4					
53	Samara	1032	1213	1166	1111	1238	32,2	38,0	36,6	35,0	39,0	46,3	50,1	46,0	44,1	46,8	703	625	630	664	22,0	19,6	19,8	20,9	27,5	27,5
54	Saratov	674	633	702	681	736	25,6	24,2	26,9	26,3	28,5	33,5	31,4	36,9	38,5	41,9	400	391	430	474	15,3	15,0	16,6	18,3	26,1	29,2
55	Ulyanovsk	385	369	363	431	440	28,4	27,5	27,2	32,7	33,5	40,2	37,3	35,7	38,8	39,8	278	256	305	339	20,7	19,3	23,2	25,8	30,6	34,1
Federal Region: Urals		4586	4557	4593	4472	4893	37,3	37,2	37,5	36,5	40,0	35,7	36,0	36,5	35,2	38,1	2615	2647	2787	2892	21,3	21,6	22,8	23,6	24,7	25,2
56	*Oblasts:* Kurgan	526	514	486	421	647	52,7	52,1	49,6	43,6	67,4	40,5	41,1	36,1	31,9	45,1	174	214	214	309	17,6	22,0	22,2	32,2	21,0	25,7

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New MbT+ TB cases										Proportion of MbT+ cases to all new TB patients					New ss+ TB cases									
		Number of cases					per 100,000 population					%					Number of cases				per 100,000 population				% of PTB	
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008	2007	2008
57	Sverdlovsk	1856	1893	1909	1902	1959	41,8	42,8	43,3	43,3	44,6	41,8	41,1	41,3	38,7	37,2	1071	1053	1029	1058	24,2	23,9	23,4	24,1	23,1	21,9
58	Tyumen	1141	1064	1098	1011	1078	34,6	32,1	33,0	30,1	32,0	28,6	27,2	27,8	29,7	33,9	725	714	679	727	21,9	21,4	20,2	21,6	22,2	25,4
	Khanty-Mansi AO	493	462	502	453	484	33,7	31,4	34,0	30,3	32,2	36,4	33,3	35,3	34,9	37,2	266	273	274	302	18,1	18,4	18,3	20,1	23,6	25,4
	Yamalo-Nents AO	134	138	145	123	144	25,8	26,2	27,3	22,8	26,5	29,8	26,8	33,0	30,8	37,0	85	85	78	98	16,1	15,9	14,4	18,1	21,7	27,9
59	Chelyabinsk	1063	1086	1100	1138	1209	29,8	30,7	31,2	32,4	34,4	34,1	37,7	41,4	36,9	41,0	645	666	865	798	18,2	18,9	24,6	22,7	31,4	30,7
Federal Region: Siberian		10538	11287	10591	10293	10658	53,1	57,2	53,8	52,6	54,5	41,2	42,8	40,9	41,1	41,0	7905	7466	7258	7617	40,1	38,0	37,1	39,0	31,8	31,8
60	*Republics:* Altai	122	142	68	82	98	59,9	69,5	33,3	39,8	47,3	41,2	47,7	26,2	34,6	39,2	94	50	35	51	46,0	24,4	17,0	24,6	17,2	24,5
61	Buryatia	503	549	572	579	590	51,8	56,8	59,4	60,3	61,5	34,1	35,9	34,2	41,4	38,6	384	395	487	437	39,7	41,1	50,7	45,5	38,4	31,1
62	Tyva	373	419	373	366	345	121,5	136,0	120,9	117,9	110,7	47,7	54,5	49,1	50,1	45,9	204	241	230	190	66,2	78,0	74,1	61,0	35,2	28,1
63	Khakassia	362	373	334	303	309	66,8	69,1	62,1	56,4	57,5	48,1	50,7	52,4	55,3	51,1	274	234	199	195	50,8	43,5	37,1	36,3	38,8	34,6
64	*Krai: Altai*	1027	1098	920	766	912	39,9	43,0	36,2	30,4	36,4	27,6	29,5	25,5	23,1	27,2	864	772	663	718	33,8	30,5	26,4	28,6	21,6	23,2
65	Krasnoyarsk	1234	1377	1359	1375	1320	42,1	47,2	46,8	47,5	45,7	39,9	43,0	45,0	45,7	42,7	810	838	899	902	27,8	28,9	31,1	31,2	32,2	31,5
	Taimyr AO	16	13	11		0	40,6	33,2	28,2			48,5	50,0	45,8			11	11			28,1	28,4				
	Evenk AO	10	15	8		0	57,3	86,5	46,3			41,7	57,7	36,4			9	7			51,9	40,9				
66	*Oblasts:* Irkutsk	1259	1198	1229	1342	1422	49,3	47,2	48,6	53,5	56,7	40,1	38,3	38,9	39,0	39,8	904	899	933	1018	35,6	35,7	37,2	40,6	29,9	31,0
	Ust-Ordyn-Buryat AO	86	95	67	110	0	64,0	70,9	50,1	82,0	0,0	43,9	37,3	31,9	48,7		68	36	81		50,8	26,9	60,4		40,7	
67	Kemerovo	2024	2281	2204	2006	2028	70,7	80,1	77,6	71,0	71,8	53,7	50,9	50,7	49,6	48,7	1823	1527	1351	1356	64,0	53,9	47,8	48,0	37,7	36,2
68	Novosibirsk	1589	1726	1416	1495	1501	59,6	65,0	53,4	56,7	57,0	41,8	45,7	38,8	42,7	41,7	1051	965	987	1108	39,6	36,5	37,4	42,0	30,0	32,6
69	Omsk	887	957	963	963	1082	43,2	46,9	47,3	47,6	53,6	36,7	39,8	39,1	37,3	41,0	713	754	684	850	34,9	37,1	33,8	42,1	28,7	34,8
70	Tomsk	717	674	684	581	534	69,0	65,1	66,1	56,2	51,6	65,2	60,7	61,3	54,9	50,9	429	458	448	391	41,4	44,3	43,3	37,8	45,8	40,9
71	Trans-Baikal Krai (Chita Oblast)	441	493	469	435	517	38,7	43,6	41,6	38,8	46,2	35,9	40,2	39,1	36,1	37,5	355	333	342	401	31,4	29,6	30,5	35,8	35,1	30,9
	Aginsk Buryat AO	27	27	25	12	0	36,9	36,6	33,7	15,8	0,0	28,1	38,0	26,3	15,4		20	23	10		27,1	30,8	13,2		14,5	
Federal Region: Far-East		3159	3547	3529	3416	3720	47,8	54,0	53,9	52,6	57,4	37,5	40,9	42,2	39,7	39,4	2218	2318	2518	2773	33,8	35,5	38,8	42,8	31,6	31,4
72	*Republic:* Sakha (Yakutia)	357	388	388	330	435	37,6	40,8	40,8	34,7	45,7	40,7	48,6	49,6	44,8	50,6	175	218	217	272	18,4	22,9	22,8	28,6	34,3	34,8
73	*Krais:* Primorsky	1272	1472	1469	1546	1506	62,2	72,6	72,7	77,3	75,5	40,1	43,9	44,2	43,1	39,4	997	1039	1084	1173	49,2	51,6	54,2	58,8	32,3	32,8
74	Khabarovsk	563	659	676	612	782	39,5	46,5	47,9	43,6	55,7	32,5	35,9	39,3	33,9	40,2	408	463	555	612	28,8	32,9	39,5	43,6	32,5	33,0
75	*Oblasts:* Amur	357	400	361	346	333	40,1	45,2	41,0	39,7	38,3	26,8	30,7	28,9	28,1	24,4	263	190	263	284	29,7	21,6	30,2	32,7	22,5	22,1
76	Kamchatka Krai	128	106	102	75	107	36,2	30,2	29,2	21,7	31,0	39,3	31,0	35,4	26,7	33,3	67	78	71	106	19,1	22,4	20,5	30,7	29,6	37,1
	Koryak AO	35	31	30		0	145,3	131,8	129,4					30,6			18	26			76,6	113,6				
77	Magadan	59	61	65	52	63	33,4	35,2	37,9	31,1	38,0	41,0	42,7	47,1	40,0	44,4	12	26	35	36	6,9	15,3	20,9	21,7	32,4	28,3
78	Sakhalin	285	304	325	288	291	53,2	57,4	61,8	55,4	56,1	54,5	54,8	55,7	57,3	49,4	211	217	198	194	39,9	41,4	38,1	37,4	46,4	36,5
79	Jewish Autonomous Oblast	117	137	122	149	180	61,8	73,0	65,4	80,3	97,0	39,3	46,0	49,8	48,1	51,1	76	80	93	88	40,5	43,0	50,1	47,4	30,9	26,0
80	Chukotka AO	21	20	21	18	23	41,1	39,5	41,6	35,7	45,8	65,6	51,3	65,6	62,1	54,8	9	7	2	8	17,8	13,9	4,0	15,9	7,1	19,5

TB notification rate in the Russian Federation among residents in 2004–2008 (Form No. 33)

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New TB cases – all forms of the disease										With cases detected post mortem	Including respiratory TB cases				Including pulmonary TB cases				Including TB cases of other sites			
		Number of cases					per 100,000 population						Number of cases		% of all forms		Number of cases		% of all forms		Number of cases		% of all forms of TB	
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Russian Federation		97322	96646	96867	96251	97886	68,2	68,079	68,0	67,7	68,930	70,2	92474	94312	96,1	96,3	85962	88042	89,3	89,9	3777	3574	3,9	3,7
Federal Region: Central		18208	17668	17642	17429	17830	48,4	47,2	47,3	46,9	48,0	49,4	16637	17031	95,5	95,5	15366	15839	88,2	88,8	792	799	4,5	4,5
1	*Oblasts:* Belgorod	934	772	819	778	865	61,8	51,1	54,1	51,3	56,9	57,1	732	816	94,1	94,3	705	778	90,6	89,9	46	49	5,9	5,7
2	Bryansk	1007	1051	1044	1110	1164	74,4	78,5	78,8	84,5	89,0	91,2	1057	1112	95,2	95,5	986	1022	88,8	87,8	53	52	4,8	4,5
3	Vladimir	820	815	898	877	877	54,8	55,1	61,3	60,3	60,5	61,7	850	849	96,9	96,8	761	777	86,8	88,6	27	28	3,1	3,2
4	Voronezh	1221	1259	1166	1251	1227	52,1	54,2	50,6	54,7	53,8	54,2	1171	1161	93,6	94,6	1117	1101	89,3	89,7	80	66	6,4	5,4
5	Ivanovo	463	496	536	455	492	41,3	44,8	49,0	42,0	45,6	46,3	439	471	96,5	95,7	410	447	90,1	90,9	16	21	3,5	4,3
6	Kaluga	595	589	558	534	533	58,0	57,9	55,2	53,0	53,0	55,5	494	507	92,5	95,1	461	485	86,3	91,0	40	26	7,5	4,9
7	Kostroma	332	293	269	242	243	46,0	41,1	38,1	34,6	34,9	34,9	236	242	97,5	99,6	212	214	87,6	88,1	6	1	2,5	0,4
8	Kursk	728	810	779	763	820	60,3	68,0	66,2	65,4	70,5	71,4	740	803	97,0	97,9	677	762	88,7	92,9	23	17	3,0	2,1
9	Lipetsk	693	685	679	738	710	58,0	57,8	57,7	63,0	60,7	61,3	699	684	94,7	96,3	689	672	93,4	94,6	39	26	5,3	3,7
10	Moscow	3110	2872	2922	3107	2989	46,9	43,3	44,0	46,7	44,8	47,3	3007	2890	96,8	96,7	2803	2700	90,2	90,3	100	99	3,2	3,3
11	Orel	428	416	433	400	379	50,6	49,6	52,2	48,5	46,1	46,6	380	362	95,0	95,5	355	332	88,8	87,6	20	17	5,0	4,5
12	Ryazan	776	790	793	737	690	64,6	66,5	67,4	63,1	59,3	61,8	712	657	96,6	95,2	650	612	88,2	88,7	25	33	3,4	4,8
13	Smolensk	824	771	762	686	751	80,3	76,2	76,2	69,4	76,4	79,9	663	723	96,6	96,3	599	673	87,3	89,6	23	28	3,4	3,7
14	Tambov	780	666	626	633	624	67,7	58,5	55,7	56,9	56,4	57,1	593	591	93,7	94,7	565	579	89,3	92,8	40	33	6,3	5,3
15	Tver	862	881	870	859	868	60,1	62,2	62,2	62,0	62,9	65,0	845	853	98,4	98,3	755	770	87,9	88,7	14	15	1,6	1,7
16	Tula	1293	1116	978	906	1005	79,2	69,3	61,5	57,6	64,2	67,1	847	955	93,5	95,0	773	887	85,3	88,3	59	50	6,5	5,0
17	Yaroslavl	630	599	594	598	521	46,8	44,9	44,9	45,4	39,6	41,2	567	477	94,8	91,6	494	423	82,6	81,2	31	44	5,2	8,4
18	*Moscow city*	2712	2787	2916	2755	3072	26,1	26,8	27,9	26,3	29,3	29,9	2605	2878	94,6	93,7	2354	2605	85,4	84,8	150	194	5,4	6,3
Federal Region: North-West		7115	7094	6885	6698	6727	51,6	51,9	50,7	49,5	49,8	51,4	6441	6508	96,2	96,7	5792	5861	86,5	87,1	257	219	3,8	3,3
19	*Republics:* Karelia	424	430	396	422	338	60,1	61,4	57,0	61,0	48,9	48,9	402	325	95,3	96,2	371	298	87,9	88,2	20	13	4,7	3,8
20	Komi	650	623	592	670	653	64,9	62,9	60,4	69,0	67,4	68,8	626	610	93,4	93,4	595	574	88,8	87,9	44	43	6,6	6,6
21	*Oblasts:* Arkhangelsk	718	630	630	562	555	54,8	48,5	49,0	44,0	43,6	45,9	550	539	97,9	97,1	504	499	89,7	89,9	12	16	2,1	2,9
	Nents AO	20	20	23	16	18	47,7	47,7	54,8	38,1	42,8	42,8	16	17	100,0	94,4	14	17	87,5	94,4	0	1	0,0	5,6
22	Vologda	543	483	467	450	478	43,4	38,9	37,9	36,7	39,1	40,1	432	456	96,0	95,4	399	429	88,7	89,7	18	22	4,0	4,6
23	Kaliningrad	993	961	1014	999	884	104,8	102,0	108,0	106,6	94,3	97,9	972	863	97,3	97,6	845	746	84,6	84,4	27	21	2,7	2,4
24	Leningrad	1038	1085	1011	877	1045	62,7	65,8	61,6	53,6	64,0	67,2	855	1027	97,5	98,3	786	959	89,6	91,8	22	18	2,5	1,7
25	Murmansk	413	403	376	400	328	47,1	46,4	43,7	46,8	38,5	40,1	396	318	99,0	97,0	375	294	93,8	89,6	4	10	1,0	3,0
26	Novgorod	377	365	360	355	350	55,6	54,5	54,4	54,2	53,6	53,6	335	337	94,4	96,3	308	314	86,8	89,7	20	13	5,6	3,7
27	Pskov	398	490	465	493	488	53,6	67,1	64,7	69,5	69,2	71,6	483	485	98,0	99,4	456	469	92,5	96,1	10	3	2,0	0,6

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New TB cases – all forms of the disease										With cases detected post mortem	Including respiratory TB cases				Including pulmonary TB cases				Including TB cases of other sites			
		Number of cases					per 100,000 population						Number of cases		% of all forms		Number of cases		% of all forms		Number of cases		% of all forms of TB	
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
28	*St. Petersburg city*	1561	1624	1574	1470	1608	33,8	35,4	34,4	32,2	35,2	36,1	1390	1548	94,6	96,3	1153	1279	78,4	79,5	80	60	5,4	3,7
Federal Region: South		13936	13548	14005	15040	14451	64,2	62,6	63,1	65,9	63,3	63,5	14386	13896	95,7	96,2	13472	13083	89,6	90,5	654	555	4,3	3,8
29	*Republics:* Adygea	329	278	283	331	314	74,0	62,7	64,0	75,0	71,2	73,7	322	307	97,3	97,8	303	278	91,5	88,5	9	7	2,7	2,2
30	Dagestan	1505	1475	1535	1497	1499	57,6	56,1	57,9	56,0	55,8	55,8	1402	1417	93,7	94,5	1300	1325	86,8	88,4	95	82	6,3	5,5
31	Ingushetia	251	215	182	212	157	52,4	44,4	37,2	42,7	31,4	31,4	207	151	97,6	96,2	190	130	89,6	82,8	5	6	2,4	3,8
32	Chechnya			902	1001	921		154,3	76,9	83,7	76,2	76,2	949	871	94,8	94,6	867	797	86,6	86,5	52	50	5,2	5,4
33	Kabardino-Balkaria	429	425	437	429	374	47,8	47,5	49,0	48,1	42,0	42,0	413	363	96,3	97,1	380	337	88,6	90,1	16	11	3,7	2,9
34	Kalmykia	332	333	342	336	295	114,4	115,1	118,8	117,3	103,3	104,0	320	289	95,2	98,0	278	261	82,7	88,5	16	6	4,8	2,0
35	Karachaevo-Cherkessia	250	217	196	212	227	57,4	50,1	45,6	49,5	53,1	53,1	200	210	94,3	92,5	182	200	85,8	88,1	12	17	5,7	7,5
36	North Ossetia - Alania	500	482	403	437	412	70,9	68,5	57,4	62,3	58,7	58,8	404	383	92,4	93,0	332	329	76,0	79,9	33	29	7,6	7,0
37	*Krais:* Krasnodar	2876	2826	2626	3169	2991	56,4	55,4	51,5	62,0	58,4	58,4	3097	2916	97,7	97,5	2981	2805	94,1	93,8	72	75	2,3	2,5
38	Stavropol	1507	1424	1433	1465	1538	55,4	52,5	53,0	54,2	56,9	57,2	1319	1394	90,0	90,6	1215	1305	82,9	84,9	146	144	10,0	9,4
39	*Oblasts:* Astrakhan	784	780	755	755	744	78,4	78,3	75,9	75,7	74,3	74,3	739	730	97,9	98,1	679	667	89,9	89,7	16	14	2,1	1,9
40	Volgograd	2169	2107	2084	2302	2146	81,4	79,6	79,3	88,1	82,3	82,6	2194	2085	95,3	97,2	2103	2005	91,4	93,4	108	61	4,7	2,8
41	Rostov	3004	2986	2827	2894	2833	69,1	69,1	65,9	67,9	66,6	66,8	2820	2780	97,4	98,1	2662	2644	92,0	93,3	74	53	2,6	1,9
Federal Region: Privolzhsky		19209	19310	19399	18294	18754	62,4	63,1	63,8	60,4	62,0	63,0	17436	17958	95,3	95,8	16287	16845	89,0	89,8	858	796	4,7	4,2
42	*Republcis:* Bashkortostan	1922	1884	1868	1752	1673	47,0	46,3	46,0	43,2	41,3	41,5	1643	1558	93,8	93,1	1526	1457	87,1	87,1	109	115	6,2	6,9
43	Mariy-El	392	443	449	541	536	54,5	62,0	63,3	76,7	76,2	76,2	526	517	97,2	96,5	485	480	89,6	89,6	15	19	2,8	3,5
44	Mordovia	623	531	561	543	531	71,5	61,6	65,8	64,3	63,2	63,3	524	522	96,5	98,3	493	486	90,8	91,5	19	9	3,5	1,7
45	Tatarstan	2022	2048	2055	1887	1884	53,6	54,4	54,6	50,2	50,1	51,5	1779	1782	94,3	94,6	1657	1667	87,8	88,5	108	102	5,7	5,4
46	Udmurtia	1130	1116	1075	1090	1101	72,6	72,1	69,8	71,0	71,8	73,1	1058	1071	97,1	97,3	988	1011	90,6	91,8	32	30	2,9	2,7
47	Chuvashia	886	875	888	865	941	68,0	67,5	68,9	67,3	73,4	75,6	838	922	96,9	98,0	805	897	93,1	95,3	27	19	3,1	2,0
48	*Oblasts:* Kirov	790	831	828	718	796	53,7	57,2	57,7	50,6	56,3	58,1	672	741	93,6	93,1	622	697	86,6	87,6	46	55	6,4	6,9
49	Nizhni Novgorod	2229	2217	2066	1868	1880	64,4	64,7	60,8	55,4	56,0	58,2	1807	1831	96,7	97,4	1691	1716	90,5	91,3	61	49	3,3	2,6
50	Orenburg	1586	1745	1847	1772	1817	73,5	81,4	86,6	83,5	85,7	86,0	1695	1757	95,7	96,7	1516	1560	85,6	85,9	77	60	4,3	3,3
51	Penza	916	939	923	853	849	64,1	66,3	65,8	61,3	61,2	61,7	807	818	94,6	96,3	758	773	88,9	91,0	46	31	5,4	3,7
52	Perm (Perm Krai)	2438	2318	2473	2167	2312	87,7	84,0	90,3	79,5	85,1	86,5	2075	2231	95,8	96,5	1938	2097	89,4	90,7	92	81	4,2	3,5
	Komi-Permytsky AO	186	159				139,2	239,4																
53	Samara	1720	1810	1898	1847	1996	53,6	56,6	59,6	58,2	62,9	64,1	1732	1871	93,8	93,7	1636	1785	88,6	89,4	115	125	6,2	6,3
54	Saratov	1750	1770	1653	1541	1548	66,4	67,6	63,5	59,5	59,9	59,9	1488	1491	96,6	96,3	1420	1417	92,1	91,5	53	57	3,4	3,7
55	Ulyanovsk	805	783	815	850	890	59,3	58,3	61,3	64,5	67,8	68,1	792	846	93,2	95,1	752	802	88,5	90,1	58	44	6,8	4,9
Federal Region: Urals		10304	10202	10444	10353	10435	83,8	83,2	85,3	84,6	85,3	86,3	9949	10052	96,1	96,3	9200	9272	88,9	88,9	404	383	3,9	3,7
56	*Oblasts:* Kurgan	1148	1043	1147	1126	1127	115,0	105,8	117,7	116,7	117,3	117,3	1080	1073	95,9	95,2	1001	920	88,9	81,6	46	54	4,1	4,8
57	Sverdlovsk	3444	3486	3781	3935	4115	77,6	78,9	85,8	89,5	93,6	95,1	3818	3974	97,0	96,6	3520	3704	89,5	90,0	117	141	3,0	3,4

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	New TB cases – all forms of the disease										With cases detected post mortem	Including respiratory TB cases				Including pulmonary TB cases				Including TB cases of other sites			
		Number of cases					per 100,000 population						Number of cases		% of all forms		Number of cases		% of all forms		Number of cases		% of all forms of TB	
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
58	Tyumen	3372	3384	3344	2910	2794	102,2	102,1	100,3	86,6	82,8	83,5	2797	2714	96,1	97,1	2587	2493	88,9	89,2	113	80	3,9	2,9
	Khanty-Mansi AO	1185	1228	1268	1146	1147	81,0	83,3	85,5	76,6	76,2	76,8	1114	1128	97,2	98,3	1022	1052	89,2	91,7	32	19	2,8	1,7
	Yamalo-Nents AO	391	450	369	343	343	75,3	85,4	69,0	63,4	63,2	63,9	333	331	97,1	96,5	302	305	88,0	88,9	10	12	2,9	3,5
59	Chelyabinsk	2340	2289	2172	2382	2399	65,7	64,6	61,6	67,8	68,3	69,3	2254	2291	94,6	95,5	2092	2155	87,8	89,8	128	108	5,4	4,5
Federal Region: Siberian		21642	21718	21546	21371	22008	109,0	110,0	109,7	109,2	112,6	114,9	20751	21352	97,1	97,0	19384	20027	90,7	91,0	620	656	2,9	3,0
60	*Republics:* Altai	291	296	257	236	249	143,0	145,0	125,4	114,4	120,2	120,2	223	240	94,5	96,4	203	207	86,0	83,1	13	9	5,5	3,6
61	Buryatia	1222	1246	1385	1365	1358	125,8	129,0	144,0	142,2	141,5	143,8	1330	1328	97,4	97,8	1245	1225	91,2	90,2	35	30	2,6	2,2
62	Tyva	687	655	637	567	578	223,7	212,6	206,2	182,6	185,5	191,6	526	529	92,8	91,5	490	505	86,4	87,4	41	49	7,2	8,5
63	Khakassia	671	642	535	507	560	123,8	119,0	99,6	94,4	104,2	105,5	503	546	99,2	97,5	484	518	95,5	92,5	4	14	0,8	2,5
64	*Krai: Altai*	3141	3074	3102	2891	2963	122,0	120,3	122,4	114,9	118,1	120,4	2803	2879	97,0	97,2	2653	2713	91,8	91,6	88	84	3,0	2,8
65	Krasnoyarsk	2797	2620	2491	2446	2559	95,3	89,9	85,9	84,6	88,5	91,5	2371	2481	96,9	97,0	2243	2349	91,7	91,8	75	78	3,1	3,0
	Taimyr AO	33	26	24			83,7	66,4	62,0															
	Evenk AO	24	24	22			137,4	138,3	128,4															
66	*Oblasts:* Irkutsk	2405	2604	2735	3006	3150	94,2	102,7	108,5	119,7	125,6	129,3	2905	3043	96,6	96,6	2696	2866	89,7	91,0	101	107	3,4	3,4
	Ust-Ordyn-Buryat AO	196	253	209	225		145,9	188,8	156,1	167,8	0,0	0,0	222		98,7		200		88,9		3		1,3	
67	Kemerovo	3636	3765	3651	3524	3519	127,0	132,3	128,9	124,7	124,6	127,4	3434	3438	97,4	97,7	3073	3114	87,2	88,5	90	81	2,6	2,3
68	Novosibirsk	3017	2947	2913	2869	2959	113,1	111,0	110,1	108,8	112,3	114,0	2808	2874	97,9	97,1	2694	2763	93,9	93,4	61	85	2,1	2,9
69	Omsk	1982	1996	2003	2097	2099	96,6	97,8	98,7	103,7	104,0	105,7	2037	2037	97,1	97,0	1914	1918	91,3	91,4	60	62	2,9	3,0
70	Tomsk	905	900	876	851	869	87,1	86,9	84,8	82,3	84,0	84,5	826	840	97,1	96,7	770	775	90,5	89,2	25	29	2,9	3,3
71	Trans-Baikal Krai (Chita Oblast)	888	973	961	1012	1145	77,9	86,0	85,4	90,3	102,3	103,0	985	1117	97,3	97,6	919	1074	90,8	93,8	27	28	2,7	2,4
	Aginsk Buryat AO	96	71	95	78		131,3	96,1	127,2	103,0			74		94,9		69		88,5		4		5,1	
Federal Region: Far-East		6896	7100	6937	7057	7665	104,3	108,1	106,3	108,6	118,2	119,9	6866	7500	97,3	97,8	6455	7101	91,5	92,6	191	165	2,7	2,2
72	*Republic:* Sakha (Yakutia)	799	718	692	620	657	84,1	75,6	72,8	65,2	69,1	70,0	584	622	94,2	94,7	519	583	83,7	88,7	36	35	5,8	5,3
73	*Krais:* Primorsky	2450	2628	2727	2915	3129	119,9	129,6	135,5	145,7	156,8	159,3	2866	3078	98,3	98,4	2719	2901	93,3	92,7	49	51	1,7	1,6
74	Khabarovsk	1443	1521	1405	1470	1559	101,4	107,4	99,7	104,7	111,1	111,3	1456	1540	99,0	98,8	1379	1475	93,8	94,6	14	19	1,0	1,2
75	*Oblasts:* Amur	1076	1052	1046	991	1111	120,8	119,0	119,2	113,6	127,8	128,6	966	1083	97,5	97,5	929	1034	93,7	93,1	25	28	2,5	2,5
76	Kamchatka Krai	265	291	253	239	278	75,0	83,0	72,7	69,0	80,4	82,2	237	274	99,2	98,6	199	244	83,3	87,8	2	4	0,8	1,4
	Koryak AO	84	106	97			348,6	450,8	423,9															
77	Magadan	132	119	110	109	99	74,8	68,7	64,7	65,2	59,7	62,7	103	97	94,5	98,0	82	86	75,2	86,9	6	2	5,5	2,0
78	Sakhalin	446	468	447	399	469	83,3	88,4	85,4	76,7	90,4	94,9	344	448	86,2	95,5	324	430	81,2	91,7	55	21	13,8	4,5
79	Jewish Autonomous Oblast	253	264	225	286	322	133,7	140,7	120,9	154,1	173,6	178,4	283	318	99,0	98,8	277	312	96,9	96,9	3	4	1,0	1,2
80	Chukotka AO	32	39	32	28	41	62,7	77,0	63,4	55,6	81,6	81,6	27	40	96,4	97,6	27	36	96,4	87,8	1	1	3,6	2,4

Table 6

Laboratory diagnostics of tuberculosis in the Russian Federation in 2007–2008
(TB facilities in the subjects of the Russian Federation, MoH&SD data: Form No. 7-TB)

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Cohorts of new pulmonary TB patients														
		Total		Including new ss+ TB cases				Patient coverage by culture tests (%)	Including MtB+ TB cases confirmed by culture (%)			Patient coverage by drug susceptibility tests (%)		Including MDR-TB cases		
		Number of casses		Number of cases		%			Number of cases	%_[1]				Number of cases	%	
		2007	2008	2007	2008	2007	2008	2008	2008	2007	2008	2007	2008	2008	2007	2008
Russian Federation		89607	91805	29952	30328	33,4	33,0	97	37573	39,6	40,9	89,0	91,1	4656	12,9	13,6
Federal Region: Central		16792	17605	5931	5969	35,3	33,9	96	7710	49,9	43,8	91,7	94,7	952	11,6	13,0
1	*Oblasts:* Belgorod	730	798	279	279	38,2	35,0	100	442	41,0	55,4	100,0	100,0	85	11,3	19,2
2	Bryansk	987	1056	401	371	40,6	35,1	100	550	37,6	52,1	100,0	99,8	71	16,7	12,9
3	Vladimir	770	831	315	389	40,9	46,8	98	426	40,4	51,3	99,4	99,1	59	9,4	14,0
4	Voronezh	1163	1130	349	334	30,0	29,6	100	605	54,6	53,5	99,2	98,7	87	15,2	14,6
5	Ivanovo	407	446	216	212	53,1	47,5	99	314	70,3	70,4	82,9	87,6	55	10,5	20,0
6	Kaluga	495	547	230	224	46,5	41,0	99	277	54,7	50,6	93,7	86,3	24	7,9	10,0
7	Kostroma	212	216	80	71	37,7	32,9	100	119	55,2	55,1	99,1	100,0	8	9,5	6,7
8	Kursk	726	816	264	253	36,4	31,0	100	365	42,5	44,7	99,7	100,0	32	9,7	8,8
9	Lipetsk	700	682	170	105	24,3	15,4	100	305	43,7	44,7	100,0	100,0	39	10,1	12,8
10	Moscow	2668	2812	802	832	30,1	29,6	93	675	22,3	24,0	75,5	84,3	49	11,6	8,6
11	Orel	381	368	205	196	53,8	53,3	99	297	76,6	80,7	100,0	99,7	16	6,8	5,4
12	Ryazan	721	658	250	258	34,7	39,2	100	300	38,4	45,6	94,9	99,7	37	11,8	12,4
13	Smolensk	612	701	141	145	23,0	20,7	93	256	38,4	36,5	42,1	68,8	16	1,0	9,1
14	Tambov	546	560	241	229	44,1	40,9	97	315	63,4	56,3	98,6	97,5	26	5,0	8,5
15	Tver	806	834	313	381	38,8	45,7	64	192	11,2	23,0	65,6	47,4	1		1,1
16	Tula	942	989	333	335	35,4	33,9	97	511	46,8	51,7	63,0	95,7	58	18,0	11,9
17	Yaroslavl	581	479	197	130	33,9	27,1	100	223	45,1	46,6	100,0	100,0	14	5,0	6,3
18	*Moscow city*	3345	3682	1145	1225	34,2	33,3	100	1538	41,2	41,8	100,0	100,0	275	14,6	17,9
Federal Region: North-West		6121	6256	2384	2355	38,9	37,6	99	3168	52,5	50,6	87,3	97,3	607	19,8	19,7
19	*Republics:* Karelia	371	325	165	142	44,5	43,7	97	144	54,7	44,3	100,0	100,0	43	20,7	29,9
20	Komi	600	574	310	298	51,7	51,9	99	305	56,9	53,1	100,0	100,0	79	14,4	25,9
21	*Oblasts:* Arkhangelsk	506	502	249	218	49,2	43,4	98	302	62,1	60,2	96,5	96,0	69	27,4	23,8
	Nents AO	14	17	9	1	64,3	5,9	100	6	85,7	35,3	100,0	100,0	1	16,7	16,7
22	Vologda	440	471	155	154	35,2	32,7	100	232	53,6	49,3	100,0	100,0	31	17,8	13,4
23	Kaliningrad	976	856	364	379	37,3	44,3	100	436	48,2	50,9	100,0	100,0	84	26,6	19,3
24	Leningrad	824	1000	208	290	25,2	29,0	100	440	41,4	44,0	100,0	100,0	43	8,2	9,8

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Cohorts of new pulmonary TB patients														
		Total		Including new ss+ TB cases				Patient coverage by culture tests (%)	Including MtB+ TB cases confirmed by culture (%)			Patient coverage by drug susceptibility tests (%)		Including MDR-TB cases		
		Number of casses		Number of cases		%			Number of cases	%_[1]				Number of cases	%	
		2007	2008	2007	2008	2007	2008	2008	2008	2007	2008	2007	2008	2008	2007	2008
25	Murmansk	384	325	150	94	39,1	28,9	100	179	56,6	55,1	80,6	96,6	49	20,6	28,3
26	Novgorod	325	366	147	141	45,2	38,5	100	221	60,3	60,4	45,9	68,8	30	20,0	19,7
27	Pskov	528	531	208	234	39,4	44,1	99	370	64,6	69,7	100,0	100,0	101	17,9	27,3
28	*St. Petersburg city*	1153	1289	419	404	36,3	31,3	100	533	47,1	41,3	54,4	100,0	77	23,6	14,4
Federal Region: South		14270	13401	4674	4451	32,8	33,2	99	4241	32,4	31,6	85,2	85,9	355	10,2	9,7
29	*Republics:* Adygea	362	316	192	119	53,0	37,7	100	151	64,1	47,8	100,0	100,0	13	1,7	8,6
30	Dagestan	1378	1325	624	687	45,3	51,8	94	341	24,7	25,7	100,0	24,6	9	10,6	10,7
31	Ingushetia	190	130	102	67	53,7	51,5	98	69	56,8	53,1	96,3	97,1	7	6,7	10,4
32	Chechnya	493	797	187	350	37,9	43,9	100	0	21,7	0,0	9,3		0		
33	Kabardino-Balkaria	282	493	74	187	26,2	37,9	100	107	37,9	21,7	46,7	9,3	0	20,0	0,0
34	Kalmykia	168	261	33	75	19,6	28,7	100	121	56,0	46,4	100,0	72,7	22		25,0
35	Karachaevo-Cherkessia	326	200	146	27	44,8	13,5	100	74	46,6	37,0	73,0	100,0	0	5,4	0,0
36	North Ossetia - Alania	867	368	353	134	40,7	36,4	100	80		21,7		57,5	3		6,5
37	*Krais:* Krasnodar	2992	2819	887	828	29,6	29,4	99	1173	42,1	41,6	89,9	90,2	158	16,2	14,9
38	Stavropol	1274	1324	470	465	36,9	35,1	100	421	38,7	31,8	99,2	94,3	26	8,8	6,5
39	*Oblasts:* Astrakhan	678	663	249	210	36,7	31,7	93	132	17,3	19,9	100,0	100,0	8	1,7	6,1
40	Volgograd	2198	2036	638	647	29,0	31,8	100	706	36,0	34,7	55,3	95,2	44	12,6	6,5
41	Rostov	3062	2669	719	655	23,5	24,5	100	866	26,8	32,4	100,0	100,0	65	6,7	7,5
Federal Region: Privolzhsky		16712	17117	5421	5438	32,4	31,8	98	7928	46,2	46,3	89,4	92,4	1172	13,5	16,0
42	*Republcis:* Bashkortostan	1580	1509	477	448	30,2	29,7	100	508	33,0	33,7	100,0	100,0	25	8,6	4,9
43	Mariy-El	485	483	223	202	46,0	41,8	81	267	75,4	55,3	100,0	100,0	43	14,8	16,1
44	Mordovia	500	489	126	95	25,2	19,4	100	190	37,4	38,9	100,0	100,0	18	4,8	9,5
45	Tatarstan	1658	1667	513	467	30,9	28,0	100	653	48,7	39,2	100,0	100,0	43	5,2	6,6
46	Udmurtia	988	1011	342	322	34,6	31,8	100	515	51,7	50,9	75,7	65,2	35	14,5	10,4
47	Chuvashia	805	897	455	474	56,5	52,8	99	628	68,4	70,0	96,0	97,6	87	14,6	14,2
48	*Oblasts:* Kirov	734	697	190	285	25,9	40,9	100	357	28,5	51,2	73,7	79,8	62	15,6	21,8
49	Nizhni Novgorod	1821	1829	616	637	33,8	34,8	99	865	42,0	47,3	86,7	91,0	136	17,2	17,3
50	Orenburg	1522	1606	330	396	21,7	24,7	99	611	43,1	38,0	99,8	100,0	96	13,7	15,7
51	Penza	805	782	279	307	34,7	39,3	100	457	49,0	58,4	91,4	100,0	33	9,7	7,2
52	Perm (Perm Krai)	2025	2149	733	593	36,2	27,6	96	925	49,8	43,0	81,1	99,5	203	7,4	22,1
53	Samara	1583	1748	481	515	30,4	29,5	100	966	51,9	55,3	92,8	98,9	260	28,3	27,2
54	Saratov	1457	1440	378	403	25,9	28,0	99	599	38,4	41,6	82,1	85,6	86	13,9	16,8

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Cohorts of new pulmonary TB patients														
		Total		Including new ss+ TB cases				Patient coverage by culture tests (%)	Including MtB+ TB cases confirmed by culture (%)			Patient coverage by drug susceptibility tests (%)		Including MDR-TB cases		
		Number of casses		Number of cases		%			Number of cases	%_[1]				Number of cases	%	
		2007	2008	2007	2008	2007	2008	2008	2008	2007	2008	2007	2008	2008	2007	2008
55	Ulyanovsk	749	810	278	294	37,1	36,3	86	387	48,2	47,8	64,0	59,7	45	19,5	19,5
Federal Region: Urals		9590	9863	2657	2802	27,7	28,4	98	3816	35,2	38,7	88,8	90,1	316	8,4	9,2
56	*Oblasts:* Kurgan	1213	982	287	271	23,7	27,6	89	394	20,7	40,1	100,0	100,0	40	3,6	10,2
57	Sverdlovsk	3553	4001	1057	1121	29,7	28,0	98	1573	40,8	39,3	99,1	96,3	92	6,2	6,1
58	Tyumen	1291	1369	270	294	20,9	21,5	100	458	30,1	33,5	87,7	100,0	58	22,0	12,7
	Khanty-Mansi AO	1022	1052	270	291	26,4	27,7	100	417	43,1	39,6	83,2	97,1	58	11,7	14,3
	Yamalo-Nents AO	302	300	62	87	20,5	29,0	100	105		35,0	47,8	90,5	25	18,2	26,3
59	Chelyabinsk	2209	2159	711	738	32,2	34,2	100	869	36,4	40,3	72,8	65,6	43	5,5	7,5
Federal Region: Siberian		19587	20380	6589	6849	33,6	33,6	97	8153	37,9	40,0	92,1	94,5	1038	14,7	13,5
60	*Republics:* Altai	195	211	34	51	17,4	24,2	99	96	42,5	45,5	96,4	99,0	18	11,3	18,9
61	Buryatia	1284	1276	453	414	35,3	32,4	97	362	21,2	28,4	100,0	97,0	40	2,6	11,4
62	Tyva	504	518	167	168	33,1	32,4	93	223	42,9	43,1	88,4	74,4	46	34,6	27,7
63	Khakassia	473	522	189	184	40,0	35,2	100	292	60,2	55,9	100,0	100,0	71	19,6	24,3
64	*Krai:* Altai	2663	2752	629	687	23,6	25,0	95	593	12,8	21,5	83,1	93,1	37	6,3	6,7
65	Krasnoyarsk	2275	2396	816	798	35,9	33,3	99	1100	47,5	45,9	99,4	99,2	176	19,0	16,1
66	*Oblasts:* Irkutsk	2710	2885	870	949	32,1	32,9	93	1044	36,5	36,2	91,9	92,0	64	5,4	6,7
67	Kemerovo	3073	3114	1237	1204	40,3	38,7	98	1570	50,7	50,4	100,0	99,7	280	16,9	17,9
68	Novosibirsk	2730	2779	851	932	31,2	33,5	99	1142	42,4	41,1	79,9	89,1	226	17,5	22,2
69	Omsk	2014	2099	674	755	33,5	36,0	98	822	30,5	39,2	71,7	91,7	111	19,5	14,7
70	Tomsk	743	738	358	339	48,2	45,9	99	428	56,7	58,0	97,6	99,1	55	14,1	13,0
71	Trans-Baikal Krai (Chita Oblast)	923	1090	311	368	33,7	33,8	99	481	43,4	44,1	100,0	89,8	14	7,3	3,2
Federal Region: Far-East		6535	7183	2296	2464	35,1	34,3	92	2557	33,6	35,6	79,9	68,4	216	11,7	12,3
72	*Republic:* Sakha (Yakutia)	517	580	179	204	34,6	35,2	96	295	48,0	50,9	73,4	86,1	57	30,2	22,4
73	*Krais:* Primorsky	2720	2904	1010	1076	37,1	37,1	97	1199	43,3	41,3	77,4	68,6	79	10,1	9,6
74	Khabarovsk	1430	1512	491	530	34,3	35,1	92	562	11,6	37,2	51,8	45,0	34	5,8	13,4
75	*Oblasts:* Amur	929	1039	231	248	24,9	23,9	78	47	20,6	4,5	97,4	19,1	3	11,8	33,3
76	Kamchatka Krai	202	249	63	98	31,2	39,4	66	14	5,5	5,6					
77	Magadan	92	93	33	30	35,9	32,3	100	37	46,8	39,8	100,0	100,0	5	20,9	13,5
78	Sakhalin	324	430	190	185	58,6	43,0	100	239	62,3	55,6	93,1	88,7	31	9,0	14,6
79	Jewish Autonomous Oblast	294	336	97	85	33,0	25,3	100	142	47,3	42,3	100,0	100,0	5		3,5
80	Chukotka AO	27	40	2	8	7,4	20,0	100	22	66,7	55,0	100,0	95,5	2	27,8	9,5

[1] calculation is based on the whole cohort of new pulmonary TB patients

Table 7

Notification rate of PTB cases with pulmonary destruction and FCTB in Russia in 2004–2008 (among residents)
(Form No. 33)

No.	Federal regions (okrugs) and territories (subjects of the Russian Federation	PTB cases with pulmonary destruction										Fibrous-cavernous TB among new TB cases												
		Number of cases					% of PTB cases					Number of cases					Per 100,000 population					% of PTB cases		
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2006	2007	2008
Russian Federation		43342	44077	43166	42438	41663	50,4	51,6	50,3	49,4	47,3	2055	2026	1905	2022	1816	1,4	1,4	1,3	1,4	1,3	2,2	2,4	2,1
Federal Region: Central		7893	7678	7610	7354	7138	49,3	49,7	49,0	47,9	45,1	431	410	435	427	360	1,1	1,1	1,2	1,1	1,0	2,8	2,8	2,3
1	*Oblasts:* Belgorod	368	359	373	320	354	42,7	51,9	50,7	45,4	45,5	21	24	25	17	13	1,4	1,6	1,7	1,1	0,9	3,4	2,4	1,7
2	Bryansk	449	483	536	553	509	51,0	54,2	59,0	56,1	49,8	30	39	24	18	26	2,2	2,9	1,8	1,4	2,0	2,6	1,8	2,5
3	Vladimir	330	310	338	287	292	45,3	42,7	42,9	37,7	37,6	10	6	8	15	9	0,7	0,4	0,5	1,0	0,6	1,0	2,0	1,2
4	Voronezh	494	531	540	533	573	45,7	48,2	53,0	47,7	52,0	20	8	39	29	40	0,9	0,3	1,7	1,3	1,7	3,8	2,6	3,6
5	Ivanovo	197	204	234	204	207	47,4	47,2	49,0	49,8	46,3	6	2	6	6	7	0,5	0,2	0,5	0,6	0,6	1,3	1,5	1,6
6	Kaluga	297	312	238	226	216	58,0	61,8	50,0	49,0	44,5	45	31	25	21	22	4,4	3,0	2,5	2,1	2,2	5,3	4,6	4,5
7	Kostroma	109	113	97	88	90	38,4	45,4	41,1	41,5	42,1	0	2	4	2	1	0,0	0,3	0,6	0,3	0,1	1,7	0,9	0,5
8	Kursk	385	405	402	386	389	60,0	57,3	58,5	57,0	51,0	43	50	43	57	46	3,6	4,2	3,7	4,9	3,9	6,3	8,4	6,0
9	Lipetsk	247	232	242	255	204	39,0	37,1	39,2	37,0	30,4	16	16	19	25	11	1,3	1,3	1,6	2,1	0,9	3,1	3,6	1,6
10	Moscow	1270	1222	1213	1263	1144	46,6	47,8	46,7	45,1	42,4	50	54	64	79	50	0,8	0,8	1,0	1,2	0,8	2,5	2,8	1,9
11	Orel	221	206	235	193	152	57,1	56,4	61,8	54,4	45,8	10	5	12	6	6	1,2	0,6	1,4	0,7	0,7	3,2	1,7	1,8
12	Ryazan	382	338	368	343	321	57,9	48,8	52,0	52,8	52,5	39	34	37	38	31	3,2	2,9	3,1	3,3	2,6	5,2	5,8	5,1
13	Smolensk	422	381	384	378	374	57,2	57,3	58,9	63,1	55,6	14	6	10	16	13	1,4	0,6	1,0	1,6	1,3	1,5	2,7	1,9
14	Tambov	420	340	302	321	296	59,2	56,2	53,9	56,8	51,1	17	23	16	10	11	1,5	2,0	1,4	0,9	1,0	2,9	1,8	1,9
15	Tver	407	434	426	413	367	51,7	53,2	54,2	54,7	47,7	16	31	31	16	17	1,1	2,2	2,2	1,2	1,2	3,9	2,1	2,2
16	Tula	539	444	339	359	380	49,1	46,7	39,7	46,4	42,8	51	41	23	25	15	3,1	2,5	1,4	1,6	0,9	2,7	3,2	1,7
17	Yaroslavl	261	272	240	256	211	54,4	56,5	51,7	51,8	49,9	6	5	3	7	3	0,4	0,4	0,2	0,5	0,2	0,6	1,4	0,7
18	*Moscow city*	1095	1092	1103	976	1059	45,8	45,6	42,8	41,5	40,7	37	33	46	40	39	0,4	0,3	0,4	0,4	0,4	1,8	1,7	1,5
Federal Region: North-West		3607	3594	3438	3403	3351	59,7	59,3	58,8	58,8	57,2	62	60	55	63	41	0,4	0,4	0,4	0,5	0,3	0,9	1,1	0,7
19	*Republics:* Karelia	213	242	233	231	183	58,5	68,0	66,6	62,3	61,4	1	2	3	2	0	0,1	0,3	0,4	0,3	0,0	0,9	0,5	0,0
20	Komi	377	368	339	389	397	66,6	67,9	68,3	65,4	69,2	6	8	14	15	8	0,6	0,8	1,4	1,5	0,8	2,8	2,5	1,4
21	*Oblasts:* Arkhangelsk	410	355	355	328	316	64,6	63,8	62,8	65,1	63,3	10	8	5	1	0	0,8	0,6	0,4	0,1	0,0	0,9	0,2	0,0
	Nents AO	12	11	17	11	4	85,7	61,1	77,3	78,6	23,5			1					2,4	0,0	0,0	4,5		
22	Vologda	245	235	220	217	218	53,4	57,9	55,1	54,4	50,8	1	3	1	5	7	0,1	0,2	0,1	0,4	0,6	0,3	1,3	1,6
23	Kaliningrad	498	447	501	479	375	61,5	56,4	61,6	56,7	50,3	4	11	10	12	4	0,4	1,2	1,1	1,3	0,4	1,2	1,4	0,5
24	Leningrad	531	588	478	406	523	57,7	58,9	51,8	51,7	54,5	17	10	8	9	11	1,0	0,6	0,5	0,6	0,7	0,9	1,1	1,1
25	Murmansk	186	194	192	216	151	50,7	53,3	57,1	57,6	51,4	6	4	6	3	1	0,7	0,5	0,7	0,4	0,1	1,8	0,8	0,3
26	Novgorod	185	162	148	155	128	55,9	50,0	45,8	50,3	40,8	1	3	0	2	0	0,1	0,4	0,0	0,3	0,0	0,0	0,6	0,0
27	Pskov	212	278	253	264	286	57,3	61,1	58,4	57,9	61,0	1	1	0	2	2	0,1	0,1	0,0	0,3	0,3	0,0	0,4	0,4

No.	Federal regions (okrugs) and territories (subjects of the Russian Federation	PTB cases with pulmonary destruction										Fibrous-cavernous TB among new TB cases												
		Number of cases					% of PTB cases					Number of cases					Per 100,000 population					% of PTB cases		
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2006	2007	2008
28	*St. Petersburg city*	750	725	719	718	774	61,6	57,4	59,7	62,3	60,5	15	10	8	12	8	0,3	0,2	0,2	0,3	0,2	0,7	1,0	0,6
	Federal Region: South	6583	6777	6830	7457	6934	53,8	57,1	54,9	55,4	53,0	158	183	173	229	161	0,7	0,8	0,8	1,0	0,7	1,4	1,7	1,2
29	*Republics:* Adygea	164	166	158	171	153	60,3	68,6	64,5	56,4	55,0	8	1	7	7	5	1,8	0,2	1,6	1,6	1,1	2,9	2,3	1,8
30	Dagestan	797	860	916	880	856	62,6	67,8	69,0	67,7	64,6	15	13	15	9	9	0,6	0,5	0,6	0,3	0,3	1,1	0,7	0,7
31	Ingushetia	105	136	111	116	94	51,7	73,5	73,0	61,1	72,3	5	8	5	8	3	1,0	1,7	1,0	1,6	0,6	3,3	4,2	2,3
32	Chechnya			512	585	554			64,4	67,5	69,5			11	38	22			0,9	3,2	1,9	1,4	4,4	2,8
33	Kabardino-Balkaria	281	266	281	278	252	74,1	73,9	72,4	73,2	74,8	9	13	9	12	7	1,0	1,5	1,0	1,3	0,8	2,3	3,2	2,1
34	Kalmykia	127	107	111	122	111	42,6	38,2	40,1	43,9	42,5	7	9	10	9	0	2,4	3,1	3,5	3,1	0,0	3,6	3,2	0,0
35	Karachaevo-Cherkessia	133	116	97	125	127	59,6	64,8	60,6	68,7	63,5	1	3	2	1	0	0,2	0,7	0,5	0,2	0,0	1,3	0,5	0,0
36	North Ossetia - Alania	177	210	164	178	174	50,1	61,9	54,3	53,6	52,9	8	8	9	6	6	1,1	1,1	1,3	0,9	0,9	3,0	1,8	1,8
37	*Krais:* Krasnodar	1458	1643	1483	1865	1571	58,1	64,6	60,9	62,6	56,0	17	31	35	47	41	0,3	0,6	0,7	0,9	0,8	1,4	1,6	1,5
38	Stavropol	658	600	529	555	558	52,3	50,6	44,6	45,7	42,8	16	23	18	23	18	0,6	0,8	0,7	0,9	0,7	1,5	1,9	1,4
39	*Oblasts:* Astrakhan	280	284	257	242	222	40,3	41,0	38,6	35,6	33,3	14	18	13	12	8	1,4	1,8	1,3	1,2	0,8	2,0	1,8	1,2
40	Volgograd	1056	1061	1136	1276	1220	52,7	57,1	59,1	60,7	60,8	42	49	30	50	37	1,6	1,9	1,1	1,9	1,4	1,6	2,4	1,8
41	Rostov	1347	1328	1075	1064	1042	48,7	48,7	41,6	40,0	39,4	16	7	9	7	5	0,4	0,2	0,2	0,2	0,1	0,3	0,3	0,2
Federal Region: Privolzhsky		8134	8534	8297	7665	7492	47,8	50,0	48,5	47,1	44,5	294	302	262	268	266	1,0	1,0	0,9	0,9	0,9	1,5	1,6	1,6
42	*Republcis:* Bashkortostan	588	627	613	519	494	35,4	37,9	38,0	34,0	33,9	25	21	21	18	12	0,6	0,5	0,5	0,4	0,3	1,3	1,2	0,8
43	Mariy-El	173	174	196	234	180	49,6	44,2	49,9	48,2	37,5	0	5	2	4	1	0,0	0,7	0,3	0,6	0,1	0,5	0,8	0,2
44	Mordovia	323	276	314	251	211	57,4	58,0	60,5	50,9	43,4	44	16	17	13	13	5,0	1,9	2,0	1,5	1,5	3,3	2,6	2,7
45	Tatarstan	740	751	743	660	645	42,4	43,0	41,5	39,8	38,7	8	10	9	13	14	0,2	0,3	0,2	0,3	0,4	0,5	0,8	0,8
46	Udmurtia	645	670	586	625	534	62,3	65,4	60,8	63,3	52,8	8	11	6	12	12	0,5	0,7	0,4	0,8	0,8	0,6	1,2	1,2
47	Chuvashia	485	504	506	438	412	59,0	61,6	60,0	54,4	45,9	19	13	12	12	14	1,5	1,0	0,9	0,9	1,1	1,4	1,5	1,6
48	*Oblasts:* Kirov	383	448	393	376	387	58,7	63,7	55,5	60,5	55,5	2	6	5	9	6	0,1	0,4	0,3	0,6	0,4	0,7	1,4	0,9
49	Nizhni Novgorod	1163	1194	1065	995	1019	58,9	59,6	57,2	58,8	59,4	107	124	106	119	113	3,1	3,6	3,1	3,5	3,3	5,7	7,0	6,6
50	Orenburg	652	759	821	745	714	48,0	51,0	52,3	49,1	45,8	4	5	5	1	4	0,2	0,2	0,2	0,0	0,2	0,3	0,1	0,3
51	Penza	386	407	397	372	359	45,9	50,1	52,3	49,1	46,4	12	18	21	12	12	0,8	1,3	1,5	0,9	0,9	2,8	1,6	1,6
52	Perm (Perm Krai)	1038	1024	1035	886	909	47,5	49,3	47,7	45,7	43,3	11	10	11	8	8	0,4	0,4	0,4	0,3	0,3	0,5	0,4	0,4
	Komi-Permytsky AO	84	98				49,7	66,2				3	0			0	2,2	0,0						
53	Samara	577	734	733	707	761	37,2	45,7	43,0	43,2	42,6	22	28	25	20	25	0,7	0,9	0,8	0,6	0,8	1,5	1,2	1,4
54	Saratov	617	590	563	529	497	38,7	37,3	37,3	37,3	35,1	14	11	9	12	10	0,5	0,4	0,3	0,5	0,4	0,6	0,8	0,7
55	Ulyanovsk	364	376	332	328	370	52,5	54,2	47,6	43,6	46,1	18	24	13	15	22	1,3	1,8	1,0	1,1	1,7	1,9	2,0	2,7
Federal Region: Urals		4031	4003	3930	3746	3742	43,7	44,0	42,6	40,7	40,4	115	129	125	131	97	0,9	1,1	1,0	1,1	0,8	1,4	1,4	1,0
56	*Oblasts:* Kurgan	496	494	537	456	496	49,9	55,6	55,1	45,6	53,9	13	23	13	16	18	1,3	2,3	1,3	1,7	1,9	1,3	1,6	2,0
57	Sverdlovsk	1400	1324	1389	1373	1352	45,6	42,5	41,5	39,0	36,5	33	40	43	49	39	0,7	0,9	1,0	1,1	0,9	1,3	1,4	1,1

No.	Federal regions (okrugs) and territories (subjects of the Russian Federation	PTB cases with pulmonary destruction										Fibrous-cavernous TB among new TB cases												
		Number of cases					% of PTB cases					Number of cases					Per 100,000 population					% of PTB cases		
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2006	2007	2008
58	Tyumen	1153	1162	1140	997	941	37,1	38,0	38,0	38,5	37,7	39	46	51	43	27	1,2	1,4	1,5	1,3	0,8	1,7	1,7	1,1
	Khanty-Mansi AO	402	422	421	372	339	36,2	37,8	36,4	36,4	32,2	9	6	10	5	2	0,6	0,4	0,7	0,3	0,1	0,9	0,5	0,2
	Yamalo-Nents AO	150	168	139	117	136	45,6	41,5	45,1	38,7	44,6	0	0	2	0	2	0,0	0,0	0,4	0,0	0,4	0,6	0,0	0,7
59	Chelyabinsk	982	1023	864	920	953	47,8	50,3	45,2	44,0	44,2	30	20	18	23	13	0,8	0,6	0,5	0,7	0,4	0,9	1,1	0,6
Federal Region: Siberian		10192	10318	9858	9632	9516	52,7	52,8	50,7	49,7	47,5	735	672	560	621	601	3,7	3,4	2,9	3,2	3,1	2,9	3,2	3,0
60	*Republics:* Altai	100	136	104	104	110	41,5	52,3	47,3	51,2	53,1	15	15	7	5	13	7,4	7,3	3,4	2,4	6,3	3,2	2,5	6,3
61	Buryatia	627	636	621	640	582	61,2	57,6	50,1	51,4	47,5	34	9	11	27	23	3,5	0,9	1,1	2,8	2,4	0,9	2,2	1,9
62	Tyva	293	272	259	254	254	49,7	47,1	48,1	51,8	50,3	17	13	20	14	17	5,5	4,2	6,5	4,5	5,5	3,7	2,9	3,4
63	Khakassia	375	361	335	276	257	61,4	63,6	67,7	57,0	49,6	29	11	13	10	9	5,4	2,0	2,4	1,9	1,7	2,6	2,1	1,7
64	*Krai: Altai*	1597	1563	1522	1291	1307	55,1	55,6	53,3	48,7	48,2	77	59	45	43	32	3,0	2,3	1,8	1,7	1,3	1,6	1,6	1,2
65	Krasnoyarsk	1410	1322	1284	1280	1231	57,1	56,3	57,0	57,1	52,4	84	61	48	45	40	2,9	2,1	1,7	1,6	1,4	2,1	2,0	1,7
	Taimyr AO	14	11	13			48,3	57,9	76,5			0	0				0,0	0,0						
	Evenk AO	15	16	17			68,2	72,7	81,0			1	0				5,7	0,0						
66	*Oblasts:* Irkutsk	1258	1345	1305	1491	1522	58,2	56,7	53,1	55,3	53,1	148	172	138	156	195	5,8	6,8	5,5	6,2	7,8	5,6	5,8	6,8
	Ust-Ordyn-Buryat AO	105	132	102	113	0	61,0	56,4	54,0	56,5		14	8	8	2	0	10,4	6,0	6,0	1,5	0,0	4,2	1,0	
67	Kemerovo	1625	1697	1590	1504	1467	50,3	51,7	49,7	48,9	47,1	118	95	64	76	87	4,1	3,3	2,3	2,7	3,1	2,0	2,5	2,8
68	Novosibirsk	1352	1335	1233	1143	1170	48,1	48,7	45,6	42,4	42,3	51	62	45	66	64	1,9	2,3	1,7	2,5	2,4	1,7	2,4	2,3
69	Omsk	709	816	798	875	817	41,6	45,5	43,4	45,7	42,6	106	134	132	128	83	5,2	6,6	6,5	6,3	4,1	7,2	6,7	4,3
70	Tomsk	478	426	406	370	365	58,8	53,1	51,3	48,1	47,1	22	14	13	15	0	2,1	1,4	1,3	1,5	0,0	1,6	1,9	0,0
71	Trans-Baikal Krai (Chita Oblast)	368	409	401	404	434	45,9	46,0	46,8	44,0	40,4	34	27	24	36	38	3,0	2,4	2,1	3,2	3,4	2,8	3,9	3,5
	Aginsk Buryat AO	33	26	32	22	0	38,8	43,3	40,0	31,9		1	1				1,4	1,4						
Federal Region: Far-East		2901	3173	3203	3181	3489	47,2	50,1	51,8	49,3	49,1	260	270	295	282	290	3,9	4,1	4,5	4,3	4,5	4,8	4,4	4,1
72	*Republic:* Sakha (Yakutia)	278	249	289	240	278	45,7	43,8	54,6	46,2	47,7	9	3	5	10	1	0,9	0,3	0,5	1,1	0,1	0,9	1,9	0,2
73	*Krais:* Primorsky	1026	1192	1256	1241	1330	45,3	49,7	51,6	45,6	45,8	146	174	188	186	183	7,1	8,6	9,3	9,3	9,1	7,7	6,8	6,3
74	Khabarovsk	534	588	566	620	710	40,5	42,2	42,9	45,0	48,1	32	26	26	26	29	2,2	1,8	1,8	1,9	2,1	2,0	1,9	2,0
75	*Oblasts:*	500	541	513	528	536	50,9	56,1	52,8	56,8	51,8	26	23	12	18	10	2,9	2,6	1,4	2,1	1,1	1,2	1,9	1,0
76	Kamchatka Krai	110	130	125	116	163	53,9	57,0	59,2	58,3	66,8	17	14	24	16	29	4,8	4,0	6,9	4,6	8,4	11,4	8,0	11,9
	Koryak AO	33	43	42		0	52,4	60,6	52,5			7	2	8	0	0	29,1	8,5	35,0	0,0	0,0	10,0		
77	Magadan	52	45	52	51	47	49,1	51,7	56,5	62,2	54,7	0	1	0	1	2	0,0	0,6	0,0	0,6	1,2	0,0	1,2	2,3
78	Sakhalin	288	306	275	231	270	72,5	76,7	70,3	71,3	62,8	23	27	30	17	25	4,3	5,1	5,7	3,3	4,8	7,7	5,2	5,8
79	Jewish Autonomous Oblast	100	105	107	141	137	41,2	40,9	50,7	50,9	43,9	6	1	7	7	10	3,2	0,5	3,8	3,8	5,4	3,3	2,5	3,2
80	Chukotka AO	13	17	20	13	18	44,8	43,6	74,1	48,1	50,0	1	1	3	1	1	2,0	2,0	5,9	2,0	2,0	11,1	3,7	2,8

Table 8

TB mortality rate in the Russian Federation in 2004–2008

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	TB mortality rates (FSSS) per 100,000 population					TB patients died within one year of follow-up: Number of patients					TB patients died within one year of follow-up: Among new TB cases, % (Form No. 33)					Deceased TB patients who were unknown to dispensary service (by territory, Form No. 8): Number of patients					Deceased TB patients who were unknown to dispensary service (by territory, Form No. 8): Among new TB cases (Form No. 8), %				
		2004	2005	2006*	2007**	2008***	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Russian Federation		21,4	22,6	20,0	18,4	17,9	4489	5300#	4443	4103	4042	4,6	5,5	4,6	4,3	4,1	3311	3290	2773	2465	2161	2,8	2,8	2,4	2,1	1,8
Federal Region: Central		15,0	15,8	13,8	12,6	12,0	910	973	910	811	819	5,0	5,5	5,2	4,7	4,6	1103	895	822	782	615	4,7	3,9	3,7	3,4	2,6
1	*Oblasts:* Belgorod	8,7	9,9	7,6	5,7	5,1	33	20	25	16	18	3,5	2,6	3,1	2,1	2,1	16	21	19	7	7	1,5	2,4	2,0	0,8	0,7
2	Bryansk	24,6	29,1	25,1	20,9	21,4	84	105	85	70	93	8,3	10,0	8,1	6,3	8,0	30	46	37	51	29	2,6	3,9	3,2	4,1	2,3
3	Vladimir	18,3	18,4	18,8	16,3	13,2	45	52	47	54	42	5,5	6,4	5,2	6,2	4,8	26	25	42	35	17	2,4	2,3	3,5	3,0	1,5
4	Voronezh	13,0	14,7	13,2	11,9	11,2	43	46	33	31	36	3,5	3,7	2,8	2,5	2,9	17	13	10	9	11	1,1	0,8	0,7	0,6	0,7
5	Ivanovo	18,5	17,7	13,4	13,1	11,7	22	21	23	17	18	4,8	4,2	4,3	3,7	3,7	10	12	11	9	8	1,7	1,9	1,6	1,6	1,3
6	Kaluga	23,6	22,9	16,6	15,0	16,6	31	45	31	27	28	5,2	7,6	5,6	5,1	5,3	54	86	24	31	29	7,2	10,4	3,2	4,3	3,9
7	Kostroma	8,2	10,5	10,2	7,0	5,9	24	26	22	15	11	7,2	8,9	8,2	6,2	4,5	5	10	9	13	12	1,2	2,8	2,8	4,3	4,0
8	Kursk	22,5	24,2	19,5	18,2	16,2	38	42	46	26	30	5,2	5,2	5,9	3,4	3,7	36	31	37	30	27	4,0	3,2	4,0	3,4	2,8
9	Lipetsk	14,6	11,0	10,4	9,7	9,0	32	23	26	26	19	4,6	3,4	3,8	3,5	2,7	14	7	5	9	10	1,7	0,8	0,6	1,0	1,1
10	Moscow	14,8	17,2	15,4	14,6	13,4	189	203	221	212	173	6,1	7,1	7,6	6,8	5,8	300	367	342	307	219	8,2	10,3	9,8	7,8	5,8
11	Orel	5,7	8,0	6,0	5,1	4,1	13	11	22	12	9	3,0	2,6	5,1	3,0	2,4	9	6	7	4	5	1,7	1,2	1,4	0,8	1,1
12	Ryazan	17,9	18,4	14,4	12,4	14,3	36	28	29	17	29	4,6	3,5	3,7	2,3	4,2	19	31	36	29	36	1,9	3,3	3,9	3,0	3,7
13	Smolensk	34,3	32,3	32,5	32,2	30,2	41	35	22	30	45	5,0	4,5	2,9	4,4	6,0	27	31	38	23	35	2,6	3,2	3,8	2,6	3,6
14	Tambov	17,5	19,3	16,1	13,0	14,1	27	22	25	26	23	3,5	3,3	4,0	4,1	3,7	3	1	4	7	8	0,3	0,1	0,5	0,9	1,1
15	Tver	21,1	21,6	21,8	23,4	22,6	71	67	79	72	67	8,2	7,6	9,1	8,4	7,7	19	30	31	41	29	1,7	2,7	2,7	3,7	2,7
16	Tula	30,7	29,7	25,2	21,7	22,2	53	91	65	55	77	4,1	8,2	6,6	6,1	7,7	30	53	49	63	48	1,7	3,6	3,9	5,1	3,7
17	Yaroslavl	14,3	12,5	12,2	11,7	11,4	31	33	34	37	24	4,9	5,5	5,7	6,2	4,6	31	36	32	22	27	3,4	4,1	4,0	2,7	3,9
18	*Moscow city*	8,3	8,8	7,3	6,6	6,5	97	103	75	68	77	3,6	3,7	2,6	2,5	2,5	457	89	89	92	58	11,4	2,2	2,3	1,9	1,1
Federal Region: North-West		19,4	19,6	17,7	15,7	14,9	496	459	499	428	401	7,0	6,5	7,2	6,4	6,0	239	336	316	267	269	2,7	3,8	3,6	3,2	3,1
19	*Republics:* Karelia	16,4	20,8	20,6	21,7	18,1	27	47	37	30	30	6,4	10,9	9,3	7,1	8,9	19	15	19	12	5	3,6	2,8	4,0	2,4	1,1
20	Komi	20,8	22,0	19,4	14,2	17,4	52	50	40	38	33	8,0	8,0	6,8	5,7	5,1	21	46	26	29	21	2,5	5,3	3,3	3,1	2,4
21	*Oblasts:* Arkhangelsk	19,2	19,3	15,1	12,7	9,9	52	74	62	66	46	7,2	11,7	9,8	11,7	8,3	26	31	36	16	29	2,7	3,6	3,8	2,1	3,9
	Nents AO	9,5	16,7	7,1	9,5	0,0	0	0	0	1	0	0,0	0,0	0,0	6,3	0,0	0	0	0	1		0,0	0,0	0,0	5,9	0,0
22	Vologda	11,1	11,8	10,2	10,0	9,9	41	34	54	27	21	7,6	7,0	11,6	6,0	4,4	8	25	9	12	14	1,2	3,9	1,6	2,1	2,3
23	Kaliningrad	35,4	33,2	28,8	18,3	15,9	96	58	71	35	27	9,7	6,0	7,0	3,5	3,1	49	104	91	52	49	4,1	8,8	7,2	4,1	4,4
24	Leningrad	33,6	33,7	30,2	24,2	24,6	85	67	96	106	123	8,2	6,2	9,5	12,1	11,8	21	20	51	75	70	1,7	1,6	4,2	6,6	5,4
25	Murmansk	14,0	12,1	10,8	10,0	8,3	39	37	31	31	21	9,4	9,2	8,2	7,8	6,4	26	30	24	18	14	4,5	5,2	4,8	3,6	3,3
26	Novgorod	27,7	26,7	27,5	28,2	24,8	8	13	21	18	12	2,1	3,6	5,8	5,1	3,4	6	8	5	3	4	1,2	1,7	1,1	0,7	0,9
27	Pskov	16,8	17,8	17,4	15,4	22,4	20	29	29	27	35	5,0	5,9	6,2	5,5	7,2	13	10	12	11	22	2,3	1,6	1,9	1,7	3,3
28	*St. Petersburg city*	13,5	13,8	12,8	13,1	11,6	76	50	58	50	53	4,9	3,1	3,7	3,4	3,3	50	47	43	39	41	2,6	2,4	2,3	2,3	2,0

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	TB mortality rates (FSSS) per 100,000 population					TB patients died within one year of follow-up (Form No. 33) Number of patients					TB patients died within one year of follow-up (Form No. 33) Among new TB cases (Form No. 33)					Deceased TB patients who were unknown to dispensary service (by territory, Form No. 8) Number of patients					Deceased TB patients who were unknown to dispensary service (by territory, Form No. 8) Among new TB cases (Form No. 8), %				
		2004	2005	2006*	2007**	2008***	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Federal Region: South		22,9	23,4	21,3	19,1	18,2	252	*718#*	303	315	291	1,8	5,3	2,2	2,1	2,0	253	204	101	91	58	1,5	1,2	0,6	0,5	0,3
29	*Republics:* Adygea	26,5	27,1	21,0	24,5	21,0	15	15	20	16	16	4,6	5,4	7,1	4,8	5,1	27	31	23	17	19	7,0	9,1	6,6	4,1	5,1
30	Dagestan	13,7	12,0	14,3	9,8	9,8	9	22	20	20	17	0,6	1,5	1,3	1,3	1,1	0	0	0	0	0	0,0	0,0	0,0	0,0	0,0
31	Ingushetia	13,0	12,2	11,0	7,7	6,9	7	8	5	5	2	2,8	3,7	2,7	2,4	1,3	0	4	1	2	0	0,0	1,6	0,5	0,9	0,0
32	Chechnya		7,2	7,2	7,4	8,7	9	20	19	35	36			2,1	0,0	3,9										
33	Kabardino-Balkaria	20,3	22,1	15,9	18,4	14,2	7	7	10	9	9	1,6	1,6	2,3	0,0	2,4	17	0	0	2	1	3,8	0,0	0,0	0,4	0,2
34	Kalmykia	30,0	28,7	23,6	21,0	22,1	17	9	9	16	8	5,1	2,7	2,6	4,8	2,7	5	21	8	8	3	1,3	5,6	2,2	2,2	0,9
35	Karachaevo-Cherkessia	11,0	15,0	10,9	10,0	11,0	5	5	7	8	5	2,0	2,3	3,6	3,8	2,2	0	0	0	0	0	0,0	0,0	0,0	0,0	0,0
36	North Ossetia - Alania	22,0	19,6	16,4	17,0	17,9	7	4	16	17	11	1,4	0,8	4,0	3,9	2,7	7	0	2	0	1	1,3	0,0	0,5	0,0	0,2
37	*Krais:* Krasnodar	24,4	25,6	22,0	20,5	18,5	60	103	73	70	81	2,1	3,6	2,8	2,2	2,7	4	41	4	4	1	0,1	1,3	0,1	0,1	0,0
38	Stavropol	16,2	16,5	12,9	13,6	11,0	39	47	42	27	33	2,6	3,3	2,9	1,8	2,1	58	47	14	23	13	3,8	2,5	0,8	1,3	0,7
39	*Oblasts:* Astrakhan	38,5	41,7	39,8	37,1	30,2	12	9	5	10	6	1,5	1,2	0,7	1,3	0,8	42	0	0	0	0	4,8	0,0	0,0	0,0	0,0
40	Volgograd	27,3	29,2	25,9	20,8	20,0	50	74	57	60	51	2,3	3,5	2,7	2,6	2,4	85	60	42	29	13	2,9	2,0	1,5	0,9	0,5
41	Rostov	31,0	30,6	30,9	26,8	29,1	24	*415#*	20	22	16	0,8	13,9	0,7	0,8	0,6	8	0	7	6	7	0,2	0,0	0,2	0,2	0,2
Federal Region: Privolzhsky		17,5	18,6	16,8	16,0	15,3	817	973	881	742	698	4,3	5,0	4,5	4,1	3,7	455	529	488	427	405	2,0	2,2	2,0	1,9	1,7
42	*Republcis:* Bashkortostan	13,4	14,7	13,8	13,8	13,2	63	76	72	47	28	3,3	4,0	3,9	2,7	1,7	12	10	10	10	8	0,5	0,4	0,4	0,5	0,4
43	Mariy-El	11,1	13,3	11,4	11,9	12,4	24	18	19	15	21	6,1	4,1	4,2	2,8	3,9	1	12	6	12	5	0,2	2,5	1,3	2,1	0,9
44	Mordovia	13,1	13,0	13,3	11,3	9,9	18	19	16	7	8	2,9	3,6	2,9	1,3	1,5	22	4	0	2	1	3,2	0,7	0,0	0,3	0,2
45	Tatarstan	14,5	14,0	10,2	10,4	9,9	57	98	73	77	48	2,8	4,8	3,6	4,1	2,5	35	59	35	45	54	1,5	2,6	1,5	2,0	2,4
46	Udmurtia	21,2	21,2	18,0	20,1	16,1	92	92	70	81	69	8,1	8,2	6,5	7,4	6,3	29	35	46	22	19	2,2	2,7	3,6	1,8	1,5
47	Chuvashia	14,6	14,3	14,3	13,8	13,4	35	39	42	31	35	4,0	4,5	4,7	3,6	3,7	18	24	20	29	28	1,7	2,3	1,9	2,9	2,6
48	*Oblasts:* Kirov	14,4	13,8	13,5	11,8	12,2	46	46	40	35	50	5,8	5,5	4,8	4,9	6,3	26	34	34	21	26	3,1	3,8	3,4	2,3	2,6
49	Nizhni Novgorod	24,6	25,0	21,8	20,2	19,6	137	137	145	105	111	6,1	6,2	7,0	5,6	5,9	76	161	163	127	131	2,7	5,5	5,7	5,1	5,2
50	Orenburg	17,7	18,8	19,7	17,2	17,2	27	51	38	38	35	1,7	2,9	2,1	2,1	1,9	3	3	3	6	5	0,2	0,1	0,1	0,3	0,2
51	Penza	14,5	15,1	12,6	11,1	10,7	45	37	40	33	36	4,9	3,9	4,3	3,9	4,2	9	15	10	5	8	0,9	1,4	1,0	0,5	0,7
52	Perm (Perm Krai)	23,2	28,0	23,8	21,8	20,7	119	163	143	94	93	4,9	7,0	5,8	4,3	4,0	119	85	87	64	39	3,9	2,8	2,7	2,3	1,3
	Komi-Permyatsky AO	35,9					9	9				4,8	5,7				7	0				3,6	0,0			
53	Samara	19,4	21,4	21,2	19,7	19,5	60	89	94	67	47	3,5	4,9	5,0	3,6	2,4	73	54	50	58	62	3,3	2,2	2,0	2,3	2,3
54	Saratov	17,6	18,7	16,9	16,7	15,0	54	50	31	48	36	3,1	2,8	1,9	3,1	2,3	25	25	17	16	16	1,2	1,2	0,9	0,9	0,9
55	Ulyanovsk	14,4	17,7	15,7	15,8	16,3	40	58	58	64	81	5,0	7,4	7,1	7,5	9,1	7	8	7	10	3	0,7	0,8	0,7	0,9	0,3
Federal Region: Urals		23,0	25,5	36,2	21,6	21,7	441	520	454	441	408	4,3	5,1	4,3	4,3	3,9	385	351	212	225	158	3,0	2,8	1,7	1,8	1,2
56	*Oblasts:* Kurgan	40,0	43,0	36,2	36,3	37,7	48	54	46	56	63	4,2	5,2	4,0	5,0	5,6	27	21	13	9	6	2,1	1,7	1,0	0,7	0,4
57	Sverdlovsk	23,9	25,8	22,9	21,4	21,0	184	209	192	173	155	5,3	6,0	5,1	4,4	3,8	160	242	118	119	93	3,6	5,3	2,6	2,4	1,8
58	Tyumen	20,3	23,8	22,3	20,2	20,3	100	154	111	120	86	3,0	4,6	3,3	4,1	3,1	24	36	28	27	24	0,6	0,9	0,7	0,8	0,8
	Khanty-Mansi AO	14,5	16,4	15,7	13,0	13,2	23	48	42	40	33	1,9	3,9	3,3	3,5	2,9	13	7	14	9	9	1,0	0,5	1,0	0,7	0,7

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	TB mortality rates (FSSS) per 100,000 population					TB patients died within one year of follow-up (Form No. 33) Number of patients					TB patients died within one year of follow-up (Form No. 33) Among new TB cases (Form No. 33)					Deceased TB patients who were unknown to dispensary service (by territory, Form No. 8) Number of patients					Deceased TB patients who were unknown to dispensary service (by territory, Form No. 8) Among new TB cases (Form No. 8), %				
		2004	2005	2006*	2007**	2008***	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
	Yamalo-Nents AO	10,4	15,0	14,6	13,5	13,3	11	10	12	9	15	2,8	2,2	3,3	2,6	4,4	0	11	3	2	4	0,0	2,1	0,7	0,5	1,0
59	Chelyabinsk	19,5	21,7	19,6	19,0	19,5	109	103	105	92	104	4,7	4,5	4,8	3,9	4,3	174	52	53	70	35	5,6	1,8	2,0	2,3	1,2
Federal Region: Siberian		35,6	37,3	32,3	29,1	29,3	1302	1337	1159	1044	1072	6,0	6,2	5,4	4,9	4,9	741	836	721	554	510	2,9	3,2	2,8	2,2	2,0
60	*Republics:* Altai	24,6	30,9	30,7	19,4	17,8	12	18	8	7	12	4,1	6,1	3,1	3,0	4,8	5	2	3	1	1	1,7	0,7	1,2	0,4	0,4
61	Buryatia	25,1	23,0	22,4	19,7	25,1	40	39	32	26	34	3,3	3,1	2,3	1,9	2,5	22	43	37	32	24	1,5	2,8	2,2	2,3	1,6
62	Tyva	72,3	71,4	66,7	79,5	74,5	35	22	29	28	34	5,1	3,4	4,6	4,9	5,9	7	22	14	11	29	0,9	2,9	1,8	1,5	3,9
63	Khakassia	33,4	46,7	28,3	23,5	24,2	52	35	29	33	33	7,7	5,5	5,4	6,5	5,9	19	22	24	8	7	2,5	3,0	3,8	1,5	1,2
64	*Krai: Altai*	39,2	42,6	35,2	33,2	32,0	149	170	156	126	129	4,7	5,5	5,0	4,4	4,4	93	112	82	60	57	2,5	3,0	2,3	1,8	1,7
65	Krasnoyarsk	32,6	32,9	28,4	25,9	25,1	212	193	146	140	137	7,6	7,4	5,9	5,7	5,4	99	125	109	96	89	3,2	3,9	3,6	3,2	2,9
	Taimyr AO	7,6	0,0	18,1	13,1		0	0	0			0,0	0,0	0,0			0	0	0			0,0	0,0	0,0		
	Evenk AO	28,6	51,9	23,4	35,6		1	1	1			4,2	4,2	4,5			0	1	0			0,0	3,8	0,0		
66	*Oblasts:* Irkutsk	39,5	45,0	38,5	35,4	41,8	172	208	185	186	210	7,2	8,0	6,8	6,2	6,7	138	153	148	74	92	4,4	4,9	4,7	2,2	2,6
	Ust-Ordyn-Buryat AO	21,6	46,3	41,8	23,9		5	8	8	4		2,6	3,2	3,8	1,8	0,0	0	2	1			0,0	0,8	0,5		
67	Kemerovo	43,0	45,5	38,3	33,5	33,7	309	316	269	225	209	8,5	8,4	7,4	6,4	5,9	193	166	128	94	77	5,1	3,7	2,9	2,3	1,8
68	Novosibirsk	40,0	39,5	35,6	30,9	28,8	166	165	149	137	138	5,5	5,6	5,1	4,8	4,7	72	90	64	67	45	1,9	2,4	1,8	1,9	1,3
69	Omsk	28,6	29,4	28,0	26,6	23,7	72	89	62	73	76	3,6	4,5	3,1	3,5	3,6	69	79	89	97	72	2,9	3,3	3,6	3,8	2,7
70	Tomsk	19,0	16,2	12,7	11,9	9,4	36	34	45	30	36	4,0	3,8	5,1	3,5	4,1	10	10	16	8	9	0,9	0,9	1,4	0,8	0,9
71	Trans-Baikal Krai (Chita Oblast)	27,0	27,6	25,6	18,3	19,8	47	48	49	33	24	5,3	4,9	5,1	3,3	2,1	14	12	7	6	8	1,1	1,0	0,6	0,5	0,6
	Aginsk Buryat AO	5,5	5,4	14,7	9,2		3	1	4			3,1	1,4	4,2												
Federal Region: Far-East		30,5	33,0	29,0	28,1	27,0	271	320	237	322	353	3,9	4,5	3,4	4,6	4,6	135	139	113	119	146	1,6	1,6	1,4	1,4	1,5
72	*Republic:* Sakha (Yakutia)	7,6	8,5	7,3	6,9	9,8	22	21	19	34	29	2,8	2,9	2,7	5,5	4,4	7	4	8	4	9	0,8	0,5	1,0	0,5	1,0
73	*Krais:* Primorsky	43,5	47,8	40,4	34,8	33,2	100	149	131	106	141	4,1	5,7	4,8	3,6	4,5	52	59	27	76	79	1,6	1,8	0,8	2,1	2,1
74	Khabarovsk	27,4	28,0	23,7	27,2	25,6	69	62	28	94	107	4,8	4,1	2,0	6,4	6,9	8	15	2	8	3	0,5	0,8	0,1	0,4	0,2
75	*Oblasts:*	41,2	47,3	43,2	41,7	38,1	57	49	21	41	30	5,3	4,7	2,0	4,1	2,7	27	28	29	4	7	2,0	2,1	2,3	0,3	0,5
76	Kamchatka Krai	16,7	14,5	15,2	18,2	15,4	6	10	11	16	10	2,3	3,4	4,3	6,7	3,6	9	3	5	3	10	2,8	0,9	1,7	1,1	3,1
	Koryak AO	87,2	72,3	78,7	112,4		3	3	3			3,6	2,8	3,1			3					3,4				
77	Magadan	7,9	9,8	10,0	10,8	10,9	3	4	0	2	5	2,3	3,4	0,0	1,8	5,1	3	4	3	3	5	2,1	2,8	2,2	2,3	3,5
78	Sakhalin	18,7	22,3	26,2	22,1	20,9	9	12	19	17	13	2,0	2,6	4,3	4,3	2,8	27	21	35	13	23	5,2	3,8	6,0	2,6	3,9
79	Jewish Autonomous Oblast	65,5	59,2	47,3	63,0	65,2	5	13	8	12	16	2,0	4,9	3,6	0,0	5,0	1	5	4	7	9	0,3	1,7	1,6	2,3	2,6
80	Chukotka AO	2,0	7,9	7,9	9,9	12,0	0	0	0	0	2	0,0	0,0	0,0	0,0	4,9	1	0	0	1	1	3,1	0,0	0,0	3,4	2,4

* Data from [19].
** Data from [31].
*** Data from [41].
\# Data need further specifying.

TB prevalence in the Russian Federation in 2004–2008
(Form No. 33)

No	Federal regions (okrugs) and territories (subjects) of the Russian Feredation	TB patients registered by the end of the year										Including MbT+				
		Number of cases					Per 100,000 population					per 100,000 population				
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Russian Federation		312208	298509	289015	276554	270544	218,3	209,7	202,5	194,5	190,5	86,9	86,6	83,9	80,9	80,2
Federal Region: Central		59214	55480	52827	49504	46908	156,9	147,8	141,4	133,0	126,3	62,3	59,8	57,1	53,8	52,4
1	*Oblasts:* Belgorod	1869	1525	1522	1254	1298	123,5	100,9	100,7	82,8	85,4	64,6	58,7	58,3	53,2	53,6
2	Bryansk	3049	3104	3365	3284	3217	224,0	230,5	252,7	249,2	245,9	101,5	106,3	104,3	103,8	110,7
3	Vladimir	2306	2158	2159	2035	1966	153,4	145,1	146,6	139,4	135,6	69,9	69,4	67,7	57,4	60,7
4	Voronezh	4339	3918	3575	3532	3199	184,4	167,9	154,5	153,9	140,3	84,9	85,9	82,2	80,5	73,2
5	Ivanovo	1551	1363	1133	1003	1048	137,3	122,3	103,0	92,2	97,1	67,4	61,3	61,8	58,6	59,7
6	Kaluga	1660	1384	1345	1164	1145	161,3	135,5	132,6	115,4	113,9	74,2	72,4	61,9	61,0	52,7
7	Kostroma	812	670	526	487	474	111,9	93,4	74,2	69,4	68,0	60,1	51,4	40,6	36,2	32,6
8	Kursk	2353	2384	2286	2255	2212	193,7	198,8	193,1	192,6	190,3	74,8	77,7	76,7	74,4	76,6
9	Lipetsk	2330	1992	1910	1826	1767	194,0	167,4	161,7	155,6	151,2	65,9	64,0	60,5	56,7	56,7
10	Moscow	12481	11992	11322	10515	9695	188,5	180,9	170,8	158,2	145,3	49,9	50,0	46,8	44,0	42,4
11	Orel	1463	1083	977	898	808	172,1	128,6	117,2	108,6	98,3	82,2	48,9	43,1	38,8	33,3
12	Ryazan	2122	2099	1942	1982	1848	175,6	175,7	164,3	169,1	158,7	79,5	71,3	67,0	78,9	82,1
13	Smolensk	2453	2331	2435	2263	2133	237,6	228,7	242,1	227,8	216,9	113,4	112,5	115,3	106,9	99,8
14	Tambov	2062	1855	1726	1538	1422	177,9	162,0	152,7	137,7	128,6	101,7	90,7	84,9	77,1	71,4
15	Tver	2876	2545	2381	2306	2268	199,2	178,5	169,3	165,8	164,4	81,5	77,4	66,7	56,6	61,8
16	Tula	3781	3582	3075	2814	2745	229,9	220,9	192,2	178,0	175,3	91,1	85,8	80,9	73,0	72,8
17	Yaroslavl	1732	1668	1613	1614	1502	128,2	124,6	121,5	122,3	114,2	53,7	58,1	55,3	55,0	52,2
18	*Moscow city*	9975	9827	9535	8734	8161	96,0	94,4	91,5	83,6	77,9	35,9	34,2	34,5	32,1	30,6
Federal Region: North-West		21364	20029	18824	18247	17592	154,5	145,9	138,1	134,7	130,3	67,8	68,7	66,6	64,3	62,9
19	*Republics:* Karelia	1416	1251	1087	1045	982	199,8	177,9	155,8	150,8	142,2	77,6	80,4	75,4	73,1	66,0
20	Komi	1902	1723	1607	1631	1585	189,1	172,9	163,1	167,3	163,7	79,8	74,4	75,8	85,9	91,7
21	*Oblasts:* Arkhangelsk	1611	1534	1451	1275	1088	122,2	117,6	112,4	99,6	85,5	68,2	70,5	69,5	54,1	46,5
	Nents AO	100	78	68	63	62	239,1	185,9	161,9	150,1	147,6	88,4	69,1	76,2	59,6	42,8
22	Vologda	1248	1245	1241	1244	1260	99,4	100,0	100,5	101,3	103,0	53,8	55,5	59,3	57,1	57,7
23	Kaliningrad	2771	2805	2608	2448	2186	291,8	296,8	277,5	261,2	233,2	133,1	141,0	148,7	144,9	147,0
24	Leningrad	2980	2316	2208	2072	2201	179,5	140,1	134,3	126,5	134,8	74,3	69,8	68,9	64,2	67,8
25	Murmansk	1341	1270	1073	1110	1002	152,4	145,5	124,1	129,5	117,8	82,8	86,7	73,9	76,7	71,0
26	Novgorod	1206	1187	1152	1182	1105	176,7	176,1	173,1	179,7	169,4	85,7	81,6	79,1	75,6	71,1

No	Federal regions (okrugs) and territories (subjects) of the Russian Feredation	TB patients registered by the end of the year										Including MbT+				
		Number of cases					Per 100,000 population					per 100,000 population				
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
27	Pskov	1217	1289	1245	1341	1276	162,8	175,0	171,8	188,0	180,9	64,3	71,9	71,8	76,5	80,3
28	*St. Petersburg city*	5672	5409	5152	4899	4907	122,7	117,6	112,5	107,2	107,4	46,6	47,5	42,9	40,8	37,8
Federal Region: South		52904	51416	54099	52442	50630	243,5	237,2	237,4	230,2	221,7	86,7	84,1	79,0	77,4	75,3
29	*Republics:* Adygea	827	769	726	695	718	185,7	173,0	164,0	157,5	162,7	97,7	100,4	90,1	87,7	89,3
30	Dagestan	6076	5787	5513	4879	4517	233,5	220,7	208,7	183,5	168,1	57,0	50,0	50,2	45,9	44,4
31	Ingushetia	1387	1376	1368	1289	1195	291,6	285,7	280,9	261,6	239,2	56,3	51,3	41,1	40,4	37,8
32	Chechnya	4644	4439	4258	4090	4100			366,2	345,5	339,1			88,5	98,2	106,6
33	Kabardino-Balkaria	1599	1596	1625	1549	1489	177,9	177,9	181,8	173,8	167,1	44,3	49,5	55,0	49,3	48,5
34	Kalmykia	1479	1481	1287	1069	910	508,9	510,9	445,8	372,2	318,7	154,5	149,4	138,6	132,3	143,2
35	Karachaevo-Cherkessia	957	922	928	955	960	219,2	212,2	215,1	222,8	224,6	45,8	38,7	40,6	53,2	52,6
36	North Ossetia - Alania	1824	1701	1644	1638	1563	258,0	241,5	234,1	233,5	222,5	84,2	80,6	86,0	81,8	70,8
37	*Krais:* Krasnodar	9757	9799	9521	9372	9045	191,1	192,1	186,8	183,7	176,6	93,4	94,4	89,9	88,2	86,6
38	Stavropol	5816	5656	5443	5448	5586	213,3	208,1	200,8	201,7	206,5	76,5	65,0	55,0	51,4	49,7
39	*Oblasts:* Astrakhan	2910	2758	2579	2593	2497	290,6	276,3	259,4	260,8	249,5	100,7	98,5	92,1	85,9	80,9
40	Volgograd	7899	7744	7619	7327	6713	295,5	291,7	289,1	279,7	257,3	104,1	102,4	101,6	98,8	89,9
41	Rostov	12373	11827	11588	11538	11337	283,4	272,9	269,3	269,8	266,5	99,8	100,1	86,1	86,6	85,4
Federal Region: Privolzhsky		59014	56928	55538	52485	51314	191,0	185,4	182,0	173,0	169,7	81,8	83,6	83,2	79,4	78,4
42	*Republcis:* Bashkortostan	5446	5303	5224	5152	5007	133,1	130,0	128,6	127,2	123,5	54,6	57,2	57,7	53,3	51,6
43	Mariy-El	754	813	787	833	831	104,4	113,4	110,6	117,9	118,2	77,2	82,0	74,9	76,8	66,4
44	Mordovia	1882	1651	1620	1469	1437	214,8	190,5	189,1	173,3	171,0	66,0	59,0	61,0	52,6	49,1
45	Tatarstan	5738	5458	4845	4158	3897	152,1	144,8	128,8	110,6	103,6	67,3	68,3	65,3	58,4	54,4
46	Udmurtia	3992	3872	3725	3662	3584	255,9	249,4	241,2	238,1	233,8	98,6	106,2	103,2	98,9	96,6
47	Chuvashia	2270	2138	1912	1699	1709	173,9	164,5	148,0	132,1	133,2	94,1	108,8	107,2	101,4	104,9
48	*Oblasts:* Kirov	2381	2476	2489	2443	2362	160,9	169,4	172,5	171,2	167,1	92,1	99,4	105,9	108,4	103,6
49	Nizhni Novgorod	7262	7074	6984	6543	6372	208,7	205,3	204,7	193,5	189,7	84,2	82,1	81,4	78,3	76,6
50	Orenburg	4348	4391	4425	4545	4634	201,1	204,2	207,0	213,8	218,7	85,0	91,5	94,5	92,3	89,9
51	Penza	2518	2068	2250	2179	2182	175,4	145,4	159,8	156,1	157,2	72,4	68,7	64,8	65,7	66,1
52	Perm (Perm Krai)	7153	6806	6695	6315	6259	256,3	245,7	243,6	231,2	230,3	114,3	110,5	105,0	99,1	98,3
	Komi-Permyatsky AO	464	442				345,2	332,8				216,5	192,0			
53	Samara	6258	6172	6089	5733	5568	194,5	192,8	190,9	180,4	175,5	84,8	89,0	89,2	86,5	89,7
54	Saratov	6226	5926	5996	5555	5231	235,5	225,7	229,9	214,0	202,5	89,8	89,7	98,9	94,4	95,1
55	Ulyanovsk	2786	2780	2497	2199	2241	204,2	205,8	186,9	166,4	170,8	83,2	82,4	75,9	72,6	78,6
Federal Region: Urals		30888	30382	29629	28807	28169	250,8	247,4	242,0	235,5	230,1	94,4	93,0	92,2	92,6	91,1
56	*Oblasts:* Kurgan	3081	2976	2900	2989	3140	306,9	300,0	295,9	308,4	326,9	124,7	119,1	115,9	115,5	130,4

No	Federal regions (okrugs) and territories (subjects) of the Russian Feredation	TB patients registered by the end of the year										Including MbT+				
		Number of cases					Per 100,000 population					per 100,000 population				
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
57	Sverdlovsk	11173	11013	11198	11374	11496	251,2	248,7	253,9	258,5	261,5	91,5	91,6	95,3	96,7	98,4
58	Tyumen	10088	9944	9567	8206	7239	306,6	300,7	287,9	245,3	214,6	118,1	111,0	105,2	101,4	91,6
	Khanty-Mansi AO	3622	3471	3429	3177	2922	248,7	236,3	232,0	213,5	194,1	105,3	97,8	95,1	90,4	85,9
	Yamalo-Nents AO	1456	1563	1386	1247	1228	282,7	298,6	261,2	231,5	226,3	98,2	102,0	93,3	84,5	91,6
59	Chelyabinsk	6546	6449	5964	6238	6294	183,2	181,6	168,9	177,4	179,3	67,6	70,7	69,6	72,9	70,8
Federal Region: Siberian		66745	63462	59485	57011	57080	335,4	320,6	302,3	291,0	291,9	136,4	136,9	132,0	126,7	126,0
60	*Republics:* Altai	588	574	545	516	581	289,4	281,5	266,5	251,2	280,5	139,8	147,1	102,2	111,5	129,9
61	Buryatia	3739	3332	2857	2689	2819	383,8	343,8	296,6	280,1	293,7	158,2	169,6	161,9	158,4	168,1
62	Tyva	2558	2174	2026	1990	2088	834,7	706,6	656,7	643,1	670,0	409,5	365,0	341,3	327,4	349,8
63	Khakassia	1985	1862	1770	1691	1676	365,8	344,2	328,9	315,1	312,0	172,5	173,0	182,1	172,4	158,0
64	*Krai: Altai*	9528	8786	8526	8165	8154	368,8	342,5	335,2	323,6	325,1	111,8	112,6	111,9	105,3	108,4
65	Krasnoyarsk	8385	7613	7355	7276	7582	285,0	260,2	253,1	251,4	262,3	117,8	110,8	108,2	106,6	104,5
	Taimyr AO	115	98	78			291,6	248,9	200,1			121,7	106,7	92,3		
	Evenk AO	102	71	70			582,9	407,5	405,1			165,7	109,1	133,1		
66	*Oblasts:* Irkutsk	9305	9286	9134	9398	9452	363,4	364,8	361,5	373,9	376,9	143,9	146,2	144,2	149,5	148,5
	Ust-Ordyn-Buryat AO	669	707	592	605		497,1	527,2	442,3	451,9	0,0	171,7	197,6	156,9	168,1	
67	Kemerovo	9857	9990	8607	7676	7360	343,2	349,9	303,2	271,6	260,7	174,0	176,9	160,0	146,0	140,1
68	Novosibirsk	8405	8044	7189	6880	6829	314,5	302,1	271,3	260,5	259,1	150,1	149,8	138,2	133,2	131,0
69	Omsk	7257	7126	6984	6384	6415	352,5	348,2	343,3	315,2	317,9	94,6	98,9	105,1	94,5	98,1
70	Tomsk	2136	1964	1876	1756	1524	205,2	189,5	181,4	170,0	147,2	126,3	125,7	126,0	116,1	100,4
71	Trans-Baikal Krai (Chita Oblast)	3002	2711	2616	2590	2600	262,4	238,7	231,9	230,8	232,4	72,4	77,7	79,1	78,4	82,8
	Aginsk Buryat AO	285	215	192	189		391,8	292,6	258,6	251,6		94,9	102,1	75,4	70,6	
Federal Region: Far-East		22028	20774	18579	18017	18809	332,0	315,1	283,8	276,8	290,0	128,4	136,6	133,4	130,3	142,0
72	*Republic:* Sakha (Yakutia)	2037	1955	1974	1854	1853	214,7	205,6	207,8	195,2	194,8	89,8	91,8	95,4	88,8	96,7
73	*Krais:* Primorsky	7383	6729	5388	5660	6431	359,9	330,5	266,8	282,2	322,2	140,3	159,8	158,3	164,8	186,3
74	Khabarovsk	4016	3746	3257	3191	3218	281,4	263,8	230,6	227,0	229,2	107,0	111,1	105,1	98,7	112,5
75	*Oblasts:* Amur	4329	4205	4184	3821	3780	484,0	473,8	474,9	436,9	434,7	164,1	174,9	169,3	157,2	158,2
76	Kamchatka Krai	894	831	727	654	702	252,0	236,0	208,2	188,4	203,1	113,0	102,5	95,1	78,4	83,9
	Koryak AO	313	324	327			1285,5	1359,1	1 410,4			492,9	520,2	500,3		
77	Magadan	540	473	362	275	263	302,8	270,8	211,0	163,2	158,6	84,7	75,0	57,7	51,0	59,7
78	Sakhalin	1940	1940	1859	1724	1716	360,5	364,4	353,3	330,8	330,9	137,5	137,9	140,1	131,4	130,6
79	Jewish Autonomous Oblast	767	788	724	741	746	404,2	417,5	388,1	399,1	402,1	228,2	247,9	231,6	252,6	258,7
80	Chukotka Autonomous Okrug	122	107	104	97	100	237,3	211,0	205,8	192,1	199,0	124,5	110,4	112,8	118,8	139,3

Table 10

Prevalence of selected forms of TB in the Russian Federation in 2004–2008
(Form No. 33)

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	PTB patients with pulmonary destruction										Fibrous-cavernous PTB										MDR in registered RTB patients with MbT+ (%)				
		Number of cases					per 100,000 population					Number cases					per 100,000 population									
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Russian Federation		113444	112676	111089	107610	104331	79,7	79,2	77,8	75,7	73,5	36295	35351	34999	33922	32319	25,4	24,8	24,5	23,9	22,8	16,5	18,7	20,3	21,4	23,4
Federal Region: Central		18669	17872	17548	16695	15721	49,7	47,6	47	44,9	42,3	5527	5215	5241	5022	4751	14,6	13,9	14,0	13,5	12,8	17,3	19,3	20,4	20,6	22,8
1	*Oblasts:* Belgorod	653	608	589	498	443	43,2	40,2	39	32,9	29,2	258	237	196	172	121	17,1	15,7	13,0	11,4	8,0	19,3	22,9	26,4	37,8	41,4
2	Bryansk	1286	1306	1375	1411	1395	95,5	97,0	103,3	107,1	106,6	436	406	397	395	391	32,0	30,2	29,8	30,0	29,9	7,7	22,0	26,1	21,0	25,0
3	Vladimir	769	728	762	616	548	51,7	49,0	51,7	42,2	37,8	172	180	160	154	133	11,4	12,1	10,9	10,6	9,2	20,5	27,0	34,8	34,7	36,8
4	Voronezh	1515	1437	1469	1416	1458	64,9	61,6	63,5	61,7	63,9	494	434	464	487	495	21,0	18,6	20,1	21,2	21,7	33,5	32,7	30,1	24,5	27,8
5	Ivanovo	463	430	439	437	416	41,5	38,6	39,9	40,2	38,5	103	95	102	98	7	9,1	8,5	9,3	9,0	0,6	30,9	44,9	43,6	38,5	40,7
6	Kaluga	539	511	416	413	351	52,8	50,0	41	40,9	34,9	213	176	168	163	137	20,7	17,2	16,6	16,2	13,6	13,3	12,3	13,5	18,2	29,4
7	Kostroma	164	156	144	135	142	22,9	21,7	20,3	19,2	20,4	50	48	40	30	27	6,9	6,7	5,6	4,3	3,9	16,3	22,9	31,7	31,9	32,6
8	Kursk	854	779	823	848	804	71,2	65,0	69,5	72,4	69,2	366	349	372	378	373	30,1	29,1	31,4	32,3	32,1	3,7	2,9	2,8	5,8	11,3
9	Lipetsk	500	453	439	435	392	42,0	38,1	37,2	37,1	33,5	187	165	155	147	155	15,6	13,9	13,1	12,5	13,3	23,3	22,6	20,2	15,2	26,2
10	Moscow	3328	3278	3182	3057	2809	50,2	49,4	48	46,0	42,1	870	866	864	859	854	13,1	13,1	13,0	12,9	12,8	19,6	17,0	16,4	19,0	21,6
11	Orel	355	274	257	250	205	42,1	32,5	30,8	30,2	24,9	86	65	52	38	31	10,1	7,7	6,2	4,6	3,8	16,1	19,3	20,4	22,5	28,9
12	Ryazan	830	784	811	814	823	69,5	65,6	68,6	69,4	70,7	309	314	364	347	345	25,6	26,3	30,8	29,6	29,6	10,2	9,5	9,6	16,6	30,6
13	Smolensk	1121	1138	1142	1095	1046	110,0	111,7	113,5	110,2	106,4	224	205	240	237	266	21,7	20,1	23,9	23,9	27,1	6,8	6,6	10,5	8,3	10,2
14	Tambov	905	826	737	684	585	79,1	72,2	65,2	61,2	52,9	287	255	239	201	182	24,8	22,3	21,1	18,0	16,5	16,2	25,7	15,3	21,9	25,0
15	Tver	1085	1052	1124	1049	979	76,1	73,8	79,9	75,4	71,0	223	225	248	221	222	15,4	15,8	17,6	15,9	16,1	7,6	8,1	6,1	2,4	2,4
16	Tula	1112	1079	909	848	793	68,6	66,5	56,8	53,7	50,6	389	401	390	338	313	23,7	24,7	24,4	21,4	20,0	15,7	20,4	22,2	24,6	26,3
17	Yaroslavl	582	604	531	551	524	43,5	45,1	40	41,7	39,8	143	158	147	140	131	10,6	11,8	11,1	10,6	10,0	16,4	10,6	12,0	16,6	17,8
18	*Moscow city*	2608	2429	2399	2138	2008	25,1	23,3	23	20,5	19,2	717	636	643	617	568	6,9	6,1	6,2	5,9	5,4	18,3	19,4	23,0	21,5	23,0
Federal Region: North-West		8370	8495	8111	7887	7422	61,0	61,9	59,5	58,2	55,0	1317	1267	1210	1216	1150	9,5	9,2	8,9	9,0	8,5	24,0	26,5	28,5	33,0	34,1
19	*Republics:* Karelia	473	473	457	449	404	67,3	67,3	65,5	64,8	58,5	103	95	89	83	79	14,5	13,5	12,8	12,0	11,4	17,7	23,0	25,4	30,8	35,2
20	Komi	774	783	727	767	804	77,7	78,6	73,8	78,7	83,0	95	101	87	118	116	9,4	10,1	8,8	12,1	12,0	20,8	28,1	26,2	31,8	33,0
21	*Oblasts:* Arkhangelsk	911	872	858	670	602	69,8	66,8	66,4	52,3	47,3	96	88	74	44	42	7,3	6,7	5,7	3,4	3,3	45,6	52,7	48,3	47,7	44,6
	Nents AO	38	29	29	23	16	90,6	69,1	69,1	54,8	38,1	9	7	8	9	8	21,5	16,7	19,1	21,4	19,0	37,8	51,7	40,6	56,0	66,7
22	Vologda	560	606	617	624	656	45,0	48,7	49,9	50,8	53,6	79	82	75	78	83	6,3	6,6	6,1	6,4	6,8	17,2	20,3	0,0	21,6	23,4
23	Kaliningrad	925	860	904	912	731	97,9	91,0	96,2	97,3	78,0	168	151	243	257	227	17,7	16,0	25,9	27,4	24,2	5,8	19,4	22,6	24,5	24,1
24	Leningrad	1172	1232	1136	1101	1132	70,9	74,5	69,1	67,2	69,3	219	166	146	132	150	13,2	10,0	8,9	8,1	9,2	17,5	19,6	24,8	31,2	30,3
25	Murmansk	378	431	391	446	336	43,3	49,4	45,2	52,0	39,5	104	123	93	81	72	11,8	14,1	10,8	9,5	8,5	38,4	38,6	39,9	40,4	44,3
26	Novgorod	461	435	410	382	345	68,4	64,5	61,6	58,1	52,9	38	41	35	39	44	5,6	6,1	5,3	5,9	6,7	33,0	29,7	43,2	40,7	45,0
27	Pskov	477	526	518	546	576	64,7	71,4	71,5	76,5	81,7	86	81	75	88	85	11,5	11,0	10,4	12,3	12,1	25,5	22,5	29,9	35,2	43,6

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	PTB patients with pulmonary destruction										Fibrous-cavernous PTB										MDR in registered RTB patients with MbT+ (%)				
		Number of cases					per 100,000 population					Number cases					per 100,000 population									
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
28	*St. Petersburg city*	2239	2277	2093	1990	1836	48,7	49,5	45,7	43,5	40,2	329	339	293	296	252	7,1	7,4	6,4	6,5	5,5	26,8	21,9	30,1	34,8	36,2
Federal Region: South		20923	20748	21170	21007	19700	96,5	95,7	92,9	92,2	86,3	8046	7865	8029	7939	6896	37,0	36,3	35,2	34,9	30,2	10,3	10,0	11,3	13,7	16,5
29	*Republics:* Adygea	398	385	365	354	300	89,6	86,6	82,4	80,2	68,0	134	132	118	128	125	30,1	29,7	26,7	29,0	28,3	7,8	7,0	7,2	6,3	8,4
30	Dagestan	2896	2824	2745	2461	2326	110,5	107,7	103,9	92,6	86,5	1461	1343	1179	1063	902	56,1	51,2	44,6	40,0	33,6	9,4	6,6	4,9	8,3	10,8
31	Ingushetia	279	320	307	257	242	57,9	66,5	63	52,2	48,4	165	167	151	137	127	34,7	34,7	31,0	27,8	25,4	2,6	8,1	16,5	24,6	24,9
32	Chechnya			1138	1478	1613			97,9	124,9	133,4	523	323	418	441	452			35,9	37,3	37,4					0,0
33	Kabardino-Balkaria	563	698	876	688	630	62,8	77,8	98	77,2	70,7	342	375	324	321	301	38,0	41,8	36,2	36,0	33,8	0,0	0,0	0,0	0,0	0,0
34	Kalmykia	539	455	434	394	344	185,9	157,0	150,3	137,2	120,5	237	242	244	220	175	81,5	83,5	84,5	76,6	61,3	24,8	0,0	23,8	21,5	24,2
35	Karachaevo-Cherkessia	235	231	231	266	257	54,1	53,2	53,5	62,0	60,1	102	85	81	117	107	23,4	19,6	18,8	27,3	25,0	12,6	9,6	12,7	12,7	14,0
36	North Ossetia - Alania	622	669	637	349	0	88,3	95,0	90,7	49,8	0,0	303	325	362	336	0	42,9	46,1	51,5	47,9	0,0	10,4	0,0	1,5	9,4	16,1
37	*Krais:* Krasnodar	5233	5189	5206	5453	4946	102,6	101,7	102,1	106,9	96,6	2298	2283	2327	2474	2427	45,0	44,8	45,7	48,5	47,4	16,3	17,1	18,2	21,3	23,6
38	Stavropol	1786	1637	1515	1518	1482	65,7	60,2	55,9	56,2	54,8	481	448	414	400	108	17,6	16,5	15,3	14,8	4,0	11,3	10,8	16,9	19,0	18,1
39	*Oblasts:* Astrakhan	1056	1002	916	928	870	105,8	100,4	92,1	93,3	86,9	471	449	440	412	358	47,0	45,0	44,3	41,4	35,8	4,1	9,8	13,0	16,9	20,1
40	Volgograd	3065	3108	3187	3238	3124	115,4	117,1	120,9	123,6	119,8	949	957	967	1007	1025	35,5	36,0	36,7	38,4	39,3	9,6	9,4	10,4	13,4	15,8
41	Rostov	4251	4230	3613	3623	3566	98,1	97,6	84	84,7	83,8	1103	1059	1004	883	789	25,3	24,4	23,3	20,7	18,5	5,3	6,8	7,9	9,7	16,3
Federal Region: Privolzhsky		21741	21572	21356	19944	19684	70,8	70,2	70	65,7	65,1	6326	5928	5711	5474	5313	20,5	19,3	18,7	18,0	17,6	19,4	19,8	22,4	24,3	27,2
42	*Republcis:* Bashkortostan	2021	2049	2049	1918	1885	49,5	50,2	50,4	47,3	46,5	883	828	803	802	776	21,6	20,3	19,8	19,8	19,1	24,8	25,0	24,3	25,6	22,6
43	Mariy-El	313	293	300	311	269	43,7	40,9	42,2	44,0	38,3	71	67	61	52	49	9,8	9,3	8,6	7,4	7,0	30,0	30,3	33,0	36,9	38,4
44	Mordovia	685	568	601	508	453	79,0	65,5	70,1	59,9	53,9	258	225	167	166	142	29,4	26,0	19,5	19,6	16,9	11,1	13,2	14,9	16,6	24,5
45	Tatarstan	2002	1952	1924	1616	1548	53,1	51,8	51,1	43,0	41,1	525	446	452	392	360	13,9	11,8	12,0	10,4	9,6	17,0	15,2	15,9	17,3	17,7
46	Udmurtia	1317	1386	1284	1254	1192	84,8	89,3	83,1	81,5	77,8	236	291	283	286	275	15,1	18,7	18,3	18,6	17,9	12,0	13,7	15,1	16,7	20,2
47	Chuvashia	1086	1096	1035	971	900	83,6	84,4	80,1	75,5	70,2	183	168	159	164	163	14,0	12,9	12,3	12,8	12,7	3,4	9,1	23,1	32,4	30,4
48	*Oblasts:* Kirov	734	830	766	698	733	50,2	56,8	53,1	48,9	51,9	99	95	96	104	116	6,7	6,5	6,7	7,3	8,2	22,6	22,6	22,1	23,0	24,8
49	Nizhni Novgorod	2997	2937	2831	2723	2594	87,0	85,2	83	80,5	77,2	1091	981	956	964	947	31,4	28,5	28,0	28,5	28,2	29,4	28,4	29,3	26,3	35,0
50	Orenburg	1837	1972	2065	1921	1985	85,4	91,7	96,6	90,4	93,7	261	273	254	250	251	12,1	12,7	11,9	11,8	11,8	28,6	19,0	18,5	22,6	25,8
51	Penza	885	801	812	712	728	62,2	56,3	57,7	51,0	52,4	245	221	241	207	201	17,1	15,5	17,1	14,8	14,5	16,3	10,8	16,1	16,1	28,2
52	Perm (Perm Krai)	2714	2573	2578	2459	2450	98,0	92,9	93,8	90,0	90,1	940	827	800	731	720	33,7	29,9	29,1	26,8	26,5	20,6	23,1	22,3	28,3	31,9
	Komi-Permyatsky AO	218	218				164,1	164,1				70	50				52,1	37,6				12,8	22,0			
53	Samara	2064	2246	2321	2272	2357	64,5	70,2	72,8	71,5	74,3	723	716	702	660	637	22,5	22,4	22,0	20,8	20,1	9,5	16,7	27,7	27,1	30,1
54	Saratov	2029	1806	1820	1676	1656	77,3	68,8	69,8	64,6	64,1	555	534	491	464	435	21,0	20,3	18,8	17,9	16,8	19,0	19,8	21,1	23,3	26,0
55	Ulyanovsk	1057	1063	970	905	934	78,3	78,7	72,6	68,5	71,2	256	256	246	232	241	18,8	19,0	18,4	17,6	18,4	20,7	21,7	26,5	25,7	25,1
Federal Region: Urals		9557	9628	9403	9417	8984	77,8	78,4	76,8	77,0	73,4	2989	3055	3077	2845	3104	24,3	24,9	25,1	23,3	25,4	10,9	10,8	13,0	14,4	17,0
56	*Oblasts:* Kurgan	892	946	1017	1051	956	89,9	95,4	103,8	108,4	99,5	411	484	442	449	466	40,9	48,8	45,1	46,3	48,5	7,6	7,7	8,1	7,2	7,7
57	Sverdlovsk	3265	3227	3215	3300	3272	73,7	72,9	72,9	75,0	74,4	947	967	1042	1020	1099	21,3	21,8	23,6	23,2	25,0	9,9	9,9	11,3	12,6	14,5

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	PTB patients with pulmonary destruction										Fibrous-cavernous PTB										MDR in registered RTB patients with MbT+ (%)				
		Number of cases					per 100,000 population					Number cases					per 100,000 population									
		2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
58	Tyumen	3371	3331	3091	2967	2645	101,9	100,7	93	88,7	78,4	1030	1017	987	795	1010	31,3	30,7	29,7	23,8	29,9	13,0	12,6	16,9	21,1	27,0
	Khanty-Mansi AO	1177	1202	1096	1039	978	80,1	81,8	74,1	69,8	65,0	333	309	270	226	194	22,9	21,0	18,3	15,2	12,9	16,4	14,9	18,2	21,4	27,0
	Yamalo-Nents AO	453	476	424	394	400	86,6	90,9	79,9	73,2	73,7	98	117	135	137	135	19,0	22,4	25,4	25,4	24,9	15,5	9,3	22,5	25,1	31,5
59	Chelyabinsk	2029	2124	2080	2099	2111	57,1	59,8	58,9	59,7	60,1	601	587	606	581	529	16,8	16,5	17,2	16,5	15,1	10,9	11,1	12,8	11,5	13,3
Federal Region: Siberian		26238	26099	25384	24519	24074	132,6	131,9	129	125,2	123,1	9072	8951	8722	8390	8125	45,6	45,2	44,3	42,8	41,6	18,3	23,4	25,8	25,4	27,0
60	*Republics:* Altai	174	213	214	176	185	85,3	104,5	104,7	85,7	89,3	111	117	108	101	103	54,6	57,4	52,8	49,2	49,7	28,5	25,1	20,1	44,3	44,6
61	Buryatia	1737	1749	1737	1683	1682	179,2	180,5	180,3	175,3	175,2	392	488	527	517	471	40,2	50,4	54,7	53,9	49,1	4,9	8,8	11,7	11,5	14,4
62	Tyva	925	924	867	825	840	300,7	300,3	281	266,6	269,6	430	401	427	407	435	140,3	130,3	138,4	131,5	139,6	42,9	52,7	58,3	27,9	43,6
63	Khakassia	722	793	843	830	712	133,5	146,6	156,6	154,7	132,5	270	220	121	152	123	49,8	40,7	22,5	28,3	22,9	15,5	24,8	32,2	34,9	41,4
64	*Krai: Altai*	4177	4005	3979	3703	3443	162,8	156,1	156,5	146,8	137,3	1447	1283	1169	1058	939	56,0	50,0	46,0	41,9	37,4	8,7	15,1	13,2	13,0	11,1
65	Krasnoyarsk	3622	3315	3271	3276	3296	123,8	113,3	112,6	113,2	114,0	975	874	849	809	775	33,1	29,9	29,2	28,0	26,8	15,5	21,8	25,2	26,8	27,9
	Taimyr AO	27	35	21			68,6	88,9	53,9			8	7	10			20,3	17,8	25,6			81,3	31,0	22,2		
	Evenk AO	48	37	44			275,5	212,4	254,7			13	10	9			74,3	57,4	52,1			93,0	36,8	60,9		
66	*Oblasts:* Irkutsk	4095	4129	4112	4259	4377	160,9	162,2	162,7	169,4	174,5	1512	1631	1594	1690	1756	59,0	64,1	63,1	67,2	70,0	5,5	7,8	8,3	10,6	11,8
	Ust-Ordyn-Buryat AO	261	306	314	283		194,6	228,2	234,6	211,4	0,0	90	96	88	82		66,9	71,6	65,7	61,3		5,7	2,6	4,8	4,9	
67	Kemerovo	3966	4005	3609	3298	3080	138,9	140,3	127,1	116,7	109,1	1510	1427	1495	1310	1187	52,6	50,0	52,7	46,4	42,0	23,5	25,8	30,2	36,7	36,5
68	Novosibirsk	3367	3362	3016	2984	2845	126,5	126,3	113,8	113,0	107,9	1031	1015	923	925	893	38,6	38,1	34,8	35,0	33,9	23,7	28,8	30,6	30,5	36,3
69	Omsk	1869	1958	2156	2017	2145	91,3	95,7	106	99,6	106,3	928	1041	1083	1030	1024	45,1	50,9	53,2	50,8	50,7	22,6	31,0	36,6	30,6	30,6
70	Tomsk	690	779	735	608	531	66,6	75,2	71,1	58,9	51,3	111	103	102	78	79	10,7	9,9	9,9	7,6	7,6	29,2	43,7	45,9	44,0	41,9
71	Trans-Baikal Krai (Chita Oblast)	894	867	845	860	938	78,7	76,3	74,9	76,6	83,8	355	351	324	313	340	31,0	30,9	28,7	27,9	30,4	21,1	23,3	22,3	16,5	16,5
	Aginsk Buryat AO	69	54	49	42		93,9	73,5	66	55,9	0,0	25	31	31	28		34,4	42,2	41,8	37,3		5,9	13,3	17,9	30,2	
Federal Region: Far-East		7945	8261	8117	8140	8745	120,5	125,3	124	125,1	134,8	3017	3069	3009	3035	2980	45,5	46,5	46,0	46,6	45,9	13,9	19,8	17,0	17,5	16,3
72	*Republic:* Sakha (Yakutia)	556	568	571	589	598	58,5	59,7	60,1	62,0	62,9	126	99	101	109	111	13,3	10,4	10,6	11,5	11,7	22,9	21,9	23,2	34,6	36,7
73	*Krais:* Primorsky	2783	2913	2992	3060	3442	136,7	143,1	148,2	152,5	172,5	1221	1243	1290	1328	1330	59,5	61,1	63,9	66,2	66,6	13,6	14,6	18,0	16,4	13,2
74	Khabarovsk	1342	1382	1304	1352	1442	94,5	97,3	92,3	96,2	102,7	455	427	401	402	409	31,9	30,1	28,4	28,6	29,1	5,1	34,3	9,8	10,9	12,3
75	*Oblasts:*	1692	1755	1776	1691	1732	190,6	197,7	201,6	193,3	199,2	687	714	655	668	568	76,8	80,4	74,3	76,4	65,3	17,1	19,3	22,7	20,7	17,8
76	Kamchatka Krai	354	330	327	335	376	100,5	93,7	93,6	96,5	108,8	136	156	152	140	160	38,3	44,3	43,5	40,3	46,3	0,0	4,7	6,6	3,7	1,7
	Koryak AO	108	143	116			453,0	599,9	500,3			34	35	44			139,6	146,8	189,8			0,0	0,0	0,0		
77	Magadan	131	147	112	94	98	75,0	84,2	65,3	55,8	59,1	17	30	25	27	32	9,5	17,2	14,6	16,0	19,3	23,0	32,1	19,2	26,7	30,6
78	Sakhalin	765	807	714	669	694	143,7	151,6	135,7	128,4	133,8	248	285	258	230	241	46,1	53,5	49,0	44,1	46,5	17,7	18,5	18,1	19,7	19,0
79	Jewish Autonomous Oblast	274	312	268	298	300	145,2	165,3	143,7	160,5	161,7	106	94	97	102	100	55,9	49,8	52,0	54,9	53,9	18,5	6,8	3,7	4,9	9,4
80	Chukotka AO	48	47	53	52	63	94,7	92,7	104,9	103,0	125,3	21	21	30	29	29	40,8	41,4	59,4	57,4	57,7	41,3	92,9	50,0	43,3	31,4

Table 11

TB treatment effectiveness in the Russian Federation in 2004–2008

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Indicators of treatment effectiveness based on dispensary follow-up data										Effectiveness of chemotherapy courses in TB control facilities in the subjects of the Russian Federation (MOH&SD report) in cohorts of new ss+ PTB patients																
												2006								2007								
												Number	%							Number	%							
		Clinical cure of RTB patients																										
		%				DFG IA (new cases) %		Bacteriological conversion in RTB patients (taking off MbT+ register) %				Cohort size	Successful treatment outcome	Failure	Died			Default	Transferred out	Cohort size	Successful treatment outcome	Failure	Died from			Default	Transferred out
															from TB	from other causes	Total						TB	Other causes	Total		
		2005	2006	2007	2008	2007	2008	2005	2006	2007	2008																	
Russian Federation		28,7	30,3	31,6	31,9	47,9	46,8	30,6	33,4	35,1	35,9	25775	58,2	14,5	9,2	3,9	13,1	10,1	4,1	29851	57,8	15,5	8,8	3,9	12,7	10,0	4,0
Federal Region: Central		29,6	30,1	33,9	35,7	48,9	52,3	36,3	37,9	39,9	41,7	5052	58,5	12,9	9,0	4,7	13,7	9,0	5,9	5900	59,7	14,4	7,6	3,3	10,9	9,2	5,7
1	*Oblasts:* Belgorod	58,4	51,7	71,9	63,4	86,4	76,5	51,7	48,7	60,8	59,3	261	71,0	11,6	4,7	5,1	9,8	4,3	3,3	277	78,3	7,2	5,1	4,3	9,4	3,2	1,8
2	Bryansk	25,7	17,4	29,3	27,6	49,6	45,9	44,4	42,7	43,3	47,3	356	39,7	18,7	7,0	6,7	13,7	25,4	2,6	401	44,4	16,2	8,0	1,7	9,7	29,2	0,5
3	Vladimir	38,9	33,8	38,3	43,2	57,8	68,0	38,6	37,6	46,4	44,6	431	69,0	9,5	10,9	2,5	13,4	5,6	2,2	314	69,7	9,2	9,2	1,6	10,8	5,1	5,1
4	Voronezh	35,3	34,8	33,3	44,0	48,4	65,6	32,9	35,1	35,4	42,8	338	62,2	12,3	5,9	4,4	10,3	9,4	5,9	342	66,4	11,7	6,1	5,0	11,1	6,4	4,4
5	Ivanovo	37,9	55,6	50,4	41,8	67,4	57,4	48,8	46,6	52,7	51,2	280	70,8	13,6	7,4	3,1	10,5	3,5	1,6	216	74,1	10,2	7,9	1,9	9,8	4,2	1,9
6	Kaluga	45,9	36,5	43,0	33,4			40,8	47,8	39,2	48,9	293	62,9	12,9	11,3	5,6	16,9	4,0	3,2	230	63,5	13,9	7,8	3,5	11,3	8,3	3,0
7	Kostroma	45,6	58,5	45,4	46,9	65,6	64,9	42,3	55,0	55,1	52,8	74	43,7	12,6	10,3	6,9	17,2	25,3	1,1	80	48,8	12,5	13,8	3,8	17,6	20,0	1,3
8	Kursk	21,8	25,6	23,4	26,2	35,5	45,4	28,9	33,3	35,6	35,5	240	57,0	12,3	11,0	6,6	17,5	9,6	3,5	261	64,8	10,3	5,7	4,2	9,9	12,3	2,7
9	Lipetsk	43,1	36,3	43,2	37,7	61,4	61,7	42,8	48,4	50,8	48,9	171	63,9	3,2	14,2	6,5	20,6	7,1	5,2	170	70,6	9,4	8,8	3,5	12,3	4,1	3,5
10	Moscow	18,8	20,8	25,7	28,4	30,4	35,4	25,0	31,1	30,9	32,1	607	55,0	15,1	13,5	5,5	19,0	5,5	5,4	797	58,6	15,7	10,8	5,4	16,2	4,6	4,9
11	Orel	49,6	42,8	43,6	50,0	46,0	53,9	89,7	87,8	103,9	109,0	265	75,7	9,4	7,5	3,1	10,6	3,9	0,4	205	81,5	10,7	4,9	2,4	7,3	0,5	-
12	Ryazan	30,8	38,6	29,0	36,2	43,0	48,8	30,7	28,6	18,2	28,5	146	43,2	21,2	6,3	7,2	13,5	19,8	2,3	248	35,5	32,7	6,0	3,2	9,2	18,5	4,0
13	Smolensk	26,7	18,6	25,9	28,1	35,2	40,1	24,9	22,6	23,5	22,3	150	55,1	13,3	11,7	5,6	17,3	7,7	6,6	140	50,0	12,1	16,4	2,9	19,3	16,4	2,1
14	Tambov	36,3	31,7	40,1	43,7	57,3	60,0	37,7	33,6	42,1	40,6	255	62,8	8,5	9,8	6,8	16,7	8,1	3,8	241	65,1	10,8	9,5	4,6	14,1	5,0	5,0
15	Tver	33,6	34,0	32,6	31,3	43,2	43,8	35,0	42,5	42,9	33,0	188	56,1	9,0	17,4	8,4	25,8	7,4	1,6	313	60,1	10,2	9,6	4,2	13,8	10,5	5,4
16	Tula	27,8	35,0	34,1	33,2	44,9	47,1	37,9	41,5	45,3	43,3	270	56,1	11,3	9,0	1,7	10,7	18,5	3,5	332	47,6	17,8	11,4	2,1	13,5	17,5	3,6
17	Yaroslavl	25,8	29,0	32,3	30,5			23,5	29,0	29,1	29,0	168	36,4	24,3	8,6	5,7	14,3	20,7	4,3	195	41,0	32,8	5,1	2,6	7,7	16,9	1,5
18	*Moscow city*	25,6	30,5	37,1	41,2	47,1	49,5	36,1	36,8	41,0	47,0	363	68,6	12,8	4,2	3,8	8,0	8,1	2,4	1138	59,1	14,3	3,7	2,5	6,2	4,7	15,7
Federal Region: North-West												196	40,7	12,6	6,3	1,2	7,4	0,2	39,1							
19	*Republics:* Karelia	30,5	31,8	32,0	33,8	42,0	44,0	29,4	33,6	37,1	36,8	2090	54,3	18,0	11,8	3,9	15,7	9,4	2,2	2376	55,0	18,5	11,3	4,2	15,5	8,6	2,4
20	Komi	28,7	36,2	30,1	28,5	36,2	34,2	26,3	34,8	33,8	33,5	177	58,2	5,9	13,5	7,1	20,6	10,0	5,3	165	44,2	20,6	15,2	6,7	21,9	10,9	2,4

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Indicators of treatment effectiveness based on dispensary follow-up data										Effectiveness of chemotherapy courses in TB control facilities in the subjects of the Russian Federation (MOH&SD report) in cohorts of new ss+ PTB patients															
												2006								2007							
												Number	%							Number	%						
		Clinical cure of RTB patients						Bacteriological conversion in RTB patients (taking off MbT+ register) %																			
		%				DFG IA (new cases) %									Died							Died from					
												Cohort size	Successful treatment outcome	Treatment failure	from TB	from other causes	Total	Interrupted treatment	Transferred out	Cohort size	Successful treatment outcome	Treatment failure	TB	Other causes	Total	Interrupted treatment	Transferred out
		2005	2006	2007	2008	2007	2007	2005	2006	2007	2008																
21	*Oblasts:* Arkhangelsk	26,6	28,7	32,8	33,9	41,5	43,6	31,7	27,3	34,9	32,6	278	68,9	12,1	7,0	2,2	9,2	6,6	3,3	309	52,8	14,9	11,7	4,5	16,2	9,7	6,5
	Nents AO	37,8	37,1	46,5	53,4	62,1	70,9	30,3	35,4	58,5	54,0	254	48,2	27,3	12,9	2,5	15,5	7,6	1,4	249	43,0	31,3	11,2	2,8	14,0	10,0	1,6
22	Vologda	31,8	45,4	40,6	37,7	55,0	44,2	36,4	55,7	84,2	74,4	6	61,6	6,3	20,8	5,0	25,8	6,3	0,0	9	77,8	11,1	11,1		11,1		
23	Kaliningrad	28,2	30,6	30,8	30,0	37,0	34,6	23,1	20,6	26,5	24,8	161	45,9	27,8	10,5	6,0	16,5	9,2	0,5	155	61,3	6,5	13,5	3,2	16,7	13,5	1,9
24	Leningrad	20,2	33,5	35,5	38,4	43,9	46,9	17,1	21,6	27,9	26,4	347	52,3	16,5	12,8	4,9	17,7	13,2	0,4	361	51,0	30,7	6,4	5,3	11,7	4,7	1,9
25	Murmansk	49,8	40,7	39,1	37,5	57,3	53,9	40,4	43,7	43,4	42,6	303	25,7	33,3	12,5	0,7	13,2	22,2	5,6	206	56,8	11,7	15,0	5,3	20,3	9,7	1,5
26	Novgorod	21,1	24,9	18,2	26,0	25,9	36,5	13,6	27,9	16,4	22,0	150	69,8	13,7	8,8	1,6	10,4	3,8	2,2	150	32,7	26,7	14,0	3,3	17,3	21,3	2,0
27	Pskov	27,3	25,6	25,6	37,0	34,6	45,0	43,9	43,8	48,0	53,6	176	56,7	10,9	12,2	4,2	16,4	9,7	3,4	147	66,0	12,9	15,6		15,6	5,4	
28	*St. Petersburg city*	24,0	30,2	26,4	31,8	37,8	45,0	40,6	47,1	49,2	47,6	238	72,4	13,7	7,3	2,1	9,3	3,0	1,6	207	55,1	17,4	11,6	4,8	16,4	9,7	1,4
	Federal Region: South	30,6	29,1	29,6	28,7	37,6	37,3	31,4	37,3	37,4	39,7		66,4	14,5	4,1	2,5	6,6	8,0	4,4	418	72,0	9,8	8,6	4,3	12,9	3,1	2,2
29	*Republics:* Adygea	25,5	26,4	26,8	27,6	36,0	37,8	30,8	34,3	34,1	35,9	3257	66,4	14,5	4,1	2,5	6,6	8,0	4,4	4666	63,7	15,6	4,9	3,3	8,2	8,4	4,2
30	Dagestan	35,7	34,5	38,7	31,9	51,2	43,3	28,6	30,0	29,8	23,5	160	69,6	10,1	7,4	2,7	10,1	7,4	2,7	190	54,7	18,9	7,9	1,6	9,5	9,5	7,4
31	Ingushetia	29,2	28,0	35,1	33,6	45,6	37,0	38,4	31,9	46,2	56,5	491	71,1	20,6	2,8	0,4	3,2	3,4	1,7	621	75,5	11,8	3,9	1,6	5,5	4,0	3,2
32	Chechnya	14,2	10,3	16,1	15,5	24,0	43,6	52,4	50,6	40,1	39,7	122	70,2	9,5	3,6	6,0	9,5	3,6	7,1	102	68,6	12,7	2,0	4,9	6,9	3,9	7,8
33	Kabardino-Balkaria	18,5	19,6	17,7	18,1	27,7	30,1	24,0	35,6	13,2	16,3	222	72,8	7,1	5,9	1,8	7,7	6,5	5,9	353	72,5	8,5	4,8	1,7	6,5	8,5	4,0
34	Kalmykia	24,2	20,7	21,4	20,2	27,4	29,6	12,6	22,0	42,6	26,4	98	44,6	29,3	0,5	2,7	3,3	20,1	2,7	187	56,1	20,9	2,7	3,2	5,9	15,5	1,6
35	Karachaevo-Cherkessia	24,1	41,2	47,6	50,7	74,7	79,5	27,8	42,6	46,4	40,5	27	51,4	34,3	0,0	0,0	0,0	8,6	5,7	74	60,8	16,2	4,1		4,1	16,2	2,7
36	North Ossetia - Alania	18,3	16,3	12,7	15,5	19,0	23,6	49,3	40,1	32,4	37,9	16	42,9	21,4	14,3	0,0	14,3	7,1	14,3	33	33,3	54,5		6,1	6,1		6,1
37	*Krais:* Krasnodar	29,8	21,3	21,4	23,7	30,3	34,8	30,2	26,4	28,0	34,1	171	70,9	11,7	3,0	1,3	4,3	7,4	5,7	146	71,2	9,6	4,8	4,8	9,6	5,5	4,1
38	Stavropol	24,6	25,3	29,7	31,7	43,9	47,9	23,7	26,5	29,0	32,0	376	54,1	20,6	2,8	4,3	7,1	14,1	4,1	887	52,5	21,4	4,3	4,5	8,8	13,8	3,5
39	*Oblasts:* Astrakhan	19,6	24,0	20,7	21,2	26,5	26,6	34,2	38,9	36,1	39,9	350	70,6	4,5	4,3	4,3	8,5	11,6	4,8	470	55,7	14,7	5,7	4,0	9,7	13,4	6,4
40	Volgograd	31,2	34,8	33,2	37,4	51,5	58,1	32,6	36,1	39,8	39,2	241	70,9	11,7	3,0	1,3	4,3	7,4	5,7	249	72,7	9,6	3,2	2,8	6,0	7,2	4,4
41	Rostov	24,6	25,5	27,1	31,5	39,2	48,9	30,6	30,0	36,5	42,3	242	68,4	11,6	5,1	2,5	7,6	6,5	5,9	636	73,4	8,8	6,4	4,7	11,1	3,3	3,3
	Federal Region: Privolzhsky	27,2	25,6	25,7	24,7	28,0	26,7	34,5	40,9	37,6	35,6	741	69,5	15,1	5,3	2,0	7,3	4,0	4,1	718	59,9	21,6	5,7	2,4	8,1	5,6	4,9
42	*Republcis:* Bashkortostan	29,3	30,0	32,4	32,9	45,1	45,8	28,4	31,6	34,9	36,0	4620	63,6	12,2	8,6	3,6	12,3	9,1	2,7	5407	62,5	11,4	9,3	5,2	14,5	8,7	2,9
43	Mariy-El	39,5	38,6	39,7	44,7	56,6	62,5	34,8	35,8	37,9	38,7	585	69,5	10,3	9,4	2,7	12,2	6,7	1,5	475	62,3	14,7	10,3	5,9	16,2	5,9	0,8
44	Mordovia	44,1	51,4	54,0	57,5	68,9	68,6	44,9	57,7	58,7	68,3	184	71,3	9,6	8,1	3,8	12,0	6,2	1,0	220	70,9	10,9	8,6	1,8	10,4	6,4	1,4

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Indicators of treatment effectiveness based on dispensary follow-up data										Effectiveness of chemotherapy courses in TB control facilities in the subjects of the Russian Federation (MOH&SD report) in cohorts of new ss+ PTB patients																
												2006								2007								
												Number	%							Number	%							
		Clinical cure of RTB patients						Bacteriological conversion in RTB patients (taking off MbT+ register) %																					
		%				DFG IA (new cases) %									Died									Died from				
		2005	2006	2007	2008	2007	2007	2005	2006	2007	2008	Cohort size	Successful treatment outcome	Treatment failure	from TB	from other causes	Total	Interrupted treatment	Transferred out	Cohort size	Successful treatment outcome	Treatment failure	TB	Other causes	Total	Interrupted treatment	Transferred out
45	Tatarstan	36,3	29,4	38,5	33,8	53,6	48,2	42,2	42,2	51,1	54,9	212	82,1	0,6	8,6	4,3	13,0	3,1	1,2	126	77,0	4,0	6,3	5,6	11,9	4,8	2,4
46	Udmurtia	34,8	42,0	49,6	46,8	70,8	68,2	28,7	32,5	42,1	40,2	502	60,2	8,8	11,1	5,9	17,0	10,4	3,8	512	64,8	6,8	9,8	2,9	12,7	9,2	6,4
47	Chuvashia	20,3	23,0	20,1	23,4	28,8	30,2	18,9	26,8	26,2	28,8	213	60,6	11,3	12,5	3,7	16,2	8,3	3,7	342	53,5	9,9	17,0	7,0	24,0	9,4	3,2
48	*Oblasts:* Kirov	33,5	47,6	55,9	49,7	67,5	67,8	21,9	41,0	49,7	44,0	511	63,3	18,0	6,5	4,1	10,6	6,5	1,5	454	66,1	19,8	4,4	3,7	8,1	4,8	1,1
49	Nizhni Novgorod	21,8	22,5	22,0	27,7	26,3	33,9	21,7	18,7	23,7	29,6	297	65,0	7,1	4,4	1,0	5,4	20,2	2,4	190	65,3	16,8	6,3	2,6	8,9	5,8	3,2
50	Orenburg	21,1	20,5	21,7	21,2	35,3	32,5	24,7	27,5	29,0	32,5	653	42,2	19,8	10,6	5,0	15,6	17,8	2,7	614	51,5	15,3	9,8	5,7	15,5	14,7	3,1
51	Penza	34,4	35,9	30,9	33,3	43,7	46,5	34,3	36,6	39,7	42,5	59,946	66,5	5,3	9,3	6,4	15,7	7,5	5,0	329	62,3	8,5	7,0	8,5	15,5	9,7	4,0
52	Perm (Perm Krai)	48,9	27,3	32,4	30,3	44,3	42,4	46,8	46,7	45,4	49,9	306	63,2	15,0	7,9	2,9	10,7	8,9	2,1	279	74,9	10,4	6,8	2,2	9,0	5,4	0,4
	Komi-Permyatsky AO	26,5	27,4	30,5	31,3	38,3	40,6	31,6	33,6	38,4	38,9	770	81,4	7,4	4,4	1,2	5,6	1,2	4,4	733	72,2	1,4	10,0	6,1	16,1	5,7	4,6
53	Samara	27,9	27,1	33,4	34,6	41,0	43,6	30,5	30,0	32,2	33,3	495	62,8	11,8	12,0	4,2	16,2	6,4	2,8	479	58,7	13,4	11,1	6,1	17,2	8,1	2,7
54	Saratov	26,6	23,1	25,7	27,9	34,8	37,5	17,2	17,5	20,8	21,1	375	54,8	18,5	6,5	3,7	10,2	14,8	1,8	376	53,7	13,0	9,0	6,6	15,6	14,6	2,9
55	Ulyanovsk	20,0	35,4	39,3	29,3	55,1	43,1	22,7	33,4	32,1	26,1	380	46,1	24,4	11,0	3,5	14,6	13,8	1,2	278	53,6	18,7	9,4	4,7	14,1	12,6	1,1
	Federal Region: Urals	26,7	28,8	30,8	31,4	70,3	48,7	30,6	31,9	33,6	37,1	1528	59,2	13,0	10,2	4,1	14,3	8,5	5,1	2649	56,6	15,9	10,3	4,3	14,6	8,6	4,3
56	*Oblasts:* Kurgan	29,0	32,0	27,4	25,2	33,7	31,7	35,0	29,6	35,2	27,4	137	70,1	14,1	6,7	1,4	8,1	3,5	4,2	286	59,8	11,5	11,9	3,8	15,7	10,5	2,4
57	Sverdlovsk	23,6	24,0	25,5	26,9	65,5	36,0	33,2	33,3	36,3	37,4	1094	59,7	13,2	12,2	5,0	17,2	6,0	3,9	1055	58,8	15,3	10,6	4,7	15,3	6,7	3,9
58	Tyumen	28,2	30,0	40,6	42,5	90,3	76,3	24,7	28,6	30,3	40,4	231	68,0	9,5	6,1	3,0	9,1	11,3	2,2	270	55,9	23,7	6,3	3,7	10,0	6,7	3,7
	Khanty-Mansi AO	30,0	28,9	36,0	38,6	54,5	56,5	28,8	28,7	34,7	36,5	68	58,8	5,9	2,9	4,4	7,4	19,1	8,8	270	49,6	20,7	8,9	3,7	12,6	9,6	7,4
	Yamalo-Nents AO	21,6	27,4	28,8	27,1	36,0	37,8	24,8	30,5	27,1	27,6	19	54,2	12,5	8,3	6,9	15,3	9,7	8,3	62	61,3	14,5	11,3	6,5	17,8	1,6	4,8
59	Chelyabinsk	28,5	34,3	27,8	28,9	88,5	64,0	33,2	35,4	33,1	37,0	219	50,9	14,0	11,2	3,8	15,0	12,5	7,6	706	54,7	13,9	11,3	4,0	15,3	11,6	4,5
	Federal Region: Siberian	30,0	31,9	32,9	31,6	52,7	47,5	29,7	32,2	33,9	34,0	7053	52,0	16,7	11,8	4,1	15,9	11,7	3,7	6565	53,8	17,3	10,2	3,6	13,8	11,1	4,0
60	*Republics:* Altai	46,4	43,8	47,2	28,9	79,8	46,9	39,5	44,5	34,8	24,1	86	48,0	28,0	10,0	2,0	12,0	10,0	2,0	34	50,0	14,7	14,7		14,7	14,7	5,9
61	Buryatia	44,4	53,8	50,5	41,0	144,9	119,2	27,1	39,6	36,1	33,2	353	55,9	12,8	7,5	4,5	12,0	17,0	2,3	453	55,6	16,6	6,2	5,1	11,3	14,3	2,2
62	Tyva	36,1	32,4	23,9	24,8	33,7	35,6	37,9	34,6	27,5	25,5	138	49,3	18,1	15,9	5,8	21,7	10,9	0,0	166	42,8	29,5	10,2	4,8	15,0	12,0	0,6
63	Khakassia	28,9	28,8	29,3	27,3	42,1	37,4	29,6	22,4	31,8	33,8	272	52,7	26,1	7,2	4,1	11,3	8,1	1,8	189	55,0	24,9	7,9	2,6	10,5	8,5	1,1
64	*Krai:* Altai	30,6	28,9	31,5	29,2	53,4	50,5	23,2	27,5	26,8	24,8	759	52,6	13,5	14,5	3,5	18,0	10,4	5,5	624	46,5	18,1	14,6	2,2	16,8	12,2	6,4
65	Krasnoyarsk	31,7	24,9	24,5	20,4	33,4	26,1	34,4	32,9	35,0	32,5	857	53,2	10,4	9,4	4,1	13,5	20,1	2,8	808	48,9	15,3	10,5	3,7	14,2	17,8	3,7
	Taimyr AO	36,8	45,0					44,4	43,6			11	81,8	9,1	0,0	9,1	9,1	0,0	0,0								

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Indicators of treatment effectiveness based on dispensary follow-up data										Effectiveness of chemotherapy courses in TB control facilities in the subjects of the Russian Federation (MOH&SD report) in cohorts of new ss+ PTB patients																
												2006								2007								
												Number	%							Number	%							
		Clinical cure of RTB patients						Bacteriological conversion in RTB patients (taking off MbT+ register) %																					
		%				DFG IA (new cases) %																						
		2005	2006	2007	2008	2007	2007	2005	2006	2007	2008	Cohort size	Successful treatment outcome	Treatment failure	Died			Interrupted treatment	Transferred out	Cohort size	Successful treatment outcome	Treatment failure	Died from			Interrupted treatment	Transferred out
															from TB	from other causes	Total						TB	Other causes	Total		
	Evenk AO	50,0	27,9					66,7	33,3			6	25,0	50,0	25,0	0,0	25,0	0,0	0,0								
66	*Oblasts:* Irkutsk	20,4	21,8	21,1	26,7	28,8	37,3	23,1	24,9	24,3	30,7	859	50,1	12,7	13,0	5,0	18,0	16,9	2,3	866	54,2	13,2	9,8	5,0	14,8	15,7	2,2
	Ust-Ordyn-Buryat AO	22,4	39,3	30,4	0,0	38,6	0,0	21,9	38,4	39,6																	
67	Kemerovo	28,2	40,7	42,5	40,6	59,3	60,2	30,9	39,0	41,0	40,6	1657	44,2	26,1	14,0	4,1	18,1	8,2	3,5	1237	46,4	24,7	13,1	4,4	17,5	6,4	4,9
68	Novosibirsk	32,7	39,1	40,3	38,5	66,6	55,3	27,9	30,1	33,4	32,9	919	57,3	13,8	12,7	3,0	15,7	6,3	6,9	849	57,7	15,1	9,1	3,8	12,9	8,6	5,8
69	Omsk	22,8	22,8	30,4	24,9	90,8	37,5	30,7	27,6	38,0	34,9	602	45,3	21,3	8,5	4,2	12,7	17,8	2,8	672	56,1	14,7	8,8	1,2	10,0	14,1	5,1
70	Tomsk	49,6	51,0	54,3	65,8	64,1	75,0	42,7	43,7	49,4	57,5	354	70,4	15,6	9,3	1,1	10,4	0,8	2,7	357	74,5	12,9	6,7	2,0	8,7	1,7	2,2
71	Trans-Baikal Krai (Chita Oblast)	30,5	25,8	30,1	36,7	40,7	54,6	31,3	31,5	35,2	38,8	318	59,1	6,5	13,5	8,0	21,5	6,8	6,2	310	72,6	10,0	7,1	4,2	11,3	3,9	2,3
	Aginsk Buryat AO	51,8	50,1	47,4	0,0	68,9	0,0	42,0	58,0	47,7																	
	Federal Region: Far-East	30,2	37,2	34,3	30,8	62,9	67,9	25,3	30,6	29,2	25,1	2175	49,6	16,5	9,4	3,6	13,0	17,4	3,5	2288	45,6	19,2	9,8	4,0	13,8	18,2	3,2
72	*Republic:* Sakha (Yakutia)	38,1	33,4	38,0	36,5	46,0	48,9	41,5	39,7	41,6	36,9	196	67,8	13,1	5,5	3,5	9,0	7,0	3,0	179	67,6	9,5	11,2	2,8	14,0	5,6	3,4
73	*Krais:* Primorsky	33,3	53,0	39,2	30,0	154,7		21,4	32,3	26,5	18,7	938	34,0	25,5	12,8	6,4	19,1	21,3	0,0	1005	41,2	20,7	7,3	4,9	12,2	20,9	5,1
74	Khabarovsk	37,4	41,4	40,5	39,7	59,8	55,0	28,5	33,5	31,4	29,3	342	50,6	13,2	7,6	2,5	10,1	21,5	4,6	489	42,1	12,3	13,3	3,7	17,0	27,2	1,4
75	*Oblasts:* Amur	20,3	19,6	24,7	24,8	38,1	35,5	15,6	17,8	22,5	22,4	342	39,9	19,3	10,3	4,2	14,5	22,9	3,4	230	40,9	32,2	10,4	3,5	13,9	11,3	1,7
76	Kamchatka Krai	32,7	36,4	33,9	25,4	61,6	37,4	29,5	31,2	28,8	22,1	46	50,6	13,2	7,6	2,5	10,1	21,5	4,6	63	23,8	28,6	19,0	3,2	22,2	25,4	–
	Koryak AO	23,5	19,9					22,1	24,2				62,2	18,9	5,6	1,7	7,2	7,8	3,9								
77	Magadan	24,8	43,1	51,9	39,0	88,0	60,0	43,7	62,6	56,2	52,2	25	44,8	10,3	17,2	3,4	20,7	24,1	0,0	33	51,5	33,3	3,0	6,1	9,1	6,1	–
78	Sakhalin	18,0	19,9	22,2	23,2	28,0	29,2	33,5	29,9	38,7	37,8	204	67,8	7,4	15,3	3,0	18,3	3,0	3,5	190	69,5	12,1	11,1	2,6	13,7	3,7	1,1
79	Jewish Autonomous Oblast	24,6	31,7	30,3	31,7	39,1	44,7	19,6	26,0	21,1	26,6	76	51,3	22,4	7,9	6,6	14,5	9,2	2,6	97	44,3	28,9	8,2	2,1	10,3	13,4	3,1
80	Chukotka AO	46,0	29,0	29,7	36,5	48,3	78,6	42,0	42,9	25,9	26,2	6	75,0	12,5	0,0	0,0	0,0	12,5	0,0	2	100,0	–	–	–	–	–	–

[1] Data for cohort analysis of the 2006 cohort.
[2] Cohort analysis of data received from southern areas of Tyumen Oblast excluding autonomous okrugs (AO).
[3] From 2007, the data includes indicators for Trans-Baikal Krai.
[4] From 2007, the data includes indicators for Kamchatka Krai.

Table 12

TB case-finding and hospilization of new TB patients in the Russian Federation in 2004–2008

No.	Federal regions (okrugs) and territories (subjects) of the Russian Federation	Population coverage with prophylaxis screenings Form No. 30				Percentage of TB cases detected during screenings of all new TB cases and detected post mortem					Hospitalization of new RTB patients					Hospitalization of new RTB patients with MbT+				
		% of average annual population				% (Form No. 33)					% (Form No. 33)					% (Form No. 33)				
		2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Russian Federation		58,2	58,2	63,2	61,4	52,4	52,0	54,7	56,0	57,8	84,2	85,4	83,9	84,7	84,8	93,7	94,3	93,0	94,2	93,9
Federal Region: Central		49,0	50,2	51,6	54,7	42,3	43,6	44,0	46,7	52,1	90,0	90,3	90,8	90,1	91,2	96,6	96,5	96,1	96,8	97,8
1	*Oblasts:* Belgorod	63,0	64,0	64,4	72,1	57,4	56,8	57,4	62,9	66,4	95,4	97,7	96,8	96,6	98,2	98,9	98,8	98,8	97,6	98,7
2	Bryansk	46,8	47,7	49,3	52,7	36,9	40,4	36,0	40,5	40,5	83,4	87,2	89,1	84,8	84,2	90,5	92,1	94,3	90,1	89,0
3	Vladimir	47,2	46,1	48,0	48,3	37,1	39,1	41,1	42,2	53,6	90,9	87,5	87,1	85,8	83,0	96,0	97,8	90,3	94,2	91,3
4	Voronezh	64,6	65,1	67,8	73,2	65,7	67,0	65,8	69,5	71,6	97,3	97,2	98,8	97,0	99,0	99,2	98,6	99,1	99,6	99,4
5	Ivanovo	68,1	67,6	63,9	66,8	46,3	41,2	44,4	44,8	44,7	96,6	98,1	95,7	96,4	96,8	99,0	99,7	98,8	98,0	98,2
6	Kaluga	43,2	44,0	44,9	46,6	45,6	41,4	39,0	49,7	55,7	86,3	92,2	86,3	87,7	75,3	93,8	95,7	98,4	100,0	99,2
7	Kostroma	51,6	53,4	52,8	53,8	45,4	42,9	39,0	46,3	46,9	95,3	98,2	95,3	89,8	89,7	100,0	100,0	100,0	100,0	97,3
8	Kursk	53,9	54,6	54,8	56,5	41,8	46,5	47,4	50,5	58,3	96,4	96,9	96,1	93,0	95,3	99,7	100,0	97,2	95,2	99,8
9	Lipetsk	70,0	79,5	85,2	87,7	57,9	60,0	61,1	68,3	75,5	97,7	94,6	94,5	84,1	94,9	98,5	96,6	97,2	97,3	95,8
10	Moscow	38,8	39,8	41,1	44,6	35,7	37,1	35,6	34,1	40,4	77,7	80,3	78,6	76,1	82,7	91,9	91,5	91,7	92,4	95,4
11	Orel	57,4	55,3	56,0	58,5	37,1	39,6	39,9	42,8	52,8	95,3	93,7	95,7	95,0	98,6	96,4	95,3	94,6	96,2	98,2
12	Ryazan	59,2	61,4	63,2	65,5	49,4	56,6	55,7	57,6	57,5	96,2	96,3	97,0	96,8	97,4	100,0	99,6	100,0	99,4	99,4
13	Smolensk	48,7	57,9	49,0	52,7	31,6	36,0	36,9	37,4	40,5	81,8	73,1	86,5	85,8	82,0	89,2	93,1	86,0	91,5	90,8
14	Tambov	59,5	58,9	59,6	63,3	53,5	53,4	58,1	53,6	65,7	97,8	97,1	96,3	98,3	98,1	98,9	99,5	100,0	100,0	99,7
15	Tver	57,9	59,3	59,7	59,4	41,4	41,6	38,9	43,9	43,1	87,6	87,3	87,0	99,4	91,0	98,5	96,1	97,0	102,1	116,4
16	Tula	55,3	54,0	53,7	54,6	45,7	41,2	46,4	40,3	45,9	90,2	89,8	93,8	93,7	93,8	96,8	95,1	97,1	98,0	98,4
17	Yaroslavl	50,5	50,4	51,0	59,1	39,8	40,9	41,9	42,0	48,0	94,0	92,3	92,7	96,1	93,3	98,4	97,9	96,6	99,2	99,1
18	*Moscow city*	40,4	41,9	45,1	48,3	31,2	34,5	38,0	46,5	53,9	94,1	93,5	94,8	96,0	96,8	99,1	98,5	98,6	99,4	99,6
Federal Region: North-West		54,0	54,6	55,1	56,4	39,7	41,3	46,9	45,9	49,3	84,3	83,5	81,6	81,2	82,0	93,8	93,2	92,1	93,4	91,8
19	*Republics:* Karelia	54,6	53,8	51,5	52,9	38,9	46,9	40,6	46,5	47,0	77,8	77,9	76,7	75,1	82,2	88,5	90,5	91,0	93,4	91,8
20	Komi	61,6	64,3	70,5	73,0	39,5	41,7	39,5	45,9	49,3	98,7	96,5	99,3	92,7	95,7	99,1	99,7	101,0	97,9	99,2
21	*Oblasts:* Arkhangelsk	53,4	52,7	51,7	50,2	38,6	32,2	35,7	40,0	44,3	81,0	73,6	61,8	61,8	56,8	94,5	94,6	86,4	89,1	79,7
	Nents AO	78,0	83,6	81,0	84,2	85,0	75,0	95,7	64,7	83,3	100,0	100,0	100,0	106,3	100,0	100,0	100,0	100,0	100,0	100,0
22	Vologda	62,2	62,6	63,1	67,4	42,3	41,7	49,3	50,8	55,4	94,9	93,1	95,2	91,7	92,1	97,8	100,0	97,5	99,5	98,6
23	Kaliningrad	52,3	52,7	51,8	53,5	33,7	36,3	58,5	49,9	55,4	84,1	79,2	79,0	81,3	78,7	96,0	89,9	90,3	93,7	93,7
24	Leningrad	49,9	49,7	51,5	54,1	42,6	43,1	47,3	40,9	44,9	79,5	85,6	81,5	80,0	82,9	97,8	91,5	90,8	90,0	92,0
25	Murmansk	49,4	50,1	49,3	49,8	32,5	38,1	39,9	45,0	46,3	46,7	43,6	53,6	62,9	63,2	61,9	62,5	70,8	84,5	82,1
26	Novgorod	66,1	65,8	65,6	69,2	45,2	46,1	48,9	48,2	62,3	97,0	97,2	95,6	96,1	99,1	100,0	98,6	96,0	100,0	100,0
27	Pskov	54,1	54,7	55,7	59,8	52,0	42,1	42,9	42,7	51,8	92,0	95,5	84,8	81,6	75,9	96,6	99,4	93,8	91,7	83,1

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		% of average annual population				% (Form No. 33)					% (Form No.33)					% (Form No. 33)				
		2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
28	*St. Petersburg city*	51,0	52,3	52,5	52,5	39,3	44,6	49,9	47,4	46,1	86,2	85,6	84,8	84,5	85,6	94,9	97,0	96,8	94,9	94,2
Federal Region: South		59,2	58,2	57,3	60,3	49,5	47,2	50,6	52,3	57,0	84,8	88,4	85,0	86,3	87,3	92,7	95,9	90,7	93,5	94,5
29	*Republics:* Adygea	49,3	53,3	52,6	53,1	38,4	39,9	42,5	38,1	44,3	92,9	94,2	102,6	90,7	88,3	99,4	97,2	97,9	100,0	100,0
30	Dagestan	80,2	70,8	71,5	77,7	45,0	43,1	41,8	41,8	47,9	73,6	81,4	77,6	85,0	91,1	77,1	97,5	83,0	93,7	100,4
31	Ingushetia	40,2	39,5	39,5	47,8	46,2	46,8	28,6	32,5	43,3	70,4	81,1	64,2	72,9	81,5	85,4	82,2	75,8	76,5	74,6
32	Chechnya		9,3	15,8	53,6	3,5	6,2	10,3	7,8	48,9	60,3	54,7	74,8	82,0	68,9	91,8	87,2	96,4	89,5	92,9
33	Kabardino-Balkaria	45,4	37,1	37,2	69,5	32,1	33,1	28,4	38,1	65,4	90,3	96,3	99,5	98,5	98,3	100,0	100,0	100,0	100,0	100,0
34	Kalmykia	66,2	66,3	65,3	54,7	50,1	44,4	47,7	52,4	42,7	81,3	85,2	84,1	87,5	89,3	90,6	94,8	85,2	89,6	93,5
35	Karachaevo-Cherkessia	58,9	59,4	53,5	63,1	46,4	44,7	46,4	46,7	46,1	82,1	91,2	79,9	79,0	85,2	94,5	100,0	100,0	92,1	98,7
36	North Ossetia - Alania	60,2	59,4	59,8	17,5	32,0	80,5	85,1	81,7	10,9	84,9	98,4	93,0	88,1	98,7	84,1	96,3	0,0	98,7	100,0
37	*Krais:* Krasnodar	57,5	55,9	62,6	64,1	47,7	43,8	48,4	52,6	57,2	74,1	79,3	79,4	75,9	78,5	89,2	88,3	89,0	88,3	85,4
38	Stavropol	69,4	70,5	70,1	73,9	49,9	0,1	52,4	52,9	59,2	90,2	89,3	89,5	91,4	90,4	93,9	97,4	97,4	96,1	97,5
39	*Oblasts:* Astrakhan	61,0	55,3	50,3	54,6	51,4	49,1	52,5	53,8	64,5	89,4	103,7	88,8	89,0	91,2	97,9	101,3	99,3	91,5	98,7
40	Volgograd	51,5	56,0	56,9	60,4	49,9	47,4	52,8	58,3	61,5	82,7	76,5	82,9	82,3	82,5	93,7	97,8	95,0	93,9	93,4
41	Rostov	51,9	51,2	53,5	52,9	59,5	72,4	68,5	68,8	74,9	98,0	101,4	92,5	98,8	98,3	100,0	100,0	100,0	100,0	100,0
Federal Region: Privolzhsky		66,3	66,0	62,6	65,8	55,1	54,4	54,8	55,8	61,0	87,6	89,0	86,9	89,6	89,2	94,4	95,6	93,8	95,8	95,3
42	*Republcis:* Bashkortostan	63,1	64,1	59,8	67,5	53,6	53,5	53,7	54,7	58,5	90,4	92,8	93,8	97,3	98,7	100,0	100,0	100,0	100,0	100,0
43	Mariy-El	60,9	65,4	64,6	66,6	48,5	46,0	45,4	56,1	54,7	97,6	94,7	83,4	95,8	95,7	99,3	97,8	93,2	98,6	98,3
44	Mordovia	72,4	74,2	73,3	76,3	54,4	56,4	56,9	61,8	67,2	95,8	94,9	94,0	95,8	94,4	97,7	99,0	98,3	99,5	99,0
45	Tatarstan	67,0	65,5	58,9	57,6	56,4	55,3	55,9	55,3	61,5	86,2	90,1	86,0	87,5	85,3	95,3	97,6	95,2	96,0	93,2
46	Udmurtia	64,1	65,6	66,9	69,6	45,7	46,6	50,2	48,8	58,2	87,8	89,9	90,3	87,5	89,2	94,6	92,0	94,2	92,8	96,5
47	Chuvashia	63,0	58,5	60,6	63,3	41,7	42,6	47,4	48,0	54,7	90,1	90,9	90,5	90,5	90,1	96,1	96,8	97,7	94,4	94,2
48	*Oblasts:* Kirov	58,4	60,3	61,7	66,1	48,9	48,5	56,5	56,4	57,7	93,4	96,4	94,0	94,2	96,4	94,3	97,3	90,7	98,6	97,2
49	Nizhni Novgorod	50,4	50,5	48,5	50,9	51,6	50,0	48,0	48,1	54,7	74,8	77,0	70,4	80,0	80,1	88,6	94,1	87,6	91,7	90,2
50	Orenburg	69,6	69,2	66,8	73,0	61,6	57,6	58,0	58,7	65,4	90,0	85,3	80,3	86,5	82,2	92,8	99,0	95,4	96,1	96,5
51	Penza	52,4	131,2	137,3	61,7	58,9	61,3	53,1	60,7	62,5	99,5	99,4	99,9	100,0	99,5	99,6	99,4	100,0	100,0	100,0
52	Perm (Perm Krai)	69,0	0,0	0,0	70,5	54,4	52,8	53,5	56,1	62,3	91,6	90,7	92,4	91,8	92,8	96,5	93,0	95,9	98,8	98,6
	Komi-Permyatsky AO					57,5	51,6				95,6	94,8				92,8	93,3			
53	Samara	75,1	75,5	71,4	71,4	61,9	59,6	61,3	61,0	64,1	75,2	79,4	77,1	79,2	81,7	81,4	87,1	83,5	87,4	89,4
54	Saratov	88,9	86,3	65,8	71,1	68,1	71,7	68,5	67,6	72,2	89,5	93,7	89,3	91,7	92,4	99,3	97,3	92,3	95,8	96,2
55	Ulyanovsk	67,6	65,7	68,0	71,4	46,1	40,6	45,2	45,2	50,6	91,3	96,1	97,9	98,0	92,2	100,0	99,1	99,4	104,2	95,3
	Federal Region: Urals	63,3	64,0	66,7	67,7	53,6	52,9	54,4	54,6	60,1	83,6	84,1	83,4	86,2	88,0	93,9	95,3	95,6	95,0	95,7
56	*Oblasts:* Kurgan	61,9	61,1	58,9	60,4	52,6	48,7	54,2	58,5	59,1	81,3	78,8	82,0	75,1	81,2	83,1	84,8	98,0	90,6	82,9

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		% of average annual population				% (Form No. 33)					% (Form No.33)					% (Form No. 33)				
		2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
57	Sverdlovsk	59,3	60,1	61,2	63,3	49,1	47,5	49,8	51,5	59,0	96,0	94,7	94,7	94,7	93,5	97,4	98,6	97,7	98,2	98,1
58	Tyumen	74,5	75,6	78,0	78,6	58,2	59,1	60,4	54,3	60,4	61,6	62,0	63,9	68,9	73,7	88,7	88,9	87,8	86,9	94,0
	Khanty-Mansi AO	79,4	79,0	80,0	78,7	67,1	64,0	66,3	62,8	68,0	70,8	68,2	69,2	71,0	73,6	90,9	87,1	81,5	85,7	88,9
	Yamalo-Nents AO	85,8	82,0	88,3	85,7	55,2	59,1	57,0	56,2	60,3	64,9	56,7	65,3	71,2	75,8	81,1	78,2	69,8	89,1	88,2
59	Chelyabinsk	58,2	58,9	65,0	64,8	54,1	54,2	53,2	58,1	61,9	98,9	104,1	95,0	98,6	98,6	98,9	100,4	99,7	99,0	99,4
	Federal Region: Siberian	60,3	61,4	61,0	65,9	48,6	49,1	50,8	53,4	60,8	79,3	80,2	77,5	77,9	78,5	91,9	92,0	91,6	92,5	90,3
60	*Republics:* Altai	73,3	68,6	71,9	75,8	46,3	47,7	52,3	0,0	57,4	96,8	89,6	90,5	89,2	86,7	98,4	95,0	100,0	98,8	97,9
61	Buryatia	60,5	59,7	61,3	60,5	57,1	51,5	54,9	56,7	62,7	87,3	75,9	82,8	67,2	78,5	90,2	96,5	96,0	89,6	89,9
62	Tyva	80,6	85,9	87,7	87,1	53,5	49,6	57,9	57,1	65,4	90,6	87,0	90,9	89,7	82,2	94,9	92,2	100,0	100,0	90,3
63	Khakassia	50,2	63,2	63,3	56,4	39,4	35,5	38,3	49,3	54,8	93,1	91,1	90,8	83,9	83,5	99,4	98,3	96,4	92,8	79,1
64	*Krai: Altai*	58,2	62,2	57,8	63,6	51,0	51,6	54,3	55,0	61,5	57,3	56,1	54,6	57,0	57,8	82,3	78,9	84,8	88,6	92,0
65	Krasnoyarsk	53,1	54,3	47,2	54,4	45,5	46,2	46,9	57,3	68,9	88,6	92,4	91,7	94,0	91,5	97,0	97,4	95,1	97,8	96,5
	Taimyr AO	82,3	79,5			66,7	65,4	62,5			100,0	100,0	100,0			100,0	100,0	100,0		
	Evenk AO	70,6	70,7			29,2	42,3	54,5			100,0	95,7	95,2			100,0	100,0	100,0		
66	*Oblasts:* Irkutsk	56,7	51,8	59,2	62,8	34,0	36,9	39,0	45,5	54,7	82,4	92,0	83,1	81,8	81,5	92,5	98,1	93,8	93,0	83,0
	Ust-Ordyn-Buryat AO	81,2	81,8	84,5		41,3	51,0	50,5	59,6		97,9	92,5	97,6	90,5		100,0	101,1	100,0	100,0	
67	Kemerovo	56,4	60,6	63,7	70,8	43,3	43,7	44,6	46,5	53,3	86,7	83,9	83,0	83,5	80,7	96,2	93,8	90,8	94,4	91,0
68	Novosibirsk	67,5	59,9	63,0	68,8	55,9	56,1	57,5	58,4	63,1	79,3	80,1	78,5	76,7	77,6	92,3	92,3	92,5	87,1	86,6
69	Omsk	69,2	77,7	76,7	78,3	59,5	67,2	62,0	62,2	66,9	69,5	80,0	65,0	74,9	81,1	88,8	91,5	92,5	92,5	94,8
70	Tomsk	53,3	56,5	44,9	50,6	48,7	44,7	52,0	52,5	53,4	69,3	59,2	58,9	64,9	66,8	76,1	71,5	73,5	84,8	89,9
71	Trans-Baikal Krai (Chita Oblast)	72,1	72,9	72,9	82,0	55,3	55,9	59,3	62,4	69,3	84,9	90,1	91,4	91,8	87,8	98,1	96,6	96,7	96,2	97,5
	Aginsk Buryat AO	80,1	83,1	87,0		54,2	54,9	52,6	65,4		95,5	97,1	100,0	100,0		100,0	100,0	100,0	100,0	
	Federal Region: Far-East	61,8	62,4	62,6	67,2	39,2	38,7	53,3	53,9	60,2	75,3	78,0	79,0	76,9	71,7	89,5	89,2	88,5	88,8	89,1
72	*Republic:* Sakha (Yakutia)	72,2	69,7	69,8	69,0	52,4	50,8	46,3	56,6	56,8	88,9	91,7	98,3	93,8	94,9	99,4	100,0	98,0	99,6	98,9
73	*Krais:* Primorsky	54,4	53,3	55,0	64,6	46,1	45,8	46,5	48,5	55,5	74,2	76,9	78,3	75,6	68,6	90,9	88,7	88,3	86,1	90,0
74	Khabarovsk	65,9	68,4	70,1	74,0	0,0	0,0	64,7	61,9	66,3	83,7	84,9	86,4	87,4	86,0	94,8	95,0	94,5	98,0	94,7
75	*Oblasts:*	64,2	65,0	65,5	69,1	54,7	55,0	66,3	63,1	71,0	55,5	62,5	59,6	50,7	45,3	72,7	79,0	74,6	77,4	75,0
76	Kamchatka Krai	50,2	52,7	47,1	50,2	46,1	49,0	54,1	57,0	56,5	75,9	87,7	77,5	79,7	71,5	77,0	95,0	78,1	94,0	96,0
	Koryak AO		59,6			50,6	43,4	61,9			90,4	92,5	85,4			94,3	100,0	75,9		
77	Magadan	67,0	66,5	67,7	68,1	65,2	61,0	58,4	46,4	64,6	96,6	100,0	102,0	99,0	100,0	90,9	100,0	94,6	100,0	100,0
78	Sakhalin	60,1	66,9	60,1	63,4	43,1	46,6	41,7	41,5	53,5	72,7	76,8	80,9	82,3	74,3	87,5	81,2	84,5	86,0	86,6
79	Jewish Autonomous Oblast	58,0	60,7	60,9	61,7	54,3	54,3	45,4	49,5	58,7	72,0	52,3	59,4	71,7	61,9	87,3	72,3	86,1	79,9	60,3
80	Chukotka AO	95,1	84,1	92,6	87,2	62,5	48,7	68,8	51,7	48,8	100,0	102,6	100,0	100,0	100,0	100,0	105,0	100,0	100,0	91,3

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