Stopping Tuberculosis in Central Asia

Priorities for Action

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AIDS Acquired Immune Deficiency Syndrome
AHP Ambulatory Health Posts
AKF Aga Khan Foundation
ALOS Average Length of Stay
BOR Bed Occupancy Rate
CAR Central Asia Republics
CCM Country Coordination Mechanism
CDC Centers for Disease Control and Prevention
DALY Disability Adjusted Life Years
DFID UK Department for International Development
DOTS TB Directly Observed Treatment Short-Course
DST Drug Susceptibility Testing
ECA Europe and Central Asia
ESCM Electronic Surveillance Case-Based Management System
FDCFixed Dose Drug Combination
FGDFocus Group Discussion
FGPFamily Group Practices
FMCFamily Medicine Center
FSUFormer Soviet Union
GDFGlobal Drug Fund
GDPGrowth Domestic Product
GFATMGlobal Fund to Fight AIDS, TB and Malaria
GLCGreen Light Committee
GMPGood Manufacturing Practice
GNI\textit{G}ross National Income
GTZGerman Technical Cooperation
HBCHigh-Burden Countries
HIVHuman Immunodeficiency Virus
HOPE\textit{N}GO, Health Opportunities for People Everywhere
HSRHealth Sector Reform
IDAInternational Development Association
IDUIDenting Drug Users
IECInformation, Education and Communication Campaign
IFRICInternational Federation of Red Cross and Red Crescent Societies
IUATLDInternational Union Against Tuberculosis and Lung Disease
KAPKnowledge, Attitudes and Practices
KfWGerman Development Bank (Kreditanstalt für Wiederaufbau)
KNCVRoyal Netherlands Tuberculosis Association
MDGMillennium Development Goals
MDRTO Multi-Drug Resistant Tuberculosis
MHIFMandatory Health Insurance Fund
<table>
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<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>MMR</td>
<td>Mass Miniature Radiography (fluorography)</td>
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<tr>
<td>MoF</td>
<td>Ministry of Finance</td>
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<td>MoH</td>
<td>Ministry of Health</td>
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<td>MoI</td>
<td>Ministry of Interior</td>
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<tr>
<td>MOIA</td>
<td>Ministry of Internal Affairs</td>
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<tr>
<td>MOJ</td>
<td>Ministry of Justice</td>
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<tr>
<td>MSF</td>
<td>Médecins Sans Frontières</td>
</tr>
<tr>
<td>N/A</td>
<td>Not Available</td>
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<tr>
<td>NDC</td>
<td>National DOTS Centre (Uzbekistan)</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organizations</td>
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<tr>
<td>NIS</td>
<td>Newly Independent States</td>
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<td>NRL</td>
<td>National Reference Laboratory</td>
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<td>NTBC</td>
<td>National Tuberculosis Centre</td>
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<td>NTBI</td>
<td>National Tuberculosis Institute</td>
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<td>NTP</td>
<td>National Tuberculosis Program</td>
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<tr>
<td>OECD</td>
<td>Organization for Cooperation and Economic Development</td>
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<tr>
<td>PHC</td>
<td>Primary Health Care</td>
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<tr>
<td>PLWHA</td>
<td>People Living with HIV/AIDS</td>
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<td>SES</td>
<td>Sanitary Epidemiological Service</td>
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<td>SIZO</td>
<td>Pre-Trial Detention Center</td>
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<td>SS+</td>
<td>Sputum Smear Positive</td>
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<td>SVAs</td>
<td>Rural Doctors Ambulatory Health Posts</td>
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<td>SWAP</td>
<td>Sector Wide Approach</td>
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<td>TB</td>
<td>Tuberculosis</td>
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<tr>
<td>TOR</td>
<td>Terms of Reference</td>
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<tr>
<td>ToT</td>
<td>Training of Trainers</td>
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<td>UN</td>
<td>United Nations</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>VCT</td>
<td>Voluntary Counseling and Testing</td>
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<tr>
<td>WFP</td>
<td>World Food Programme</td>
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<td>WHO</td>
<td>World Health Organization</td>
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Executive Summary

Tuberculosis is still a significant health and economic problem in Central Asia, despite some recent progress that may be due to improvements of the overall economic situation in these countries, and partial adoption of the DOTS Strategy recommended by WHO. Over 50,000 new cases have been detected in 2003, and over 7,000 people died due to TB in the four countries studied. This study has confirmed that it is highly unlikely that the Central Asian Republics succeed in achieving the global targets for tuberculosis control in the short-term, particularly in what concerns case detection. In the meantime, the epidemic continues to have a serious epidemiological impact and affects the economies of these countries, which incur productivity losses and direct costs that are estimated to range from 0.5 to 0.8 percent of GDP annually.

The study of tuberculosis in Central Asia aimed at:

- Assessing progress in Central Asia towards achieving the tuberculosis global targets for 2005 for case detection (70 percent) and treatment success (85 percent), aiming at reducing TB prevalence and mortality;
- Identifying constraints in achieving the global targets, including those related with allocation and use of resources, program implementation and management, and other health system issues; and
- Estimating the potential negative impact of the epidemic in human and economic terms in the medium-term.

The study reviewed the epidemiological situation, control efforts and financing of tuberculosis programs in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. It was based on a review of existing statistics and reports and consultation of key stakeholders—Governments, NGOs, and donors—in Central Asia. The study was carried out in the context of the sector work on TB, HIV/AIDS, and sexually-transmitted diseases that the Bank has been undertaking in Central Asia since 2001 (Godinho and others 2004; Godinho and others 2005; Renton and others 2004). This work is expected to contribute to addressing the impending epidemiological crisis that has been posed by the sudden increase in cases of HIV/AIDS infection combined with a prevalent epidemic of TB.

Taken together, the TB and HIV/AIDS studies are expected to:

- Inform civil society, Government counterparts, Bank management, and partner organizations about the epidemics and necessary actions that need to be taken in the short to medium term to prevent HIV/AIDS and control TB in Central Asia;
- Inform the Bank’s policy dialogue and operational work to control HIV/AIDS and TB in Central Asia; and
- Contribute to strengthening the regional partnership between Governments, civil society, UN agencies, and multilateral and bilateral agencies to prevent these diseases.
Main Challenges in Achieving Global TB Targets

The decline in living standards that followed the breakup of the Soviet Union led to a rapid increase in TB. The lack of resources limited the countries’ ability to respond to the epidemic. In the last several years, however, the Governments of Central Asia have been actively implementing the DOTS Strategy to reduce the burden of disease caused by TB. Furthermore, many international donor agencies have stepped in to provide financing for technical assistance and drugs and supplies that are critical to meet the challenge. These efforts are having an impact on TB control throughout the region and are likely to contribute to reducing the burden of disease in Central Asia. However, Central Asian countries face considerable challenges to achieve the global TB targets in the near future.

In terms of tuberculosis control in Central Asia, Kazakhstan is relatively successful. After experiencing a surge in TB in the 1990s, the country is now taking measures to decrease the burden of disease due to TB permanently. Between 1998 and 2004, the number of notified cases has declined by 3,000 and the mortality rate associated with TB declined by 45 percent. In some oblasts, case fatality has been reduced to 2 percent. The prison system is one of the sectors that most benefited from this reduction.

However, despite the progress achieved in terms of treatment and improvements in hospital and input-outcome performance, many areas require additional attention. In Kazakhstan, the cure rate is below the suggested rate. The system reports a default rate of 4 percent, together with a failure rate of 11 percent and transfer out rate of 2 percent; therefore, the unsuccessful outcome of treatment totals 17 percent.

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**Figure 1. TB Notification Rates in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan**

TB is still an important economic problem in Kazakhstan. By 2002, the country had lost US$114 million, or 0.47 percent of GDP, due to fiscal costs and productivity losses. In addition, benefits are not distributed evenly throughout the country and significant gaps persist, making it more difficult to achieve uniform success rates.

Project HOPE conducted a Knowledge, Attitude, and Practice (KAP) survey in Kazakhstan. One of its major findings was that the population does not trust the capabilities of health facilities and staff. Increased population awareness of the dangers of the disease should be part of the new agenda of activities. Present steps towards full implementation of MDRTB treatment, without proper training, supervision or planning, may result in erratic treatment for these cases and result in an incurable disease. There is no integrated TB/HIV program.

One of the key factors that will determine the overall success of Kazakhstan in reducing TB is the use of financial resources and the results obtained with resources available. Among all countries evaluated in this study, the Government of Kazakhstan provides the highest level of funds for TB control—on average, 0.16 percent of GDP or US$2.5 per capita. This is almost five times the public contribution in neighboring countries. Donors have also played an important role in complementing public efforts. This significant amount of resources partially explains the satisfactory outcomes experienced during the last two years.

One of the weakest points of the Kazakh program is the distribution of resources. There is a 10-fold difference in per capita spending between the most and the least resourced oblasts. The budget allocation mechanisms fail to distribute resources according to the particular needs of the regions, so gaps in various regions are substantial. The allocation of funds on a per bed basis creates an incentive to oversupply beds to the detriment of needed expenditures in drugs and staffing. There is a clear need to develop a provider payment mechanism that links allocation to actual needs and outcomes, rather than historical figures based on the number of beds.

The TB burden in the Kyrgyz Republic is the second largest among the countries evaluated in this study. Nearly 5,800 new cases of tuberculosis were registered in 2004 in Kyrgyzstan, and the notification rate was 115 cases per 100,000 population. The mortality rate was over 11 deaths per 100,000 population. Although the country has achieved some promising results, further action should be taken to effectively lower TB rates in the country. Currently, the reported success rate is 81 percent and the number of patients that interrupt treatment is relatively high. Therefore, it seems difficult that the country will achieve the TB global targets in the near future, given the current situation.

The impact of tuberculosis on the Kyrgyz economy is high. Estimates for 2002 showed that yearly losses due to TB were approximately US$8.4 million, or 0.53 percent of GDP. Thus, a sustained public intervention is required to reduce both incidence and mortality and mitigate the current negative impact on productivity. Specific measures to change the current situation include: an increase in budget, an extended program to educate staff and general public on TB-related topics (including DOTS), and improved laboratories, infrastructure, and monitoring systems.

Special attention should be paid to TB in Kyrgyz prisons and TB hospitals as their performances are suboptimal. The notification rate was 2,875 per 100,000 prisoners in 2004. However, based on the reported absolute numbers, this study estimated notification rates in prisons to be over 5,500. Increasing prison performance would require improvement
of program management skills, collaboration between the Ministry of Justice and the National TB Program, increased understanding of DOTS principles by prison authorities and medical staff, and monitoring and analysis of results. DOTS should be fully implemented in the penitentiary sector including the SIZO. The Ministry of Justice would benefit from technical assistance to implement DOTS throughout the prison system. In hospitals, almost all Republican facilities present a below average performance, in terms of average of length of stay (ALOS) and bed occupancy rate (BOR), with only the National TB Center showing efficient results.1

Although the contribution of the Kyrgyz Government to TB control has increased in 2002–2003, there are not enough resources allocated for effective TB control. If planned expenditures and donor contributions are executed effectively, the Kyrgyz Republic could reduce the negative effects of TB on the economy and population. However, this requires improved managerial skills because in most cases only 77 percent of the budget is executed. A serious challenge for the Kyrgyz Republic is to overcome the expected decline in resources in the medium-term. Donor contributions are expected to fall sharply and public budgets are not planned to exceed US$1 million. Therefore, it becomes clear that the next two or three years are key for the success of the TB strategy in the Kyrgyz Republic.

TB resources per capita show an unequal distribution in the Kyrgyz Republic as in other countries in Central Asia. However, the distinctive characteristic in this country is that the gap between oblasts is not as large as in other countries. During 2003, for instance, the gap between the highest and the lowest budget per capita was 3.5. The award of $2.20 to TB specialists for each newly-diagnosed patient has not been established countrywide. Patient and/or provider incentives should be established throughout the country to increase cure rates.

Tajikistan is the poorest country in Central Asia, with 80 percent of the population living below the poverty line. This also explains the poor conditions governing TB control. Despite the approval of the 2002 DOTS Strategy Law, public contributions are still below the regional average. Actual budgets are insufficient for providing an adequate TB care service, forcing the country to depend greatly on international contributions, which are seven times higher than the government budget.

As in other Central Asian countries, tuberculosis represents a high economic burden for Tajikistan. Every year, more than US$5 million are lost due to fiscal disbursements and productivity losses. This represents an estimated 0.5 percent of GDP, although the figure could be much higher if quality mortality data were available. This situation requires a stronger Government intervention in order to achieve, in the medium and long term, significant reduction in TB rates to improve living standards and to reduce the negative impact of the disease on the economy.

The country faces many problems regarding further expansion of DOTS implementation. DOTS covers only 13 percent of the population and has not yet been introduced in the prison system. There is insufficient continuity in the work of institutions engaged in DOTS implementation, as well as in communities. Program management requires technical assistance, and TB services need transport for supervision and monitoring. Unified and standard forms are not yet used throughout the country. Sputum microscopy labs and

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1. Data on ALOS and occupation rate have to be interpreted with caution as poor conditions of health facilities drive patients away from some hospitals.
trained staff are scarce. There is no Reference Laboratory in the country. One of the immediate consequences is that the level of drug resistance is unknown. Treatment adherence for many patients is a logistical problem. Some patients live in mountainous regions that are inaccessible during most of the winter.

Training of trainers must be organized to ensure continuous improvement of knowledge of staff. Community health workers should be trained and involved in the program, as there is a shortage of TB doctors and high turnover of other staff. Oblasts are not able to provide incentives for health workers to be involved in DOTS implementation. A career structure and increased salary scales would contribute to improve human capacity development.

The results of this study indicate the need to apply several measures to improve the TB Program in Tajikistan. The first task is to enhance the public contribution, which is the lowest in Central Asia. However, there are also important distributional issues that could be addressed to improve outcomes. The wide gap that exists between the Sugd Oblast and other oblasts is a major weakness in the financial strategy. Therefore, a second important measure deals with the improvement of resource allocation mechanisms. Finally, the difficult TB situation in prisons, the low DOTS coverage and the weak hospital performance are also relevant areas to which the country must pay attention in order to achieve the global targets for TB control. At this moment, it seems difficult for Tajikistan not only to achieve the targets, but also to maintain them over the long run. A clear example of the difficult TB situation in Tajikistan is that 85 percent of deaths in prisons are due to TB causes.

The main results of this evaluation show that Uzbekistan has been performing moderately well in recent years. However, the low case detection rate (44 percent as estimated by WHO) is still a challenge for TB services. Ensuring outpatient management of TB patients is vital in order to decrease high default rates. The experience from the primary health care project to improve efficiency and effectiveness must be transferred and adapted to the TB system.

Despite efforts to improve TB treatment outcomes, the economic burden of TB on the Uzbek economy is one of the highest in the region. Considering both direct and indirect costs, an average US$55 million are lost each year due to fiscal and productivity costs. This figure represents 0.57 percent of GDP. This makes a strong case for Government intervention in order to achieve, in the medium and long terms, significant reduction in TB rates. Specifically, the study suggests that important reforms should be undertaken to improve the epidemiological situation in prisons, budget allocation, and hospital performance.

Political commitment should focus on decreasing TB among prisoners, where relevant indicators have been deteriorating over the 1998–2002 period. Although some progress was observed in 2003, the net balance is unsatisfactory. The situation of the prison system does not differ from other Central Asian countries. Prisoners are the group most affected by TB, and the most important issues regarding TB in prisons are inadequate infrastructure and drug availability. DOTS implementation in the prison sector has just started, but technical assistance is necessary.

The high level of MDRTB (13 percent primary and 40 percent acquired), with probably a much higher proportion of drug resistance in prisons, makes it imperative to launch a DOTS Plus Program in Uzbekistan. There is no coordination between TB and HIV/AIDS Centers.

The parallel system of data collection decreases the willingness of doctors to complete updated forms and makes surveillance data unreliable. Data collection needs to be unified.
Although the National Reference Laboratory has been newly equipped for this task, it has insufficient staff and means to undertake proper quality assurance.

Of the four countries analyzed, Uzbekistan is among those with the highest public TB budget, representing 0.14 percent of GDP, with only Kazakhstan spending more than Uzbekistan. Donors contribute approximately one fifth of the Government contribution. Therefore, both sources provide a significant TB budget that represents almost 0.2 percent of GDP. Differences in resource allocation among oblasts are considerable and must be reduced.

**Key Issues and Actions to Control TB in Central Asia**

The main issues identified by the study, and recommended key actions are summarized below.

*TB in Prisons.* In general, incidence and mortality rates are much higher in prisons than among the general population, while DOTS is particularly effective in this setting. In Kazakhstan, following the adoption of DOTS in prisons, mortality rates have decreased significantly and show promising signs for other countries. Exchange of information and cooperation between the penitentiary system and the Ministry of Health at the operational level is still weak in all four countries. One of the main issues is how to deal with prisoners that are released before finishing the TB treatment regimen. Prisons in the region are under-funded, which results in poor hygiene, nutrition and ventilation. All factors contribute to increased development of disease and transmission of the infection. Alternatives to imprisonment and changes in the penal code that would reduce the number of prisoners, and length of imprisonment, would contribute more to reducing the epidemic than DOTS implementation alone (PRI/KNCV 2003).

**Key Actions to Control TB in Prisons:**

1. Adopt the DOTS approach throughout the prison system.
2. Coordinate provision of TB services in prisons with TB services from the Ministry of Health.
3. Actively follow up on prisoners released while on TB treatment.
4. Allocate sufficient funding for control of TB in prisons.
5. Adopt alternatives to imprisonment of minor offenders to decrease overcrowding.

   This is especially relevant for drug users, who are at increased risk of being infected with HIV.

*MDRTB.* The situation with the multi-drug resistant TB is of great public health concern in Central Asia, as it happens throughout the former Soviet Union. Given the intermittent drug supply and the wide-ranging and unregulated treatment regimens, MDRTB is an increasing problem in the region. There is a risk of establishing resistance to second-line drugs, as with first-line drugs, due to inappropriate usage, leaving the region and the world at large with an additional public health problem.

**Key Actions to Control MDRTB:**

1. Implement quality-assured DOTS Plus TB Programs.
2. Establish Centers of Excellence for training and treatment of MDRTB cases.
3. Increase success rate of TB programs that will ensure Green Light Committee clearance for use of second-line drugs at discounted prices.

**TB/AIDS Dual Infection.** The fast growing HIV/AIDS epidemic may wipe out recent gains in TB control in Central Asia, as tuberculosis is the main opportunistic infection associated with AIDS. The reduction in HIV transmission through harm reduction strategies (condom use, needle exchange programs) and drug substitution therapies contributes directly to containing the TB epidemic. However, the vertical TB and HIV/AIDS programs in Central Asia are not integrated, and there is lack of clarity about responsibilities for diagnosis and treatment of HIV/AIDS patients with TB. The urgency to coordinate strategies and programs is not well understood by national TB Institutes, AIDS Centers and donors. However, it would be beneficial for the control of both diseases to make concerted efforts in developing surveillance and infrastructure, especially refurbishment of the laboratory network; establishing quality assurance mechanisms; training health providers; and improving drug management and treatment delivery.

**Key Actions to Control the Dual TB/HIV infection:**

1. Develop TB/HIV surveillance, including proportion of TB cases among HIV infected, and proportion of HIV infected among TB cases.
2. Prevent HIV/AIDS infection through methadone replacement and harm reduction programs, especially in prisons.
3. Develop a common strategy for TB and AIDS Programs to deal with cases of dual TB/HIV infection. The Regional AIDS Control Project will provide assistance in this area.
4. Screen and treat people living with HIV for TB, and screen and treat TB patients for HIV/AIDS.

**DOTS Implementation.** Although all countries have officially adopted the directly observed, short course treatment strategy recommended by the World Health Organization (WHO), DOTS remains a controversial approach and has been unevenly implemented across the region. There is significant political commitment to TB control and adoption of the DOTS approach throughout the four countries studied. However, this does not always or consistently translates in sufficient and rational allocation of funds and other resources for TB control in each country, or in full understanding of the DOTS approach.

Poverty, long distance and limited involvement of primary health care services in TB control severely diminish the access of rural patients to services, and pose a serious constraint to observation of treatment and patient compliance. The observed slow progress in controlling the epidemic may be related with the way TB programs are implemented at the local level, including access to service due to geographical distance, out-of-pocket costs of care, and continued reliance on outmoded public health practices.

Although many efforts have been directed at training health staff in knowledge and skills necessary to implement the DOTS strategy, there has not been a comprehensive strategy to improve the understanding and competence of all health staff involved regarding this strategy.

The analysis has shown that countries spend on average 15 percent of their public budgets on drugs. Urgent registration of essential drugs should be facilitated. Staff has to
be trained in all aspects of drug management, including procurement, storage, distribution and stock keeping.

There is great variation in TB surveillance across Central Asia. Evidence-based information for health professionals, decision-makers and population about the disease and its diagnosis and treatment, is scant. The old soviet approach to TB control and DOTS have been applied to case detection and treatment in Central Asia with mixed results. As this study points out, such combination results in two kinds of patients, DOTS patients and non-DOTS patients, which does not contribute to improve success rates.

Key Actions to Improve DOTS implementation:

1. Coordinate provision of TB control services between TB services and prisons, primary health care and AIDS Centers.
2. Expand throughout the region the TB Electronic Surveillance Case-Based Management System (ESCM) piloted in Kazakhstan and Kyrgyz Republic with assistance from CDC.
3. With assistance from the Red Crescent, establish a network of nurses to visit patients at home and observe treatment.
4. Organize study tours for key stakeholders to best practice countries such as OECD countries, China and Peru.
5. Train staff in public health and management skills such as program planning, budgeting and development of human capacity.
6. Coordinate donors so that high quality technical assistance is provided by a limited pool of recognized international experts.

Financing TB Control. Great differences were observed in terms of public funding for TB among the four republics. A number of factors combine to exacerbate the problems in TB financing. Contributions from international agencies play a significant role in supplementing public budgets. A recurrent problem is the uneven distribution of TB funds among oblasts indicating that financial resources are not allocated by following homogeneous, public health-based criteria. In this regard, budget mechanisms that do not link resources to outcomes are an important limiting factor. There is also an apparent tradeoff between salaries and drugs: countries with the highest wage bill devote fewer resources to finance drugs. At nearly 10 percent of health spending in most countries, it is imperative that each dollar invested provides the highest return in terms of achieving successful results.

Key Actions to Improve Use of Resources:

1. Link allocation of human and financial resources to results—detection, cure, and mortality rates.
2. Review staffing and infrastructure needs and agree on restructuring strategies that ensure rapid and real expansion of DOTS throughout the region, including in prisons.
3. Coordinate donor contributions at the regional level to ensure economies of scale and sharing of best practices in TB control.
4. Avoid crowding out of drug spending by salary expenditures to ensure that drug supply is guaranteed and program success rates improve.
PART I

Priorities for Action
CHAPTER 1

Introduction

This study aims at identifying constraints for implementation of appropriate programs to control TB in Central Asia, and suggest strategies to achieve the global TB targets in case detection and cure rates. The study makes recommendations for the Bank’s policy dialogue and operational work in this area. It also aims at contributing to build a regional partnership between Governments, civil society, UN agencies, and multilateral and bilateral agencies that have been working on TB control in the region.

The study was carried out in the context of the sector work on HIV/AIDS, sexually-transmitted diseases and TB that the Bank has been undertaking in Central Asia since 2001 to address the impending epidemiological crisis that has been posed by the sudden increase in cases of HIV/AIDS infection combined with a prevalent epidemic of TB. These studies are based on a review of existing statistics and reports and on intense consultation of key stakeholders—Governments, NGOs, and donors—in Central Asia.

Box 1: TB Study Objectives

The specific study objectives are the following:

- Assess progress towards achievement of the global targets for 2005 for case detection (70 percent) and treatment success (85 percent) aiming at reducing TB prevalence and mortality;
- Identify constraints in achieving the global targets, including those related to allocation and use of resources, program implementation and management, and other health system issues; and
- Estimate the potential negative impact of the epidemic on the economy in the medium-term.
The HIV/AIDS and Tuberculosis Country Profiles were developed to inform Bank management and other stakeholders about the main characteristics of the epidemics in the region, to describe differences among the countries; and to develop an understanding of the main issues related to the prevention of HIV/AIDS and the control of TB. The Central Asia AIDS Study aimed at identifying strategies for ensuring early and effective intervention to control the AIDS epidemic in Central Asia at national and regional levels, considering priorities based on global evidence. A mapping study was carried out to identify the main corridors for transport of people and goods, especially illegal drugs, and regional epidemiological hotspots for HIV/AIDS, STIs, and TB in Central Asia (Godinho and others 2004; Godinho and others 2005; Renton and others 2004).

The TB situation in some Eastern European countries has been extensively studied over the last 10 years, since incidence began to increase with the breakup of the Soviet Union and related economic and social problems. This Study focuses on a region that has not been as extensively covered in the intervening years as, for example, the Russian Federation.

The study is an input for understanding the past, present and potential future evolution of the TB epidemic in Central Asia and the behavior of TB Programs in four countries: Kazakhstan, the Kyrgyz Republic, Uzbekistan, and Tajikistan. Turkmenistan was not included in this study due to the difficulty in collecting data in this country, and carrying out the consultative process with civil society and public agencies that was undertaken in the other four countries.

The Study undertook two reviews:

**Box 2: TB and HIV/AIDS Study Objectives**

Taken together, the Central Asia TB and HIV/AIDS studies are expected to:

- Inform civil society, Government counterparts, Bank management and partner organizations about the epidemics and necessary actions that need to be taken in the short- to medium-term to prevent HIV/AIDS and control TB;
- Inform the Bank’s policy dialogue and operational work to control HIV/AIDS and TB in Central Asia; and
- Contribute to strengthening the regional partnerships between Governments, civil society, UN agencies, and multilateral and bilateral agencies to prevent these diseases.

**Review of TB Programs in Central Asia.** This review aimed at answering study questions regarding achievement of global targets, role of prisons, constraints to DOTS implementation, and the institutional capacity to implement DOTS and control TB. It reviewed TB Program implementation by Ministries of Health and in prisons, in each country, including political commitment, surveillance, training, diagnosis and treatment, supervision, and monitoring and evaluation. The review updated the data included in the TB Country Profiles and further analyzed data on TB Programs in Central Asia.
Review of TB Program Resources. This assessment aimed to evaluate from a financial and economic point of view the overall performance of public TB programs. The specific objectives were:

1. To analyze the importance of Government and donor contributions for controlling TB in Central Asia.
2. To assess the performance of different regions (Oblasts) and hospitals according to inputs.
3. To evaluate the structure, dynamics and distribution of TB funds within and among oblasts.
4. To determine the importance of TB losses in the regional economies.
5. To benchmark the performance of the four republics vis-à-vis key indicators in other regions of the world.

The study team visited Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan in 2003 and 2004 to collect data, carry out field visits and consult key stakeholders. Information for the study was collected from multiple sources. In January 2003, a standard questionnaire was sent to Ministries of Health, Justice, Interior, and Finance of the Central Asian Republics. Results of the questionnaire were analyzed and integrated in the review study. In addition, data were requested from all donors active in the region regarding their programs and financing for TB programs. The Study also reviewed existing statistics and reports from official sources and from partner organizations (WHO, USAID, Project Hope, and Médecins sans Frontières, among others). Followup visits were arranged in each country to discuss preliminary results and collect missing information. During the team visits, TB/AIDS workshops were organized in which representatives of Ministries of Health, Finance, Interior, Justice, and Education participated. The workshops discussed the main issues identified by this and other Central Asia TB/AIDS studies. Roundtable meetings with non-governmental organizations (NGOs) and donor agencies were also organized. Finally, the study was reviewed by Ministries of Health and TB Institutes in Central Asia before publication.

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**Box 3: TB Study Questions**

The study questions were the following:

1. How likely is Central Asia to achieve the global targets for 2005 for case detection (70 percent) and treatment success (85 percent) aiming at reducing TB prevalence and mortality?
2. What is the role of prisons in fueling the TB epidemic and contributing to increasing rates of MDR-TB?
3. What are the constraints to appropriate implementation and expansion of DOTS programs in Central Asia?
4. Do these countries have the necessary institutional capacity to prevent and control these diseases? What are the main weaknesses of TB services?
5. What are the resources available and necessary to control these diseases? And
6. What is the potential economic impact of the epidemic?
The study has certain limitations. It only analyzed secondary data, and the quality of these data is uneven. In addition, as observed when the Bank reviewed data from Europe and Central Asia for the Millennium Development Goals, data for the same indicator varies significantly according to source. This makes comparisons of regional data and data from other countries particularly difficult. Data provided by TB Institutes for the study differed from data reported to WHO and other organizations. Denominators are not always consistent, with population data based either on census figures or UNDP estimates. In this study, Country Profiles rely on data provided through the study structured questionnaires, while the overview chapter also refers to data reported by WHO.

Most of the epidemiological and financial information requested was available but three main problems were observed. First, data are not standardized (for example, budgetary figures), something that made it difficult to make comparisons among countries. Second, the absence of key indicators at the oblast level, such as cure and mortality rates in Tajikistan, affected the generation of a regional, input-outcome econometric model initially considered. Finally, the complete absence of out-of-pocket payment information and the partial availability of TB costs limited economic estimates.

This is however the first study that brings together epidemiological and financial data on tuberculosis from four countries in Central Asia. Despite data limitations, the dissemination of the study and discussion of proposed key actions with regional Governments, NGOs, and international organizations (especially WHO, KfW, and USAID/CDC) will provide an additional opportunity for continuation of the policy dialogue in this area. The study will be helpful for further research in the region, further development of a Regional Partnership on TB proposed by WHO, and as a background for potential operations to assist further control of TB in the region. Other organizations—such as WHO, IUTLD, and Green Light Committee—that have a comparative advantage in addressing difficult TB issues, such as MDRTB and impact of different TB control programs, may want to further investigate issues raised by the study, and follow up on recommendations regarding additional studies.

This report is organized in two sections. The first part briefly reviews the TB situation globally and in the Former Soviet Union (FSU), which shares many of the characteristics of the epidemic and control strategies with Central Asia. It analyzes the main issues identified by the study in the four Central Asian countries studied; discusses the implications of the assessment for Central Asia TB Programs and its operations; indicates which of the identified issues can be dealt with additional technical and financial support, and those that would require additional external support; and makes recommendations for action. The second part of this study, the Country Profiles, reviews the epidemiological and financial situation in each country in detail, and makes country-specific recommendations to improve the performance of TB Programs in Central Asia.

The Global TB Epidemic

The resurgence of the TB epidemic has become one of the major challenges for public health professionals worldwide, especially in developing countries, where about 84 percent of TB patients live. Most of the TB patients are poor people between 15 to 54 years of age. WHO estimates that one third of the world’s population is currently infected with TB. The global incidence rate of TB is growing at approximately 0.4 percent per year, but the growth in new cases is much more marked in countries of the Former Soviet Union.
Drug resistant tuberculosis is on the rise, greatly increasing the cost of treatment. Multi-drug resistant tuberculosis (MDRTB) has already been identified in over 100 countries, and more than 400,000 estimated new cases of MDRTB develop each year. These MDRTB cases are up to 100 times more expensive to treat than drug-sensitive TB.

As tuberculosis is the most frequent opportunistic infection associated with AIDS, about a third of the 36 million people who are infected with HIV worldwide are co-infected with TB, and more than 10 percent of patients with sputum smear-positive pulmonary TB are HIV-positive. Therefore, there is a growing recognition of the need for increased collaboration between TB and HIV programs to provide a coherent health service response to the dual epidemics. Increased coordination will yield benefits for more effective and efficient surveillance, training, drug supply, and case management (Maher and Mikulencak 1999).

In 1993, the World Health Organization (WHO) considered tuberculosis (TB) a global emergency and started a worldwide effort to curb the epidemic through the implementation of a strategy called Directly Observed Treatment, Short-Course (DOTS; Uplekar 2002). Once patients with infectious TB have been identified using microscopy services, health and community workers and trained volunteers observe and record patients swallowing the full course of the correct dosage of anti-TB medicines during six to eight months. The most common anti-TB drugs are isoniazid, rifampicin, pyrazinamide, streptomycin and ethambutol. Sputum smear testing is repeated after two months and five months to check progress, and again at the end of treatment. A recording and reporting system documents patients’ progress throughout the treatment process and its final result.

### Box 4: DOTS Strategy

Implementation of a program that includes directly observed treatment, short course—the DOTS Strategy recommended by the World Health Organization—is the cornerstone of successful treatment and control of a TB epidemic. DOTS combines five elements:

- Political commitment;
- Microscopy services;
- Sustainable drug supply;
- Surveillance and monitoring systems; and
- Use of highly effective standard regimes with direct observation of treatment.

### Box 5: DOTS Results

Since DOTS was introduced in 1995:

- Over 10 million infectious patients have been successfully treated.
- In half of China, cure rates among new cases are 96 percent.
- In Peru, widespread use of DOTS for more than ten years has led to the successful treatment of 91 percent of cases and a reduction in incidence of new cases.
- Globally, DOTS programs would have to treat an extra 360,000 smear-positive patients each year to reach 70 percent case detection by the end of 2005.
This Study has assessed the likelihood of Central Asian countries achieving in the near future the global targets for TB control, which have been ratified by the World Health Assembly.

In addition, in 2000, world leaders agreed at the Millennium Summit on an ambitious agenda for reducing poverty and improving lives, the Millennium Development Goals (UN 2000). For each goal one or more targets have been set, mostly for 2015, using 1990 as a benchmark. A framework of 8 goals, 18 targets and 48 indicators to measure progress towards the Millennium Development Goals (MDGs) was adopted by a consensus of experts from the United Nations Secretariat, OECD, IMF and the World Bank. Under Goal 6: Combat HIV/AIDS, malaria and other diseases, Target 8 aims at halting by 2015 and beginning to reverse the incidence of malaria and other major diseases—including tuberculosis. The MDG Indicators that are relevant for TB control are the following:

MDG Indicator 23. Prevalence and death rates associated with TB;
MDG Indicator 24. Proportion of TB cases detected and cured under DOTS.

TB in the Former Soviet Union

Tuberculosis continues to be a major public health problem in countries of the Former Soviet Union (FSU). In 2002, 404,628 cases of tuberculosis (5 percent of the global TB burden) were reported in Europe and Central Asia, with large variation in prevalence rates among three areas (WHO 2002):

- 14 cases per 100,000 population in Western countries (the 15 countries of the European Union plus Andorra, Iceland, Israel, Malta, Monaco, Norway, San Marino, and Switzerland);
- 54 cases per 100,000 in Central European countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Former Yugoslav Republic of Macedonia, Poland, Romania, Slovakia, Slovenia, Turkey, and Yugoslavia); and
- 97 cases per 100,000 in the 15 countries of the Former Soviet Union (FSU).

Rates were highest among men, with greater sex differences in countries with higher reporting rates. Among cases never treated, the proportion of multi-drug resistant tuberculosis (MDRTB) cases was much higher in FSU countries and Eastern Europe than in Western European countries. The risk of spreading resistant TB throughout the European region and beyond became a major concern.

In most Western and Central European countries, stable or decreasing TB reporting rates and low levels of drug resistance indicate that TB control remains overall effective.
Table 1. Key Global TB Epidemiological and Financial Indicators

<table>
<thead>
<tr>
<th>Epidemiological Indicators (World)</th>
<th>MDG Target</th>
<th>Target Year</th>
<th>Estimate 2003</th>
<th>Change, Reference Year to 2003 (%)</th>
<th>Reference Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOTS case detection (%)</td>
<td>70</td>
<td>2005</td>
<td>45</td>
<td>+7.5</td>
<td>2002</td>
</tr>
<tr>
<td>DOTS treatment success (%)</td>
<td>85</td>
<td>2005</td>
<td>82 (2002 cohort)</td>
<td>0.0</td>
<td>2001 cohort</td>
</tr>
<tr>
<td>Incidence rate (per 100,000 per year exc HIV)</td>
<td>falling</td>
<td>2015</td>
<td>129</td>
<td>+0.6</td>
<td>2002</td>
</tr>
<tr>
<td>Incidence rate (per 100,000 per year inc HIV)*</td>
<td>140</td>
<td>2002</td>
<td>+1.0</td>
<td>2002</td>
<td></td>
</tr>
<tr>
<td>Prevalence rate (per 100,000 exc HIV)</td>
<td>half 1990 level</td>
<td>2015</td>
<td>240</td>
<td>-22</td>
<td>1990</td>
</tr>
<tr>
<td>Prevalence rate (per 100,000 inc HIV)</td>
<td>245</td>
<td>1990</td>
<td>-21</td>
<td>1990</td>
<td></td>
</tr>
<tr>
<td>Mortality rate (per 100,000 per year exc HIV)</td>
<td>half 1990 level</td>
<td>2015</td>
<td>24</td>
<td>-12</td>
<td>1990</td>
</tr>
<tr>
<td>Mortality rate (per 100,000 per year inc HIV)</td>
<td>28</td>
<td>1990</td>
<td>-1.6</td>
<td>1990</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Financial Indicators (High-burden countries) (US$ millions)</th>
<th>Estimate 2005</th>
<th>Change 2002–2005 (%)</th>
<th>Reference Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total costs of TB control</td>
<td>1321</td>
<td>+49</td>
<td>2002</td>
</tr>
<tr>
<td>NTP budgets for TB control</td>
<td>741</td>
<td>+79</td>
<td>2002</td>
</tr>
<tr>
<td>Total funding available for TB control</td>
<td>1202</td>
<td>+36</td>
<td>2002</td>
</tr>
<tr>
<td>Government (excl. loans)</td>
<td>982</td>
<td>+26</td>
<td>2002</td>
</tr>
<tr>
<td>Loans</td>
<td>56</td>
<td>+102</td>
<td>2002</td>
</tr>
<tr>
<td>Grants (excl. GFATM)</td>
<td>55</td>
<td>+29</td>
<td>2002</td>
</tr>
<tr>
<td>GFATM</td>
<td>109</td>
<td>NA</td>
<td>2002</td>
</tr>
<tr>
<td>Funding gap as reported by NTPs</td>
<td>119</td>
<td>+34</td>
<td>2002</td>
</tr>
<tr>
<td>Costs per patient (US$) (median values)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cost</td>
<td>213</td>
<td>+22</td>
<td>2002</td>
</tr>
<tr>
<td>NTP budget</td>
<td>133</td>
<td>+45</td>
<td>2002</td>
</tr>
<tr>
<td>First-line drugs budget</td>
<td>28</td>
<td>-12</td>
<td>2002</td>
</tr>
</tbody>
</table>

*Inc HIV: Including HIV + TB patients: MDG Indicators for TB exclude HIV + patients, but these statistics are also useful in TB control.
NA: not applicable; funds first distributed in 2003.
In Western countries, cases of foreign origin represent a high and increasing proportion of TB cases. By contrast, the 61 percent increase in TB reporting rates between 1995 and 2000 in the FSU suggests increasing TB incidence, although in some countries it may be also be a sign of improved reporting. Increasing incidence and high levels of drug resistance suggest a reduced performance of TB control programs in a time of socio-economic hardship. These trends and the possible negative impact of the spreading HIV epidemic over TB rates demand urgent action to strengthen TB control programs in the FSU.

The economic disruption that followed the breakdown of the FSU has been disastrous for TB control. After the disintegration of the Soviet Union, unemployment, deterioration of the social situation, disruption of social support to marginalized populations and internal migration created the ground for an increase in tuberculosis. In addition, state funding for health systems decreased significantly. Drug supply became erratic and resources allocated for TB control, including supervision and monitoring, decreased dramatically. In the case of Tajikistan, several years of civil war further aggravated the epidemic.

Low educational level and income, imprisonment, homelessness and overcrowding, unemployment, smoking, alcohol consumption, shortage of food, and contact with TB patients have been identified as the most important risk factors for the spread of TB in a post Soviet setting (Tekkel and others 2002).

Shilova and Dye (2001) studied the increase of TB in Russia, where the notification rate of all new TB cases increased by 7.5 percent per year and the death rate by 11 percent per year from 1991–1999. Approximately 120,000 new cases and 30,000 deaths were reported in 1999. With a mathematical model describing the deterioration in case finding and cure rates, the authors replicated the average rate of increase in incidence 1991–1999. In addition to these programmatic factors, the authors considered that enhanced transmission due to the mixing of prison and civilian populations and an increase in susceptibility to disease may explain the increase in the number of TB cases in Russia.

**TB in Prisons**

In all FSU countries, about 10 percent of prisoners suffer from tuberculosis. In the Russian Federation, one-third of tuberculosis patients have a history of imprisonment. TB Projects in the Russian Federation, the Caucasus and Kazakhstan have shown that case notification in prisons is 20–50 times higher than among the general population. Estimates of notification rates are clearly influenced by relatively small numbers, but even so the rates are staggeringly high compared to those among the civilian population.

TB and MDRTB are rampant in prisons due to overcrowding, malnutrition, and lack of sufficient drugs. Most prisons house more prisoners than the system can adequately handle, and prisoners have to take turns sleeping because of an insufficient number of beds. Windows often are kept closed to keep the wind, cold and sand out. Prison cells are thus overcrowded and not ventilated. Walls and bed linens are often damp. This is the perfect environment for transmission of tuberculosis. Prison health services have always been under-budgeted, and treatment has been inadequate for years, leading to high rates of drug and multi-drug resistance. The increased number of drug users infected with HIV that are incarcerated complicates the problem further, and prisons may face in the near future an increasing difficulty in treating HIV/MDRTB cases.
Prisons used to be part of Stalin’s labor production network and were self-sufficient as income-generating entities. After the breakup of the FSU, the network disappeared and so did the income. Prisons are under-funded, resulting in poor maintenance, poor hygienic conditions, insufficient food, and limited availability of drugs. Prisoners are malnourished. The irregular availability and use of TB drugs has created an enormous drug-resistance problem. Prisons are considered to be an “epidemiological pump” posing a threat to the community at large (Council of the Baltic States). When infected and ill, prisoners expose prison staff and visitors, and after release, put the general population at risk. In the Russian Federation, for example, in the late 1990s an estimated 130,000 prisoners moved in and out prison annually.

**MDRTB.** Multi-drug resistant tuberculosis, or MDRTB, (*M. tuberculosis* resistant to at least the two major drugs, isoniazid and rifampicin) is a major problem in the region. MDRTB is difficult and expensive to treat and has a high mortality rate. Throughout the FSU, MDRTB in newly diagnosed patients has been reported at 11–14 percent, while MDRTB in previously treated patients is estimated to be 35–45 percent.

**TB/AIDS**

The TB epidemic will be complicated by the growing HIV/AIDS epidemic. In Eastern Europe and Central Asia, which is the region that has experienced the fastest growing epidemic in the world, HIV was initially concentrated among injecting drug users (IDUs).
However, there are signs that the infection has been spreading to other groups through sexual transmission, due to the rise in commercial sex work in many countries in the region. A large proportion of prisoners are incarcerated for drug-related crimes. A high frequency of intravenous drug use among prisoners puts them at high risk of HIV infection. Since HIV infection among IDUs has been rapidly increasing, it can be expected that HIV prevalence in the prison system will continue to increase. In an environment in which individual immunity is low because of insufficient nutrition, lack of hygiene, mental stress, and HIV, airborne transmission of TB and MDRTB is high, the risk of dual infection is significant.

**TB Control in the Former Soviet Union**

The Former Soviet Union established a disease-oriented, vertical approach for clinical and public health management of infectious diseases. This was in line with what happened in the rest of the world. But while Western countries understood that control strategies had to be driven by genuine outcome data, the FSU persisted in achieving predetermined input targets, even if these were not realistic. There is however no doubt that before the breakdown, the Former Soviet Union was relatively successful in combating infectious diseases, notably tuberculosis.

In the Former Soviet Union, two structures have been involved in TB control. The first is the clinical-oriented, vertical structure of TB dispensaries, hospitals and sanatoria. This used to be a highly specialized service with well-trained and highly skilled professionals that were responsible for TB diagnosis and treatment of both adults and children. The service was based on population screening, either by x-ray (fluorography) or tuberculin skin testing, patient management with prolonged treatment supported by extensive radiological examinations, frequent bacteriologic control by culture and extensive followup after the end of the treatment. For surveillance purposes, patients were divided in seven major categories with subdivisions.

The second structure is the Sanitary and Epidemiological Services (SES). This department of the Ministry of Health tracks outbreaks of disease by surveillance of notification of many infectious and non-infectious diseases, and supports public health actions to curb further transmission of disease. It provides infection control in clinical settings, but also contact-tracing or defaulter retrieval in public health settings, and disinfection activities where infectious patients have been detected. The SES is still a powerful department in many FSU countries, which determines to a large extent infection control strategies. Surveillance, often regulated to minute details by law, is a domain that is not easily given up when new strategies with new monitoring demands—such as the DOTS Strategy for TB control—are introduced.

**The FSU Approach to TB Control versus the DOTS Approach**

The implementation of the WHO-recommended DOTS Strategy in the FSU is still controversial. The relatively simple DOTS Strategy, and its reputation as a strategy for low-income countries, made Soviet-trained TB doctors suspicious. Doctors see DOTS as too simplistic an intervention, and therefore put on DOTS programs only patients that are not
severely ill, but are reluctant to use the new approach for all patients. The result is two kinds of patients: DOTS patients and non-DOTS patients. Theoretically, the non-DOTS patients are also treated adequately (perhaps less efficiently, but not necessarily less effectively), but this is difficult to judge, since these patients are not evaluated and entered into DOTS registers. This is one of the main reasons for the lack of reliable data in the region. The main difference between the two strategies resides in the management of the disease (Table 2).

The FSU Strategy centers on the patient. Early diagnosis makes treatment easier, and progress is measured based on complete repair of affected tissues. Patient management decisions are clinical decisions, looking at cavity closure on the chest x-ray. The DOTS Strategy targets the infectious patient as a source of transmission, and looks at treatment as prevention of further transmission. Treatment aims at killing the infecting organism (*M. tuberculosis*) and patient management decisions aim at the disappearance of the mycobacterium from the sputum.

In the traditional FSU model, surveillance is process-oriented, while DOTS surveillance is outcome-oriented. The use of ineffective and costly population-based screening, long treatment duration with costly hospital-based clinical interventions, and frequent BCG vaccinations are the drawbacks of the FSU Strategy.

The WHO strategy, aiming at infectious (sputum smear positive) cases, and implemented through donor driven pilot projects, where only new cases are included in the DOTS program to demonstrate its potential success, leave more than half of the patients (children, smear negative and extra-pulmonary adult cases and sometimes recurrent cases) without treatment. There is an urgent need for a context-specific discussion on these issues, resulting in clear guidelines for National Tuberculosis Programs, as well as for donors (Cox and Hargreaves 2003).

<table>
<thead>
<tr>
<th></th>
<th>FSU Approach</th>
<th>DOTS Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Finding</td>
<td>Mass screening</td>
<td>Symptomatic</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>X-Ray</td>
<td>Microscopy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(X-Ray and culture)</td>
</tr>
<tr>
<td>Treatment</td>
<td>Individual</td>
<td>Standardized</td>
</tr>
<tr>
<td></td>
<td>(3–5 drugs)</td>
<td>(3–5 drugs)</td>
</tr>
<tr>
<td>Classification</td>
<td>7 categories</td>
<td>3 (+1) categories</td>
</tr>
<tr>
<td>Reporting</td>
<td>Case-finding</td>
<td>Case-finding</td>
</tr>
<tr>
<td></td>
<td>Monthly and annually</td>
<td>Treatment outcome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quarterly</td>
</tr>
<tr>
<td>Vaccinations</td>
<td>2–4 times</td>
<td>(At birth)</td>
</tr>
<tr>
<td>Isolation</td>
<td>Hospital</td>
<td>Ambulatory</td>
</tr>
<tr>
<td></td>
<td>Sanatorium</td>
<td>(Hospital)</td>
</tr>
<tr>
<td>Surgery</td>
<td>Routine</td>
<td>Rare</td>
</tr>
<tr>
<td>Contact Investigation</td>
<td>Routine</td>
<td>(Routine)</td>
</tr>
</tbody>
</table>

(Interventions in parentheses are only carried out when deemed necessary.)
TB Control in Prisons

In the past, Ministries of Interior had authority over the prison sector in the FSU under the principle that the State had to be protected against criminals. In recent years, most CIS countries have handed this responsibility to Ministries of Justice under the principle that criminals deserve punishment. The penitentiary system has a similar structure throughout the FSU: police cells, pre-trial detention centers (SIZO), post-trial prisons with different regimes of punishment, colonies (used to be labor camps), and settlements. The latter are places where prisoners and their families live without public budget support, but with movement restrictions. Prisoners in this situation are called banned people.

All prisoners entering a detention center (pre-trial) or prison (post-trial) are examined at entry. TB screening is part of the examination, but x-ray machines used for screening are not functional anymore in many countries in the region. In facilities where DOTS has been introduced, microscopy has replaced x-ray screening (fluorography). The prison system relies in many instances on the services of the Ministry of Health. This raises the issue of payment from prisons to civilian laboratories.

Prisoners identified as having TB are transferred to a prison TB hospital, while the followup phase takes place in a TB Colony. TB evolving during detention should be detected either by self-reporting or regular monitoring, but the latter does not take place routinely. Self-reporting is influenced by potential immediate gains in the short term for the prisoner, as it has been reported in prisons throughout the FSU. If conditions in a TB hospital or colony are better than conditions elsewhere (better nutrition, easier regime), the prisoner may fake TB to get into such an institution (for example, by getting sputum from an infected prisoner); if that is not the case, the prisoner may hide the symptoms. This complicates case detection and treatment in prisons.

MDRTB Control

The treatment of MDRTB is costly (US$5,000–$8,000 per patient, as compared to US$50–80 per normal patient); lengthy (18–24 months as compared to 6–8 months under DOTS); and clinically difficult due to adverse reactions and interactions of the 5–7 drug combination used to treat multi-drug resistant cases. WHO has developed a modified DOTS strategy for diagnosis and treatment of MDRTB called DOTS Plus (WHO 2003). It has all the elements of the DOTS strategy, including standardized treatment regimens and adapted case monitoring, but it uses second-line drugs, which are much more expensive and difficult to use than the first-line drugs used to treat patients without resistant strains. To curb the high prices of second line drugs, an international Green Light Committee (GLC) has been established that assesses a country’s TB control performance and, if found satisfactory, will give clearance to buy drugs at a greatly reduced cost (90 percent of the cost on the open market).

The reasoning of international organizations to restrict treatment for MDRTB is well understood, as anarchy in treatment regimens with first-line drugs has resulted in multi-drug resistance. Standardization and good practice in TB control are needed before engaging in a new and more difficult strategy. However, this may not be the right approach in the Former Soviet Union. Governments are under enormous pressure to treat MDRTB and chronic cases. When these cases were primarily among marginalized populations, their
predicament could be ignored. Yet, the increase in cases of multi-drug resistance made it a problem for the general population.

Second-line drugs are available in pharmacies and patients buy them. Doctors face the ethical dilemma to ignore this fact or help patients as much as they can. As patients are not able to afford all the necessary drugs, or since only a few drugs are available in the market, the situation is very risky. In sum, the MDRTB situation is similar to the situation for non-resistant TB in the mid-1990s: anarchy in treatment regimens, eventually leading to “super” multi-drug resistance.

**TB/AIDS**

Although it has been experiencing the highest growth rate in HIV cases in the world, the FSU has been slow in taking action to prevent the epidemic. The number of cases with dual infection of HIV and TB is still very small, and therefore clear policies and guidelines to provide care for these cases have not yet been developed in the region.
Tuberculosis is one of the major causes of death and disability in Central Asia. Each year the economies of the region incur productivity losses and direct costs as a result of the disease estimated by the study to range from 0.5 to 0.8 percent of GDP. The decline in living standards that followed the break up of the Soviet Union led to a rapid increase in TB, but in turn the lack of resources limited the countries’ capacity to respond to the epidemic. All four countries assessed in this study are politically committed to meet the global targets for TB control and the Millennium Development Goals by 2015. However, given the problems they are facing, it is highly unlikely that these goals can be reached without additional international support, particularly in what concerns case detection. Case detection in Central Asian countries was estimated by WHO to be around 40 percent in 2002, while treatment success rates ranged from 78–82 percent for those patients that had been treated under the DOTS strategy.

This study assessed the TB situation in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. Kazakhstan, the largest of the five Central Asian republics, is rich in natural resources and is home to a diversity of ethnic groups. With a population of 15 million people and a territory of more than 2.7 million square km, travel distances are enormous. The Kyrgyz Republic is a mountainous country with the smallest area and population in Central Asia. It is also one of the poorest. Tajikistan is the most disadvantaged of the Central Asian Republics: it has a mountainous terrain and arable land is scarce, it has limited resources and few transportation links. Ravaged by several years of civil war it is the poorest country in the region. The country’s 1,200 km long border with Afghanistan has rendered it an important route for the drug trade. Uzbekistan, with a population of 25.3 million, is the most densely populated of the five Central Asian Republics (CAR).
The countries in Central Asia share a history of seven decades under Soviet rule. Despite cultural and ethnic differences, these countries shared the same politics and policies. The whole conglomerate of newly independent states experienced the same economic downfall that lasted at least a decade. However, the development of Central Asian countries after independence has been occurring at a different pace. Table 3 shows that there are vast differences in income per capita (range US$180–1,510). Some Central Asian countries have found new opportunities, for example Kazakhstan through high oil prices. Tajikistan, however, lags far behind after the lengthy civil war. Although all countries show an increase in their GDP, the Kyrgyz Republic and Tajikistan have benefited only from a very small increase, and remain very poor countries.

Poverty is widespread in the region—from 28 percent of the population in Uzbekistan to 80 percent in Tajikistan live below the poverty line. Consequently life expectancy is low. Although Kazakhstan is the country with the highest per capita income, Uzbekistan with a much lower per capita income reports the lowest poverty rate. Uzbekistan is also the most densely populated country in the region, with half of the region’s population. This suggests that economic hardship in this region was only one of the contributing factors for an increasing TB epidemic. Population density varies from 5.4 in Kazakhstan to 60 per square km in Uzbekistan. This has implications for people’s access to health care and other social services.

The downturn of the economy has led to a general deterioration of public services in Central Asia, as it did throughout the Former Soviet Union. Before 1995, the Central Asian health care system was based on the “Semashko” model, with medical services provided free-of-charge. In the 1990s, health-budget deficits and lack of incentives for providers have led to an inefficient system. Two main common challenges for these countries are the

<table>
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<th>Table 3. General Country Data 2002</th>
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<tr>
<td>Kazakhstan</td>
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<tr>
<td>Population</td>
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<tr>
<td>GNI per capita (US$)</td>
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<tr>
<td>GDP (billion US$)</td>
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<td>GDP growth (%)</td>
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<tr>
<td>Surface (thousands km²)</td>
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<tr>
<td>Population/km²</td>
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<tr>
<td>Population growth (%)</td>
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<tr>
<td>Poverty (%)</td>
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<tr>
<td>Life expectancy in years</td>
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<tr>
<td>Oblasts (#)</td>
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<tr>
<td>Rayons (#)</td>
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</tbody>
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poor state of primary health care and growing rates of TB, STIs, HIV/AIDS, and other infectious diseases. Health care systems must respond to these urgent health needs despite low and in some cases, unsustainable funding. They have done so by announcing policies intended to upgrade primary care, fully or partially legalizing user charges, reducing hospital beds, and developing reform programs aiming to create more integrated health services. However, progress in health care delivery reforms has been slow. Specialized hospitals (including TB hospitals) were an integral part of the Soviet model and mergers with general hospitals have been difficult to achieve. Hence, transfer of resources from these hospitals to active outpatient treatment has been slow. However, the health systems present in Central Asia are becoming more diverse as reforms in the region in the past few years have moved at different pace and took different directions.

The Kazakh health care delivery system is divided into three levels of care: primary, specialized and highly-specialized care. PHC is delivered in feldsher-midwife and feldsher stations (FAPs and FPs), rural hospitals, rural physician’s ambulatories (SVAs) and rayon polyclinics in rural areas, and city hospitals, polyclinics, and family medicine ambulatories (SVAs) in urban areas. Specialized health care is delivered in central rayon hospitals, consultative-diagnostic polyclinics, city and oblast hospitals, rayon/city/oblast dispensaries (generally without beds). Highly-specialized care is provided in clinics, republican hospitals, national centers, and scientific research institutions, most of which are based in Almaty with the exception of a few located in some oblasts. Public health services of the country are provided by the sanitary-epidemiological services. The health care delivery system varies across different regions by a number of parameters, such as level of consolidation of funding and management functions, amount of resources for funding the guaranteed benefits package allocated per capita, provider payment methods, and PHC structure. This situation considerably obstructs the implementation of the national health protection policy ensuring equity and accessibility of state guarantees for all.

In Kazakhstan, there are huge distances between villages and primary health care points, and significant variation in the quality of health services between urban and rural areas. Health care development involved uncontrolled increases in the numbers of medical staff and hospital facilities. Hospitals spend 75–85 percent of the available funds for the health sector, while primary health care services (PHC) receive only about 10–15 percent of the overall budget. An average physician’s salary amounts to only about half the average salary in the country and is insufficient to meet even the most basic needs, such as housing and food. For this reason, many qualified health staff leave the profession, and those who remain lack motivation. The management structure is very centralized, with little community involvement and participation.

Efforts are underway to decentralize the administration and introduce new payment systems that encourage professionals to provide efficient and effective health care. A reform program aiming to reduce the number of hospitals and hospital beds by shifting the priority to the PHC system has been piloted in some areas in Kazakhstan. Reforms in medical education have introduced the concept of family practice and training of general practitioners. More than 1,000 family doctors have been already trained. In addition, the Kazak School of Public Health has been established, and has started providing training in health policy, management, economics and other related areas for health managers. One of the priorities is the strengthening of the private health sector.
The MANAS Health Care Reform Program, prepared in 1994–95 in collaboration between the Government, WHO and donors, examined the health status of the Kyrgyz Republic and identified priorities for health sector reform. The MoH has been implementing the health sector reform program supported by the World Bank through two projects covering the period 1996–2006.

The first Kyrgyz Health Project supported the MANAS Health Care Reform Program and aimed at improving the health of the population, the effectiveness and efficiency of the service delivery system, the access to quality care, and financial viability of the system. Implementation of the DOTS approach was included in the TB control subcomponent of the PHC component. This subcomponent was essential for the MoH to start implementing DOTS in 1996 and expand it throughout the country by October 1998 (with exclusion of prisons, which were under a different ministry and were not included in the project). The second Kyrgyz Health Project has been supporting countrywide expansion of the health reform measures piloted during the first project. Further DOTS implementation has been only indirectly addressed by the second project, through the public health component and its sub-components of health protection and health promotion. The MoH and the Bank have now started the preparation of a Sector Wide Approach Program (SWAP) to continue reform efforts in social sectors.

The Kyrgyz Republic introduced contracting based on output-based provider payment systems encouraging providers to become more efficient and accountable. An integrated model of primary care (based on the model of family medicine) has been introduced throughout the country. Utilization of primary care, especially among the poor, has continued to grow in the last few years. Vulnerable groups have benefited under the reforms since they no longer have to make out-of-pocket payments. Public health reforms are only in their first phase. These focus on rationalizing and streamlining the functions of the Sanitary and Epidemiological Services. These efforts will have to be continued. TB and HIV/AIDS will require targeted interventions and cross-sectoral collaboration.

After the end of the civil war, Tajikistan started investing heavily on refurbishment of social services with support from several agencies, including the World Bank and the Aga Khan Foundation. Primary health care is being developed, with a strong focus on community involvement. Investments have been made in TB infrastructure. In Tajikistan, the delivery of health care services is divided among four administrative levels: national, regional, district, and village. The Ministry of Health runs national level institutions, and local administrations run other health care services. Primary health care doctors tend to diagnose and refer onwards rather than undertake treatment themselves. However, there is a training program for family physicians (general practitioners) that aims at increasing the role of primary care. Specialized dispensaries are numerous in Tajikistan since many disease categories (STIs, TB, oncology, and drug addiction) are treated separately. The hospital stay in these dispensaries is typically long: TB hospitals admit patients for several months. In addition to the Ministries of Health, Environment, Agriculture, Irrigation and Water Supply play a role in delivering public health services in Tajikistan. The Sanitary Epidemiological Services responsible for prevention, control, and monitoring of infectious

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2. The MANAS Healthcare Reform Program, prepared in 1994–95 in collaboration between the Government, WHO and donors, examined the health status of the Kyrgyz Republic and identified priorities for health sector reform.
diseases are unable to perform these functions due to the breakdown of the country’s infrastructure and the closure of many SES laboratories.

At the end of the 1980s, Uzbekistan was left with a dilapidated and inefficient health care structure inherited from the Soviet Union. In Uzbekistan health service delivery is devolved primarily to the regional (oblast) and municipal (rayon in rural areas) facilities, although some services continue to be delivered vertically through Republican facilities (primarily for tertiary and specialized care) and a “parallel” system for employees of certain ministries (defense, external affairs) or enterprises (mining). These parallel systems are being integrated within the larger MoH-run system of care, with a few exceptions such as in the Navoi region. Delivery is still dominated by large, specialized inpatient facilities, although gradually primary health care is being strengthened. Currently the financing and organization of health service delivery involves multiple levels of government and institutions. The State has maintained its role as overseer of the health sector through the Cabinet of Ministers (COM), who is responsible for the direction of the health system reforms and national health priorities with their decisions ultimately approved by the President. The role of organizing and managing the health system is the responsibility of the Ministry of Health (MoH). The Ministry of Finance (MoF) approves and allocates budgets for health care, financed from general government revenues, based on a set of input norms (such as number of beds, and staff slots). The budget at the facility level is provided in four categories, down from about 18 line items previously. There is also some limited flexibility now to reallocate and carry over funds into the next fiscal period.

Discussions and negotiations between the Government of Uzbekistan, the World Bank and USAID regarding primary health care reforms began in 1996. In early 1998, USAID started providing technical assistance in this area through the ZdravReform Project (now known as the ZdravPlus Project). In 1999, a five-year Bank loan of $30 million, which complemented the USAID project, was approved. The Uzbek Health I Project focused on restructuring primary health care in rural pilot areas comprising three components: strengthening the quality of services, training of GPs and community nurses, and developing new finance and management mechanisms. USAID and DFID provided most of the technical assistance, while the Bank loan financed equipment and materials. This Project was recently closed and a follow up project has been approved for implementation in the period 2005–2010. The Uzbek Health II Project includes a Public Health Component, which in turn includes subcomponents on TB and HIV/AIDS control.

In recent years, the Governments of Central Asia have been actively introducing the DOTS Strategy to reduce the burden of disease caused by TB. Many international agencies have stepped in to provide financing for TB National Programs, or drugs and supplies that are critical to meet the challenge. These efforts are having an important impact on the prevalence of TB throughout the region, and are likely to contribute to reducing the burden of disease in Central Asia.

This chapter presents the results of the assessment of TB Programs in Central Asia carried out by this study. It is structured into three sections. The first section analyzes epidemiological data of the region. The second section describes the TB Control programs and their differences. The third section analyzes the financial and institutional issues governing TB control in the region and looks at differences across countries. Among others, the section evaluates public spending, the contribution of international donors and the outcomes achieved in both the prison and the hospital system.
Epidemiology of TB in Central Asia

The TB situation in Central Asia reflects the general pattern of the tuberculosis epidemic in the Former Soviet Union in the late 1980s and 1990s, as poverty, malnutrition, overcrowding, and unemployment became widespread in these countries. Central Asia reports the highest TB death rates in the Former Soviet Union. Every year there are over 50,000 new cases of TB in the region. The notification rate per 100,000 ranged from 160 in Kazakhstan to 61 in Tajikistan in 2003, but given the similarity in notification cases in the mid-1990s, it is likely that all five countries share the same epidemiological development. HIV/AIDS is increasing in the region and, if no early action is taken, this will fuel a dual epidemic, as TB is the main opportunistic infection of AIDS. Sluggish health sector reform, lack of resources and qualified staff, underdevelopment of the laboratory network, and a high level of primary multi-drug resistance (MDRTB) have made TB control a major problem in the region. This is now aggravated by the fast growing HIV epidemic.

Notification

In the 1990s, all five Central Asian countries, except Kazakhstan, had notification rates of 40–50 per 100,000 population. Kazakhstan reported about 80 cases per 100,000. Between 1997 and 2000, an increase in notification was observed in Kazakhstan and the Kyrgyz Republic. TB cases almost doubled in the Kyrgyz Republic between 1994 and 1998; notification in Kazakhstan continued to increase at around 20 percent for the next two years, until both countries started to level off in 2001 (Figure 3). In 2001, the notification rates per 100,000 in

Figure 3. TB Notification Rates in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan 1990–2002

Kazakhstan (178) and in the Kyrgyz Republic (133) were significantly higher than in the Russian Federation (89), and incomparable with Western Europe (for example, United Kingdom 12).

Kazakhstan has the highest notification rate of all Central Asian Republics. Since independence in 1991, the tuberculosis notification rate has more than doubled, from 65 per 100,000 population in 1991 to 160 in 2003. The increase in annual case notification rates between 1991 and 2002 is likely to reflect increased case detection and improved reporting. In 2003, for the first time notifications decreased, which may indicate that Kazakhstan has reached the plateau of its epidemic.

Among the four countries evaluated, the Kyrgyz Republic has the second highest notification rate of TB, with a 19 percent increase in notifications since 1998. However, most of it occurred in the first three years after DOTS implementation and can be seen as the result of

<table>
<thead>
<tr>
<th>Country (thousands)</th>
<th>Number</th>
<th>Rate</th>
<th>Number</th>
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<th>Rate</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
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<td>178</td>
<td>9,452</td>
<td>61</td>
<td>22,519</td>
<td>146</td>
<td>10,127</td>
<td>65</td>
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<tr>
<td>Kyrgyz Republic</td>
<td>6,613</td>
<td>131</td>
<td>1,587</td>
<td>31</td>
<td>7,176</td>
<td>142</td>
<td>3,229</td>
<td>64</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>4,052</td>
<td>65</td>
<td>687</td>
<td>11</td>
<td>8,769</td>
<td>109</td>
<td>3,046</td>
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<tr>
<td>Turkmenistan</td>
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<td>77</td>
<td>1,254</td>
<td>26</td>
<td>4,507</td>
<td>94</td>
<td>2,028</td>
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</tr>
<tr>
<td>Uzbekistan</td>
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<td>80</td>
<td>4,783</td>
<td>19</td>
<td>26,079</td>
<td>101</td>
<td>11,735</td>
<td>46</td>
</tr>
<tr>
<td>Russia</td>
<td>128,873</td>
<td>89</td>
<td>27,865</td>
<td>19</td>
<td>182,166</td>
<td>126</td>
<td>81,309</td>
<td>56</td>
</tr>
<tr>
<td>UK</td>
<td>6,889</td>
<td>12</td>
<td>1,365</td>
<td>2</td>
<td>7,023</td>
<td>12</td>
<td>3,151</td>
<td>5</td>
</tr>
</tbody>
</table>


Kazakhstan (178) and in the Kyrgyz Republic (133) were significantly higher than in the Russian Federation (89), and incomparable with Western Europe (for example, United Kingdom 12).

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Among the four countries evaluated, the Kyrgyz Republic has the second highest notification rate of TB, with a 19 percent increase in notifications since 1998. However, most of it occurred in the first three years after DOTS implementation and can be seen as the result of
improved case finding and reporting. In 2003, 6,172 TB patients were registered, a small
decrease of 1.7 percent as compared to 2002, but it is premature to confirm a downward trend.

The notification rate of TB in Tajikistan is the lowest in the Central Asian Republics.
This reflects low case detection and under-reporting rather than good results. Patients have
less access to diagnosis and treatment due to lack of free TB drugs, diagnostic services,
difficult terrain and conflict.

Uzbekistan has a serious tuberculosis problem. In 2003, a slight decrease of 1 percent
in notification was observed for the first time, but the change is too small to be of any
significance. Future years will show if an epidemiological plateau has been reached. Given
the ongoing DOTS implementation and expansion, it is likely that notifications will con-
tinue to increase.

As previously mentioned, data reported by WHO in its annual report, differ from
data that the countries have provided for this study. There are two possible explanations
for this: 1) data were given to WHO before validation, while the study received revised
data; 2) WHO uses UNDP estimates for population to calculate rates, and the MoH may
have used more recent census figures. Uzbekistan reported similar notification rates to
WHO and this study. However, Kazakhstan reported 178 to WHO, and 165 for the study;
the Kyrgyz Republic reported 131 and 126; and Tajikistan reported 65 and 53, respectively.

WHO also estimates the real case detection rate, which gives an indication of the validity
of case detection and subsequent notification rates. The Kyrgyz Republic has a detection
rate of 92 percent, which is good. Uzbekistan detects an estimated 89 percent of cases, and
Tajikistan 60 percent. However, if Kazakhstan would report according to WHO guidelines,
it notification rate would be 146 and therefore much closer to neighboring countries. This
suggests that over-diagnosis may explain these differences.

The initial increase in Kazakhstan just preceded the introduction of DOTS in 1998,
and therefore may not be attributed to increased case detection. The continued increase of
case notification in Kazakhstan in 1999, after DOTS implementation, may have been
caused by the rapid introduction of the program, the sudden ample supply of TB drugs
where there had been serious shortages in previous years, and delayed training in the new
strategy, combined with a lack of supervision, all leading to over-diagnosis of cases or
inclusion of chronic cases that were reported as newly treated.

In the Kyrgyz Republic, the introduction of DOTS was more gradual, with training
preceding implementation, and therefore notification is probably more reliable. In
Uzbekistan, and later on in Tajikistan, notification increased after the beginning of DOTS
implementation, which may have been due to the improved surveillance system and
increased trust of patients in the health system. Tajikistan may reach high rates similar to
other Central Asian countries once full DOTS coverage has been reached.

When comparing the notification of sputum smear positive cases, Kazakhstan does well
with an estimated detection rate of 93 percent, but the Kyrgyz Republic, despite its good DOTS
program, only detects 49 percent of cases, Uzbekistan detects 41 percent, and Tajikistan 23 percent.
The latter low figure is the result of late and still limited introduction of the DOTS strategy in
Tajikistan. As a comparison, Russia detects 34 percent of cases, and the UK 43 percent.

Given the similarity in notification in the mid-1990s, it is likely that these countries share
the same epidemiological development. If this is true, one may assume that the present level
of incidence rate in Central Asia is similar to the rate in the Kyrgyz Republic: 120–130 per
100,000. In Kazakhstan, authorities are worried about the steep increase in notification (25,000
new cases every year). Improved diagnostic procedures, excluding non-TB cases, and improved surveillance excluding chronic cases, will contribute to a better understanding of the epidemiological situation. In Uzbekistan and Tajikistan, rates are expected to continue increasing in the near future. These are important assumptions for planning TB control activities.

**Age and Gender**

In Kazakhstan and Uzbekistan, 50 percent of patients are between 15 and 34 years. This suggests that half of the patients in Central Asia are in the age group 15–34, which is the most productive age group from an economic point of view. In Kazakhstan and Uzbekistan, more men than women suffer from TB: the male/female ratio in these countries is 1.3 and 1.4, respectively. This is a consequence of increased risk among groups such as alcoholics and homeless people, which usually are mainly male. However, it cannot be excluded that in some traditional settings in Central Asia, women have less access to health care than men. This issue needs to be further investigated.

**Mortality**

As with notification, mortality rates in Central Asian countries in the early 1990s were similar at around 10 per 100,000. From 1992 onward, mortality rates increased in Kazakhstan and the Kyrgyz Republic, although much more in the first country (up to 37 per 100,000) than in the second (up to 16 per 100,000) (Figure 4). In both countries, a decrease in mortality followed the introduction of DOTS, again more drastically in Kazakhstan, which can be interpreted as an early sign of a successful strategy implementation. It is not clear,

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**Figure 4. TB Mortality Rate in Central Asia per 100,000 Population 1990–2003**

![Graph showing TB mortality rates in Central Asia from 1990 to 2003.](source: Central Asia TB Institutes 2003.)
however, why Kazakhstan has a much higher mortality rate than the Kyrgyz Republic, given that the epidemics are similar. In the Kyrgyz Republic, the mortality rate stabilized just above 12 per 100,000, which is similar to the death rate in Uzbekistan. This may reflect the region’s true level of mortality by TB. Lower rates in Tajikistan are most likely a reflection of poor registration.

The Kazak TB mortality rate increased more than three times from 1990 to 1998, becoming one of the highest in the Eurasian region at 38 per 100,000 in 1998. During the period of 1998–2001, death rates have declined by 36 percent. This significant decrease in mortality is an early sign that the TB control program has been successful.

It is tempting to speculate why the Kazak mortality rate was three times higher than in neighboring countries. There are no indications that different risk groups were involved. Kazakhstan is a relatively rich country and, although roughly one-third of the population lives below the poverty line, this is a small proportion as compared with the Kyrgyz Republic and Tajikistan. In addition, CDC assisted the establishment of an electronic data collection system, and closely supervised data collection and reporting, which makes the possibility of an error unlikely. Mortality continued to be notified by SES as well, as it always used to be, and this parallel system was not influenced by changes in the TB control notification system. This would suggest that other countries in the region are under-reporting TB mortality. However, this review has not found any reasons to suspect that the other three countries are under reporting TB mortality data through the SES system. Therefore, we assume that the significant increase in TB mortality in Kazakhstan prior to DOTS implementation was genuine, although a good explanation for this is lacking. It is however a good sign that after DOTS implementation, a rapid decrease in mortality has been observed.

CDC calculated how many lives were saved since the introduction of the DOTS strategy in Kazakhstan (Figure 5). If the increase in mortality had continued as between 1994 and 1998, in 2001 9,200 deaths would have occurred. The DOTS strategy between 1998 and 2001 has therefore prevented 13,392 deaths.

Mortality more than doubled in the Kyrgyz Republic between 1991 and 1997, but in 1997 there was an unexpected high mortality rate because of the inclusion of data from the prison system. If that particular year is ignored, mortality increased between 1991 and 1994 by 61 percent and has been relatively stable since then. In 2003 and 2004, mortality was 11.8 and 11.4 per 100,000, respectively, which is slightly less than in previous years.

The mortality rate in Tajikistan is low as compared to other countries in the region, but this may be the result of incomplete reporting. An increasing trend may have occurred between 1998 and 2002, and the low rate in 2003 would suggest a reversal of this trend. Yet, the high rate in 2002 may have been insignificant, in which case mortality has been stable in recent years.

The TB mortality rate in Uzbekistan increased by 20 percent between 1995 and 2003. It peaked in 2001, with an increase of 30 percent between 1995 and 2001, and a decrease of 8 percent between 2001 and 2003. This may be an early indication that the DOTS strategy has been successful.

**MDRTB**

Surveys in Kazakhstan, Kyrgyz Republic, and Uzbekistan show results similar to other FSU countries: MDRTB in newly diagnosed patients has been reported at 11–14 percent, while MDRTB in previously treated patients would be 35–45 percent.
In Kazakhstan, data have been collected through the CDC electronic data collection system, which is well supervised and therefore should be considered reliable. It can be assumed that, on average, a quarter of all patients detected have an MDRTB strain, which has serious implications for TB control strategies and for the TB budget. According to a national Drug Susceptibility Testing (DST) survey, primary MDRTB was estimated at 9.7 percent in Kazakhstan, while the acquired MDRTB was estimated at 18.3 percent (TB Research Institute 2002). According to CDC, based on routinely collected data of 13,854 bacteriologically confirmed patients, 23.5 percent previously treated patients ($N=3,930$) had MDRTB between 2000–2002 (Favorov 2004).

In 2002, drug resistance data were collected by the Kyrgyz National TB Center. In 525 strains of new patients, MDRTB was present in 13 percent; and in 113 strains of previously treated patients, MDRT was present in 46 percent. Resistance to isoniazid and streptomycin was high: respectively 34.5 percent and 61.3 percent in new cases; and 73.5 percent and 81.4 percent in previously treated cases. There is no information on the representativeness of these data, but overrepresentation of difficult patients that are followed at the TB Institute is likely. Low failure rates among treated patients suggest lower overall resistance.

There is no information on the level of MDRTB in Tajikistan, but it may be assumed that it is lower than in neighboring countries, given that for a number of years during the civil war the country was out of TB drugs. Support for this assumption may be found in the relatively low failure rates (8.5 percent) in DOTS pilot areas (HOPE 2003).

Given the results of DST in neighbouring countries, it may be assumed that MDRTB in Uzbekistan in new cases is of about 10–15 percent and in previously treated cases
35–50 percent. In the autonomous Republic of Karakalpakstan, MSF has conducted a drug susceptibility testing (DST) survey in collaboration with a reference laboratory in Germany. According to the results of this survey, primary MDR was as high as 13 percent and acquired MDR was 40 percent. As a result of this survey, MSF started a pilot in MDRTB treatment, with a cohort of 100 patients.

**TB/AIDS**

Although HIV/AIDS infection is considered to be still at a low level in Central Asia, it is increasing at an alarming rate: from less than 140 cumulative cases up to 1996 to over 12,000 cases in 2004. At the end of 2004, 4,702 cases had been reported in Kazakhstan, 655 in the Kyrgyz Republic, 119 in Tajikistan, and 6,862 in Uzbekistan. Data on HIV/AIDS refer to reported cases, but none of the countries has yet established sentinel and second generation surveillance.

Kazakhstan is the most affected country in the region. HIV is also on the rise in the Kyrgyz Republic, as the country is a transport route for illegal drugs. About 85 percent of HIV positive cases are IDUs. In 2000, sentinel surveillance found an HIV prevalence of 12–19 percent among IDUs in Bishkek and 32–50 percent in Osh. According to the National AIDS Centre, 10 percent of HIV positive people are also co-infected with TB. Around 40,000 injecting drug users have been identified in Tajikistan. HIV prevalence is estimated at about 4 percent in this group, which is the largest risk group for HIV transmission, although heterosexual transmission has been increasing. No information is available on patients co-infected with HIV and TB. It is expected that in 2005, there will be over 10,000 HIV positive people in Uzbekistan.

The number of cases with dual infection of tuberculosis and HIV is still very limited (Table 6). However, it may be expected that the number of TB/AIDS cases, including MDRTB, will increase with the rise in HIV prevalence.

In Central Asia, Governments have established AIDS Centers that have started implementing evidence-based strategies for prevention and control of HIV/AIDS. These efforts are mostly donor-funded. However, young IDUs at risk are difficult to reach by the health care system, and their status is often identified only when they are incarcerated.

A simple modeling exercise based on data from Kazakhstan indicates that without interventions a steep increase in the number of TB/AIDS cases among 20-year-olds may be observed in the near future. This rough estimate assumes a 1 percent annual risk of infection and that the number of HIV cases doubles every year. It demonstrates that an appropriate TB control program would reduce new cases by 10 percent annually, and a

<table>
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<tr>
<th>Table 6. HIV and TB/AIDS Cases in Central Asia</th>
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<tr>
<td>HPV/AIDS cases</td>
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<td>% TB/HIV co-infection</td>
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*Source: Central Asia AIDS Centers and TB Institutes 2004.*
Figure 6. Increase of TB/HIV Dual Infection among 20 Years-old in Kazakhstan

![Graph showing the increase of TB/HIV dual infection among 20 years-old in Kazakhstan. The graph illustrates the impact of different intervention strategies on the percentage of TB/HIV coinfection. The strategies include no intervention, 10% decline in TB control per year, halving the increase in HIV control, and both interventions.]()

Source: Estimates based on data from Kazakh MoH.

A prevention strategy can reduce the annual increase in HIV cases by half. However, if both TB control and HIV prevention programs were successfully implemented, the proportion of cases with dual infection would decrease in the fourth year (Figure 6).

**TB in Prisons**

Estimates of notification rates of TB in prisons are clearly influenced by relatively small numbers, but even so the rates are staggeringly high compared to the civilian population. The TB notification rate in Kazakhstan has been decreasing, but it was still high in 2004. The epidemiological profile in prisons indicates that between 1997 and 2001 (especially after 1999) all rates declined. The number of new cases, for instance, fell 45 percent in the five-year period. Even more dramatic is the 85 percent reduction in the mortality rate between 1998 and 2002. These impressive outcomes are the result of an improved political commitment and extended DOTS coverage in prisons.

In Kazakhstan, where data may be considered the most reliable in Central Asia, mortality rates are four times higher in prisons than among the general population. Mortality rates are high despite the official policy to discharge prisoners who are about to die for ‘humanitarian’ reasons. This policy improves prison statistics, but contributes to increased transmission of the disease.
Prisons are one of the most critical elements of the TB epidemic in the Kyrgyz Republic, despite the reported substantial reductions in total cases and mortality rates in recent years. The Penitentiary system notified 3,830 cases per 100,000 in 2002, 2,947 in 2003, and 2,875 in 2004. It is however difficult to ascertain how rates are calculated. Based on the reported absolute numbers, this study estimates that it may be as high as 5,559 and 5,594, respectively in 2002 and 2003. The number of deaths by TB is alarming. Including prisoners in SIZOs (pre-detention centers), the total number of fatality cases was 122 in 2003, which results in a rate of 904 per 100,000. But in previous years mortality rates were twice as high, which may indicate that introduction of DOTS in prisons has resulted in a reduction of TB mortality. Estimates indicate that about 5 percent of prisoners are released before completion of treatment. In the first 9 months of 2003, 26 inmates with TB were released while still on treatment and information about them was sent to the National TB Center. There is however no information on the outcome of their treatment.

In Tajikistan, according to a survey undertaken by the Ministry of Health (MoH) up to 78 percent of patients who die from TB come from prisons. As expected, the cumulative effects of poor investment in prisons has had a negative effect on TB outcomes:

1. With the prison population almost doubling in the period from 1998 to 2003, the number of TB deaths in prisons jumped from 8 cases in 1998 to 73 in 2003, which is an almost ten-fold increase. Therefore, in this period TB mortality rate among prisoners has increased from 129 to 658 deaths per 100,000 prisoners.
2. The total number of active TB cases has also increased progressively. For the same period, the coefficient escalates from 370 cases to 732, while the proportion in the total population remained stable (from 6.1 percent to 6.6 percent).
3. The number of new TB cases also doubled, increasing from 192 to 399 cases between 1998 and 2003.

On average, 2,146 new TB cases appear in Uzbek jails each year, representing 3.7 percent of this population. The percentage of prisoners with TB has risen from 9 percent to 15 percent in the period 1998–2003. These results suggest inadequate TB treatment, a low share of effectively treated persons and/or a high rate of failure. The variations are not sufficient to conclude that there is a trend reversal. However, the constraints under which these results are obtained suggest that better outcomes could be achieved if more resources were allocated to the sector.

| Table 7. TB Notification and Mortality in Prisons in Central Asia 2003 |
| --------------------------------- | ------- | ------- | ------- | ------- |
| Kazakhstan | Kyrgyz | Tajikistan | Uzbekistan |
| Notification of TB cases | 2,137 | 753 | 399 | 1,387 |
| Notification rate | 1,937 | 2,947 | 3,600 | 3,208 |
| Mortality rate | 90 | 904 | 658 | NA |

Source: Central Asia Ministries of Justice; Ministry of Interior of Uzbekistan 2004.
**MDRTB in Prisons**

A recent survey in prisons in Kazakhstan shows that 1 out of 3 new cases and 1 out of 2 cases of recurrent TB suffer from MDRTB (KNCV 2003). This coincides with what has been observed in other FSU countries (Baltic countries, Ukraine, Russia, Moldova), where levels of resistance in prisons are invariably much higher than among the general population, with rates of over 50 percent being reported. This has consequences for treatment regimens.

Given the high proportion of prisoners that have been treated for a previous episode of TB and lack of treatment records in many cases, re-treatment of all prisoners with five drugs could be considered. However, one of the drugs is streptomycin, for which levels of resistance may be as high as 70 percent in the general population. Alternative regimens are needed, and the international community of TB control experts should reach a consensus on how to deal with this difficult issue.

**TB/AIDS in Prisons**

In general, prisons report a high number of HIV/AIDS cases, which have not been included in official figures reported by AIDS Centers. According to prison statistics, in Kazakhstan, 3 percent of prisoners are infected with HIV or have already developed AIDS, while in Tajikistan 8 percent are infected. These figures may be under or over-estimated, as proper testing is often lacking, especially in Tajikistan. None of the penitentiary departments in Central Asia has developed strategies to deal with the TB/AIDS dual epidemic.

In 2001, Kazakh prisoners accounted for 25 percent of registered HIV/AIDS cases, suggesting a prevalence of HIV of 0.5 percent. However among 11,117 screened incarcerated IDU, the prevalence was 3 percent. An estimated 30 percent of prisoners are IDUs, so the risk of transmission of HIV through needle sharing or sexual intercourse is enormous. No data are available on the prevalence of dual infection with TB and HIV. But in a population where 10–20 percent of the prisoners suffer from TB, the prevalence of TB infection among inmates must be well over 50 percent. This raises the possibility that at least half of HIV positive prisoners

<table>
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<th>Table 8. MDRTB in Prisons in Central Asia in 2002 (%)</th>
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<tbody>
<tr>
<td>Kazakhstan</td>
</tr>
<tr>
<td>Cases never treated</td>
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<tr>
<td>Cases previously treated</td>
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*Source: KNCV Tuberculosis Foundation 2003.*

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<th>Table 9. TB/HIV Cases in Prisons in Central Asia 2003</th>
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<tr>
<td>Kazakhstan</td>
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<tr>
<td>TB/HIV cases</td>
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</table>

*Study estimate.*
have also been infected by TB. A rough estimate of about 400 HIV infections suggests that about 200 prisoners may be co-infected with TB and HIV. In the Kyrgyz Republic, a large proportion of inmates (70 percent) are drug users, of which 80 percent use drugs intravenously.

**TB Control in Central Asia**

*Government Commitment*

All Central Asia Governments have expressed strong commitment to control TB, and have officially adopted the DOTS approach. In Kazakhstan, a Presidential Decree called for nationwide implementation of the WHO-recommended strategy. This is the only country in Central Asia that finances anti-TB drugs from the state budget. The Kyrgyz Government considers TB control a priority, and it was the first Central Asian Republic to adopt DOTS as the national TB control strategy. In Tajikistan, political commitment for DOTS implementation is also high, as demonstrated through the approval of an order in 2002 endorsing the main components of DOTS strategy and creating a central TB team. Another order approved an eight year strategic Development Plan (2002–2010). There has also been growing Government commitment for TB Control and implementation of the DOTS Strategy in Uzbekistan. All official decrees on TB support the DOTS Strategy. In 2001, the Parliament passed a law on population protection from TB that provided a systematic approach to TB interventions, including the provision of free treatment to the entire population at inpatient, outpatient and sanatorium facilities.

***TB Services***

TB control services are still provided through a vertical system in Central Asia. Despite the partial introduction of DOTS, TB control in Central Asia is organized according to FSU structures. Figure 7 shows the structure of the Kyrgyz National TB Program, which is similar to the structure of TB Programs throughout the region. A separate TB service operates in all countries, with a National TB Institute defining policy and being the main recipient of public funds. At regional level (Oblast), and often at district level (Rayon), TB hospitals provide inpatient treatment, although at rayon level, TB Dispensaries mainly provide ambulatory care.

In all countries, primary health care (PHC) services have become involved to a variable extent in the identification of patients and delivering treatment to ambulatory patients. The new model includes the establishment of polyclinics where various specialists provide primary health care. Such polyclinics have a TB Cabinet with a TB specialist and in some cases, depending on size, a microscopy laboratory. In Uzbekistan, Family Welfare Centers may have a laboratory, depending on the size of the catchment population, but have no TB cabinets, and general practitioners (GPs) are expected to carry out early case finding and provide support to patients in adherence to treatment.

The National Tuberculosis Institute (NTBI) is the main policy body for TB control in Kazakhstan. Its Director is the NTP manager, and deputies supervise aspects of the TB control program: epidemiology, treatment, MDRTB, laboratory management, and drug procurement. The NTBI houses the country’s MDRTB treatment unit and the National Reference Laboratory. The system is replicated at oblast and rayon level. The NTBI supervises activities at the Oblast TB Hospital level, while the Oblast TB Coordinator, often the Director of the Oblast TB Hospital, supervises the rayon level. Patients self refer either to PHC
Figure 7. Organizational Chart of the Kyrgyz National TB Program

polyclinics or directly to the TB Dispensary. Initiation of treatment takes place in TB hospitals or TB dispensaries with inpatient facilities. Chronic cases can be admitted in sanatoria, although the number of sanatorium beds has decreased in recent years.

In the Kyrgyz Republic, the total number of TB institutions has been declining over the last six years. In 2003, there were five hospitals and TB-related institutions in the Kyrgyz Republic. These five Republican institutions are: the National TB Center (NPC) in Bishkek, the Cholpon-Ata Hospital, the Shekhaftar Hospital, the Issyk-Kul Hospital and the Kyzil-Bulak Hospital. The NPC is based in Bishkek and the Director is the National Coordinator for TB. In addition, there are three City Children Antituberculosis Clinics, bringing the total number of beds to 370. The Kyrgyz Republic has nine administrative units (oblasts), including 45 smaller administrative units (rayons). Each of the oblasts has a TB Dispensary with an inpatient department (the stationary center) and an out-patient department (the ambulatorium center). TB dispensaries, originally located in all rayons, have been reduced from 22 in 1999 to 17 in 2003. Additionally, recent changes have included the integration of TB Cabinets into Family Health Centers. If a TB patient needs inpatient treatment, he or she may go to either the Oblast TB Hospital or Rayon General Hospital. The whole system had 360 TB physicians by 2003, an increase of 50 posts in relation to 1998 (310 physicians). The NTBI has 74 doctors, out of which 51 doctors are full-time staff, and 104 nurses, out of which 88 are full-time appointments.

Tajik TB services include the National TB Center in Dushanbe, three regional TB Centers, and 5 city and 50 district TB facilities. The TB system physical infrastructure also needs considerable investment of resources. The TB hospital system comprises 26 hospitals with 2,270 beds. The number of hospital facilities has remained fixed, while the number of TB beds has grown by 2 percent in the last six years. In 2003, the average hospital capacity was 88 beds. Throughout this period, TB Dispensaries and labs have grown by 8.5 and 13 percent, respectively. TB services are staffed by 245 physicians, of which 136 are TB specialists. Strong measures will be needed to recruit and train new TB staff. Salaries that are extremely low are insufficient to attract new staff, and the average age of TB specialists in the country is 55. The situation with nurses and lab technicians is similar.

Uzbekistan is divided in 12 oblasts, 1 City (Tashkent), and 1 autonomous Republic (Karakalpakstan). A National DOTS Centre has been established, which is housed in the Republican TB Center, but has its own independent budget. The National DOTS Centre is responsible for planning and supervision of TB services. At the oblast level, DOTS Centers act independently from the TB hospitals and are involved in training, supervision and monitoring. These centers oversee the implementation of the TB program. At the rayon level, hospitals/dispensaries are the primary pillars of the TB structure, with some rayons sharing facilities (inter-rayon hospitals). There are over 10,000 beds in TB hospitals. Between 1998 and 2003, the increase in the number of TB hospitals was ten-fold. However, the number of TB Dispensaries fell by 11 units. Presently there is one TB doctor per 1,700 population and every 14 patients.

The infrastructure of the TB services (excluding prisons) is similar in all Central Asian countries. Rates of beds, doctors and dispensaries per 100,000 population vary significantly, but rates per 1,000 patients are closer (Table 10). The number of TB beds averages 570 per 1,000 patients. This is about one bed for two patients, suggesting an average admission of 6 months (if all beds were fully occupied). Given an average admission time under DOTS of 2.5 months, it is easy to conclude that there are twice as many beds as necessary.
The Kazakh TB hospital system had 12,512 hospital beds in 2003, which is one of the highest figures of the region (94.4 beds per 100,000 habitants). Additionally, there are 3,925 sanatorium beds for both adults and children. Together, the supply of beds reaches 121 TB beds per 100,000 persons. The supply of beds is highest in the Aktube Oblast (238 beds per 100,000 inhabitants) and Kzil-Orda Oblast (216 beds), while Almaty City (52 beds) and Astana City (63 beds) have the lowest supply.

In terms of physical inputs, the total supply of hospital beds in the Kyrgyz Republic has decreased between 1998 and 2003, falling from 4,205 to 3,611 beds. Republican institutions account for 21 percent of bed supply, or 750 beds. The largest TB Republican entity is the National TB Center, which accounts for 40 percent of Republican beds (300 units), followed by the Shekhaftar hospital with 20 percent. The other three hospitals have 13 percent each.

In Uzbekistan, the average size of each hospital is 93.4 beds per facility and this figure has been relatively stable over time. In terms of beds per 100,000 habitants, the country had 43 beds per 100,000 in 2003. A similar trend is observed in terms of beds per 1,000 new cases. Ninety percent of TB beds are for adults and 10 percent for children. By oblast, 95 percent of the beds belong to local governments, while the other 5 percent are located in Republican facilities. However, differences among oblasts are considerable. Four oblasts (Karakalpakstan, Fergana, Samarqand, and Andijan) had 43 percent of the beds that existed in 2002. While Karakalpakstan had 21 beds per 1,000 habitants, Bukhara has a coefficient that is almost ten times lower.
It is difficult to determine what should be the norm for the number of TB specialists. If the Kazak standards were adopted, it would be 18 patients per doctor per year. This is very low as compared with the recommended number of patients per general practitioner (2,000–2,500). An analysis of clinical tasks and public health related-activities TB doctors have to perform would allow to determine what should be their annual workload. The number of TB doctors in Tajikistan relative to the population (2.7 per 100,000) is much lower than in the other three countries, although the number of doctors per patient is only slightly lower. This country may run into a shortage of TB doctors given that the detection rate of TB patients will increase with the expansion of DOTS coverage, and the average age of Tajik TB doctors is 55 years. With an average of 73 doctors per 1,000 patients, Uzbekistan has too many doctors.

In what concerns laboratories, the norm is one microscopy laboratory per 50–100,000 population. Tajikistan and Uzbekistan conform to the norm, while Kazakhstan and the Kyrgyz Republic have too many labs. However, patient load and geographical dispersion of the population should be considered before deciding that two thirds of the laboratories are unnecessary and could be closed.

Kazak TB laboratories are organized in a network that consists of three diagnostic levels. At the first level there are smear microscopy centers in rayon TB dispensaries and in primary health care (PHC) facilities. The number of these laboratories has been reduced in the last few years from 700 to 510. There is no clearly defined second, intermediate level, for culture examination. The 20 oblast TB laboratories that perform culture also carry out drug susceptibility testing (DST). There are a number of bacteriological laboratories in general polyclinics that do cultures, but they are not included in the network. The third level laboratory is the National Reference Laboratory (NRL) at the NTBC, which performs smear, culture and DST. The National Reference Laboratory has taken on its role, and the quality of its work has improved greatly with support from CDC. The main TB laboratories in the country have been equipped with binocular microscopes. Prison TB laboratories are only partly incorporated in the network at oblast level. Use of the PHC system for identification of patients suspect of TB and treatment in the continuation phase is still limited. X-ray, fluorography, and digital fluorography are largely reserved for high-risk populations and the penitentiary sector.

The Kyrgyz National TB Center also houses the National Reference Laboratory. It has been certified by the Supranational Laboratory in Borstel (Germany). The reduction in TB labs in the Kyrgyz Republic has been even more dramatic than the reduction in TB Dispensaries, having been downsized from 442 labs in 1998 to 158 in 2003 (65 percent reduction). Further centralization is under consideration. Each Family Health Center has its own laboratory, but not all are able to do sputum examinations. In rural areas, slides can be prepared and fixed by nurses (feldshers), who have received training for this.

In Tajikistan, provision of laboratory services was interrupted due to civil war. The laboratory infrastructure needed to support TB diagnostics, including x-ray equipment, microscopes and reagents, requires almost total renovation. The National TB Laboratory is dysfunctional and the building needs refurbishment. The country thus lacks a reference laboratory, although equipment has been donated by Project Hope. Except in pilot districts, most laboratories are in poor condition. Most premises need repair or modifications, and binocular microscopes and reactive agents are lacking. The NTP plans to establish and/or strengthen 66 laboratories with funding from the GFATM. KfW has provided 50 microscopes, and Project Hope has been training laboratory staff.
Uzbekistan had 289 laboratories in 2004. The National Reference Laboratory undertook quality assurance of oblast laboratories, which in turn oversee the quality of rayon laboratories (sensitivity is 86 percent and specificity is 96 percent). Nine oblast laboratories received new equipment and reagents from KfW, and the Samarkand Oblast Lab received equipment from Project HOPE, but three regions—Fergana Oblast, Navoi Oblast, and Syrdarya Oblast—use the services of laboratories from central polyclinics and SVPs, which have been equipped under the Bank-financed health project. The situation in laboratories in non-DOTS sites has deteriorated during the last 10 years. Laboratories are situated in general hospitals, polyclinics and TB dispensaries, and in general, the laboratory equipment is old and the premises need refurbishment. CDC has established a Laboratory Training Center in the Republican TB Research Institute. Staff from all over the country, including prisons, is currently being trained by Project Hope and CDC.

**DOTS Implementation**

Although all Central Asian countries have introduced the DOTS Strategy for TB control, the extent of its implementation differs across countries. Three of them started several years ago (Kazakhstan, the Kyrgyz Republic, and Uzbekistan), while Tajikistan has started only recently. Uzbekistan influences to a great extent DOTS coverage in the region given the relatively large size of the population. Tajikistan is still largely uncovered. By the end of 2003, only about two thirds of the population of Central Asia was covered by DOTS programs. However, in 2004, over 80 percent was covered, as Uzbekistan reports having covered 90 percent of its population with DOTS programs. These percentages do not include coverage in prisons (Tables 11 and 12).

In Kazakhstan, USAID and Project Hope have been supporting DOTS expansion through six pilot projects. KNCV Tuberculosis Foundation, a Dutch NGO, has been implementing DOTS in prisons in the Pavlador Oblast since 1998 and in three more oblasts.

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<th>Table 11. DOTS Strategy in Central Asia</th>
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<td>DOTS Strategy approved into law</td>
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<th>Table 12. DOTS Coverage in Central Asia 1998–2003 (%)</th>
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<td>1998</td>
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<tr>
<td>Kazakhstan</td>
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<tr>
<td>Kyrgyz Republic</td>
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<tr>
<td>Tajikistan</td>
</tr>
<tr>
<td>Uzbekistan</td>
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<td>Total</td>
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Source: Central Asia TB Institutes 2003.
since 2001. Due to long distances and lack of resources in remote regions, the quality of the TB Control Program may have suffered, particularly on followup of defaulters and direct observation of treatment.

In the Kyrgyz Republic, a pilot DOTS program was established in 1996 in four districts of two regions. After encouraging results from the use of the new approach in new cases of TB—a case notification rate 14 percent higher than in the rest of the country and a treatment success rate of 88 percent in 1996—DOTS was adopted throughout the country in 1998. Since then, 100 percent of the population has been officially covered by DOTS. This expansion was orchestrated through the health sector reform program undertaken by the Kyrgyz Ministry of Health with assistance from the World Bank. More than one third of the primary health care budget from the Bank credit was allocated to TB training, diagnosis and treatment.

In Tajikistan, with direct support of Project Hope, the Ministry of Health successfully implemented DOTS in Dushanbe City and Leninski Oblast in 2002. This covers 13 percent of the population. Intermediate indicators and outcome data suggest that implementation has been successful.

Uzbekistan intended to complete the expansion of the DOTS strategy throughout the country by the end of 2004. This was an ambitious objective—in 2003, only about half of the population was covered by DOTS. However, the MoH claims that in 2004, 90 percent of the population was covered by DOTS programs. KFW and the GDF have been providing first-line drugs to all oblasts. Since 1998, Médecins Sans Frontières-Holland (MSF-H) has successfully implemented a DOTS program in the autonomous Republic of Karakalpakstan and, more recently, in the Khorezm Velayat. However, the DOTS program has not been implemented in the penitentiary sector in those regions. MSF has officially handed over this DOTS project to the Ministry of Health in December 2003, but it will continue to provide support for two years to the DOTS Plus pilot project in Karakalpakstan. Project HOPE and CDC, funded by USAID, implemented DOTS in ten pilot rayons. The Belgian Damien Foundation, financed by KfW, will support DOTS implementation in Buchara, Khaskadarya and Surkhandarya Oblasts. Recently, Tashkent Oblast and Ferghana Valley have been fully covered with KfW support. In addition, the Uzbek Health II Project financed by the World Bank includes funds to expand DOTS to an additional two Oblasts; and the country has obtained in 2004 a grant from the GFATM to further expand DOTS implementation throughout the country.

**Case Finding and Diagnosis**

WHO estimated that only about half of infectious cases were detected in the Central Asian Republics in 2000. Since then, case detection has increased in all CA countries. Bacteriology confirmation of the diagnosis by smear microscopy varied from 19 percent in Uzbekistan to 61 percent in Kazakhstan in 2002. (Table 13). Smear microscopy is the basic bacteriological method for detection of infectious TB cases. However, in Central Asia there is still much reliance on case detection through screening with fluorography.

In Kazakhstan, case finding is still based on annual screening by fluorography or radiology of risk groups, who form a large part of the general population. Children are screened at school entry by tuberculin skin tests. The proportion of sputum smear positives TB cases among all cases notified has increased slightly between 1998 and 2000 and stabilized since then. This indicates a reliable case detection system.
The Kyrgyz Republic is second among Central Asian Republics in incidence of TB, but the TB case notification varies significantly across the country. Staff in some oblasts receive incentives of about US$2.2 per new patient enrolled and treated. Microscopy diagnosis has become routine. Among about 3,000 pulmonary cases reported in 2002, 41 percent were bacteriologically confirmed.

In Tajikistan, the laboratory network was disrupted by the civil war, and only DOTS pilot sites report reliable notification rates.

In Uzbekistan, an indication of the rapid expansion of the DOTS program is the increase in notified cases. In several DOTS areas, an increase of cases was reported, sometimes doubling the number of diagnosed cases as compared to the previous year. This is likely the result of an increased trust in the system due to availability of treatment. Overall, only a quarter of diagnosed cases have their diagnosis confirmed by a positive sputum smear. According to WHO estimates in 2003, only 44 percent of sputum smear positive patients were detected in Uzbekistan. The rate of sputum positive pulmonary patients in relation to the total number of patients is much higher in the regions covered with DOTS than in other regions of the country. In regions where the DOTS strategy has been implemented, it is 45 percent, while in other regions it is 23 percent. In pilot sites, diagnosis is made through sputum smear microscopy where laboratories have been equipped with binocular microscopes and x-ray if available. Fluorography and X-ray screening are routine for high risk groups.

**Table 13. Estimated Percentage of all TB Cases Notified**

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<tbody>
<tr>
<td>Kazakhstan</td>
<td>73.6</td>
<td>55.1</td>
<td>78.8</td>
<td>73.4</td>
<td>80.0</td>
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<td>Kyrgyz Republic</td>
<td>72.4</td>
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<td>Tajikistan</td>
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<tr>
<td>Uzbekistan</td>
<td>58.3</td>
<td>40.1</td>
<td>40.8</td>
<td>38.0</td>
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<tr>
<td>Central Asia</td>
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<td>—</td>
<td>47.0</td>
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<tr>
<td>FSU</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>36.0</td>
<td>—</td>
</tr>
<tr>
<td>Central Europe</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>51.0</td>
<td>—</td>
</tr>
<tr>
<td>Western Europe</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>36.0</td>
<td>—</td>
</tr>
<tr>
<td>Total Europe</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>39.0</td>
<td>—</td>
</tr>
</tbody>
</table>


Limited direct observation of treatment and patient follow up are some of the main programmatic issues in Central Asia.

Due to long distances in Kazakhstan, access to health care facilities for direct observation of treatment during the continuation phase of treatment is limited, and therefore the system heavily relies on inpatient care. The DOTS strategy for treatment has been adapted
to Kazakh guidelines, thus allowing doctors to choose from a variety of standard regimens for which the selection criteria are unclear, and to prolong the intensive phase according to clinical and radiological criteria. This leads to over-treatment. A default tracing procedure has been established; however default prevention mechanisms are lacking.

In the Kyrgyz Republic, primary health care services including feldshers, ambulatory health posts (FAPs) and rural doctors ambulatory health posts (SVAs) have been involved in the TB Control Program and are expected to directly observe treatment and follow up on patients. Default tracing procedures are in place. However, patient adherence to treatment is influenced by high rates of migrant labor.

Tajikistan is still at an early stage of implementation of DOTS. In pilot sites, the TB Control Program has been well integrated into the general health care service. However, resources to follow up patients in the districts are limited. Access to some mountainous regions during winter time is impossible, which hampers adherence to treatment. Health education of patients, their families and the general public is necessary to prevent massive defaulting.

In most DOTS regions in Uzbekistan, general health care facilities are involved in early detection and followup of patients. ‘DOTS corners’ have been established in PHC services and in some policlinics of regions where DOTS has been implemented. In these regions, PHC services deliver treatment to patients in the continuation phase. However, there is a relative high rate of treatment interruption (7–9 percent). Default tracing procedures are weak and need to be strengthened. Resources should be allocated for transport of staff for followup of patients. The International Federation of Red Crescent has started to pilot provision of social support for patients as an incentive, which should be expanded if successful.

**TB Drug Management**

Except in Kazakhstan, TB drugs are mainly financed by donors in Central Asia. From the point of view of TB drug availability and access, Kazakhstan has achieved sustainability in procurement and distribution. But the registration and quality assurance system in place do not ensure good drug quality. TB drug procurement and distribution are the Government responsibility. Since 1998, there has been a steady increase in Government funds allocated for competitive procurement ensuring the availability of all first-line TB drugs to all patients at all levels of health care free of charge. Therefore, there is no shortage of first-line drugs across the country. Kazakhstan has been committed to centralised procurement of TB drugs for its national TB program, but recently decided to decentralise procurement to the oblast level, which may reduce their availability. Second-line drugs are also purchased and distributed. However, prices paid for second-line drugs can be greatly reduced if procured through the Green Light Committee (GLC). TB drugs, including second-line drugs, can be found in private pharmacies.

In the Kyrgyz Republic, TB drugs procured by the MOH are free of charge for TB patients, regardless of their place of residence. TB drugs are procured centrally by the MOH with funding from the World Bank and KfW. The Global Drug Facility (GDF) has provided drugs for 8,000 patients. KfW’s commitment to procure drugs up to 2007 is under discussion. Since 1998, no stock–of TB drugs have occurred.

Tajikistan applied successfully to the Global Drug Facility (GDF), ensuring drug support for DOTS areas countrywide during three years. However, TB services do not have storage and staff capacity to adequately stock the necessary annual supply of TB drugs. GDF drugs
will be distributed in DOTS regions only, but by 2005 the whole country will be covered. TB drugs are delivered mainly to the Tajik Firm “Fabrika,” a private company in charge of preparing 18 types of patient kits (1 kit per category, per phase/per band weight). The average cost per kit prepared is about US$3. This packaging allows easier distribution, management, and conservation of TB drugs. Financial support for this activity comes from Project HOPE.

In Uzbekistan, the MOH relies heavily on international donor support for procurement of TB drugs. The TB drug supply system is a mix of centralized and decentralized procurement and distribution. Supply of the non DOTS areas is the responsibility of local authorities and budgets but due to lack of funding at the local level, the MOH made several central purchases of some first-line TB drugs in recent years. KfW has provided drugs for nine DOTS Oblasts; and GDF has recently provided drugs for other oblasts. Therefore, the whole country has been supplied with TB drugs from 2003 until 2005. Resources should be ensured for regular drug supply and a reserve of drugs for at least two cohorts of patients.

**Recording and Reporting**

The old Soviet notification system continues to be in use throughout Central Asia. CDC has assisted Kazakhstan and the Kyrgyz Republic establishing electronic surveillance case-based management systems (ESCM), but in Kazakhstan the system has been suspended for unknown reasons. WHO laboratory registries have been introduced across the country.

In the Kyrgyz Republic, the standard recording and reporting system is in place. Cohort analysis of treatment outcome is being performed in the civilian sector. Electronic surveillance (ESCM) has been piloted with CDC support since 2002. After training health staff, CDC will handover the management of the system to the MoH.

In Tajikistan, registration forms and registers as recommended by WHO have been prepared and are distributed in pilot districts. However, lack of communication equipment and transport hampers data collection.

In Uzbekistan, in regions where DOTS has been implemented, WHO standard recording and reporting has been introduced. CDC plans to initiate the Electronic Surveillance and Case Management system that was piloted in Kazakhstan and Kyrgyz Republic. However the old SES system is still in place, and parallel reporting by old methods continues.

**Supervision and Monitoring**

Project HOPE developed a monitoring checklist for laboratories, and has been training TB staff across the region in supervision. New checklists have been in use since May 2002.

The Kazakh state budget allocates funds for regular monitoring visits of the NTBC coordinators and of a recently appointed prison coordinator for monitoring visits to the oblasts. However, there is no fund allocation for monitoring visits of the Oblast Coordinator to rayons.

In the Kyrgyz Republic, the National TB Center has a team of supervisors. The Sanitary-Epidemiological Services (SES) has the capacity and is willing to be involved in surveillance and monitoring of the TB Control Program. It has updated guidelines and applied new international standards. WHO has been providing funds for monitoring of DOTS across the country, and Project Hope is also involved in monitoring.

In Tajikistan, district supervisors have to be identified in each region and trained. In addition, there are not enough cars for supervisors, and no budget for recurrent costs.
The Republican TB staff and Project Hope staff conduct joint supervision visits and discuss findings with district staff.

The Uzbek National TB Institute has a team of supervisors that visits oblasts to assess compliance with the old Soviet style guidelines. This is still based on old official regulations. In parallel, a DOTS monitoring system is being established throughout the country. KfW has financed office equipment, vehicles and transport costs to enable Oblast DOTS Centers to carry out monitoring and supervision.

**TB Control in Prisons**

DOTS has been implemented in prisons in Kazakhstan and the Kyrgyz Republic. Tajikistan has nominally introduced it, but has no funds to implement TB control in prisons. Uzbekistan has approved DOTS implementation in prisons in 2004, and is starting its first pilot project. However, Governments in the region have to understand that tuberculosis control in prisons requires more than appropriate implementation of a technical strategy. Issues such as overcrowding in prisons require attention and action for successful control of TB, including changes in the legal system compatible with a human rights approach. There are examples of programs in the FSU where these elements have been considered. For instance, in Kazakhstan and Moldova, a consortium of KNCV and Penal Reform International, has tackled TB as a multisectoral problem. Changes in the penal code and offering of alternatives to imprisonment are decreasing the overcrowding in prisons. This model could be replicated in other Central Asian countries.

Early release through amnesties and regular release of prisoners with TB still under treatment are major concerns, as many prisoners do not report to health facilities after release. The prisons systems in Central Asia rely in many instances on the services of the ministries of health. This raises the issue of payment from prisons to civilian laboratories. As in other FSU countries, prisoners identified as having TB are transferred to a prison TB Hospital, while the continuation phase takes place in a TB Colony.

The Kazakh Ministry of Justice associates the significant decrease in case notification rate in prisons with DOTS implementation, which emphasizes the importance of uninterrupted TB drug supply. Results may not be as good as desirable, however, given the fact that many prisoners had been treated before (probably more than 50 percent) and the proportion of prisoners being released while still on treatment is rather high (30 percent). Despite the approval of an order on monitoring TB control in prisons by the NTBC, the link between health services for the general population, including the Oblast TB Dispensaries, and the prison health services is still weak due to lack of funds.

In the Kyrgyz Republic, penal reform is ongoing, and new legislation has been approved. The DOTS approach was launched in prisons in December 1998. While 10 percent of total prisoners were covered by DOTS in 2001, only 4 percent were covered in 2003. Currently, only one out of three TB prisons follow the DOTS treatment approach. According to a new regulation, prisoners who are ill with TB should be referred to TB dispensaries for continuation of treatment. However, of 1,600 patients released in 2002, only 600 were traced and continued treatment.

In Tajikistan, authorities are eager to start DOTS in prisons. In 2002, the Penitentiary System was transferred from the Ministry of Internal Affairs (MoIA) to the Ministry of Justice (MoJ) as part of the penal reform program. While in 1998 there were 60 prisoners.
per bed, this figure increased to 111 prisoners in 2003, an 84 percent growth rate. In terms of the total number of TB cases during this period, the indicators grew from 37 to 68 TB prisoners per bed.

In Uzbekistan, the Ministry of Interior is responsible for TB control in the penitentiary system. DOTS implementation in prisons has started in 2004 according to a plan developed by the MoI, the National DOTS Center and the MoH, and assistance from WHO. Project Hope has trained some of the staff of the penitentiary sector, and will provide additional technical assistance in 2005; and KfW has provided microscopes. However, diagnosis is still done by radiography, and TB treatment in prisons is limited. On average, there are 2.4 TB prisoners per bed.

No special strategies have been considered to deal with MDRTB and TB/AIDS in prisons in Central Asia. Isolation of MDRTB patients from other patients is not done routinely. Screening for TB in HIV positive patients is not carried out. HIV screening of TB patients is done occasionally, but without asking for consent and without providing counseling. Condom distribution and harm reduction to curb the spread of HIV are hampered by legislation that does not recognize use of illegal drugs and homosexuality in prisons. However, some Central Asian Governments (Kazakhstan and Kyrgyz Republic) have started considering implementing in prisons the whole range of preventive approaches, including methadone replacement treatment for drug addiction, and harm reduction.

### Control of MDRTB

Kazakhstan has recently introduced MDRTB treatment. A Center for MDRTB has been established in the respective National TB Institute. Kazakhstan has not approached the Green Light Committee (GLC) yet, and it is unlikely that at the present state of DOTS implementation the country would qualify for green light for implementation of DOTS Plus, and cheaper second-line drugs.

The Kazakh National TB Program (NTP) has been treating patients with MDRTB since 2000. In 2002, the Government provided second line drugs to cover the treatment of 1,300 patients. In 2003, it planned to expand MDRTB treatment to the entire Republic.

---

**Table 14. TB Control in Prisons in 2002**

<table>
<thead>
<tr>
<th></th>
<th>Kazakhstan</th>
<th>Kyrgyz</th>
<th>Tajikistan</th>
<th>Uzbekistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prison Population</td>
<td>79,000</td>
<td>13,168</td>
<td>9,343</td>
<td>46,000</td>
</tr>
<tr>
<td>Administration</td>
<td>Justice</td>
<td>Justice</td>
<td>Justice</td>
<td>Interior</td>
</tr>
<tr>
<td>DOTS coverage (%)</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TB Beds</td>
<td>—</td>
<td>625</td>
<td>100</td>
<td>2,170</td>
</tr>
<tr>
<td>TB Hospitals</td>
<td>—</td>
<td>3</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>Colonies</td>
<td>—</td>
<td>2</td>
<td>—</td>
<td>3</td>
</tr>
<tr>
<td>SIZOs</td>
<td>—</td>
<td>5</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

*Source: Central Asia Ministries of Justice; Ministry of Interior of Uzbekistan 2003.*
One reason for high rates of resistance is insufficient adherence to treatment. The system reports a default rate of 4 percent. Together with a failure rate of 11 percent and transfer out of 2 percent, the unsuccessful outcome of treatment is 17 percent. The present move towards full implementation of MDRTB treatment, without proper training, supervision or even a plan may result in erratic treatment for these cases, leading to an almost incurable disease.

However, taking into account real and perceived need, the decision of the Kazakh Government to undertake proper MDRTB treatment and establish a Center for MDRTB treatment is sensible. Kazakhstan can afford second-line drugs, while its neighbors cannot, but the country would make significant savings if it had access to lower-priced drugs through the GLC. Anecdotal reports indicate that 60–70 percent of MDRTB cases in Kazakhstan show sputum smear conversion after six months of treatment, but extensive evaluation of the program is necessary.

The Kyrgyz Republic uses the standard definition for chronic cases, which are those that have finished and failed two courses of short course chemotherapy under directly observed treatment. By the end of 2003, about 3,000 chronic cases were registered of whom 1,200 patients were sputum smear positive cases. The National Reference Laboratory collaborates with the supra-national laboratory in Borstel, Germany, which recently awarded a certificate for good quality in culture and drug susceptibility testing to the Kyrgyz Reference Lab. The establishment of a department to treat MDRTB patients has been included in the GFATM grant proposal, to pilot treatment for 90 MDRTB patients. Kyrgyz officials are proposing the establishment of hospices for chronic patients.

WHO has now agreed that the present category II regimen for recurrent cases of TB is not adequate for circumstances in Central Asia. It advises to use a standardized category 4-treatment regimen for recurrent cases, which includes second-line drugs. A community survey of drug resistance is necessary to measure resistance to second-line drugs and detect what drugs can be used. For this, the capacity of laboratories to carry out drug susceptibility testing (DST)—skilled human resources, equipment, consumables—needs to be improved. The use of rapid tests (liquid media, molecular methods) should also be considered.

**TB Hospital Performance**

A critical problem in TB control is overreliance on hospital treatment and the share of resources allocated to TB hospitals across the region. Shifting to the DOTS strategy, which depends more on outpatient than inpatient care, would potentially render half of all beds unnecessary. In this regard, it is critical to analyze the performance of hospitals in the treatment of TB and to attempt to improve program performance. To evaluate hospital performance, two indicators are considered: the average length of stay (ALOS) and the bed occupancy rate (BoR). Hospitals were categorized as efficient or inefficient according to these two indicators (see Country Profiles).

Figure 8 summarizes the results of the analysis. Important differences in TB hospital performance were observed by the study. For example, in Kazakhstan 50 percent of the hospitals were classified as efficient in terms of average length of stay (ALOs) and bed occupancy rate (BOR). However, in the Kyrgyz Republic, which has the second highest TB budget per capita, 75 percent of the TB hospitals were considered inefficient. The other two countries experienced a balanced 20 percent of hospitals judged as efficient and inefficient.
In Kazakhstan, long distances between rural settlements and health services, and the lack of followup mechanisms may justify the high number of beds and utilization of hospital beds. If this premise is accepted, the overall performance of the hospital system in Kazakhstan is quite satisfactory. Except for Kazakhstan, the rule is the existence of a low share of hospitals in efficient positions. In effect, in most countries, efficient hospitals represent between 20 and 25 percent of tertiary institutions.

**Treatment Outcome**

Success rates ranged from 78 percent in Kazakhstan to 86 percent in Tajikistan in 2002. These data need, however, to be interpreted with caution. First, the evaluation pertains to totally different cohorts. In Kazakhstan, data refer to the entire country, while in Tajikistan it comes from only two pilot DOTS projects. Secondly, in pilot projects cohorts may be constructed according to the DOTS strategy, but in a countrywide report, cohorts may still be constructed according to FSU definitions. In the FSU system, cohorts had a different definition and patients were included in the analysis in a different way. Closure of cavity had to be proven by roentgen tomography.

In Kazakhstan, cavity closure is reported in 70 percent of pulmonary cases, and bacteriological conversion in 89 percent of cases. Cure rates for smear positive patients are based on negative smears at the end of treatment, but deaths are excluded from the denominator (and in some facilities, MDRTB cases are also excluded), increasing cure rates in such a way that it does not allow for comparisons with rates from countries that use WHO definitions. Often the proportion of cases adds up to over 100 percent, indicating that not only do the cohorts differ from international standards, but also that cohort analysis is not well understood.
The case fatality rate is similar in all DOTS programs, either countrywide or in pilot projects, except in Tajikistan where the case fatality is relatively high. Failure rates differ. The high rate in Tajikistan must be viewed against the small number of cases evaluated. The relatively high rate in Kazakhstan compared to Uzbekistan and Kyrgyz Republic does not tally with the results found by drug resistance testing (DST).

In the Kyrgyz Republic, with the exception of the first year of DOTS implementation (1998), 96–99 percent of the notified new sputum smear positive cases have been evaluated. Success rates are over 80 percent. In recent years, the proportion of failure cases has been increasing. In re-treatment cases, the success rates have been 73–76 percent (except in 1998). An unsuccessful outcome has been relatively high, caused by failure rates and defaulter rates of 6–9 percent. Prisoners are at high risk of infection and have a high probability of death. In net terms, positive performance indicators in 2002 have deteriorated compared to 1998.

In Tajikistan, initial smear conversion rates among new cases tested at the end of the second month of treatment reached 80 percent. In the project HOPE pilot projects, the success rate of the program was high: 75 percent at the start, 88 percent three cohorts later.

<table>
<thead>
<tr>
<th>Table 15. TB Treatment Outcome 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
</tr>
<tr>
<td>Cured</td>
</tr>
<tr>
<td>Success*</td>
</tr>
<tr>
<td>Died</td>
</tr>
<tr>
<td>Failed</td>
</tr>
<tr>
<td>Defaulted</td>
</tr>
<tr>
<td>Transferred</td>
</tr>
</tbody>
</table>

Source: Central Asia TB Institutes 2003.

The success rate is the sum of cure rate and treatment completion rate (the latter is not shown in the table).

<table>
<thead>
<tr>
<th>Table 16. DOTS Treatment Success 1995–1999 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Kazakhstan</td>
</tr>
<tr>
<td>Kyrgyz</td>
</tr>
<tr>
<td>Tajikistan</td>
</tr>
<tr>
<td>Turkmenistan</td>
</tr>
<tr>
<td>Uzbekistan</td>
</tr>
</tbody>
</table>


4. The success rate is the sum of cure rate and treatment completion rate (the latter is not shown in the table).
In Uzbekistan, an increasing number of patients have been included in the cohorts that are evaluated. Treatment success in the period 1999–2002 varied between 76 and 80 percent. For a new program, these results are acceptable. However, irregular trends on failure and death rates indicate that recording and reporting are still weak. In the well-monitored project of MSF Holland in Karakalpakstan, the success rate decreased in recent years. A possible explanation is that patient enrolment was selective in the early stages of DOTS implementation, aiming at definite new cases to increase the chance of success. Once the program became a routine, enrollment is less selective and the automatic result is a somewhat lower success rate.

**Financing TB in Central Asia**

This section evaluates sources of funding, spending and cost-effectiveness of TB programs in Central Asia. The four Central Asian countries allocate between 0.03 and 0.15 percent of GDP for TB control programs. Differences between countries are significant, particularly in per capita expenditures: Tajikistan (US$0.08) spent 30 times less than Kazakhstan (US$2.45) in 2002. The per capita spending gap is significantly less between Kazakhstan and the two other countries examined in the study—the ratio between them is approximately five to one (Table 17).

None of the countries in Central Asia is able to finance the TB program without external assistance. Donors play a very significant role in financing TB control in the region. The evidence shows that those countries with lower public spending are targeted by international aid. The two principal agencies financing TB in the region are USAID and KfW, providing more than 80 percent of the funds in some cases. In addition, the Global Fund Against AIDS, TB and Malaria has granted funds for TB control to the Kyrgyz Republic, Tajikistan, and, recently, Uzbekistan.

The study analyzed key indicators to provide an overview of the differences across the four countries. Though each country faces a different set of challenges, the regional comparison yields interesting results in terms of key outcomes and financing levels. There are important differences in the pace of DOTS implementation but outcomes, in terms of cure rates and deaths, are generally similar across countries. Compared to other regions with similar socioeconomic indicators, Central Asia reports better outcomes. Finally, the study carried out an international comparison of the performance of the four Republics. Comparative data used for the analysis are from the WHO TB Report 2004. The regional benchmarking is a comparative, summarized analysis of what was developed in the individual Country Profiles. As such, the section is organized around the following key indicators: (a) TB budget spending (as percentage of GDP and per capita); (b) donor contributions; (c) budget structure; and (d) economic impact of TB.

<table>
<thead>
<tr>
<th>Table 17. Public TB Spending by Country in 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TB Public Spending</strong></td>
</tr>
<tr>
<td>Kazakhstan</td>
</tr>
<tr>
<td>Kyrgyz Republic</td>
</tr>
<tr>
<td>Uzbekistan</td>
</tr>
<tr>
<td>Tajikistan</td>
</tr>
</tbody>
</table>

*Source: Estimates based on data from Central Asia Ministries of Finance, 2003.*
TB Budget

From a financial point of view (per capita spending and the ratio of TB spending to GDP), it is clear that three well-defined groups exist in the region: Kazakhstan, with the highest expenditures, Kyrgyz Republic and Uzbekistan, with an intermediate level of expenditures, and Tajikistan, with very low expenditures. The gap between the per capita spending is very significant: Kazakhstan allocates 30 times more resources per person for TB control than Tajikistan and almost 6 times more funds than Kyrgyz Republic and Uzbekistan. Even if the ratio of TB spending to GDP is considered, the gap between the highest and the lowest coefficients is 5 times.

The analysis of budget by country also highlights interesting aspects. The distribution of TB funds across oblasts is highly uneven and does not correlate well with the estimated burden of TB cases by region. As shown in Table 18, the gap was almost three times between the highest and the lowest resourced oblast in the Kyrgyz Republic. Similarly, Tajikistan concentrates TB funds in just a few cities, leaving the rural areas with very few resources for TB control.

Table 18. Gaps in TB Spending by Country 2002

<table>
<thead>
<tr>
<th>Country</th>
<th>Ratio between Highest and Lowest Resourced Oblast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>12</td>
</tr>
<tr>
<td>Kyrgyz Republic</td>
<td>2.8</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>80</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>12</td>
</tr>
</tbody>
</table>


Figure 9. TB Public Spending in Central Asia 2002

Estimates based on data from Central Asia Ministries of Finances 2003.
Donor Contributions

The second financial aspect deals with the contribution of international agencies to TB control. Several international NGOs and organizations have been assisting the Governments of Central Asia to adopt and implement the DOTS Strategy, and have had a key role in surveillance, diagnosis, and treatment of TB in the region (Table 20).

USAID is providing $15 million to support TB control in all Central Asian countries between 2005 and 2010. Through Project HOPE and CDC, USAID has been assisting DOTS pilot projects in all Central Asian countries, including prisons. This assistance includes upgrading surveillance systems and laboratories and training TB specialists and other health professionals on proper diagnosis and treatment of TB.

The German Development Bank (KfW) has been providing over €20 million to Central Asian countries. These grants finance procurement of first-line drugs, laboratory equipment, and supplies in the Kyrgyz Republic and Uzbekistan.

In addition, the Kyrgyz Republic applied for support from the Global Fund against AIDS, Tuberculosis and Malaria (GFATM) and was granted US$1.2 million for TB; Tajikistan received $1.3 million; and Uzbekistan has been granted $6 million; Kazakhstan has included coverage of patients infected with TB under the HIV/AIDS grant proposal.

A number of other donors and agencies are also present in the region. WHO provides technical assistance for DOTS implementation throughout Central Asia. MSF has supported DOTS pilot projects in the Aral Sea region in Turkmenistan and Uzbekistan, where TB rates are especially high. The Global Drug Facility has also provided first line drugs to Tajikistan. The International Federation of the Red Cross provides food and other supplies for TB patients. In Kazakhstan, KNCV Tuberculosis Foundation and Penal Reform International (PRI) have introduced TB control as an intrinsic part of human rights in prisons.

The World Bank through country-specific health projects has been providing financial and technical support for DOTS implementation in Kazakhstan, Kyrgyz Republic, and Uzbekistan. In Kazakhstan, the Bank-financed project that provided support to TB services has closed; in the Kyrgyz Republic, a Bank-financed project that provides some support to TB activities is under implementation; and in Uzbekistan, the Health II Project, which includes a subcomponent of $0.5 million for TB control, will provide support to DOTS implementation in two oblasts. The Bank and DFID have been assisting Governments in Central Asia to prepare a Regional AIDS Control Project that, among other activities, will fund activities that address the specific issues raised by people co-infected with HIV and TB.

Table 19. TB Costs, Indirect Costs and Rates of Return

<table>
<thead>
<tr>
<th></th>
<th>TB Costs as a % of GDP</th>
<th>Indirect Costs (%)</th>
<th>IRR(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>0.47</td>
<td>69</td>
<td>38</td>
</tr>
<tr>
<td>Kyrgyz Republic</td>
<td>0.53</td>
<td>63</td>
<td>104</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>0.43</td>
<td>45</td>
<td>89</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>0.57</td>
<td>76</td>
<td>52</td>
</tr>
</tbody>
</table>

Table 20. Donor Contributions for TB Control in Central Asia (thousands)

<table>
<thead>
<tr>
<th>Donors</th>
<th>Country</th>
<th>Activities</th>
<th>Period</th>
<th>Contribution (Thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KfW TB1</td>
<td>Kyrgyz</td>
<td>TB Drugs</td>
<td>2002–2003</td>
<td>$1,228</td>
</tr>
<tr>
<td></td>
<td>Uzbekistan</td>
<td>TB Drugs, Lab and office equipment, Consumables</td>
<td>2002</td>
<td>€5,000</td>
</tr>
<tr>
<td></td>
<td>Kazakhstan</td>
<td>TB drugs, DOTS training</td>
<td>2004–2006</td>
<td>€2,560</td>
</tr>
<tr>
<td></td>
<td>Uzbekistan</td>
<td>Equipment: microscopes, x-rays, transport, fridges, cool boxes</td>
<td>2004–2007</td>
<td>€7,500</td>
</tr>
<tr>
<td></td>
<td>Kazakhstan</td>
<td>TB drugs, DOTS Training</td>
<td>2004–2007</td>
<td>€2,560</td>
</tr>
<tr>
<td>USAID</td>
<td>Kyrgyz</td>
<td>Training (HOPE), Electronic surveillance and Lab equipment (CDC)</td>
<td>2003–2008</td>
<td>$3,348</td>
</tr>
<tr>
<td></td>
<td>Kazakhstan</td>
<td>Training, Lab equipment</td>
<td>1994–2004</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TB control in prisons</td>
<td>2001–2004</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Training, Electronic surveillance, Lab equipment</td>
<td>2000–2004</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drug quality assurance</td>
<td>2002–2005</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Primary Health care strengthening</td>
<td>1994</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DOTS implementation, also in the prison sector</td>
<td>2004–2008</td>
<td>$15,000*</td>
</tr>
<tr>
<td>WHO</td>
<td>Kyrgyz</td>
<td>Electronic surveillance, Lab equipment and training, DOTS training, IEC</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Uzbekistan</td>
<td>TA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health and TB control among eco-victims</td>
<td>1996</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Training</td>
<td>1998</td>
<td>NA</td>
</tr>
<tr>
<td>GDF</td>
<td>Kyrgyz</td>
<td>TB Drugs</td>
<td>2002</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Uzbekistan</td>
<td>TB Drugs</td>
<td>2002</td>
<td>NA</td>
</tr>
<tr>
<td>GFATM</td>
<td>Kyrgyz</td>
<td>Microscopes, Reagents, Training and monitoring</td>
<td>2003–2005</td>
<td>$1,212</td>
</tr>
<tr>
<td>World Bank</td>
<td>Kazakhstan</td>
<td>Lab equipment</td>
<td>1999</td>
<td>$9,500</td>
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<tr>
<td>World Bank Health II</td>
<td>Uzbekistan</td>
<td>2 Oblasts, 3 prison labs, Training</td>
<td>2005–2010</td>
<td>$0.5</td>
</tr>
<tr>
<td>MSF-H</td>
<td>Uzbekistan</td>
<td>DOTS, MDRTB pilot project, Training centers and training</td>
<td>2003</td>
<td>$0.11</td>
</tr>
<tr>
<td>Cordaid/ICCO/KNCV/PRI</td>
<td>Kazakhstan</td>
<td>DOTS implementation in the prison system</td>
<td>2001–2004</td>
<td>$1,102</td>
</tr>
<tr>
<td>Damien Foundation</td>
<td>Uzbekistan</td>
<td>TA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>IFRC</td>
<td>Uzbekistan</td>
<td>Food supplies</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: Donors 2004. USAID contribution is for five countries.
Regarding donor contributions, as the country with higher income per capita and higher health sector spending, Kazakhstan is at the bottom of the ranking while Kyrgyz Republic is the highest recipient, getting 5.5 times more than Kazakhstan. Tajikistan, with the lowest public spending, is the second largest recipient of donor funds in Central Asia. Tajikistan and Kyrgyz Republic are the two most favored countries by international donations, not only in absolute values, but also as a percentage of public spending. Donor contributions represent 68 and 69 percent of total spending in Tajikistan and Kyrgyz Republic, respectively. As expected, in Kazakhstan donor contribution is just a small fraction of what the Government spends, given the high level of public spending. In general, the overall trend shows an inverse correlation between public and donor contributions, indicating that in general donor financing is targeted to those countries with lower public financing capacity.

**Budget Structure**

Comparisons in terms of budget structure are difficult because data availability varies among countries. TB Services have difficulty in assessing gaps in funding as budgets are generally provided as a lump sum based on the number of inpatient days or on an historical basis. The actual amount allocated is always less than the budgeted, and therefore program managers invariably ask for more funds than necessary. This results in negotiations, in which the more skillful or politically better placed get the better deal. Clearly, financial management at all levels should be strengthened.
If Government expenditures are considered, there is some consistency across countries regarding pharmaceutical expenditures. On average, drugs absorb almost 15 percent of TB funds, ranging from 12 to 19 percent. In staff expenditures, however, the differences among countries are considerable, ranging from below 25 percent to 43 percent. There is a tradeoff between salaries and drugs, so if staffing gets more resources, drugs are affected by a diminished budget. Similarly, strong programs in infrastructure and food provision characterize those countries where wages absorb a small share. In Tajikistan, for instance, civil works represent almost 50 percent of the TB budget, while in Kyrgyz Republic food accounts for 33 percent of total spending on TB control. While some of these problems are resolved through contributions of external donors, there are important gaps and lessons to be learned regarding the distribution of funds.

Taking into consideration the difficulties in analyzing budget structure, Figure 12 summarizes the relative share of salaries and drugs in TB budgets. Two basic profiles emerge. Uzbekistan and Kazakhstan belong to a first group where spending on salaries is significantly higher than that on drugs, while the Kyrgyz Republic and Tajikistan belong to a second group with salaries being less than 25 percent of total spending. Particularly for Tajikistan, the low wage bill and drug budget are the result of a strong investment-oriented strategy that aims to build up a traditional infrastructure-focused program for TB control. Therefore, civil works represent almost 50 percent of total expenditures. In three out of four countries, the spending on drugs is below 16 percent; Kyrgyz Republic is an outlier with a high 52 percent expenditure rate on drugs. However, this high figure is the result of donor contributions. Thus, if donors are excluded from the analysis, drugs absorb 19 percent of public expenditures on TB in the Kyrgyz Republic, which is more in line with the rest of

Source: Estimates are based on data from Central Asia TB Institutes and Ministries of Finances 2003.
the countries. In Uzbekistan, the already low spending on drugs decreases even further, if donor funds are excluded.

In summary, if only public expenditures are considered, drugs represent less than one-fifth of total spending, while salaries are normally above 30 percent, although this varies according to the specific strategy followed by each country. Countries with a long lasting tradition of TB control policies tend to allocate more resources for staffing and drugs; late-comers to TB control, such as Tajikistan, allocate a higher share of funds to infrastructure.

**Economic Impact of TB**

The cost of TB on the overall economy was evaluated and compared across Central Asian countries. The high expenditures and the financial burden that TB imposes on the countries are important reasons to ensure that value-for-money is being delivered in the response to the epidemic. Study estimates, which account for direct and indirect costs and benefits, show that between 0.43 and 0.57 percent of GDP across the region is lost due to morbidity and mortality from TB. The economic analysis is based on a comparison of the current situation, “without intervention” and the proposed situation, “with intervention,” whereby a number of avoidable cases of TB and TB deaths are accounted for in monetary terms.

The economic analysis considers the direct benefits, which would accrue to the MOH in each country due to reductions in direct costs for outpatient and inpatient treatment, and the indirect benefits, which are derived from avoiding the loss of life (estimated as avoidable TB deaths). These figures are most likely underestimated due to incomplete mortality data and other data limitations as indicated before in this report. Compensating for these omissions is likely to increase the loss attributable to TB, bringing it close to 1 percent of GDP.
Cost-benefit analysis confirms the substantial social and economic gains that would be realized if the interventions were successful in reducing the prevalence of TB. In the four countries evaluated in this study, on average each dollar invested in TB treatment would yield two dollars of benefits in terms of reduced morbidity and mortality. A significant share—above 50 percent in most cases—of the total benefits is derived from the savings in lives lost to TB (based on discounted flows of avoided productivity losses).

Figure 12 compares the economic impact of TB across countries. Uzbekistan ranked first, with 0.57 percent of GDP, while the lowest was Tajikistan.

Finally, Figure 13 shows performance in terms of success and case fatality rates. Although there is an important gap between the top and bottom ranked nations, the disparity is not as wide as in financial terms. Kazakhstan, with the highest allocation per capita, shows the highest success rate, so the result basically matched the expected situation. It is important to note the relatively high success rates reported by Tajikistan (78 percent) despite the low per capita spending. This results from the fact that Tajikistan is only reporting data from the two DOTS pilot sites.

In summary, Central Asian countries differ significantly in levels of financing of TB control activities. Differences in performance indicators are less significant but equally important, clearly showing that investing in TB control brings high benefits to the economy. Additionally, the outcomes observed in the region also reflect the importance of donors in complementing the Government actions and supplementing their programs with adequate public funding.
Figure 14. TB Incidence Rates by Country or Region, 2002

Source: Based on data from WHO 2004.

Figure 15. Population Covered by DOTS 2002

International Benchmarking

To assess the four countries from an international perspective, the study focused on five referential regions or group of nations: Southeast Asia, Africa, America (including North America), the Former Soviet Union (FSU), Europe (includes OECD countries) and High-Burden Countries (HBC). Both the epidemiological profile and the outcomes from TB policies were evaluated. Data for this analysis came from the WHO TB Report 2004.

The first relationship depicts the epidemiological situation of the 10 countries and regions considered in terms of incidence rates per 100,000. Regarding incidence rates, the four Central Asian Republics are in a favorable position in relation to the rates observed in Southeast Asia, Africa, and HBC, three regions with similar epidemiological profiles. However, the four Central Asian countries still have high incidence rates when compared to OECD countries. If reported notification rates were used in the analysis, Central Asia countries would however be among high-burden countries.

DOTS coverage is reported to be higher in Central Asia countries, with the exception of Tajikistan, than in high-burden countries on average. There is a strong polarization among Central Asian countries in terms of DOTS coverage rate: Kazakhstan and the Kyrgyz Republic report 100 percent coverage, while Uzbekistan claims to have covered about 90 percent of the population in 2004; in Tajikistan, coverage with DOTS is significantly lower than in Europe and Former Soviet Union in general.
Main Findings and Key Actions to Stop TB in Central Asia

Despite some recent progress—that may be due to improvements in the overall economic situation in these countries and partial adoption of the DOTS Strategy recommended by WHO—tuberculosis is still a significant health and economic problem in Central Asia. It is highly unlikely that Central Asian countries will achieve in the short term the global targets for case detection and treatment success. In the meantime, the epidemic continues to have a serious epidemiological impact and affect the economies of these countries.

In the last several years, the Governments of Central Asia have been actively introducing the DOTS Strategy to reduce the burden of disease caused by TB. Furthermore, many international donor agencies have stepped in to provide technical assistance and financing for training, drugs and supplies that are critical to meet the challenge. These efforts are having an impact on TB control throughout the region, and are likely to contribute to reducing the burden of disease in Central Asia in the medium-term. In the longer term the Millennium Development Goals that aim at halting the increase in mortality and decreasing the incidence of TB by 2015 may be achieved if present efforts in public spending and donor contributions continue. However, given the likelihood that donor contributions will decrease in the next decade, governments of the Kyrgyz Republic, Tajikistan, and Uzbekistan should plan to increase public funding to cope with the ongoing epidemic.

Main Epidemiological Issues

Three epidemiological factors stand out that continue to substantially contribute to the situation and may wipe out recent gains in the near future: tuberculosis in prisons, multi-drug resistance and the risk of a dual TB/AIDS epidemic.
Box 7: TB Study Main Findings

1. It is highly unlikely that Central Asian countries will achieve in the short-term the global targets for case detection (70 percent) and treatment success (85 percent) aiming at reducing TB prevalence and mortality. Case detection was estimated to be around 50 percent, while treatment success rates range from 78–86 percent for those patients that have been treated under the DOTS strategy.

2. Although reaching the MDG targets for TB in 2015 is within reach of three of the four countries, success is partly dependent on resource allocation. If public spending increases to compensate for a decrease in donor funding over the next decade, other prerequisites may be met.

3. Economies of these countries incur productivity losses and direct costs that are estimated to range from 0.5 to 0.8 percent of GDP annually.

4. Prisons are considered to be the epidemiological pump of the TB epidemic in Central Asia. Factors that encourage the spread of TB in prisons also promote the spread of multi-drug resistance.

5. The high number of people with multi-drug resistance TB in Central Asia is of great public health concern.

6. The fast growing HIV/AIDS epidemic may wipe out recent gains in TB control in Central Asia.

7. Although all countries have officially adopted the DOTS Strategy recommended by WHO, it remains a controversial approach and has been unevenly implemented across the region.

TB in Prisons

Prisons are considered to be the epidemiological pump of the TB epidemic in FSU countries (Harvard Medical School and OSI 1999). Factors that encourage the spread of TB in prisons also promote the spread of multi-drug resistance. In general, incidence and mortality rates are much higher in prisons than among the general population, while DOTS can be particularly effective in this setting. In Kazakhstan, following the adoption of DOTS in prisons, mortality rates have decreased significantly and show promising signs for other countries. In Uzbekistan, the penitentiary system is also open to the introduction of the DOTS strategy. Curiously, the study found that those countries where the number of beds and facilities remained the same or grew showed the worst TB prison outcomes,

Box 8: Key Actions to Control TB in Prisons

1. Adopt the DOTS approach throughout the prison system.

2. Coordinate provision of TB services in prisons with the Ministry of Health TB services.

3. Actively follow up on prisoners released while on TB treatment.

4. Allocate sufficient funding for control of TB in prisons.

5. Adopt alternatives to imprisonment of minor offenders to decrease overcrowding. This is especially relevant for drug users, who are at increased risk of being infected with HIV and TB.
indicating that the approach that has been followed is not working. Exchange of information between the penitentiary system and the Ministry of Health at the operational level is still weak in all four countries. A problem unsolved by all countries is how to deal with TB infected prisoners that are released before finishing the treatment regimen. Prisons are underfunded, which results in poor hygiene, poor nutrition, and poor ventilation. All factors contribute to increased development of the disease and transmission of the infection. Alternatives to imprisonment and change of the penal code, reducing the number and duration of stay of prisoners, may contribute more to reducing the epidemic than a technical approach alone (PRI/KNCV 2003).

**MDRTB**

The situation with multi-drug resistant TB in Central Asia is of great public health concern. Given the intermittent drug supply in many Central Asian Republics and the wide-ranging and unregulated treatment regimens, MDRTB is an increasing problem in the region. Furthermore, in some countries, TB specialists tend to start treatment with second-line drugs before satisfactory DOTS implementation. In addition, the treatment protocols used in many of the FSU countries are not evidence-based. There is, therefore, a risk of establishing resistance to second-line drugs, as with first-line drugs, due to inappropriate usage, leaving the region and the world with an additional public health challenge. Kazakhstan has started providing second-line drugs, but their quality is not assured. In all countries treatment with second-line drugs is anarchic as patients are able to buy drugs of unknown quality in private pharmacies.

**TB/AIDS**

The fast growing HIV/AIDS epidemic may wipe out recent gains in TB control in Central Asia, as tuberculosis is the main opportunistic infection of AIDS. Use and trafficking of drugs, trafficking of women and commercial sex work, and labor migration will continue contributing to transmission of HIV, and indirectly to the increase of the number of TB cases. The rapid spread of HIV will pose a threat to TB control, first in prisons, but eventually outside the penitentiary system. Projections carried out in Russia have shown that, even in the presence of only a moderate HIV/AIDS epidemic, TB may become uncontrollable (Vinokur and others 2001).

However, as elsewhere in the region, the vertical TB and HIV/AIDS programs in Central Asia are not integrated, and there is lack of clarity about responsibilities for treatment of AIDS patients with TB. Although there are clear advantages in combining efforts in

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**Box 9: Key Actions to Control MDRTB**

1. Implement quality assured DOTS Plus TB Programs.
2. Establish Centers of Excellence for training in and treatment of MDRTB cases.
3. Increase success rate of TB programs that will ensure GLC clearance for use of second-line drugs at discounted prices.
equipping laboratories and assuring quality, training, surveillance, drug management and treatment delivery, the urgency to coordinate strategies is not perceived by the National TB and AIDS Programs or by the donors. A study estimate showed, however, that through combined efforts the increase in the dual infection can be reversed in four years. The reduction of HIV transmission through harm reduction strategies (condom use, needle exchange programs) and drug substitution therapies will make a direct contribution to reversal of the TB epidemic.

**DOTS Implementation in Central Asia**

There is significant political commitment to TB control and adoption of the DOTS approach in the four countries studied. However, this does not always or consistently translate in sufficient and rational allocation of funds and other resources for TB in each country, or full understanding of the DOTS approach. Although all countries have officially adopted the DOTS Strategy recommended by WHO, and two report 100 percent population coverage, DOTS remains a controversial approach, and has been unevenly implemented across the region. In addition, reported coverage refers to catchment area of health services that have staff trained on DOTS, while full DOTS implementation varies significantly among the different oblasts in each country, including in Kazakhstan and the Kyrgyz Republic. The observed slow progress in controlling the epidemic may be related with the way TB programs are implemented at the local level, including access to service due to geographical distance and out-of-pocket costs of care, and continued reliance on outmoded public health and medical practices. Summarized below are some of the most important constraints to appropriate implementation of the DOTS approach in Central Asia identified by the study.

**Surveillance and Monitoring Systems**

There is great variation in TB surveillance across Central Asia. Evidence-based information for health professionals, decision-makers and population about the disease and its diagnosis and treatment, is scant. Countries report different data to different organizations.
In Kazakhstan, the continued increase in notifications has made doctors and politicians uneasy, and there is the risk that the Kazakh Government will withdraw its support for DOTS. The TB Electronic Surveillance Case-Based Management System (ESCM), developed with assistance of the U.S. CDC, became fully operational throughout the country in 2000. However, the Ministry of Health decided to revert to the old Soviet system in 2003, for reasons that are not entirely clear. In the Kyrgyz Republic, surveillance is case-based according to WHO standards. In other countries, surveillance is mostly carried out according to the old Soviet reporting system, except in pilot DOTS areas where WHO and other international organizations provide assistance. Monitoring of TB programs is under development in DOTS areas.

**Institutional Capacity**

Despite having different institutional capacity, all countries share the same lack of management skills in program planning, budgeting and development of human capacity. Public health services need to be strengthened to enable Ministries of Health to develop infectious disease control strategies, improve health information systems, and drug management, and evaluate program performance. New approaches to clinical management are needed for those already working, and to train those in medical schools and universities. TB control requires a multi-sectoral and integrated approach—between TB services and prisons, primary health care, and AIDS Centers—instead of the vertical approach that has been followed so far. Partnerships between governmental and non-governmental organizations, private practitioners, multilateral organizations and bilateral donors, and technical agencies must be built to avoid duplication of efforts and wasting of funds. Technical assistance is necessary. However, each international NGO and donor tends to bring its own experts, and too many experts give mixed messages.

**Case Detection and Treatment**

A combination of the old Soviet approach to TB control and DOTS has been applied to case detection and treatment in Central Asia resulting in two kinds of patients: DOTS patients and non-DOTS patients. This situation may have serious consequences for achieving the global TB targets in Central Asia.

**Use of Highly-Effective Standard Regimes with Direct Observation of Treatment**

Poverty, long distances and limited involvement of primary health care services in TB control severely diminish the access of rural patients to services and pose a serious constraint to observation of treatment and patient compliance. In addition, as other physicians in the former Soviet Union, many Central Asia TB doctors are not convinced of the benefits of using standard regimes with direct observation of treatment.

**Sustainable Drug Supply and Drug Management**

The analysis has shown that countries spend on average 15 percent of their public budgets on drugs, but donor contributions significantly change the situation, with the Kyrgyz Republic allocating over 50 percent of TB funds to drugs. However, a sustainable drug supply
is not ensured in any Central Asian country, including Kazakhstan. Lack and haphazard use of first-line drugs partially explains the rise in multi-drug resistance observed in Central Asia. If the same happens with second-line drugs used to treat MDRTB, additional resistance will be established, which would pose one of the most serious global public health problems. Urgent registration of essential drugs should be facilitated. Staff has to be trained in all aspects of drug management, including procurement, storage, distribution and stock keeping.

Infrastructure and Staff

The conditions under which TB control has to be implemented are poor in all countries in the region. The buildings are old, broken down, unhygienic, and often not heated in wintertime. The staff, too large in some facilities, is underpaid, poorly trained, and unmotivated. As a result, it has a hard time in coping with diagnosis and adherence to treatment. Although many efforts have been directed at training health staff in knowledge and skills necessary to implement the DOTS strategy, there has not been a comprehensive strategy to improve the understanding and competence of all levels of health staff involved regarding this strategy.

Funding of TB Control in Central Asia

Great differences were observed in terms of public funding for TB among the four republics. The highest per capita allocation in Kazakhstan is 30 times that of the lowest per capita allocation in Tajikistan. Also in terms of GDP, the public contribution in Kazakhstan is five times the contribution in Tajikistan. Contributions from international agencies play a significant role in supplementing public budgets. Countries with lower public spending tend to receive higher levels of external aid, something that improved the overall spending for TB purposes.
Budget mechanisms that do not link resources to outcomes are an important limiting factor. The focus of physicians and local authorities on the number of beds and facilities, rather than on the number of patients cured impedes the efforts to combat TB effectively. Furthermore, incentives to shift from hospital-based protocols to the more ambulatory based DOTS strategy continue to meet resistance.

**Resource Allocation**

A recurrent problem is the uneven distribution of TB funds among oblasts. For instance, in Tajikistan, the gap between the highest- and the lowest-resourced oblasts is 10 fold, while in the Kyrgyz Republic it is 3 fold. The analysis has shown that financial resources are not allocated through homogeneous criteria based on the size of the population or epidemic.

The allocation for drugs is fairly similar across countries but it tends to vary for salaries and infrastructure. If donor contributions are excluded, Governments spend between 12 and 19 percent of their budgets on drugs, and between 21 and 43 percent on salaries. Tajikistan and the Kyrgyz Republic devoted less than 25 percent of total financing to salaries, while Kazakhstan and Uzbekistan allocate more than 40 percent. It is notable that there is a tradeoff between salaries and drugs—countries with the highest wage bill devote fewer resources to financing of drugs.

**Impact on the Economy**

TB is still an important economic problem in all the countries. TB associated costs, either in the form of fiscal spending or productivity losses represent between 0.43 and 0.57 percent of total output. Because TB represents a significant burden for Central Asia economies, public intervention is warranted. At nearly 10 percent of health spending in most countries, it is imperative that each dollar invested provides the highest return in terms of outcomes.

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**Box 12: Key Actions to Improve Use of Resources**

1. Link allocation of resources (human and financial) to results (detection and cure rates, and mortality rates).
2. Review staffing and infrastructure needs and agree on restructuring strategies that ensure rapid and real expansion of DOTS throughout the region, including in prisons.
3. Coordinate donor contributions at the regional level to ensure economies of scale and sharing of best practices in TB control.
4. Avoid the crowding out of drug spending by salary costs to ensure that drug supply is guaranteed and program success rates improve.
The World Bank Role on TB Control

The World Bank has supported the implementation of the DOTS Strategy in over 30 countries around the world. Commitments exceed half a billion dollars, including large projects in India and China—together home to over 40 percent of the world’s TB patients. The Bank is a co-sponsor of the Stop TB Partnership, which involves over 200 governments and organizations. The Bank serves as a fiscal agent for the Stop TB Trust Fund, which supports the partnership, including its Global Drug Facility that has so far enabled efficient TB drug supply to nearly 50 low-income countries including in Central Asia.

In Central Asia, in addition to this study, an indepth review of the Kazakhstan TB and HIV/AIDS Programs (Cercone 2004) was carried out in 2003–2004. This review was conducted in the context of the policy dialogue between the Bank and the Government of Kazakhstan, and sector work that has been co-financed by both parties. The study includes: (i) an epidemiological review of TB and HIV/AIDS in Kazakhstan; (ii) results of focus groups with PLWHA, TB patients and providers; (iii) TB and HIV/AIDS facility surveys; and (iv) a cost-effectiveness study of both programs. This case study sheds additional light on issues of resource allocation, infrastructure, quality and patient and provider satisfaction.

As a follow up to these reviews in Central Asia, the following studies have been proposed:

1. Tracer studies that would follow TB patients through the health system to assess how diagnosis, treatment, recording and reporting of TB are organized, especially in rural sites, both under the “FSU” and the “DOTS” models;
2. Comparison of costs of the implementation of the FSU and DOTS models, which would focus on TB pilot sites and on potential for reallocation in the FSU model; and

3. Budgeting the implementation of an effective DOTS program by country, with identification of sources of funding (Governments, donors), funding categories, and financing gaps in the short and longer term.

Other organizations—such as WHO, IUTLD, and KNCV—have more of a comparative advantage than the Bank to further investigate difficult TB issues such as the epidemiological and economic impact of different TB control paradigms, and would therefore be expected to take the lead in these areas.

The Bank will assist KfW organizing the annual Regional TB Conference, which is scheduled for September 2005 in Astana, Kazakhstan. The Central Asia TB study, which has been reviewed by counterparts from Ministries of Health, Justice, and Interior in each country, will be further disseminated in Central Asia and elsewhere. Discussion of the proposed key actions with Governments in the region, NGOs and international organizations—especially WHO, KfW, and USAID/CDC—will provide an opportunity for a continuation of the policy dialogue in this area. The Bank will also initiate discussions with Government counterparts in Central Asia and partner organizations in 2005 regarding the possibility of developing a Regional TB Control Project in Central Asia. Such a project would address some of the main issues identified by this study, and complement ongoing TB control efforts in Central Asia.

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**Box 13: Bank-financed TB Control Projects in the Former Soviet Union**

The **Russia TB and AIDS Control Project** ($150 million) supports the goal of the Government’s Federal Program on Prevention and Control of Social Diseases to protect its population and economy from uncontrolled epidemics of TB, HIV/AIDS and other sexually transmitted infections.

The **Ukraine TB and HIV/AIDS Control Project** ($60 million) supports the Fourth Program on HIV/AIDS Prevention to reach the following objectives: to stabilize the epidemiological situation in the country; to reduce risky behavior among young people; and to reduce the social tension in the society and negative consequences of the epidemic. The total cost of the Project is $77 million, including a $60 million Bank loan, and $17 million from the Ukrainian Government.

The **Moldova AIDS Control Project** ($5 million) is a component of the national TB/AIDS Program, which is financed in parallel from the following grants: an IDA grant of US$5.5 million for AIDS, a USAID grant of US$4.0 million for TB, and a US$5.2 million grant from the Global Fund to Fight AIDS, TB, and Malaria (GFATM), both for AIDS and TB.

The **Central Asia AIDS Control Project** ($26.9 million) that will contribute to minimize the potential negative human and economic impact of a generalized HIV/AIDS epidemic, and complement country-specific programs, includes funding for TB/HIV activities.

The **Uzbek Health II Project**, which is under implementation, includes a Public Health Component of $4.5 million. This component includes HIV/AIDS and TB subcomponents ($2.5 million) to be partly financed by an IDA grant. The TB subcomponent extends implementation of the WHO-recommended DOTS approach to two additional regions (oblasts).
Part II

Country Profiles
CHAPTER 5

The Republic of Kazakhstan
Main Challenges in Achieving Global TB Targets

In terms of tuberculosis control in Central Asia, Kazakhstan is relatively successful. After experiencing a surge in TB in the 1990s, the country is now taking measures to decrease the burden of disease due to TB permanently. Between 1998 and 2004, the number of notified cases has declined by 3,000 and the mortality rate associated with TB declined by over 45 percent. Overall, amongst the population with TB countrywide, case fatality has been reduced to 2 percent in some oblasts. The prison system is one of the sectors that most benefited from this reduction.

However, despite progress achieved in treatment and hospital performance, many areas require additional attention. Global targets expected to be reached by 2005 include: (i) treating successfully 85 percent of detected sputum smear-positive TB patients, and (ii) detecting 70 percent of all such patients. In Kazakhstan, the cure rate is below the suggested rate. The system reports a default rate of 4 percent, together with a failure rate of 11 percent and transfer out rate of 2 percent; therefore, the unsuccessful outcome of treatment totals 17 percent.

TB is still an important economic problem in Kazakhstan, although not as significant as in Russia or Ukraine. By 2002, the country lost US$114 million due to fiscal and productivity losses, which represents 0.47 percent of GDP. Additionally, benefits throughout the country are unevenly distributed and significant gaps persist, making it more difficult to achieve uniform success rates.
Stigmatization, poverty, unemployment, homelessness, a history of imprisonment, alcoholism, and drug abuse may lead to late detection, late diagnosis, low cure rates, increased death, high default, and treatment failure rates. These risk groups may not be reached by health education messages targeted at the general population. Project HOPE conducted a Knowledge, Attitude and Practice (KAP) survey. One of its major findings was that the population did not trust the capabilities of health facilities and staff. Increased population awareness of the dangers of the disease should be part of the new agenda of activities. Health education, targeting risk groups, patients, their families and the general public need to be strengthened.

Cohort analysis is weak. DOTS training of TB personnel is incomplete and the lab network requires additional financing to improve case detection and to quantify adequately the burden of drug resistant tuberculosis. In general, laboratories follow safety instructions. However, proper safety cabinets have not been installed in all labs, and staff do not use masks. Training in infection control and waste management is necessary, and infection control measures have to be introduced in TB related facilities.

Project HOPE has trained several thousands of health staff. A pool of trainers consisting of health professionals from the NTBC, the Kazakh State Medical University and the nursing school in Almaty, has been established at the central level. Project HOPE uses these trainers, together with their own staff, to conduct training in the regions, including prisons. However, the national and oblast capacity in project management should be improved. The use of outcome data for planning purposes is not done at all or if done, it is not done properly.

Present steps towards full implementation of MDRTB treatment, without proper training, supervision or planning, may result in erratic treatment for these cases and result in an incurable disease. Currently, there is no integrated TB/HIV program.

Social support to marginalized and vulnerable patients is being provided in five oblasts by the National Red Crescent Society. Socially vulnerable patients are supported with food, hygiene packages and home visits by Red Crescent nurses. However, this program covers only patients who have interrupted treatment for more than two weeks.

One of the key factors that will determine the overall success of Kazakhstan in reducing TB is the use of financial resources and the results obtained with resources available. Among all countries evaluated by this study, the Government of Kazakhstan provides the highest level of funds for TB control—on average, 0.16 percent of GDP or US$2.5 per capita. This is almost five times the public contribution in neighboring countries. Additionally, donors have played an important role in complementing public efforts. This significant amount of resources partially explains the satisfactory outcomes experienced during the last two years.

One of the weakest points of the program is the distribution of resources. Differences in spending per capita are 10-fold between the top and bottom resourced oblasts. The budget allocation mechanisms fail to distribute resources according to the particular needs of the regions, so gaps in various regions are substantial. The allocation of funds on a per bed basis creates an incentive to over supply beds to the detriment of needed expenditures in drugs and staffing. There is a clear need to develop a provider payment mechanism that links allocation to actual needs and outcomes, rather than historical figures based on number of beds.
Profile Introduction

Kazakhstan, the largest of the five Central Asian republics, is rich in natural resources and has a diverse ethnic makeup. With a population of 15 million and a territory of more than 2.7 million square kilometer (6.2 inhabitants per sq. km.) travel distances are enormous. The climate is continental with cold winters and hot summers, with arid and semiarid climate zones. Astana is the new capital of the Republic of Kazakhstan but Almaty, the former capital with a population of more than 1 million, remains the cultural and economic centre. During the past seven years the number of people officially registered as unemployed has increased more than 60-fold. The unemployment rate differs significantly according to a socio-economic status. Unemployment is high and exceeds 20 percent in some regions. According to the World Bank, 38 percent of the Kazakh citizens live below the poverty line of $24 per month.

This country profile is divided into three sections. The first section analyzes epidemiological data. The second section describes the TB Control program. The third section analyzes the financial and institutional issues governing TB control in Kazakhstan. Among other issues, it evaluates public spending and contribution of international donors in terms of outcomes achieved in prisons and hospitals. The section evaluates TB budgets by oblasts and assesses the main features of allocation of funds in the country. Finally, the section estimates the economic costs of TB and develops an input-outcome evaluation.

TB Epidemiology

Notification

Kazakhstan has the highest notification rate of all Central Asian Republics. Since independence in 1991, the tuberculosis notification rate has more than doubled, from 65 per 100,000 population in 1991 to 165 in 2002. The increase in annual case notification rates between 1991 and 2002 is likely to reflect the increased case detection and improved reporting. In 2003, for the first time notifications decreased by 2.2 percent to 23,943, which may indicate that Kazakhstan has reached the plateau in its epidemic.

In 2002, Kazakhstan reported 61,606 registered patients with active TB. According to the classic Former Soviet Union (FSU) definition, the number of active TB patients included those that have completed treatment in the previous two years. This explains why this figure is about three times the annual notification of new cases. However, by a modern definition of TB patients, those that have completed treatment should not be counted as patients anymore.

The majority of TB patients are socially and economically deprived people, mainly from rural areas. The most affected region is Kzil-Orda, near the Aral Sea, with 291 cases per 100,000. The city of Almaty with 69 per 100,000 has the lowest case notification rate in the country.

Age and Gender

Tuberculosis occurs predominantly among young people. About half (51 percent) of the patients are between 15 and 35 years old (Figure 16). The male to female ratio is 1.3.
Since the introduction of the DOTS strategy in 1998, mortality has declined. The Kazak TB mortality rate increased more than three times from 1990 to 1998, becoming one of the highest in the Eurasian region at 38 per 100,000 in 1998. In 1999, for the first time since

**Mortality**

Since the introduction of the DOTS strategy in 1998, mortality has declined. The Kazak TB mortality rate increased more than three times from 1990 to 1998, becoming one of the highest in the Eurasian region at 38 per 100,000 in 1998. In 1999, for the first time since

**Source:** Ministry of Health of Kazakhstan 2002.

**Source:** Ministry of Health, TB Electronic Surveillance and Case Based Monitoring system (ESCM) 2002.
In 1990, the mortality rate started to decrease. During the period between 1998 and 2004, death rates declined by 45 percent. This significant decrease in mortality is an early sign that the TB control program is successful.

CDC calculated how many lives were saved since the introduction of the DOTS strategy in Kazakhstan (Figure 18). If the increase in mortality had continued at the same rate that was observed between 1994 and 1998, then 9,200 deaths would have occurred in 2001. Therefore, the DOTS strategy between 1998 and 2001 prevented 13,392 deaths.

**MDRTB**

According to a national Drug Susceptibility Testing (DST) survey, primary multi-drug resistant TB (MDRTB) is estimated at 9.7 percent while the acquired MDRTB is estimated at 18.3 percent (National TB Institute, 2002). According to CDC, based on routinely

![Figure 18. Estimated Number of Lives Saved by DOTS in Kazakhstan 1999–2001](image)

| Table 21. TB Notification and Mortality Rates per 100,000 in Kazakhstan |
|-----------------|---|---|---|---|---|---|---|---|---|---|
| Notification    | 65.8 | 67.1 | 82.5 | 91.3 | 118.4 | 141.0 | 153.2 | 155.7 | 165.1 | 160.4 | 154.3 |
| Mortality       | 10.1 | 26.4 | 34.6 | 37.7 | 38.4 | 30.7 | 26.4 | 24.5 | 24.2 | 22.4 | 20.6 |

*Source: Ministry of Health, TB Electronic Surveillance and Case based Monitoring system (ESCM) 2002.*

* Does not include TB cases among prisoners
collected data of 13,854 bacteriologically confirmed patients, 23.5 percent previously treated patients (N = 3,930) had MDRTB between 2000–2002 (Favorov, 2004). In the FSU, primary MDRTB rates vary between 10–15 percent, while the acquired MDRTB rates vary between 30–40 percent.

**TB/AIDS**

Some areas are more heavily affected by HIV/AIDS than others (Pavlador has 174 registered cases, Karaganda 110 and South Kazakhstan Oblast 109). A new pilot project addresses the problem of TB/HIV in Almaty City, but only 17 patients are currently under treatment.

**TB in Prisons**

In 2003, there were around 49,000 prisoners held in pre-trial detention centres (SIZO), prisons and settlement colonies. In 2000, Kazakhstan had the third highest rate of prisoners (590 per 100,000 population) after the USA and Russia. Due to penal reform and amnesties, the number of prisoners has declined to less than 50,000 and Kazakhstan has dropped to the 17th place on the ranking list. MoH, MoJ, and MoI collaborate in tuberculosis diagnosis, treatment, and surveillance. However, in 2004 the TB notification rate was over 1,500 per 100,000 and the reported mortality rate as high as 80 per 100,000.

The epidemiological profile in prisons indicates that between 1997 and 2004 (especially after 1999) the TB epidemic among prisoners has been declining. The number of new cases, for instance, fell 75 percent from 5,555 to 1,388 in the seven-year period. Even more dramatic is the 91 percent reduction in the mortality rate between 1997 and 2004. These impressive outcomes are the result of an improved political commitment and extended DOTS coverage in prisons.

A study of MDRTB in prisons carried out in four oblasts found a primary MDRTB rate of 27 percent and an acquired MDRTB rate of 70 percent (PRI/KNCV, 2003).

**HIV/AIDS in Prisons**

The prison population is a particularly vulnerable group, both for TB and HIV. In 2001, prisoners accounted for 25 percent of registered HIV/AIDS cases, which suggests a prevalence of HIV of 0.5 percent. However, among 11,117 screened incarcerated IDU, the prevalence was 3 percent. An estimated 30 percent of prisoners are IDUs, so the risk of transmission

| Table 22. TB Notification and Mortality among the Prison Population |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Registered TB cases  | 11,903| 12,970| 12,628| 9,163 | 8,060 | 8,242 | 6,240 | 6,042 |
| New TB cases         | 5,555 | 5,061 | 3,434 | 3,038 | 2,908 | 3,011 | 2,137 | 1,388 |
| Notification rate    | 4,721 | 4,268 | 2,995 | 2,515 | 2,210 | 2,316 | 1,937 | 1,573 |
| Number of deaths     | 1,302 | 1,218 | 345   | 175   | 174   | 134   | 103   | 74    |
| Mortality rate       | 880   | 820   | 300   | 140   | 130   | 100   | 90    | 80    |

of HIV through needle sharing and sexual intercourse is enormous. No data are available on the prevalence of dual infection with TB and HIV, but in a population where 10–20 percent of the prisoners suffer from TB, the prevalence of TB infection among inmates must be over 50 percent. This raises the possibility that at least 50 percent of HIV positive prisoners have also been infected by TB.

**Tuberculosis Control**

**Government Commitment**

In May 1998, the President of Kazakhstan issued a Decree on “Priorities for Improvement of the Health Status of Kazakhstan’s People.” This Decree called for nationwide implementation of the WHO-recommended directly observed therapy, short-course strategy (DOTS) and allocated special state funds for regular TB drug procurement. Kazakhstan is the only country in Central Asia that finances anti-TB drugs from the state budget. In the Presidential program “Health of the Nation,” efficient TB control is seen as a priority health problem and the importance of the DOTS strategy is stated. In response to the Presidential decree, the Government of Kazakhstan issued an Order on “Urgent Actions to Protect the Population from Tuberculosis.” This order states that the TB control program should be a priority in financing and social protection, and all TB patients should be provided with free treatment and drugs.

A high-level working group for DOTS implementation, the Coordinating Council on TB Control consisting of Ministries of Health, Justice, Internal Affairs, Finance, and Defense, was established at the national level. A similar interdepartmental structure has also been established at the oblast level. In November 1998, the Ministry of Health issued the first order (Prikaz) on DOTS implementation in Kazakhstan. The Ministry of Health prepared this order with technical assistance from Project HOPE and CDC, financed by USAID and WHO. In 2001, the Ministries of Health and Justice issued an order “On the improvement of TB medical services for the population of the Republic of Kazakhstan,” and in May 2001, an order “On the status and measures to strengthen the TB control in the Republic of Kazakhstan.” In 2001, the National TB Centre (NTBC), submitted a five-year plan to the MoH, “A Complex of Urgent Actions for TB Control in the Republic Kazakhstan for 2002–2006.” Each region (Oblast) has to have a TB program signed by the Governor (Akim); and districts (Raions) also develop annual TB programs.

**Health Care Services**

There are huge distances between villages and primary health care points, hence, the quality of health services in rural areas is significantly lower than in urban areas. The number of primary health care (PHC) workers is being reduced. Efforts are underway to decentralize the administration and introduce new payment systems that encourage professionals to provide efficient and effective health care. A reform program aiming to reduce the number of hospitals and hospital beds by shifting the priority to the PHC system is being established in pilot areas. Reforms in medical education have introduced the concept of family practice and training of general practitioners. More than 1,000 family doctors have been already trained. In addition, the Kazakh School of Public Health has been established and has started
providing training in health policy, management, economics and other related areas for health administrators and managers. One of its priorities is strengthening of the private health sector.

The downturn of the economy has led to a general deterioration of social services and the pre-independence “Semashko” model became unsustainable. Hospitals spend 75 percent to 85 percent of the available funds for health, while primary health care services receive only about 10 to 15 percent of the overall budget. Health care development has been associated with uncontrolled increases in the number of medical staff and hospital facilities. At the same time, with low budget spending, an average salary of physician is only half of the average salary in the country and is insufficient to meet even the most basic needs, such as housing and food. For this reason, many qualified health workers leave the profession and those who remain lack motivation to work. The management structure is very centralized with little community involvement and participation. Efforts are underway to decentralize the administration and introduce new payment systems that encourage professionals to provide efficient and effective health care. A reform program aiming to reduce the number of hospitals and hospital beds by shifting the priority to the PHC system is being piloted. TB control is still provided through a vertical system. The National Tuberculosis Institute (NTBI) is the main policy body for TB control in Kazakhstan. Its Director is the NTP manager, and deputies supervise aspects of the TB control program: epidemiology, treatment, MDRTB, laboratory management, and drug procurement. The NTBI houses the country’s MDRTB treatment unit. It also houses the National Reference Laboratory. The system is replicated at oblast and rayon level. The NTBI supervises activities at the Oblast TB Hospital level, while the Oblast TB Coordinator, often the Director of the Oblast TB Hospital supervises the rayon level. Patients self refer either to PHC polyclinics or directly to the TB Dispensary. Initiation of treatment takes place in TB hospitals or TB dispensaries with inpatient facilities. Chronic cases can be admitted in sanatoria, although the number of sanatorium beds has decreased in recent years.

**DOTS Coverage**

Kazakhstan has a National TB Control Program based on the WHO recommended TB Control Strategy (DOTS) “adjusted to Kazakh conditions.” Since 1999, 100 percent of the population is officially covered by DOTS. USAID and Project HOPE have been supporting DOTS expansion through six pilot projects throughout the country. Over 39,000 TB specialists were trained by Project Hope on surveillance, management and diagnosis and treatment. KNCV Tuberculosis Foundation, a Dutch NGO, has been implementing DOTS in prisons in Pavlador Oblast since 1998 and in three additional oblasts since 2001. Due to long distances and lack of resources in remote regions, the quality of the TB Control Program may suffer however, particularly when it comes to followup of defaulters and direct observation of treatment.

**Case Finding and Diagnosis**

Case finding is still based on annual screening by fluorography or radiology of risk groups, who form a large part of the general population. Children are screened at school entry by tuberculin skin tests. In 2001, the NTBC reported that 35 percent of the population was
screened and that 99 percent of the target groups were reached. This contributed to 43 percent of the notified TB cases. Incidence among the screened population was 193 per 100,000. This figure indicates that risk groups have been properly targeted, as the incidence is higher than in the general population. It is however difficult to accept that one third of the population would belong to a risk group.

Smear microscopy is the basic bacteriological method for detection of infectious TB cases. The proportion of sputum smear positives TB cases among all cases notified increased slightly between 1998 and 2000 but since then it has stabilized. This indicates a reliable case detection system.

TB laboratories are organized in a network that consists of three diagnostic levels. At the first level there are smear microscopy centers in raion TB dispensaries and in primary health care (PHC) facilities. The number of these laboratories has been reduced in the last few years from 700 to 510. There is no clearly defined intermediate level for culture examination. The 20 oblast TB laboratories that perform culture also carry out drug susceptibility testing (DST). There are a certain number of bacteriological laboratories in general policlincs that do cultures, but they are not included in the network. The third level laboratory is the National Reference Laboratory (NRL) at the NTBC, which performs smear, culture and DST. The quality of lab work has improved greatly with support from CDC. The main TB laboratories in the country have been equipped with binocular microscopes. Prison TB laboratories are only partly incorporated in the network at oblast level. Use of the PHC system for identification of new cases and treatment of those in the followup phase is still limited. X-ray, fluorography, and digital fluorography are largely reserved for high risk populations and the penitentiary system.

### Direct Observation of Treatment and Followup

A default tracing procedure has been established but default prevention mechanisms are lacking. Due to long distances, access of patients to health care facilities for direct observation of treatment during the continuation phase is limited, therefore the system heavily relies on inpatient care. The DOTS strategy for treatment has been adapted to Kazakh guidelines, thus allowing doctors to choose from a variety of standard regimens and to prolong the intensive phase according to clinical and radiological criteria, which are unclear, leading to over-treatment. A training module for clinical case management is needed. So far, DOTS training has emphasized a public health approach to case management, but it is necessary to ensure that this approach is also based on a sound clinical protocol.

<table>
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<tr>
<th>Year</th>
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</tr>
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**Source:** Ministry of Health of Kazakhstan 2002.
Control of MDRTB

The National TB Program (NTP) has been treating patients with MDRTB since 2000. In 2001, there were 400 patients under treatment. In 2002, the Government provided second-line drugs to cover the treatment of 1,300 patients with MDRTB. In 2003, it planned to expand MDRTB treatment to the entire Republic. According to new NTP regulations, all patients requesting re-treatment should have a culture and DST, and Oblast Centers should provide second-line treatment when available. One reason for high rates of resistance is insufficient adherence to treatment. The system reports a default rate of 4.2 percent. Together with a failure rate of 11.2 percent and transfer out of 2.1 percent, the unsuccessful outcome of treatment is 17.5 percent. Better use of PHC personnel and a better perception of public health issues can improve this situation. PHC medical personnel throughout the country should be trained in the application of the DOTS strategy. Cohort analysis is weak. The laboratory network should be strengthened to improve case detection and to adequately quantify the burden of drug resistant tuberculosis. The present move towards full implementation of MDRTB treatment, without proper training, supervision or even a plan may result in erratic treatment for these cases, leading to an almost incurable disease.

TB Control in Prisons

The Ministries of Justice and Health consider a significant decrease in case notification rate in prisons to be the result of DOTS implementation, which emphasizes the importance of uninterrupted TB drug supply.

The MoJ is responsible for TB Control in prisons, while the MoI is in charge of TB Control in SIZOs (pre-detention centres). In 2002, an order was issued by the MoI, MoJ, and MoH, regulating the co-operation between medical departments of SIZOs, prisons, and the civilian health services. This enables a better followup of released prisoners with TB and allows for supervision in prisons by NTBC and Oblast TB Dispensary staff.

Since 1998, the KNCV Tuberculosis Foundation and Penal Reform International have been supporting TB control in prisons, including training and proposals for alternatives to imprisonment. In 1998, a pilot project started in Pavlodar, and in 2002 the project was extended to East Kazakhstan, Akmola and Karaganda. Since 2001, USAID/Project HOPE, have been supporting prisons in Karaganda by providing training to prison medical staff and equipment to the prison laboratory at Dolinka. The laboratory serves the TB hospital and a colony for TB and HIV patients. In the Karaganda Prison Hospital, diagnosis still relies on radiological rather than bacteriological criteria, although in all cases sputum smear microscopy has been performed. However, even with successful outcomes, some areas still require strengthening of appropriate followup measures when a TB prisoner is released.

Treatment regimens follow the DOTS strategy protocols, with the MoH reporting an increase in treatment success from 54 percent in 2001 to 60 percent in 2003 among newly diagnosed TB patients; and from 39 percent to 52 percent among relapse cases. Better results have been achieved in TB facilities in pilot regions. Results, however, are not as positive as expected, as more than 50 percent of prisoners are likely to have been treated before, and the proportion of prisoners being released while still on treatment is rather high (30 percent). Amnesties and regular release of prisoners with TB still under treatment are of major concern, as many of them do not report to health facilities after the release.
The link between civilian and prison health services is still weak because of lack of funds, despite the approval of an order on monitoring TB control in prisons by the NTBC. With support from KNCV, the MOJ has initiated in 2004 drug sensitivity testing in prisons, but it is unclear if this will continue.

**TB Drug Management**

From the point of view of TB drug availability and access, Kazakhstan has achieved sustainability in procurement and distribution. But the registration and quality assurance system does not capture unbiased drug quality issues. Kazakhstan has been committed to centralised procurement of TB drugs for its national TB program, but recently decided to decentralise procurement to the oblast level. Since 1998, there has been a steady increase in Government funds allocated for competitive procurement ensuring the availability of all first-line TB drugs to all patients at all levels of health care free of charge. Therefore, there is no shortage of first-line drugs across the country. Second-line drugs are also purchased and distributed. However, prices paid for second-line drugs can be greatly reduced if procured through the Green Light Committee (GLC). TB drugs, including second-line drugs can be found in private pharmacies.

**Recording and Reporting**

New forms have been introduced in Kazakhstan. Since 2000, individual patient data are transferred from the TB 01 patient card to an electronic data base developed and introduced by USAID/CDC, the Electronic Surveillance and Case based Monitoring system (ESCM). The system was gradually established in all oblasts by 2002. In 2003, the MoH suspended the ESCM until further notice for unknown reasons. Since then, access to TB data has become conditional to written permission by MoH. WHO laboratory registries have been introduced across the country. Kazakhstan continues to report its annual data to WHO and EuroTB.

**Supervision and Monitoring of the Program**

Project HOPE developed a monitoring checklist for laboratories, which have been in use since May 2002. There is a checklist for bacterioscopy and culture, which consists of 33 questions and a workbook with instructions and explanations. The state budget allocates funds for regular monitoring visits of the NTBC coordinators to oblasts and a recently appointed prison coordinator for monitoring visits to prisons. However, training and monitoring are not sufficiently funded, and there are no funds for monitoring visits of the Oblast Coordinator to the raions. A new KfW-financed project includes procurement of cars for supervision activities.

**Hospital Performance**

Over 70 percent of newly registered patients are treated at inpatient facilities, in addition to chronic patients and patients with multi-drug resistant disease that are infectious. Patient follow up is mostly carried out in TB sanatoria.
In 2003, the TB hospital system had 12,512 beds, the highest number in the region (94.4 beds per 100,000 population). Additionally, there are 3,925 sanatorium beds for adults and children. Together, the supply of beds reaches 121 TB beds per 100,000 persons. The supply of beds is highest in the Aktube (238 beds per 100,000 inhabitants) and Kzil-Orda (216 beds) Oblasts, while Almaty City (52 beds) and Astana City (63 beds) have the lowest supply. No reduction in the number of beds is planned in the short-term.

The turnover rate (the average number of patients per bed) in Kazakh hospitals is consistent with that of other countries in the region at approximately 5 patients per bed. However, Kazakhstan has one of the highest bed occupancy rates (BOR) in the region: 95.6 percent, as compared to 86 percent in the Kyrgyz Republic. Within the country, Almaty City has the highest turnover rate (8.2 patients per bed) and second highest BOR (103 percent).

A more interesting approach is to evaluate these variables together. Figure 20 is divided into quadrants with each having a particular performance level. Quadrant III indicates efficiency within the hospital as it combines a high turnover rate (proxy for productivity) and a high occupancy rate. In contrast, Q-I is the inefficient quadrant as a result of low bed utilization and a low number of patients per bed. The outcomes from the analysis are satisfactory, with only three regions (18.8 percent) placed in the inefficient quadrant and eight regions (50 percent) in the efficient quadrant. Finally, six oblasts show a poor performance due to a low BOR and four oblasts due to a below average turnover rate.
Long distances between rural settlements and health services, and the lack of follow up mechanisms may justify the high number and utilization of beds in hospitals. If this premise is accepted, the overall performance of the hospital system is satisfactory and two important elements emerge. First, the number of beds within hospitals in Kazakhstan is greater than in neighboring countries and appears to satisfy the demand. However, gaps between oblasts are considerable and some regions require attention as their bed supply is much less than the national average. Second, half of the regions present efficient hospital performance while thirteen have from good to excellent performances.

Treatment Outcome

Following the implementation of the DOTS strategy in 1998, the treatment success rate increased to almost 82 percent in 2002, according to the MoH. The case fatality rate is 5 percent and the failure rate 10–11 percent. Cavity closure is still seen by many regional doctors as the proper indicator for cure. It has to be proven by roentgen tomography. Cavity closure is reported for 70 percent of pulmonary cases, while bacteriological conversion is seen in 82 percent. Cure rates for smear positive patients are based on negative smears at the end of treatment but deaths are excluded from the denominator (in some facilities also MDRTB) increasing the cure rates in such a way that does not allow for comparison with other countries that use WHO definitions. Often, the proportions add up to over 100 percent, indicating that not only do the cohorts differ from international standards, but also that cohort analysis is not well understood. Results according to the WHO methodology point to a success rate around 78 percent (Table 24).
Financing TB Control

Sources of Funding

The TB control program has two sources of public financing, state and local. The state budget allocates funds only for TB drugs. The local budget covers all other expenses: salaries, communal services, heating, nutrition for patients, drugs for symptomatic treatment and treatment of side effects. The line-item budgeting creates few incentives for efficiency. TB hospital funding that is still based on number of beds and bed-days creates strong incentive to keep patients hospitalised for long periods of time. The size of the local budget depends on the prosperity of each oblast and may differ substantially. In 2001, per capita financing ranged from $68.2 (10,000 tenge) in the Atyrau Oblast to only $9.4 (1,380 tenge) in the Almaty Oblast. In eight out of fourteen oblasts, the level of per capita financing is about $24 (3,600 tenge) per year. Salaries of medical personnel have increased and are paid on time, which acts as an incentive to increase quality of care. However, there are no additional incentives for implementing DOTS in the PHC system since the average length of hospital stay has increased as a result of a new order (Prikaz). Current financing by bed occupancy becomes an additional disincentive for shortening the inpatient phase of treatment.

Public Financing

The budget for TB control has increased substantially and the Government has included procurement of second-line drugs (so-called reserve drugs in Kazakhstan). The penitentiary system is included in the program. The total budget allocation during 2002 was US$37.2 million, which was the largest among the Central Asian countries assessed. The significant amount of resources represents approximately four times the expenditures in Uzbekistan and 100 times public TB spending in Tajikistan. Public expenses for TB control represent 0.16 percent of GDP, 0.7 percent of total Government expenditure and a significant 8 percent of the public health budget. By far, the country has the highest level of public contribution to TB control among all countries analyzed.

The relatively high public contribution to TB is further evidenced when other variables are considered. For instance, spending per capita was US$2.54, which is five times the average

| Table 24. Treatment Outcomes for New Smear-Positive Cases Treated Under DOTS |
|-----------------------------|-----------------------------|-----------------------------|
|                            | 2000 | 2001 | 2002 |
| Evaluated                  | 8,781| 8,894| 9,191|
| Cured                      | 75.6 | 76.2 | 76.4 |
| Completed                  | 3.0  | 1.7  | 1.3  |
| Failed                     | 10.1 | 11.6 | 11.2 |
| Died                       | 4.7  | 4.7  | 4.8  |
| Defaulted                  | 3.3  | 3.7  | 4.2  |
| Transferred out            | 3.3  | 2.2  | 2.1  |
| Success rate               | 78.6 | 77.9 | 77.7 |

Source: Estimates based on MoH data and using the WHO methodology.
**Figure 21. TB Public Spending in the Economy in 2002**

Source: Estimates based on Kazakhstan MoH data.

**Figure 22. Cost per TB Patient by Oblast in 2002**

Source: Estimates based on Kazakhstan MoH data.
allocation for TB control by other countries in the region. There has also been an upward trend over the years due to the progressive decline of the Kazakh population. While average cost per patient is US$1,422, there are significant differences in the distribution of costs across the regions. As seen in Figure 22, cost of treatment of a TB patient in Kostanay is almost five times that of a patient in Karaganda. However, the high average cost is largely driven by five oblasts with average spending per patient above US$1,500. The average cost per patient represents 83 percent of per capita GDP in 2002–2003. As expected, the cost per bed-day is also high at US$6.3 as compared to US$2.5 in other Central Asian countries.

In summary, Kazakhstan has shown political commitment to control TB proven by its strong budget support to the TB Program. However, there are still some issues to be resolved, particularly budget distribution, expressed in the large variation in spending among oblasts, and efficiency, as demonstrated by high per patient and per bed-day costs.

Donor Assistance

As in most neighboring countries, Kazakhstan also benefits from a significant amount of external aid flows for TB control. The total expected contributions between 2002 and 2007 are US$9.3 million, out of which 75 percent will be distributed between 2004 and 2006. The share of total external aid for TB as a percentage of GDP is one of the lowest in the region. For instance, in 2003, it represented 0.003 percent of total resources, going up to 0.009 percent by 2004. Similarly, the contribution per person was also lower than in other countries. In real terms, the capita contribution fluctuated from US$0.05 in 2002, to US$0.01 in 2003 and a projected US$0.17 for 2004. The last figure is the result of both a significant increase in external donations and a decrease in total population.

As in the Kyrgyz Republic, external funding for TB resources mainly comes from two bilateral agencies, USAID and KfW. USAID, through several organizations (Project HOPE, CDC, and so forth), has emphasized training, refurbishment, TB control in prisons, laboratory strengthening, and electronic surveillance. KfW mainly supports the upgrading of laboratories, training, and drug provision. Other agencies that have provided important resources for TB control are the World Bank and Cordaid/ICCO. The Bank has helped equip the PHC laboratories and Cordaid/ICCO financed TB projects in prisons.

USAID has continuously supported TB control programs in CA. For 2004–2008, it allocated US$15 million. With USAID funding, Project HOPE introduced the first DOTS program in Central Asia and has been working in Kazakhstan since 1994. Since 2001, HOPE also supports TB control in prisons in Karaganda oblast. CDC started its activities by establishing

| Table 25. Donor Assistance to TB Control in Kazakhstan (US$) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | 2002            | 2003            | 2004            | 2005            | 2006            | 2007            | Total           |
| Donors          | 770,880         | 180,000         | 2,419,787       | 2,292,667       | 2,287,667       | 1,349,000       | 9,300,000       |

Source: Donors 2004.

5. Figures on cost per patient consider all budgetary categories (staff, drugs, equipment, etc.) and three sources of funding: local, state and donor contributions.
an Infectious Disease network in 1995. Since 2000, it works on strengthening laboratory diagnosis and electronic surveillance. Rational Pharmaceutical Management (RPM), present in Kazakhstan since 1998, started a TB drug quality assurance program with USAID support in 2002. Primary health care has been strengthened by Zdrav Plus since 1994. WHO-Euro created a post for a Regional TB officer, who is based in Almaty, with USAID funds.

KfW has provided €5.12 million for 2004–2007 for upgrading laboratories, training, supervision and uninterrupted supplies of drugs in five oblasts, both for civilian and prison

### Table 26. Donor Assistance to TB Control in Kazakhstan

<table>
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<th>Donor</th>
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<th>Year(s)</th>
<th>Amount (millions)</th>
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<td></td>
<td>Project HOPE</td>
</tr>
<tr>
<td></td>
<td>TB control in prisons</td>
<td>2001–2004</td>
<td></td>
<td>CDC</td>
</tr>
<tr>
<td></td>
<td>Training Lab equipment</td>
<td>2000–2004</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electronic Case based Surveillance and monitoring (ECBMS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drug quality assurance</td>
<td>2002–2005</td>
<td></td>
<td>RPM</td>
</tr>
<tr>
<td></td>
<td>Primary health care strengthening</td>
<td>1994–</td>
<td></td>
<td>ZdrafPlus</td>
</tr>
<tr>
<td></td>
<td>DOTS implementation, also in the prison sector</td>
<td>2004–2008</td>
<td>$15 for 5 countries</td>
<td></td>
</tr>
<tr>
<td>KfW TB1</td>
<td>TB drugs Training DOTS</td>
<td>2004–2006</td>
<td>€2.56</td>
<td>MoH</td>
</tr>
<tr>
<td>KfW TB2</td>
<td>TB drugs Training DOTS</td>
<td>2004–2007</td>
<td>€2.56</td>
<td>MoH MinJus</td>
</tr>
<tr>
<td>World Bank</td>
<td>Lab equipment</td>
<td>1999</td>
<td>$9.5</td>
<td>MoH</td>
</tr>
<tr>
<td>Cordaid/ICCO</td>
<td>DOTS implementation in prisons</td>
<td>2001–2004</td>
<td>$1</td>
<td>KNCV MinJUs</td>
</tr>
<tr>
<td></td>
<td>Penal Reform and Alternatives to imprisonment</td>
<td>2001–2004</td>
<td>$1.2</td>
<td>PRI MinJus</td>
</tr>
</tbody>
</table>

Source: Donors 2004.
health services. The World Bank provided US$9.5 million to equip PHC laboratories, which had an impact on the diagnostic services for TB control. Cordaid and ICCO, supported by the Dutch Government, have been financing TB control and human rights in prisons since 1998 through the Penal Reform International (PRI) and KNCV Tuberculosis Foundation. A combined PRI/KNCV program started in Pavlodar and has since been extended to three more oblasts, including Karaganda, in cooperation with Project HOPE.

In summary, compared to the size of the economy and the country’s population, the importance of international assistance is relatively low in Kazakhstan. If current trends prevail over the next two years, donor contributions per capita will not exceed US$0.20.

**Budgetary Analysis**

This section evaluates the composition and distribution of TB budget in Kazakhstan, focusing on its effects and performance among oblasts. As presented in Figure 24, 40 percent of the budget is spent on staff and Social Security contributions. Drugs account for 16 percent of overall spending. This type of allocation is consistent with the TB financing structure in the rest of the region. On average, recurrent costs account for more than 90 percent of the budget and investment spending is extremely low. In three oblasts, it represents less than 0.5 percent of the budget.

At the core of the composition of the public TB budget is local participation. Oblasts provide a higher proportion of resources than the Republican entities with the exception of drugs. In effect, 85 percent of 2002 TB expenditures were provided by regions and only 15 percent by Republican institutions. This disparity is a result of the division of responsibilities within the system, which is illustrated in Figure 25. For instance, the Republican entities are devoted almost exclusively to providing TB drugs and do not finance other activities, such as advocacy, training, and construction or renovation of TB facilities.

The pattern of total budget allocations for TB for each oblast is depicted in Figure 26. A majority of oblasts (75 percent) receive 5 to 9 percent of total TB resources. However, Southern Kazakhstan absorbs 20 percent of the country’s TB resources. Oblasts can be

![Figure 24. TB Budget Structure in 2002](image)

*Source: Estimates based on Kazakhstan MoH data.*
Figure 25. Contribution for TB Control by Account in 2002

Source: Estimates based on Kazakhstan MoH data.

Figure 26. Distribution of TB Resources by Oblast in 2002

Source: Estimates based on Kazakhstan MoH data.
divided into two main groups according to their share in total TB budget: those that receive less than 3 percent of the total funds and those that receive between 5 and 9 percent. Southern Kazakhstan is an outlier.

Per capita spending in oblasts reflects the share of that oblast in TB spending. On one hand, Almaty City and Astana City, with the lowest percentage of funds allocated for TB control, also have the lowest per capita spending. This is the result of having a small budget share with a larger population: their combined TB budget allocation is 3 percent while these regions hold 10 percent of the population. On the other hand, Kzil-Orda and Aktube have the highest spending per capita, at almost US$5 per person. Together they have 7 percent of the population, but spend 14 percent of the national TB budget.

The analysis of spending patterns in each oblast shows interesting results. It is clear that some oblasts emphasize certain expenditures over others. For instance, Astana City has a salary-oriented budget, allocating 59 percent of its budget for salaries, while Western Kazakhstan allocates only 18 percent to this item. Among all oblasts, Astana City has the largest proportion of expenditures on drugs (29 percent), while Southern Kazakhstan allocates 8 percent of its resources to pharmaceuticals. Differences among oblasts may result from differences in the epidemiological situation in the region, the level of “maturity” of the implementation of the national strategy, as well as other factors.

As mentioned before, Kazakhstan presents the highest TB spending in the region. Its budget distribution pattern is consistent with other countries in the region that allocate a large share for wages, a moderate share for drugs, and very little for infrastructure. However, the main concern is not with resource allocation within oblasts, but with the resource distribution across oblasts. For instance, the TB spending per person in Kzil-Orda is 13 times

---

**Figure 27. TB Spending per Capita by Oblast in 2002 in US$**

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Per capita US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alm C</td>
<td>0.4</td>
</tr>
<tr>
<td>Ast C</td>
<td>1.2</td>
</tr>
<tr>
<td>Alm</td>
<td>1.4</td>
</tr>
<tr>
<td>Kos</td>
<td>1.9</td>
</tr>
<tr>
<td>Jam</td>
<td>2.0</td>
</tr>
<tr>
<td>E-K</td>
<td>2.1</td>
</tr>
<tr>
<td>N-K</td>
<td>2.2</td>
</tr>
<tr>
<td>Kar</td>
<td>2.6</td>
</tr>
<tr>
<td>Prav</td>
<td>2.7</td>
</tr>
<tr>
<td>Man</td>
<td>2.8</td>
</tr>
<tr>
<td>S-K</td>
<td>3.0</td>
</tr>
<tr>
<td>W-K</td>
<td>3.1</td>
</tr>
<tr>
<td>Akm</td>
<td>3.4</td>
</tr>
<tr>
<td>Aty</td>
<td>4.7</td>
</tr>
<tr>
<td>Akt</td>
<td>4.9</td>
</tr>
<tr>
<td>Kz</td>
<td>4.9</td>
</tr>
</tbody>
</table>

*Source: Estimates based on Kazakhstan MoH data.*
higher than that observed in Almaty City (Figure 28). Such large disparities require changes in current budget allocation mechanisms based on uniform criteria.

**Input-Outcome Analysis**

This section describes an input-outcome evaluation based on cure rates as an outcome indicator and physical or monetary input indicators. For each relationship, the chart is divided into quadrants organized clockwise. The intersection point illustrates the average rate of each variable and the performance of each indicator is evaluated with regards to the average of the total oblasts considered. According to this, a possible interpretation of Q-I is that a low spending per person yields a low cure rate. The efficient or outstanding quadrant is Q-II (upper right quadrant) because with a low input endowment the oblast is capable to achieve above average results (in this case, a high cure rate). Finally, Q-IV is the inefficient quadrant with the inverse relationship to Q-II.

The first relationship, depicted in Figure 29, links spending per capita to cure rates. Following the outlined criteria, the analysis shows that most oblasts are inefficient as 7 out of 16 oblasts receive a higher per capita spending, but their correspondent cure rates fall below average. There are also 5 efficient oblasts placed in Q-II that receive a lower budget.

6. Cure rates were used instead of success rates because no data on treatment completion were available for 2003. For 2002, the difference between success and cure rates was less than 2 percentage points at the oblast level.
and, yet, achieve higher cure rates. Finally, only four oblasts behave as expected and are present in Q-I and Q-III. Almaty City is the most surprising region because it has the lowest per capita spending (US$0.41), but experiences the highest cure rate with 91 percent achievement. Overall, TB control programs seem to be moderately efficient, although there is a significant variation within the country.
Another dimension of efficiency analysis is evaluation of the spending structure. Figures 30–33 show different relationships between human and physical inputs and cure rates. There seems to be little correlation between the number of TB doctors per 100,000 population and cure rates. The fact that there is a relatively high number of oblasts that have high ratio of doctors to population but low cure rates is worrying.

The situation improves slightly when drug spending and cure rates are analyzed. No oblasts appear in Q-III and six oblasts are positioned in Q-II (the efficient zone). However, as mentioned in the previous two cases, the six inefficient oblasts cancel the six efficient oblasts, creating a strong polarization between these two broad groups.

The most striking characteristic of the relationship between number of beds and cure rates is the extremely high number of oblasts in the inefficient quadrant IV. Seven oblasts are located in this quadrant, 10 have above-the-average bed coefficients and only four oblasts are operating efficiently. This may indicate the existence of an oversupply of beds in the majority of regions at the expense of other important inputs necessary to achieve higher cure rates.

Finally, from the perspective of infrastructure, we evaluated the relationship between the number of facilities per 100,000 population and cure rates in Figure 33. This analysis is one of the few cases where the majority of oblasts generate expected results. Furthermore, only two oblasts (Akmola and Aktube) are labeled as inefficient, while five oblasts are part of Q-II. This diverges from the pattern observed with previous indicators and these results are the opposite of the bed-cure rate analysis. Examining beds and facilities together in one

**Figure 31. TB Drug Spending and Cure Rates by Oblast in 2003**

*Source:* Estimates based on Kazakhstan MoH data.
Figure 32. TB Beds and Cure Rates in 2003

Source: Estimates based on Kazakhstan MoH data.

Figure 33. TB Facilities and Cure Rates in 2003

Source: Estimates based on Kazakhstan MoH data.
model suggests that while the number of TB facilities in Kazakhstan is adequate they tend to have an oversupply of beds.

Economic Analysis

Cost-benefit and a cost-effectiveness analyses were carried out to estimate the impact of the TB program in Kazakhstan. The assessment considers the traditional benefit-cost ratio, the internal rate of return (IRR), the net present value (NPV) and the cost per DALY. Additionally, the report includes an estimate of the burden of TB on the economy.

The following parameters are relevant to estimate the economic benefits of the program: the timeframe (2003–2015) and the time it takes to impact the health of the population (2 years after the first set of investments), the size of the target group, the existing patterns of morbidity and mortality, the number of years of productive life added as a result of the percentage decrease in mortality, and the existing cost structure in the health sector. The CBA uses the following assumptions to measure the direct and indirect benefits:

1. A 45 percent reduction in hospital visits and hospitalizations;
2. A 35 percent reduction in first round TB patients;
3. A 60 percent reduction in second round TB patients;
4. A 50 percent reduction in TB mortality rate; and
5. A discount rate of 10 percent.

There are direct and indirect benefits. The direct benefits are the expected tangible benefits accruable from reduced hospital visits and stays. Indirect benefits are related to the potential life-years saved by the program and the economic and financial value of increased productivity through a lower disability rate. The cost-benefit analysis assumes that the TB program covered 14.8 million people and that a 13-year period will be required to reflect the flow of costs and benefits. The analysis considers two types of patients: those that require only one course of treatment (one-round patients) and those that require two rounds. From the total number of treated persons, it is assumed that 80–85 percent of patients are cured in the first round.

The broad outcomes of the program are presented in Table 27. Summary indicators show that the program yields important health benefits to the population. The benefit-cost ratio yields a coefficient of 1.4, meaning that for each dollar invested in TB control, the economy receives US$1.4 in benefits. The IRR is estimated to equal 38 percent, the lowest among the four countries. This suggests that most benefits are from indirect sources and account for 82 percent of the US$451.9 million in benefits (discounted value). These outcomes are relevant to understand the efforts that are required to achieve global targets in Kazakhstan. Compared with other countries, indirect benefits have a lower share in total benefits, which is partially explained by the dramatic reduction in hospitalizations.

To measure effectiveness, the study defined four parameters. First, single-round patients experience a mild disability (0.05) for eight months, while two-round patients have a 0.1 disability weight for 16 months. Second, under the No Intervention case, the incidence rate remained at 3.7 cases per 1,000 population, but with intervention it fell by 50 percent. Third, the mortality rate remained at 24 per 100,000 population without intervention and declined to 12 percent under the intervention. Finally, the cure rate was fixed at
80 percent. Discounted marginal costs of the intervention were estimated at US$33.2 million during the 2003–2015 period. The program could save 408,220 DALYs and avert 12,276 deaths. The cost per DALY was estimated at US$64.7, while the cost per death averted was US$2,156. The cost per DALY was much higher than the international standards that put the cost per DALY of TB programs in the range of US$3–10.

**Economic Impact of TB**

The importance of the burden of TB for the economy was estimated by measuring both productivity losses (in terms of deaths, disability and hospital visits) and direct fiscal expenditures. The results from the exercise are summarized in Table 28. During a typical year, given the current epidemiological profile, the total costs for the economy were estimated to be US$114.4 million. Of these costs, 31 percent were direct costs (US$35.4 million) and 69 percent were the result of productivity losses, specifically due to deaths (67 percent of total costs and 97 percent of indirect costs). In some oblasts, direct fiscal costs represented only 5 percent of total costs (Pavlodar), but in other oblasts, it reached 61 percent (Almaty City). As a share of GDP, current costs and losses represent 0.47 percent of total output. Compared with other countries in the region, the scale of impact on the economy is similar to that in Tajikistan but far less than in Uzbekistan.

### Table 27. Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>Discounted Costs</th>
<th>Discounted Direct Benefits</th>
<th>Discounted Indirect Benefits</th>
<th>Total Benefits</th>
<th>Net Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>35,413,900</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>(35,413,900.00)</td>
</tr>
<tr>
<td>1</td>
<td>33,160,288</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>(33,160,288.18)</td>
</tr>
<tr>
<td>2</td>
<td>31,050,088</td>
<td>13,961,780.31</td>
<td>64,195,295.42</td>
<td>78,157,075.73</td>
<td>47,106,987.70</td>
</tr>
<tr>
<td>3</td>
<td>29,074,173</td>
<td>12,100,209.60</td>
<td>55,635,922.70</td>
<td>67,736,132.30</td>
<td>38,661,958.96</td>
</tr>
<tr>
<td>4</td>
<td>27,223,999</td>
<td>10,460,631.20</td>
<td>48,097,255.17</td>
<td>58,557,886.37</td>
<td>31,333,887.71</td>
</tr>
<tr>
<td>5</td>
<td>25,491,562</td>
<td>9,018,165.21</td>
<td>41,464,896.83</td>
<td>50,483,062.04</td>
<td>24,991,499.65</td>
</tr>
<tr>
<td>6</td>
<td>23,869,372</td>
<td>7,750,611.99</td>
<td>35,636,775.22</td>
<td>43,387,387.21</td>
<td>19,518,015.16</td>
</tr>
<tr>
<td>7</td>
<td>22,350,412</td>
<td>6,638,171.21</td>
<td>30,521,849.83</td>
<td>37,160,021.04</td>
<td>14,809,609.03</td>
</tr>
<tr>
<td>8</td>
<td>20,928,113</td>
<td>5,663,189.82</td>
<td>26,038,953.14</td>
<td>31,702,142.95</td>
<td>10,774,029.89</td>
</tr>
<tr>
<td>9</td>
<td>19,596,324</td>
<td>4,809,935.88</td>
<td>22,115,750.87</td>
<td>26,925,686.75</td>
<td>7,329,362.69</td>
</tr>
<tr>
<td>10</td>
<td>18,349,285</td>
<td>4,064,395.82</td>
<td>18,687,809.48</td>
<td>22,752,205.30</td>
<td>4,402,920.05</td>
</tr>
<tr>
<td>11</td>
<td>17,181,603</td>
<td>3,414,092.49</td>
<td>15,67,759.96</td>
<td>19,111,852.45</td>
<td>1,930,248.99</td>
</tr>
<tr>
<td>12</td>
<td>16,088,229</td>
<td>2,847,922.15</td>
<td>13,094,548.10</td>
<td>15,942,470.26</td>
<td>(145,758.44)</td>
</tr>
</tbody>
</table>

| B-C Ratio | 1.41 |
| NPV Benefits | 451,915,922.4 |
| IRR | 38% |

*Source: Donors 2004.*
Table 28. Direct, Indirect, and Total TB Costs in a Typical Year

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Direct Costs</th>
<th>Indirect Costs</th>
<th>% Direct Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Visits</td>
<td>Disability</td>
<td>Deaths</td>
</tr>
<tr>
<td>Almaty</td>
<td>1,850,287</td>
<td>28,076</td>
<td>130,441</td>
</tr>
<tr>
<td>Almaty City</td>
<td>2,266,591</td>
<td>29,313</td>
<td>136,187</td>
</tr>
<tr>
<td>Southern-Kazakhstan</td>
<td>2,213,057</td>
<td>29,484</td>
<td>136,979</td>
</tr>
<tr>
<td>Jambil</td>
<td>2,117,928</td>
<td>17,426</td>
<td>80,959</td>
</tr>
<tr>
<td>Western-Kazakhstan</td>
<td>3,082,314</td>
<td>32,872</td>
<td>152,719</td>
</tr>
<tr>
<td>Kizilorda</td>
<td>1,955,227</td>
<td>21,424</td>
<td>99,532</td>
</tr>
<tr>
<td>Akmola</td>
<td>1,889,003</td>
<td>20,548</td>
<td>95,467</td>
</tr>
<tr>
<td>Eastern-Kazakhstan</td>
<td>3,422,296</td>
<td>33,965</td>
<td>157,798</td>
</tr>
<tr>
<td>Kostanay</td>
<td>2,968,950</td>
<td>27,851</td>
<td>129,393</td>
</tr>
<tr>
<td>Astana City</td>
<td>1,786,541</td>
<td>24,344</td>
<td>113,100</td>
</tr>
<tr>
<td>Karaganda</td>
<td>937,567</td>
<td>12,153</td>
<td>56,463</td>
</tr>
<tr>
<td>Northern-Kazakhstan</td>
<td>1,989,467</td>
<td>21,622</td>
<td>100,455</td>
</tr>
<tr>
<td>Atirau</td>
<td>1,529,708</td>
<td>13,111</td>
<td>60,914</td>
</tr>
<tr>
<td>Aktube</td>
<td>6,341,777</td>
<td>31,353</td>
<td>145,663</td>
</tr>
<tr>
<td>Pavlodar</td>
<td>458,378</td>
<td>5,869</td>
<td>27,266</td>
</tr>
<tr>
<td>Mangistau</td>
<td>604,809</td>
<td>10,263</td>
<td>47,683</td>
</tr>
<tr>
<td>Republic of Kazakhstan</td>
<td>35,413,901</td>
<td>359,674</td>
<td>1,671,020</td>
</tr>
</tbody>
</table>
Tuberculosis control is a priority issue for the government. Tuberculosis control in prisons has become an integral part of control efforts. Good cooperation at operational level between the MoH and MoJ medical departments. Decentralization is piloted. PHC budget increased. The private sector becomes strengthened. Smear microscopy has been adopted as the basic tool for diagnosis. Well organized laboratory network. NRL has a very good technical standard. Standardized regimens have been introduced. Creation of the position of Chemizator for case management. Overnight implementation in the whole country. Insufficient technical assistance to prison sector. Funding of the program at oblast level based on bed-days. Prisoners on treatment that are released are not followed up due to lack of adequate support mechanisms. PHC system is still weak. Mandatory health insurance was discontinued. Screening with fluorography is still seen as a major tool in case finding. Too many laboratories perform culture and DST. Not all laboratories are included in QA network. Too many standardized regimens applied without criteria. Too long inpatient treatment. High failure rates. Rapid expansion of MDRTB treatment without training and quality assurance. Comprehensive 5-year NTP plan in preparation. School of Public Health has been established. NRL has the technical capacity to become the SNRL for CAR. Co-operation between Chemizators and PHC structures to ensure adequate treatment delivery and patient adherence. NTBC can become a Center of Excellence for the CAR. Opposition to DOTS strategy. Geographical situation with vast distances between small settlements and poor infrastructure is an obstacle to a well-organized PHC. TB suspects have to pay for a chest x-ray, which could be an obstacle for early diagnosis. QA system may breakdown because of overloading the higher level services. Erratic treatment of MDRTB cases.
Table 29. Kazakhstan—SWOT Analysis (Continued)

<table>
<thead>
<tr>
<th>SWOT Analysis</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Education</td>
<td>KAP survey was conducted.</td>
<td>No adequate IEC materials have been developed.</td>
<td>Findings of KAP survey allow to better target risk groups.</td>
<td>Groups at risk are not reached by general HE.</td>
</tr>
<tr>
<td>Training</td>
<td>Extensive training of health staff and ToT.</td>
<td>Not all levels of health staff (PHC, prisons) have been adequately trained.</td>
<td>NTBC could nominate a Training Co-coordinator to draw up a comprehensive long-term training plan.</td>
<td></td>
</tr>
<tr>
<td>Drug Management</td>
<td>Consistent availability of all 1st line drugs due to central procurement.</td>
<td>Lack of feedback mechanism.</td>
<td>Establishment of a National Drug Information Centre.</td>
<td>Poor quality drugs may increase MDRTB problem.</td>
</tr>
<tr>
<td></td>
<td>Availability of 2nd line drugs.</td>
<td>No quality requirements in tender documents.</td>
<td>Establishment of a National Drug Information Centre.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anti-tuberculosis drugs can not be sold in private pharmacies.</td>
<td>Procurement process is not transparent.</td>
<td>Establishment of a National Drug Information Centre.</td>
<td></td>
</tr>
<tr>
<td>Recording and Reporting</td>
<td>ESCM has facilitated data collection.</td>
<td>Definitions still differ from DOTS definitions.</td>
<td>Inclusion of prison sector in electronic data collection.</td>
<td>Improper outcomes due to misunderstanding may lead to wrong management decisions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Checklists of Project HOPE are too complicated.</td>
<td>Inclusion of prison sector in electronic data collection.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No standardized treatment outcome monitoring of MDRTB.</td>
<td>Inclusion of prison sector in electronic data collection.</td>
<td></td>
</tr>
<tr>
<td>Supervision</td>
<td>NTBC supervises oblasts.</td>
<td>Insufficient funds for supervision at rayon level.</td>
<td>New position of Infectious Control Nurse to be established; training by the SPH with help of CDC.</td>
<td>Insufficient funding.</td>
</tr>
<tr>
<td>Infection Control</td>
<td>Guidelines exist.</td>
<td>Guidelines are not followed everywhere.</td>
<td>New position of Infectious Control Nurse to be established; training by the SPH with help of CDC.</td>
<td>Insufficient funding.</td>
</tr>
<tr>
<td>TB/HIV</td>
<td>No programmatic links between AIDS and TB programs.</td>
<td>A working group on TB/HIV has been established.</td>
<td>New position of Infectious Control Nurse to be established; training by the SPH with help of CDC.</td>
<td>No strategy for dual infection.</td>
</tr>
</tbody>
</table>

Source: Based on a review by KNCV Tuberculosis Foundation 2002. Some of the weaknesses have been addressed in the meantime, but overall the analysis is still
The Kyrgyz Republic
Main Challenges in Achieving Global TB Targets

The TB burden in the Kyrgyz Republic is the second largest in Central Asian countries that are evaluated. Nearly 5,800 new cases of tuberculosis were registered in 2004 in Kyrgyzstan and the notification rate was 115 cases per 100,000 population. The mortality rate was over 11 deaths per 100,000 population. Although the country has experienced some promising results, further action should be taken to effectively lower TB rates in the country. Currently, the reported success rate is 85 percent and the number of patients that interrupt treatment is relatively high. Therefore, it seems difficult that the country will achieve the TB global targets in the near future.

The United Nations’ Millennium Development Goals Progress Report (2003) considers that the most important barriers for achieving the global targets in the Kyrgyz Republic are:

1. Insufficient funding from the Government;
2. Insufficient education among patients about the consequences of not completing the treatment regime;
3. Lack of quality of sputum collection by medical staff or insufficient qualification of lab assistants. With regards to TB detection at the primary health care level, there is no difference in the selection of patients for testing sputum smear; and
4. Lack of detection of patients with neglected forms of the disease having a negative impact on treatment outcomes.

Tuberculosis impacts heavily the Kyrgyz economy. Estimates for 2002 showed that yearly losses due to TB were approximately US$8.4 million, or 0.53 percent of GDP. Thus, a sustained public intervention is required to reduce both incidence and mortality and...
mitigate the current negative impact on productivity. Specific measures to change the current situation include: an increase in budget, an extended program to educate personnel and people on TB-related topics (including DOTS), better laboratories and infrastructure, and improved monitoring systems.

Special attention should be paid to TB in prisons, where most of the relevant indicators have been increasing or show no significant progress. Improving performance of prison TB programs would require improvement of program management skills, collaboration between the Ministry of Justice and the National TB Program, increased understanding of DOTS principles by prison authorities and medical staff, monitoring and analysis of results. DOTS should be fully implemented in the penitentiary system, including the SIZO. The Ministry of Justice would benefit from technical assistance to implement DOTS throughout the prison system. The pool of MDRTB patients will decrease over time if DOTS implementation throughout the country is successful.

Existing levels of resources are inadequate for effective TB control, although Government funding has increased in recent year. If the Government budget is fully executed, the Kyrgyz Republic could reduce the negative effects of TB on the economy and population. However, this would require improved cash management skills because currently budget execution is only 77 percent.

In addition, donor funds need to be used effectively. A serious challenge for the Kyrgyz Republic is to overcome the expected decline in resources in the medium term. Donor contributions are expected to fall sharply and public budgets are not likely to exceed US$1 million. Therefore, it becomes clear that the next two or three years are key for the success of the TB strategy.

Similarly to other countries in the region, TB resources in the Kyrgyz Republic are not distributed equally as demonstrated by significant variation in per capita spending across regions. However, here the gap between oblasts with high and low spendings is not as large as it is in other countries. During 2003, for instance, the gap between oblasts with the highest and the lowest levels of per capita spending on TB was only 3.5. Still, levels of financial incentives for health workers differ across the country. For example, the award of $2.20 for a newly diagnosed patient has been introduced only in few regions.

Profile Introduction

The Kyrgyz Republic is the smallest country in Central Asia both in terms of area and population. It is one of the most mountainous and poorest countries in the region. Its GNI per capita equals US$290. The country has made considerable progress in attaining macroeconomic stability and the average GDP has grown at about 5 percent a year since 1996. Nevertheless, 39.3 percent of the population still lives below the poverty line.

This Country Profile is divided into three sections. The first section analyzes epidemiological data. The second section describes the TB Control Program. The third section analyzes the financial and institutional issues governing TB control in the Kyrgyz Republic. Among others, the section evaluates public spending, the contribution of international donors and the results achieved in both the penitentiary and the general hospital systems. The section evaluates TB budgets by oblasts and assesses the main features of current
resource allocation mechanisms. Finally, the section estimates the economic costs of TB and develops an input-outcome evaluation.

**TB Epidemiology**

*Notification*

Among the four countries evaluated, the Kyrgyz Republic has the second highest notification rate of TB, and there has been an increase in notifications since 1998. However, most of the increase occurred in the first 3 years after DOTS implementation and can be attributed to improved case finding and reporting. In 2004, 5,756 TB patients were registered, a decrease of 8 percent as compared to 2002. However, this downward trend can still be easily reversed.

*Age and Gender*

Tuberculosis occurs predominantly among young people. About half (52 percent) of the patients are between 15 and 35 years old. The male/female ratio is 1.7.

*Mortality*

Until 2002, the mortality rate had been steadily increasing. It doubled between 1991 and 1997, with the sharpest increase experienced in the last year of that period (Figure 35) due to the inclusion of number of deaths in prisons in the general statistics only on that year. The latest mortality figure is 11.4 per 100,000 in 2004, which is slightly less than in previous years.

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**Figure 34. TB Notification by Age and Gender in 2002**

MDRTB

In 2002, drug resistance data were collected by the National TB Center in Bishkek. In 525 strains of new patients, MDRTB was present in 13.3 percent; and in 113 strains of previously treated patients, MDRTB was present in 46 percent. As expected, resistance to isoniazid and streptomycin was high: respectively 34.5 percent and 61.3 percent in new cases; and 73.5 percent and 81.4 percent in previously treated cases. There is no information on the representativeness of these data, but overrepresentation of difficult patients that are followed at the TB Center is likely. Low failure rates among treated patients suggest lower overall resistance.

Table 30. TB Notification and Mortality Rates Per 100,000

<table>
<thead>
<tr>
<th>Years</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>New TB cases</td>
<td>5,195</td>
<td>5,535</td>
<td>5,953</td>
<td>6,274</td>
<td>6,279</td>
<td>6,172</td>
<td>5,756</td>
</tr>
<tr>
<td>New pulmonary TB cases (SS+)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1,555</td>
<td>1,671</td>
<td>1,761</td>
</tr>
<tr>
<td>Notification rate</td>
<td>109</td>
<td>114</td>
<td>122</td>
<td>127</td>
<td>126</td>
<td>123</td>
<td>115</td>
</tr>
<tr>
<td>Number TB deaths</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>688</td>
<td>592</td>
<td>NA</td>
</tr>
<tr>
<td>Mortality rate</td>
<td>13.5</td>
<td>13.6</td>
<td>12.6</td>
<td>13.5</td>
<td>13.8</td>
<td>11.8</td>
<td>11.4</td>
</tr>
</tbody>
</table>

Source: National TB Center, Kyrgyz Republic.

Figure 35. TB Notification and Mortality Rates per 100,000

Source: National TB Center, Kyrgyz Republic.
HIV/AIDS

HIV is on rise in the Kyrgyz Republic as it is a transport route for illegal drugs. By February 2004, a total of 508 HIV positive people had been registered, and 20 people had died of AIDS. About 85 percent of HIV positive cases are among IDUs. Using the 2000 sentinel surveillance data, according to which HIV prevalence among IDUs in Bishkek is 12 to 19 percent and in Osh 32 to 50 percent, the MoH estimated the number of HIV-infected IDUs in Bishkek to be about 6,500 and in Osh 2,050. Several NGOs are involved in harm reduction programs. According to the National AIDS Centre, 10 percent of HIV positive people are also co-infected with TB. Therefore, there are about 50 people living with HIV/AIDS that are also infected with TB.

TB in Prisons

Prisons are one of the most critical elements of the TB epidemic in the Kyrgyz Republic, despite the reported substantial reductions in total number of cases and mortality rates in recent years. The notification rate per 100,000 prisoners was 2,875 in 2004. It is however difficult to ascertain how these rates have been calculated. Based on the reported absolute numbers, this study estimates notification rates to be over 5,500. The number of deaths due to TB is alarming. Including prisoners in SIZO’s (pre-detention centers), the total number of cases of death was 122 in 2003, or 904 deaths per 100,000, which may be due to the introduction of DOTS in prisons, as in previous years the mortality rate was twice as high.

The total number of prisoners is unclear, although according to prison authorities, in 2003 there were 13,462 prisoners in the country, a 20 percent decline in the number of prisoners since 2000. This was the result of amnesties that took place in recent years. If prisoners in settlement colonies were included, however, the total prison population would be around 17,000, a number most often stated in reports. Settlement colonies house prisoners who have served half of their sentence with good conduct and can finish the remainder of their sentence in semi-liberty. Prison authorities may not report these prisoners because the Ministry of Justice is not responsible for providing medical services to them—this is the responsibility of the Ministry of Health.

Table 31. TB Notification and Mortality Rates per 100,000 Prisoners

<table>
<thead>
<tr>
<th></th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>All new TB cases</td>
<td>150</td>
<td>676</td>
<td>1,512</td>
<td>1,765</td>
<td>732</td>
<td>753</td>
<td>731</td>
</tr>
<tr>
<td>All TB cases reported in prisons</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1,315</td>
<td>1,297</td>
</tr>
<tr>
<td>New pulmonary TB cases (SS+)</td>
<td>NA</td>
<td>NA</td>
<td>364</td>
<td>386</td>
<td>124</td>
<td>143</td>
<td>139</td>
</tr>
<tr>
<td>Notification rate per 100,000 prisoners*</td>
<td>1,997</td>
<td>3,222</td>
<td>4,952</td>
<td>7,654</td>
<td>3,830</td>
<td>2,947</td>
<td>2,875</td>
</tr>
<tr>
<td>Mortality rate per 100,000 prisoners</td>
<td>623</td>
<td>1,425</td>
<td>1,887</td>
<td>2,636</td>
<td>1,759</td>
<td>904</td>
<td>NA</td>
</tr>
</tbody>
</table>

* Study estimates point to higher notification rates.

Male prisoners are especially susceptible to TB, possibly due to overcrowding in male prisons. Estimates indicate that about 5 percent of prisoners are released before completion of treatment. In 2003, 398 inmates with TB were released while still on treatment and information about them was sent to the National TB Center. There is however, no information on the outcome of their treatment.

HIV/AIDS in Prisons

Half of the country’s HIV positive people are incarcerated: in 2004, 140 HIV positive prisoners were registered, ten of whom also suffered from TB. A large proportion of inmates (70 percent) are drug users and 80 percent use drugs intravenously.

Tuberculosis Control

Government Commitment

The Government considers TB control to be a priority. The Kyrgyz Republic was the first Central Asian Republic to adopt DOTS as the national TB control strategy. Several decrees were issued and the DOTS program rapidly expanded throughout the country. A Law on TB prevention was adopted in 1998, and inter-sectoral plans for 1998–2000, and for 2001–2002 were approved. National interagency meetings on TB, and more recently on TB and HIV/AIDS, were held twice chaired by the President of the country, the Prime Minister, and the Deputy Prime Minister. A Country Coordination Mechanism (CCM) has been set up to successfully apply for a TB grant from the Global Fund against AIDS, TB and Malaria (GFATM). In theory, good collaboration exists between the civilian and penitentiary system for TB Control, but in practice, there is little coordination and cooperation. For example, the prison system has not been included in the Government’s application for the GFATM grant and hence, has not benefited from these funds.

Health Care Services

The MoH is implementing a Health Sector Reform Project (HSRP) supported by the World Bank through two projects covering the period of ten years, from 1996 to 2006. The MoH and Bank have started the preparation of a Sector Wide Approach Program (SWAP) to continue the reforms. The first project supported the MANAS Health Care Reform Program that aimed at improving the health status of the population, the effectiveness of the service delivery system, the access to quality care, and long-run financial viability of the system. It had four components: (i) promotion of primary health care (PHC) and modern treatment protocols; (ii) restructuring of the delivery system; (iii) improved management of the pharmaceutical system; and (iv) introduction of an incentive-based provider payment system. Implementation of the DOTS approach was included in the TB control subcomponent of the first component. This subcomponent was essential for the MOH to start implementing DOTS and expanding it throughout the country by October 1998 (with exclusion of prisons, which were under a different ministry
and not included in the project). The second project has been supporting strengthening and countrywide expansion of the health reform measures piloted during the first project. However, further DOTS implementation has been only indirectly addressed by the second project, through the public health component and its sub-components of health protection and health promotion.

**TB Services**

The total number of TB institutions has been declining over the last six years. In 2003, there were five hospitals and TB-related institutions in the Kyrgyz Republic. They are the National TB Center (NPC) in Bishkek, the Cholpon-Ata Hospital, the Shekhaftar Hospital, the Issyk-Kul Hospital, and the Kyzil-Bulak Hospital. The NPC is based in Bishkek and its Director is the National Coordinator for TB. In addition, there are three City Children Antituberculosis Clinics, bringing the total number of beds to 370.

The Kyrgyz Republic has nine administrative units (oblasts), including 45 smaller administrative units (raions). Each oblast has a TB Dispensary with an inpatient department (the stationary center) and an out-patient department (the ambulatory center). TB dispensaries, originally located in all raions, have been reduced from 22 in 1999 to 17 in 2003. Additionally, recent changes have included the integration of TB Cabinets into Family Health Centers. Therefore, TB patients needing treatment can go to either an Oblast TB Hospital or a Family Health Center.

The reduction in TB labs has been even more dramatic than the reduction in TB Dispensaries, having gone from 442 labs in 1998 to 158 in 2003 (65 percent reduction). However, the number of physicians in the system increased from 310 in 1998 to 360 in 2003. The NPC has 74 doctors, out of whom 51 are full-time members, and 104 nurses, out of whom 88 are full-time appointments.

**DOTS Coverage**

In 1996, a pilot DOTS program was established in four districts of two regions in the country. After encouraging results from the use of the new approach in new cases of TB—a treatment success rate of 88 percent in 1996 and a case notification rate 14 percent higher than in the rest of the country—DOTS was established in the entire country in 1998. Since then, 100 percent of the population has been officially covered by DOTS. This expansion

<table>
<thead>
<tr>
<th>Table 32. TB Institutional Structure</th>
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<tbody>
<tr>
<td><strong>Years</strong></td>
</tr>
<tr>
<td>Number of TB dispensaries</td>
</tr>
<tr>
<td>DOTS program in PHC facilities</td>
</tr>
<tr>
<td>Number of TB labs</td>
</tr>
<tr>
<td>Number of raions covered by DOTS</td>
</tr>
</tbody>
</table>

*Source: National TB Center, Kyrgyz Republic.*
was orchestrated through the health sector reform program undertaken by the Kyrgyz Ministry of Health with assistance from the World Bank. More than one-third of the primary health care budget from the Bank credit was allocated to TB training, diagnosis and treatment.

**Case Finding and Diagnosis**

The Kyrgyz Republic is second among Central Asian Republics in incidence of TB. The TB case notification varies significantly across the country. The highest rate of almost 154/100,000 was reported in 2002 in Jalal Abad in the South of the country. Staff is paid US$2.2 per new patient enrolled and treated. Microscopy diagnosis has become routine. The 6,279 newly notified cases in 2002 included 2,511 extra-pulmonary cases. Among 3,086 pulmonary cases, 1,555 (41 percent) were bacteriological confirmed.

The National TB Institute also houses the National Reference Laboratory. It has been certified by the Supranational Laboratory in Borstel (Germany). Of the 400 TB labs operating in 1999, only 120 remain and further centralization is under consideration. Each Family Health Center has its own laboratory, but not all are able to do sputum examinations. In rural areas, slides can be prepared and fixed by nurses (feldshers) who have received appropriate training.

**Direct Observation of Treatment and Followup**

Primary health care services including feldshers, ambulatory health posts (FAPs), and rural ambulatory health posts (SVAs) have been involved in the TB Control Program and are expected to directly observe treatment and follow up with patients. Default tracing procedures are also in place. However, patient adherence to treatment is influenced by high rates of labor migration.

**Control of MDRTB and DOTS Plus**

The Kyrgyz Republic uses the standard definition for chronic cases, which are those that have finished but failed two short courses of chemotherapy under directly observed treatment. By the end of 2003, about 3,000 chronic cases were registered of whom 1,200 patients were sputum smear positive cases. The National Reference Laboratory collaborates with the supranational laboratory in Borstel, Germany, which recently awarded it a certificate for good quality in culture and drug susceptibility testing. The establishment of a department to treat MDRTB patients has been included in the GFATM grant proposal to open in 2005. The Kyrgyz Republic plans to pilot treatment of 50 MDRTB patients. Kyrgyz officials are proposing the establishment of hospices for chronic patients.

**TB Control in Prisons**

The Ministry of Justice reports that all newly diagnosed patients are covered with DOTS since this approach was launched in prisons in 1998. However, the proportion of inmates covered by DOTS has been drastically reduced during the last three years. In 2002, the number of prisoners covered by DOTS decreased by 60 percent, while the number of
prison hospitals offering DOTS treatment remained unaltered with one center. In other words, while 10 percent of total prisoners were covered by DOTS in 2001, only 4 percent were covered in 2003; and only one out of three TB prison hospitals follow the DOTS treatment approach. Amnesties are given to end-stage patients. According to a new regulation, prisoners who are ill with TB should be referred to TB dispensaries for continuation of treatment. However, out of about 1,600 patients under treatment released in 2001, only 600 were traced and continued treatment.

Penal reform is ongoing, and new legislation has been approved. There is a regional approach to penal reform and reduction of infectious diseases. In the Kyrgyz Republic, prisons are under the Ministry of Justice. There are five pre-trial detention centers, eight general colonies, two TB colonies (these include TB hospitals) and a central penitentiary hospital that handles all medical problems, except TB. Newly diagnosed cases are sent to Colony 31, with a capacity for 800 inmates and 150 beds. Chronic TB patients are sent to Colony 27, which has a capacity for 800 inmates and 175 hospital beds. Key infrastructure elements such as number of beds have not changed since 2000 (Table 33).

There is only one fluorography machine in a SIZO. In 2003, 65 percent of all inmates underwent fluorography examination. The annual turnover rate is estimated at 15,000. Coverage by X-ray screening is low because the system is unable to afford it, and X-ray machines are worn out. Through a KfW grant, laboratories of the penitentiary system have been equipped with binocular microscopes and reagents have been provided. There is however a shortage of laboratory staff. KfW has provided drugs for 800 inmates, and Project HOPE has assisted with monitoring. Nutrition is less than optimal, which diminishes patients motivation to comply with treatment. For chronic cases, no special treatment is available.

**TB Control in Other Sectors**

The Ministry of Defense has its own strategy to deal with TB and HIV/AIDS. Including law enforcement, the total number of troops is 35,000. This includes Internal Affairs (internal troops), Border Guard (national security), National Guard and the Ministry of Emergencies. Troops are screened twice a year for TB. If found suffering from TB, a soldier will be dismissed from services and has to seek treatment in the civilian sector. For the last five years, the Ministry of Defense has conducted an active information campaign, called “Batallion,” to inform troops about the risks of HIV and STIs. Project HOPE is also working with the TB Services to improve the information, education and communication aspects of TB Control.

<table>
<thead>
<tr>
<th>Years</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB beds in prisons</td>
<td>475</td>
<td>475</td>
<td>625</td>
<td>625</td>
<td>625</td>
<td>625</td>
<td>625</td>
</tr>
<tr>
<td>Prisoners covered by DOTS</td>
<td>150</td>
<td>676</td>
<td>1,512</td>
<td>1,460</td>
<td>732</td>
<td>753</td>
<td>682</td>
</tr>
</tbody>
</table>

*Source: Ministry of Justice, Kyrgyz Republic.*
**TB Drug Management**

Since 1998, the supply of TB drugs has been steady and uninterrupted. TB drugs procured by the MOH are free of charge for TB patients, regardless of their place of residence. TB drugs are procured centrally by the MOH with funding from the World Bank and KfW. The Global Drug Facility (GDF) has provided drugs for 8,000 patients. KfW’s commitment to procure drugs up to 2007 is under discussion.

**Recording and Reporting**

The standard recording and reporting system is in place. Cohort analysis of treatment outcome is being performed in the civilian sector. Electronic surveillance (ESCM) was established with CDC support in 2002. After training health staff, CDC will transfer the management of the system to the MoH.

**Supervision and Monitoring of the Program**

The National TB Center has a team of supervisors. The Sanitary-Epidemiological Services (SES) has the capacity and is willing to be involved in surveillance and monitoring of TB. It has updated guidelines applying new international standards. WHO has been providing funds for monitoring of DOTS across the country. Project HOPE is also involved in monitoring and has developed a detailed checklist for supervision. According to an annual plan that is approved by the National TB Center, Project HOPE conducts monitoring visits to oblasts and has also organized training, including on drug management.

**Hospital Performance**

In terms of physical inputs, the total supply of hospital beds in the Kyrgyz Republic has decreased from 1998 to 2003, falling from 4,205 to 3,634 beds. Republican facilities account for 27 percent of bed supply. The distribution of beds by facility is shown in Figure 37. The largest TB facility is the NPC, which accounts for 43 percent of beds, followed by the Shekhaftar hospital with 18 percent. The other three hospitals have 13 percent each.

The overall and individual performance of hospitals and the NPC are evaluated in Figure 38. Q-IV is the efficient segment that combines both a high Bed Occupancy Rate (BoR) and a low Average Length of Stay (ALOS).\(^\text{10}\) However, an important caveat should be made: a low ALOS may also indicate poor quality of TB services; therefore, a very low ALOS coefficient may not always be an optimal outcome. The inefficient quadrant is represented by Q-II, where both BoR and ALOS are above the national average. The best performance is shown by the NPC, where the ALOS is 61 days and the yearly BoR is 99 percent. All other hospitals are located in Q-II, with the Issyk-Kul hospital having indicators that are closest to national figures and the Shekhaftar Hospital having the worst performance.

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\(^{10}\) Information on hospital data (specially ALOS and occupation rate) has to be considered carefully because bad conditions in Central Asia hospitals (poor heating, water availability, etc.) lead to patients refusing to being admitted.
Figure 37. Supply of TB Beds by Republican Institution, 2003

Source: Estimates based on data from the National TB Center.

Figure 38. Republican TB Institutions Performance, 2003

Source: Estimates based on data from the National TB Center.
With the exception of the first year of DOTS implementation (1998), 96 to 99 percent of the notified new sputum smear positive cases have been evaluated. Success rates are over 80 percent. However, in recent years, the proportion of failure cases have been increasing. In re-treatment cases, the success rates have been 57–67 percent (except in 1998). Treatment failure has been relatively high at 12–18 percent.

### Treatment Outcome in Prisons

Prisoners are at a high risk of infection and have a high probability of death. The number of patients assessed, and treatment outcomes of new sputum positive pulmonary patients in prisons vary significantly from year to year, which makes it difficult to assess the success of the DOTS implementation (Table 36).

| Table 34. Treatment Outcome in New Sputum Smear Positive Pulmonary TB Patients |
|---------------------------------|---|---|---|---|---|
|                                | 1998 | 1999 | 2000 | 2001 | 2002 |
| Evaluated                      | 830  | 1,278| 1,257| 1,476| 1,487|
| Cured                          | 80.2 | 77.3 | 71.3 | 71.7 | 77.9 |
| Completed                      | 1.9  | 5.1  | 9.3  | 8.3  | 3.4  |
| Failed                         | 6.9  | 4.9  | 4.0  | 5.7  | 7.1  |
| Died                           | 3.4  | 3.0  | 3.4  | 4.6  | 4.4  |
| Defaulted                      | 3.4  | 3.7  | 4.5  | 6.0  | 4.6  |
| Transferred out                | 3.9  | 5.6  | 5.6  | 2.4  | 1.8  |
| Success rate                   | 85.4 | 82.8 | 82.1 | 81.0 | 81.9 |

**Source:** National TB Center, Kyrgyz Republic.

| Table 35. Treatment Outcome in Re-Treatment Cases of Pulmonary TB Cases |
|-----------------------------|---|---|---|---|---|
|                                | 1998 | 1999 | 2000 | 2001 | 2002 |
| Evaluated                    | 35   | 86   | 134  | 248  | 327  |
| Cured                        | 22.9 | 52.3 | 44.8 | 30.2 | 26   |
| Completed                    | NA   | 2.3  | 9.7  | 24.6 | 40.4 |
| Failed                       | 5.7  | 15.1 | 16.4 | 18.1 | 11.9 |
| Died                         | 2.9  | 5.8  | 0.7  | 5.6  | 7.6  |
| Defaulted                    | 5.7  | 3.5  | 11.2 | 13.7 | 10.1 |
| Transferred out              | NA   | 5.8  | 4.5  | 3.2  | 2.8  |
| Success rate                 | 25   | 58   | 62.4 | 57.4 | 67.2 |

**Source:** National TB Center, Kyrgyz Republic.

**Treatment Outcome**

With the exception of the first year of DOTS implementation (1998), 96 to 99 percent of the notified new sputum smear positive cases have been evaluated. Success rates are over 80 percent. However, in recent years, the proportion of failure cases have been increasing. In re-treatment cases, the success rates have been 57–67 percent (except in 1998). Treatment failure has been relatively high at 12–18 percent.

**Treatment Outcome in Prisons**

Prisoners are at a high risk of infection and have a high probability of death. The number of patients assessed, and treatment outcomes of new sputum positive pulmonary patients in prisons vary significantly from year to year, which makes it difficult to assess the success of the DOTS implementation (Table 36).
The performance of TB treatment in prisons is partly a result of an inadequate supply of basic resources. However, improving prison performance would also require improvement of program management skills, collaboration between the Ministry of Justice and the National TB Program, increased understanding of DOTS principles by prison authorities and medical staff, and monitoring and analysis of results. DOTS should be fully implemented in the penitentiary system, including in the SIZO. The Ministry of Justice needs technical assistance in implementing DOTS throughout the system.

Financing TB Control

Sources of Funding

Funding for TB Control in the Kyrgyz Republic comes from the public budget and international assistance. If all funding for TB control planned for the period between 2002 and 2006 is fully disbursed, it should amount to about $11 million (Table 37).

Public Budget

Public spending on TB programs equaled 92.2 million som ($2 million) in 2002. According to preliminary estimates, in 2003 it should have been 84.4 million som ($1.83 million). The 2003 final budget is far below the original 198 million som (US$4.3 million) budgeted for that year. The National TB Center is estimated to require 300 million som annually ($6.5 million). Given the present budget, all salaries can be paid, but only 50 percent of

Table 36. Treatment Outcome of New Sputum Positive Patients in Prisons

<table>
<thead>
<tr>
<th>Years</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluated</td>
<td>80</td>
<td>287</td>
<td>325</td>
<td>378</td>
<td>114</td>
<td>115</td>
<td>608</td>
</tr>
<tr>
<td>Cured</td>
<td>31</td>
<td>23</td>
<td>137</td>
<td>151</td>
<td>30</td>
<td>69</td>
<td>122</td>
</tr>
<tr>
<td>Completed</td>
<td>NA</td>
<td>1</td>
<td>2</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>314</td>
</tr>
<tr>
<td>Failed</td>
<td>18</td>
<td>20</td>
<td>35</td>
<td>33</td>
<td>4</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Died</td>
<td>1</td>
<td>10</td>
<td>78</td>
<td>75</td>
<td>21</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td>Defaulted</td>
<td>NA</td>
<td>Na</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Transferred out/released</td>
<td>50</td>
<td>46</td>
<td>73</td>
<td>119</td>
<td>59</td>
<td>21</td>
<td>120</td>
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<tr>
<td>Treatment success</td>
<td>31</td>
<td>24</td>
<td>139</td>
<td>135</td>
<td>30</td>
<td>69</td>
<td>436</td>
</tr>
</tbody>
</table>

Source: Ministry of Justice, Kyrgyz Republic.

Table 37. Public Funding of TB Control Program in the Kyrgyz Republic

<table>
<thead>
<tr>
<th>Donor</th>
<th>Total</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>11,136</td>
<td>2,000</td>
<td>2,284</td>
<td>2,248</td>
<td>2,248</td>
<td>2,248</td>
</tr>
</tbody>
</table>

necessary food for patients and 20 percent of the needed drugs can be procured. These gaps have to be filled by donors.

Estimated expenditures\textsuperscript{11} (in 2003 terms), in both local and US currencies are shown in Figure 39 for the 2001–2008 period. Over the eight-year period that is assessed, the Government would spend 97.9 million som ($2.13 million) per year, with a concentration of resources during 2004–2006. Three periods are clearly defined in the chart. In the first period, from 2001 to 2003, spending rises and then falls to an average US$1.8 million per year. In the second period, from 2004 to 2006, TB spending rises significantly to US$3.5 million per year and peaks at US$3.8 million in 2004. Compared to the previous period, TB expenditures would double and there would be a downward trend over the next three years. Finally, between 2007 and 2008, it is expected that TB funds will fall dramatically to a mean spending of US$0.42 million per year, which is almost one-tenth of the average expenditure of the previous period. Total spending by 2008 would reach nearly US$18 million (US$16 million in real terms). From this total, 33 percent would be allocated in the first term, 62 percent in the second term, and only 5 percent during the last two years.

Expected expenditures per capita would follow the same pattern (Figure 40).\textsuperscript{12} The average spending per person is estimated at US$0.41 per year (19.32 soms), with a maximum US$0.75 per capita during 2004 and a minimum US$0.08 during 2007–2008.

\textbf{Figure 39. Expected Public TB Spending, 2001–2008 (in Million Soms and US$)\textsuperscript{13}}

\begin{center}
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
\hline
Real TB budget (million 2003 soms) & 81.74 & 94.16 & 84.41 & 176.21 & 169.22 & 137.91 \\
Real TB budget (million US$) & 1.71 & 1.95 & 1.82 & 3.79 & 3.64 & 2.97 \\
\hline
\end{tabular}
\end{center}

\textit{Source:} Estimates based on data from the National TB Center and Ministry of Finances.

\textsuperscript{11} Includes estimated total government and donor contributions.

\textsuperscript{12} To estimate these figures, the study assumed a 1 percent population growth rate and an exchange rate of 46 som = US$1.

\textsuperscript{13} 2003 figures include the first nine months of the year.
Figure 40. Expected Public TB Expenditures per Capita, 2001–2008 (in Soms and US$)

Source: Estimates based on data from the National TB Center and Ministry of Finances.

Figure 41. Expected Public TB Spending as a Percentage of GDP and Health Care, 2001–2008

Source: Estimates based on data from the National TB Center and Ministry of Finances.
The TB budget is expected to average 0.12 percent of GDP during the 2001–2008 period, assuming that GDP would grow at 4 percent annually. During the 2001–2003 period, the average rate of the TB budget was 0.11 percent, but projections for 2004–2006 show an expected 0.19 percent of total output. Finally, for the last two years, TB budgets would represent only 0.02 percent of GDP.

TB spending is expected to represent 4.6 percent of total health care spending. At its highest (2004), it would account for 8.2 percent of health expenditures. Following 2004, it would start declining gradually until it reaches 0.77 percent of total health care expenditures. Finally, TB programs are estimated to account for an estimated 0.47 percent of the total Government budget, or 0.41 percent when including the Social Fund. During 2004–2006, the expected proportion of public finance for TB programs is 0.64 percent, which is much higher than the 0.4 percent of the 2001–2003 period and the 0.07 percent of the last two years. The burden on budget is high, especially during the 2004–2006 period. However, as it is described in the next section, the pressure is relieved partially through donor contributions.

**Donor Assistance**

The previous analysis considered that, from 2002 to 2008, the planned contribution of international agencies for TB control in the Kyrgyz Republic would be US$7.4 million (Table 38). This represents an average of US$1.1 million per year, but resources may be distributed unequally across years. Most of the funds would be allocated during 2003–2006 (68 percent of total funds), while in the period from 2007–2008 only a fraction of funds will be disbursed, accounting for 15 percent of total planned resources.
Table 38. Donor Funding for TB Control Programs (US$)

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donors</td>
<td>1,267,200</td>
<td>1,672,492</td>
<td>1,163,200</td>
<td>1,075,908</td>
<td>1,133,200</td>
<td>565,000</td>
<td>565,000</td>
<td>7,442,000</td>
</tr>
</tbody>
</table>

From a macro perspective, international contributions represented 0.09 percent of GDP in 2002, increasing to 0.10 percent in 2003. For 2004, assistance to TB control is expected to represent 0.07 percent of total input. In terms of per capita spending, the same pattern is observed. In 2002, the real contribution per person is US$0.27, one of the highest in the region, and it further increases to US$0.34 in 2003. In 2004, it is expected to slightly decrease to US$0.23.

By source, two agencies have contributed almost 100 percent of the total external funds for TB in the Kyrgyz Republic in recent years. KfW has contributed approximately 43 percent of funding through two projects, while USAID has provided the rest. KfW has supported the TB Control Program with two grants of €2.6 million in 1998–2001 and €2.6 million in 2002–2004. KfW has been discussing with the Kyrgyz Government awarding a third grant to support the TB Control Program in the penitentiary system. Further support is also expected from USAID through its partners Project HOPE and CDC. The GFATM has awarded $1.2 million to the Kyrgyz TB Program for 2003–2004. Further contributions were obtained from the GDF and WHO. Important areas that still need attention are provision of drugs and lab equipment and DOTS training. Other minor targets are strengthening of supervision and electronic surveillance.

**Budgetary Analysis**

The real expenditure per capita by oblast during 2002–2003 is illustrated in Figure 44. Population data by oblast were not available for 2002, but the structure of the population for 2003 was available. Assuming that population was constant, the figure shows a decline.

Figure 43. Distribution of Donor Assistance 2002–2008

Source: USAID and KfW.
in total budget. At national level, per capita expenditure falls by 5 percent from US$0.64 to US$0.61. Substantial reductions in spending per person are observed in Issyk-Kul, Batken, and Chui, while minor reductions occur in Bishkek. Osh, formerly with the largest share of resources, ranks third with a stable capita during the past two years. Finally, Naryn, Talas, and Djalal-Abad are the only oblasts where the per capita spending increases.

The cost per patient was estimated for 2003 (Figure 45). Financial information for that year was available for the first 9 months, so the study made a linear projection of the total expenditure by the end of 2003. On average, the cost per patient was US$276, but differences among oblasts were significant. For instance, the cost per patient in Bishkek was US$365, while in Issyk-Kul it was US$128, a 2.8 times-gap.

Figure 46 shows the structure of TB budgets according to spending categories or accounts. At the aggregate level, the core of the expenditures is concentrated on three items, which represent about 88 percent of total TB spending: drugs (52 percent), food (20 percent) and salaries (16 percent). The high share of drugs is clearly understandable due to the great contribution of external donors. For 2002 and 2003, international agencies contributed US$2.5 million, which is equally distributed across the two years. This represents 3.3 times the expenditure that was disbursed by local units in 2003. While expenditure on food decreases in 2003, salaries and drugs receive an increase in financial support; therefore, the aggregate share of the three most important items increase from 86 percent to almost 90 percent.

Source: Estimates based on data from the National TB Center and Ministry of Finances.
Figure 45. Cost per TB Patient by Oblast 2003 (US$)

Source: Estimates based on data from the National TB Center and Ministry of Finances.

Figure 46. TB Budget Structure by Category 2002–2003

Source: Estimates based on data from the National TB Center and Ministry of Finances.
Drugs and food accounted for more than 50 percent of TB expenditures. They represent key proxy variables for assessing the quality of TB services given that both are directly related to patient treatment. Figure 46 shows information on drug and food costs per patient-day. On average, the country spent US$0.25 per day per patient for food and US$0.16 for drugs. Differences across oblasts are significant. The gap between the oblasts with the highest (Bishkek) and the lowest (Chui) expenditures is 4 times for drugs and 3.8 times for food. Regarding drugs, five out of eight oblasts are below the national average, while four are below the national food per patient-day spending level. In both situations, the same three oblasts are above the country’s average: Osh, Djalal-Abad, and Bishkek, an evidence of the significant polarization that exists in terms of TB expenditures.

The results above are complemented by those shown in Figure 48, where the share of drugs and food in the correspondent oblast budget are considered. The chart is divided into quadrants; the cross point represents the average rate of the correspondent variable. Going clockwise, Quadrant I (lower-left segment of the chart) shows those oblasts with the lowest food and drugs expenditures. According to the results, most of the oblasts (50 percent) are located in Quadrant-I, which indicates that their drug and food expenditures are below the national level. Only in two oblasts expenditures on these items are above the mean (Q-III). In two other oblasts, one item is below and the other is above the average spending.

Source: Estimates based on data from the National TB Center and Ministry of Finances.
These results suggest that the two oblasts located in Quadrant III provide higher quality TB services for patients (based on the overall level of food and drug spending available per patient), while those located in Quadrant I provide poor quality TB services.

**TB Hospital Expenditures**

This section assesses the five TB facilities for which data are available. The total level of resources devoted to TB facilities was unstable between 2001 and 2003. In real 2003 dollars, the Government devoted US$0.51 million to finance hospitals and the NPC in 2001. This budget decreased to US$0.49 million during 2002 and increased to US$0.54 million in 2003. This implies a 3 percent average growth rate for the biennium.

The TB Institute absorbs most of the resources, almost 48 percent during 2003. Although the NPC receives a large share of overall resources allocated for TB control, they are not enough to sustain an adequate working environment in this institution. As mentioned before, a budget of 300 million soms (US$6.5 million) is needed to effectively cover the Center’s operations. With the current Government contribution, salaries are paid fully, but only 50 percent of food and 20 percent of drugs are covered. The second largest institution is the Issyk-Kul Hospital, with 19.3 percent of total funds. Therefore, these two institutions, the hospital and the NPC, comprise 67 percent of total expenditures.
Figure 50 shows the average spending pattern of the Republican institutions as well as the contribution to the four most important categories, which accounted for 93 percent of the expenditures during the 2001–2003 period. Republican institutions concentrate 41 percent of expenditures on salaries (including Social Fund contributions). Food, the largest account among oblasts, ranks second with 34 percent participation in Republican institutions, and drugs absorb 18 percent of the budget.

Budget allocation for different items differs across hospitals, although three main items (food, drugs and salaries) account for 93 percent of hospitals expenditures. Salaries paid by Republican institutions represent 8.7 percent of national TB payroll, while the other 91.3 percent is disbursed by local budgets (oblasts). Similarly, drug spending by Republican institution only represents 6.4 percent of total expenditures in pharmaceuticals. By oblast, the Cholpon-Ata Hospital devotes more than 50 percent of its resources to finance salaries, while in the Issyk-Kul Hospital such a figure does not exceed 30 percent. Therefore, the Cholpon-Ata Hospital almost doubles the allocation for salaries in its budget structure as compared with Issyk-Kul. This, plus the similarities in drugs expenditure, supports a tradeoff effect in which a higher share for salaries is compensated by a lower contribution for food.

On average, the cost per bed is US$721 (Figure 51). Issyk-Kul (US$1045) spends 45 percent more than the national average, while Shekhaftar (US$335) spends less than half of the national average and approximately 3 times less than Issyk-Kul.

Source: Estimates based on data from the National TB Center and Ministry of Finances.
Figure 50. Structure of Republican TB Hospital Expenditures by Category, 2001–2003

Source: Estimates based on data from the National TB Center and Ministry of Finances.

Figure 51. Cost per Bed by TB Hospital 2003

Source: Estimates based on data from the National TB Center and Ministry of Finances.
Other TB Expenditures

Data on costs were available for fluoroscopy tests and treatment, but not for the entire treatment process. During 2003, a total 371,233 exams detected 2,015 new cases, or 0.3 percent of total patients screened. The total expenditure for fluorography exams reached 5.6 million soms (US$0.12 million) and the cost per new case was 2,763 soms (US$59). The unitary cost of several TB treatment-related components is presented in Figure 51. The costs of drugs ranges from 0.8 soms (US$0.01) for isoniazid to 7.1 soms (US$0.15) for streptomycin (cost per unit). Data for 2003 estimates the cost of complex drug treatment (isoniazid and rifampicin) at 1.43 soms per unit. As expected, lab exams represent higher costs. On average, bacterioscopy costs 13.5 soms (US$0.29) per test, while culture has a cost of 135 soms (US$2.9) with 30 soms for seeding and 105 soms for sensitivity testing (without amortization and salary). Finally, a chest X-ray costs 70 soms (US$1.5).

The cost of total treatment packages differs according to the treatment protocol and the lab exams. For illustration, a six-month treatment that comprises isoniazid 300 mg and rifampicin 450 mg, plus three X-ray tests and bacteriology, costs 1,317 soms or approximately US$28 per patient. This estimate only includes drugs and some specific lab exams and not hospitalizations, transport costs, salaries and other related costs.

![Figure 52. Unitary Costs of TB Treatment-Related Components, 2003](image)

Source: Estimates based on data from the National TB Center and Ministry of Finances.
Input-Outcome Analysis

A combined analysis was conducted to assess the effect of resource allocation (financial and physical inputs) on TB outcomes. The first part evaluates the capability of the Government to allocate resources effectively according to the epidemiological condition of the oblast. This determines if, when distributed, financial inputs follow the TB conditions that prevail in the oblast. In the second part, TB outcomes (cure and mortality rates) are evaluated according to the resource allocation in each oblast.

Allocative Approach

One may expect that financial resources are distributed according to needs in each oblast: the greater the problem, the greater the funds allocated for TB control. Figure 53 represents the relationship between TB cases and per capita budget allocation for each oblast with respect to the national averages in 2002. Quadrants I and III correspond to adequate resource allocation where a less-than-average number of TB cases (per 100,000 inhabitants) is matched by a less-than-average budget per capita. In a similar way, Q-III

![Figure 53. TB Cases and Budget per Capita, 2002](image)

Source: Estimates based on data from the National TB Center and Ministry of Finances.

14. This year was selected because data, especially outcome indicators, were not available for 2003. Additionally, most of the 2003 input information (beds, doctors, paramedical staff, etc.) corresponds to the first nine months of the year. Finally, this section does not include donor contributions.
represents a combination of above-the-average cases with above-the-average budget per person. For 2002, six oblasts (75 percent) are located in adequate resource allocation quadrants, with three in Q-I and three in Q-III. However, one oblast (Talas) receives a higher budget per capita despite its low rate of TB cases. The Chui Oblast is faced with a high rate of TB but low funding (Q-IV).

Although budget allocation strategies are not a large problem in Kyrgyzstan, changes can be introduced to improve resource allocation. The above analysis clearly demonstrates that some oblasts may benefit from a poor budget policy. For instance, Quadrant III presents two cases, Bishkek and Osh, which receive more resources than Jalal-Abad despite the fact that it has 16 percent more TB cases. Similarly, in Quadrant I, Naryn and Issyk-Kul share approximately the same number of cases per 100,000 population (92.1 and 93.5, respectively), but Issyk-Kul receives less than half of the budget allocated to Naryn (US$0.22).

However, if the notification rates are used, some of the earlier conclusions change. Taking it into consideration, makes the current budget allocation mechanisms less efficient than when considering only TB cases and per capita allocation. Now, oblasts are equally distributed among quadrants, with two oblasts per quadrant, implying that 50 percent of the oblasts are improperly located. If an historical needs-based approach is followed, oblasts that experienced higher rates in previous years, will receive a higher budget per capita in a given year. The budget allocation did not change from year to year. In Figure 54, both the 2001 and 2002 notification rates are plotted against the 2002 budget per capita. This figure shows that all oblasts retain the same quadrant-location with only minor changes.

**Figure 54. TB Notification Rate and Budget per Capita, 2001–2002**

*Source:* Estimates based on data from the National TB Center and Ministry of Finances.
that have no influence on the final result. This conclusion supports the idea that TB resource allocation does not follow established criteria, and that even historical factors, which traditionally influence budget distribution, have no affect on the distribution of oblasts by the different quadrants.

**Outcome Evaluation**

In this section, two TB-related outcomes (cure rate and case fatality rate) are compared to input-related indicators, such as doctors per 100 cases, drug participation in TB budgets and beds per 100 cases. In this case, TB coefficients become the dependent variables and both outcomes and inputs are measured in growth rates for 2001–2002. The goal is to show how variations in resources are correlated with variations in TB results.

Figure 55 explores the relationship between increases in per capita budget allocation and cure rates from 2001 to 2002. Expected results are located in quadrants I and III, where cure rates grow with a growth in per capita spending. Quadrant II is the ideal situation with a low growth rate in the budget per capita (including negative rates) matching an above average change in TB outcomes. Finally, quadrant IV represents inefficiency as funding increases by more than the average, but the cure rate increases at a less-than-average rate.

Considering this, the results of this analysis highlight some important problems. Three oblasts are located in expected quadrants (either I or III), but two of them belong to Q-I where a low cure rate accompanies a low growth rate in per capita spending. Therefore, their below average cure rates can be partially explained by lack of financial resources.

---

**Figure 55. Growth in TB Budget per Capita and Cure Rates 2001–2002**

*Source: Estimates based on data from the National TB Center and Ministry of Finances.*
Two oblasts, Issyk-Kul and Jalal-Abad, are located ideally in Q-II, where the budget per capita has negative growth rates, but the cure rates improved considerably. For example, during 2001, the cure rate in Jalal-Abad was 75 percent and grew to 90 percent in 2002. Similarly, for Issyk-Kul, its respective rates were 53 and 72 percent in 2001 and 2002. Most of the oblasts, however, belong to Q-IV—the inefficient zone—and the poor cure rates (improving only 3 percent) must be explained by factors other than financial problems. Together, the three budgets per capita (Osh, Bishkek and Batken) grew by 38 percent (mean rate) in contrast with the 12 percent increase for the whole economy. A possible explanation may be the high starting value of their cure rates. On average, this group’s cure rate was 72 percent in 2001, while the same coefficient was 64 percent in Q-II oblasts. It is important to note that, the higher the starting cure rate, the more difficult it is to achieve marginal gains.

The relationship between growth in per capita spending and case fatality is expected to have a negative correlation, where mortality decreases as financial resources increase. Figure 56 represents this relationship, with Q-I reflecting an optimal situation as it combines low budget growth rate and a large decline in case fatality rates. Therefore, with less financing, the corresponding oblast is capable to reduce deaths from TB. At national level, the case fatality rate of new smear-positive cases decreased by 5 percent between 2001 and 2002, while budget per capita increased by 12 percent. Figure 56 shows that the majority of oblasts (6 oblasts) are concentrated in quadrants II and IV. The other two oblasts are located in the efficient quadrant, Q-I (Issyk-Kul), and the inefficient quadrant, Q-III (Batken). Finally, in three oblasts, the 2002 case fatality rates were higher than in the previous year.
For two of these oblasts (Naryn and Jalal-Abad), this may be explained by a strong reduction in their per capita spending of 23 and 18 percent, respectively. While a shortage of resources can explain the poor outcomes of both oblasts, they cannot explain the outcome in Issyk-Kul, where the case fatality rate declined by 10 percent while its budget per capita decreased by 8 percent.

In summary, at an aggregate level, both outcomes (cure and case fatality rates) positively responded to the average increase in per capita allocation. Combined results present four oblasts with a consistent behavior for both indicators:

1. Issyk-Kul: Outstanding performance where the budget per capita decreased but both outcomes (cure rates and case fatality rate) changed positively above the average.
2. Batken: Opposite to Issyk-Kul, where its per capita allocation increased above the mean national rate, but both indicators improved at a less-than-average rate.
3. Chui and Naryn: In both oblasts the outcome indicators placed them in the expected quadrants.
4. The remaining oblasts present mixed results as they performed poorly in one indicator and adequately in the other.

Figure 57 shows correlation between doctor availability and the cure rate. It shows that the number of doctors within a certain range does impact significantly the cure rate. The overall cure rate improved by 8.5 percent from 2001 to 2002, yet the number of TB doctors decreased in six oblasts and increased only in two (Batken at 13 percent and Bishkek at 2 percent). Three oblasts, Chui, Jalal-Abad, and Issyk-Kul, improved their cure rates much more than Bishkek and Batken regardless of the fact that the number of TB doctors per

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**Figure 57. Growth in TB Doctors per 100 Cases and the Cure Rate, 2001–2002**

Source: Estimates based on data from the National TB Center and Ministry of Finances.
100 cases have decreased in them. They seem to operate most efficiently and are placed in Q-II Issyk-Kul emerges as an oblast where, despite its tough economic conditions, its outcomes are better than for most of its counterparts. Finally, two regions behave as expected and are part of Q-I: their poor cure rates are correlated with a significant decline in medical staff.

The relationship between drugs allocation from the total expenditure and cure rate has some specific characteristics that were not analyzed before (Figure 58). At an aggregate level, the average drugs expenditure from the total spending increased by only 0.5 percent. Two oblasts (Bishkek and Osh) diminished the share of drugs in their budgets. This result reflects a tradeoff in Bishkek between salaries and drugs, as the number of TB doctors increased and the share of drugs decreased in the same period. Regardless of this cut, Bishkek had both the greatest number of TB doctors and the highest proportion of drug spending among all regions.

The results achieved by Bishkek and the described tradeoff may suggest that reinforcing one area and weakening another does not work. To improve TB indicators effectively, both categories—expenditures on drugs and salaries—should be strengthened simultaneously. An overall perspective shows that most oblasts behave in an expected manner and are located either in Q-I or in Q-III (62.5 percent of the cases). This demonstrates that the relationship between drugs and cure rates tends to perform in a projected way where a high allocation to drugs correlates with an improved cure rate. Batken and Naryn are located in Q-IV (inefficient) and only Jalal-Abad is present in Q-II (efficient). As in previous graph, Batken is still in the inefficient quadrant, while Issyk-Kul, although located in the expected quadrant (Q-III), is quite close to the efficient Q-II.

Finally, the relationship between beds and cure rates was analyzed. The number of beds per 100 cases decreased by 8.6 percent from 2001 to 2002. As a proxy for infrastructure, this
variable reveals a weak connection between infrastructure and cure rates. The distribution of oblasts is similar and most oblasts are located in Q-IV. Again, Bishkek and Batken belong to this quadrant with low efficiency, while Issyk-Kul is found in Q-II with high efficiency.

A summary of the performance of each oblast is shown in Table 39. To evaluate the aggregate performance, the oblast received 1 point for each “outstanding” position, –1 point

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Per Capita Expenditure</th>
<th>Beds</th>
<th>Drugs</th>
<th>Doctors</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batken</td>
<td>Inefficient</td>
<td>Inefficient</td>
<td>Inefficient</td>
<td>Inefficient</td>
<td>Inefficient</td>
</tr>
<tr>
<td>Bishkek</td>
<td>Inefficient</td>
<td>Inefficient</td>
<td>Expected</td>
<td>Inefficient</td>
<td>Inefficient</td>
</tr>
<tr>
<td>Chui</td>
<td>Expected</td>
<td>Outstanding</td>
<td>Expected</td>
<td>Outstanding</td>
<td>Expected to Outstanding</td>
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<tr>
<td>Issyk-Kul</td>
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<td>Outstanding</td>
<td>Expected</td>
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</tr>
<tr>
<td>Jalal-Abad</td>
<td>Outstanding</td>
<td>Expected</td>
<td>Outstanding</td>
<td>Outstanding</td>
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</tr>
<tr>
<td>Naryn</td>
<td>Expected</td>
<td>Expected</td>
<td>Inefficient</td>
<td>Expected</td>
<td>Expected</td>
</tr>
<tr>
<td>Osh</td>
<td>Inefficient</td>
<td>Expected</td>
<td>Expected</td>
<td>Inefficient</td>
<td>Inefficient to Expected</td>
</tr>
<tr>
<td>Talas</td>
<td>Expected</td>
<td>Inefficient</td>
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<td>Inefficient</td>
<td>Inefficient</td>
</tr>
</tbody>
</table>

Source: Estimates based on data from the National TB Center and Ministry of Finances.
for an “inefficient” position, and 0 for an “expected” result. The main conclusions of the assessment are:

a. Issyk-Kul and Jalal-Abad show the greatest efficiency and, although their expenditure per capita decreased between 2001 and 2002, their cure rates increased above the average rate.

b. Batken and Bishkek (the capital) are the least efficient oblasts with considerable growth in input-related variables, but poor outcomes.

Cost-Benefit and Cost-Effectiveness Analysis

This section presents evidence from cost-benefit and cost-effectiveness analysis of the TB program in the Kyrgyz Republic (Table 40). These results are the relevant parameter to understand the necessary efforts that are required to achieve the global targets for TB. The assumptions are the same that were made in the case of Kazakhstan. The most important source of savings is the reduced case fatality of TB patients, which would total US$28.8 million, or 93 percent of total discounted benefits. From direct sources, a total of US$1.7 million in savings is expected, which represents only 2 percent of spending reductions. This implies that indirect sources are the key factors to the success of the program, as they contribute more than 97 percent of total savings. The results indicate that the

<table>
<thead>
<tr>
<th>Year</th>
<th>Discounted Costs</th>
<th>Discounted Direct Benefits</th>
<th>Discounted Indirect Benefits</th>
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<th>Net Benefits</th>
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<tbody>
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<td>(2,248,000.00)</td>
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<td>1,970,994.38</td>
<td>232,921.58</td>
<td>4,014,554.74</td>
<td>4,247,476.33</td>
<td>2,276,481.95</td>
</tr>
<tr>
<td>3</td>
<td>1,845,567.47</td>
<td>203,675.31</td>
<td>3,518,421.67</td>
<td>3,722,087.98</td>
<td>1,876,520.52</td>
</tr>
<tr>
<td>4</td>
<td>1,728,122.26</td>
<td>177,655.56</td>
<td>3,076,583.20</td>
<td>3,254,238.76</td>
<td>1,526,116.50</td>
</tr>
<tr>
<td>5</td>
<td>1,618,150.85</td>
<td>154,530.15</td>
<td>2,683,500.08</td>
<td>2,838,030.22</td>
<td>1,219,879.38</td>
</tr>
<tr>
<td>6</td>
<td>1,515,177.61</td>
<td>133,999.63</td>
<td>2,334,144.34</td>
<td>2,468,143.97</td>
<td>952,966.36</td>
</tr>
<tr>
<td>7</td>
<td>1,418,757.22</td>
<td>115,794.19</td>
<td>2,023,991.98</td>
<td>2,139,786.17</td>
<td>721,028.95</td>
</tr>
<tr>
<td>8</td>
<td>1,328,472.67</td>
<td>99,670.80</td>
<td>1,748,966.56</td>
<td>1,848,637.36</td>
<td>520,164.69</td>
</tr>
<tr>
<td>9</td>
<td>1,243,933.50</td>
<td>85,410.63</td>
<td>1,505,396.27</td>
<td>1,590,806.89</td>
<td>346,873.40</td>
</tr>
<tr>
<td>10</td>
<td>1,164,774.09</td>
<td>72,816.72</td>
<td>1,289,974.97</td>
<td>1,362,791.69</td>
<td>198,017.60</td>
</tr>
<tr>
<td>11</td>
<td>1,090,652.11</td>
<td>61,711.88</td>
<td>1,099,726.98</td>
<td>1,161,438.87</td>
<td>70,786.76</td>
</tr>
<tr>
<td>12</td>
<td>1,021,246.97</td>
<td>51,936.75</td>
<td>931,975.12</td>
<td>983,911.87</td>
<td>(37,335.11)</td>
</tr>
<tr>
<td>Total</td>
<td>20,298,794.57</td>
<td>1,655,694.49</td>
<td>28,803,969.71</td>
<td>30,459,664.21</td>
<td>10,160,869.64</td>
</tr>
<tr>
<td>B-C Ratio</td>
<td>1.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPV Benefits</td>
<td>10,160,869.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRR</td>
<td>1.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
program would yield important health benefits to the population. The discounted expected net benefit is US$10.2 million, with a B-C ratio of 1.5 and an IRR of 104 percent.

To measure effectiveness, the study defines the following parameters. First, one-round patients experience a mild disability, 0.05, for eight months, while two-round patients have a 0.1 disability weight during 16 months. Second, under the No Intervention case, the incidence rate is kept at 1.2 cases per 1,000 inhabitants, but with intervention the same rate falls by 50 percent. Also, the mortality rate remains at 11.8 deaths per 100,000 inhabitants during No Intervention, and declines to 5.9 deaths under the Intervention. Finally, the cure rate is fixed at 80 percent.

Total costs of the intervention are estimated to be US$35.1 million during the 2003–2015 period. Without Government intervention, the costs were estimated to be US$33 million. Expected results were 66,061 DALYs saved and 20,089 deaths averted. The cost per DALY would be US$25.4, while the cost per death averted would be US$803.2. This outcome is far from international standards that locate cost per DALY of TB programs in the range of US$3-10 depending on the components of the treatment package. The variation should be explored in further research to better understand whether the higher cost is due to higher drug costs in Central Asia than the internationally estimated cost per DALY, or if methodological considerations are the main cause.

**Economic Impact of TB**

Finally, the economic costs of TB in terms of productivity losses and fiscal expenditures were estimated (Table 41). During a typical year, total losses equal US$8.4 million, out of which 37 percent are direct fiscal expenditures. As a share of GDP, current costs and losses represent 0.53 percent of total output and the second highest burden among the countries evaluated.

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Direct Costs</th>
<th>Indirect Costs</th>
<th>% Direct Costs</th>
<th>Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Visits</td>
<td>Disability</td>
<td>Deaths</td>
<td>Total</td>
</tr>
<tr>
<td>Osh</td>
<td>1,045,515</td>
<td>8,773</td>
<td>40,222</td>
<td>1,358,360</td>
</tr>
<tr>
<td>Jalal-Abad</td>
<td>645,605</td>
<td>5,798</td>
<td>26,584</td>
<td>897,780</td>
</tr>
<tr>
<td>Batken</td>
<td>125,574</td>
<td>2,476</td>
<td>11,354</td>
<td>383,427</td>
</tr>
<tr>
<td>Chui</td>
<td>297,474</td>
<td>6,297</td>
<td>28,686</td>
<td>974,933</td>
</tr>
<tr>
<td>Issyk-Kul</td>
<td>76,119</td>
<td>1,762</td>
<td>8,077</td>
<td>272,763</td>
</tr>
<tr>
<td>Talas</td>
<td>129,903</td>
<td>1,248</td>
<td>5,723</td>
<td>193,272</td>
</tr>
<tr>
<td>Naryn</td>
<td>91,466</td>
<td>1,268</td>
<td>5,815</td>
<td>196,389</td>
</tr>
<tr>
<td>Bishkek</td>
<td>670,749</td>
<td>5,436</td>
<td>24,922</td>
<td>841,669</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,082,406</strong></td>
<td><strong>33,059</strong></td>
<td><strong>151,565</strong></td>
<td><strong>5,118,592</strong></td>
</tr>
</tbody>
</table>

*Source*: Estimates based on data from the National TB Center and Ministry of Finances.
The Republic of Tajikistan
Main Challenges in Achieving Global TB Targets

Tajikistan is the poorest country in Central Asia, with 80 percent of the population living below the poverty line. This also explains the poor conditions governing TB control. Despite the approval of the 2002 DOTS Strategy Law, public contributions are still low and below the regional average. Actual budgets are insufficient for providing an adequate TB care service, forcing the country to depend greatly on international contributions, which are equal to almost seven times the government budget.

As in other Central Asian countries, tuberculosis is a heavy economic burden for Tajikistan. Every year, more than US$5 million are lost due to fiscal expenditures and productivity losses. This represents an estimated 0.5 percent of GDP and the figure could be significantly higher if quality mortality data were available. This situation requires a stronger Government intervention in order to achieve, in the medium and long term, significant reduction in TB rates to improve living standards and to reduce the negative impact on the economy.

The results of this study indicate the need to apply several measures to improve the TB Program in Tajikistan. The first task is to enhance the public contribution, which is the lowest in Central Asia. However, there are also important distributional issues that could be addressed to improve outcomes. The wide gap that exists between Sugd and the rest of oblasts is a major weakness in the financial strategy. Therefore, the second important measure deals with the improvement of resource allocation mechanisms. Finally, the difficult TB situation in prisons, the low DOTS coverage and the weak hospital performance are also relevant areas to which the country must pay attention in order to achieve the global targets for TB control. At this moment, it seems too difficult for Tajikistan not only to achieve the targets, but also to maintain them over the long run.

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>6,375,598</td>
<td>6,306,489</td>
</tr>
<tr>
<td>New TB cases</td>
<td>3,402</td>
<td>3,971</td>
</tr>
<tr>
<td>New sputum smear positive</td>
<td>824</td>
<td>924</td>
</tr>
<tr>
<td>Pulmonary TB cases (%)</td>
<td>(24%)</td>
<td>(32%)</td>
</tr>
<tr>
<td>TB notification rate</td>
<td>53.3</td>
<td>61.0</td>
</tr>
<tr>
<td>TB mortality rate (%)</td>
<td>9.7</td>
<td>6.1</td>
</tr>
<tr>
<td>TB treatment success rate (%)</td>
<td>77.6</td>
<td>NA</td>
</tr>
<tr>
<td>TB case fatality rate (%)</td>
<td>4.2</td>
<td>NA</td>
</tr>
<tr>
<td>TB failure rate (%)</td>
<td>8.5</td>
<td>NA</td>
</tr>
<tr>
<td>Number of prisoners</td>
<td>9,343</td>
<td>11,094</td>
</tr>
<tr>
<td>New TB cases in prisons</td>
<td>834</td>
<td>399</td>
</tr>
<tr>
<td>Notification rate among prisoners</td>
<td>8,926</td>
<td>3,600</td>
</tr>
<tr>
<td>HIV cases among prisoners (%)</td>
<td>NA</td>
<td>8</td>
</tr>
<tr>
<td>Number of TB/HIV cases</td>
<td>NA</td>
<td>3</td>
</tr>
</tbody>
</table>
The country faces many problems regarding further expansion of DOTS implementation. DOTS covers only 13 percent of the population and has not yet been introduced in the penitentiary system. There is insufficient continuity in the work of institutions engaged in DOTS implementation as well as in communities. Program management requires technical assistance and furthermore, TB services need transport for supervision and monitoring. Unified and standard forms are not yet used throughout the country. Sputum microscopy labs and trained staff are scarce. There is no Reference Laboratory in the country. One of the immediate consequences is that the level of drug resistance is unknown. Treatment adherence for many patients is a logistical problem. Some patients live in mountainous regions that are inaccessible during several months during wintertime. An integrated approach should be introduced to improve adherence. Community health workers should be trained and involved in the program, as there is a shortage of TB doctors and high turnover of other staff. Oblasts are not able to provide incentives for health workers to be involved in DOTS implementation. Training of trainers must be organized to ensure continuous improvement of staff knowledge. A career structure and increased salary scales will contribute to improve human capacity development.

Drug supply is erratic in non-pilot regions and inadequate in general, which will lead to an increase in drug resistance levels. Training on drug management is needed. In general, inpatient conditions are poor due to problems of infrastructure, inventory, heating and food. TB patients in hospitals and prisons are not isolated and do not have good nutrition. Patient stigmatization should be addressed through health education and public awareness campaigns. Although HIV infection has been increasing significantly in the country, there is no integrated TB/HIV program.

Tajikistan has the lowest public contribution for TB control among the four countries assessed. Despite the approval of a recent law, the public TB budget is still far from providing enough resources for controlling and treating the disease. The country depends greatly on international contributions to fight TB. However, given the epidemiological profile in both the civilian and penitentiary systems, it is clear that more funds, over a long period, are required to achieve the global TB targets.

Unequal distribution of funds creates two distinct groups, Sugd and Khatlon oblasts which receive 75 percent of the budget, and the rest of the country which gets the remaining 25 percent. The gaps, although decreasing during the last years, are still significant: the per capita spending of the favored oblast is 63 times that of the least favored oblast. TB financing should be modified and no longer be based on number of beds. The number of beds needs to be reduced and ambulatory treatment to be strengthened.

A clear example of the difficult situation of TB in Tajikistan is the penitentiary system. It is estimated that 85 percent of prison deaths are due to TB. During the last six years, the number of beds and facilities has not changed despite the continuous growth of the prison population. As a result, the incidence of disease has either worsened or remained at high level with no prospect to decline.
Profile Introduction

Tajikistan has a population of 6.3 million and 45.5 person per square kilometer. This country is the most disadvantaged of the Central Asian Republics: it has limited resources with few transportation links, was ravaged by several years of civil war, and consequently, is the poorest country in the region. With a Gross National Income (GNI) per capita of US$180, Tajikistan is one of the poorest countries in the world. More than 80 percent of the population lives below the poverty line. The country has however, some natural resources, most importantly water and hydropower, and also some minerals, gold, silver, precious stones, and uranium. The terrain is mainly mountainous and arable land is scarce. The country’s 1,200 km long border with Afghanistan has made it an important route for the drug trade.

This Country Profile is structured into three sections. The first section analyzes epidemiological data. The second section describes the TB Control program. The third section analyzes the financial and institutional issues governing TB control in Tajikistan. Among others, the section evaluates the dimension of public spending, the contribution of international donors and the outcomes achieved in both the penitentiary and the hospital system. The section evaluates TB budgets by oblast and assesses the main features of how funds are allocated in the country. Finally, the section estimates the economic costs of TB and develops an input-outcome evaluation.

TB Epidemiology

Notification

The notification rate of TB in Tajikistan is the lowest of the Central Asian Republics. In 2002, it was one fourth of the notification in Kazakhstan. This reflects the low case detection and under-reporting rather than good results. Patients have less access to diagnosis and treatment due to lack of free TB drugs, diagnostic services, difficult terrain, and conflict.

Mortality

The mortality rate is low as compared to other countries in the region, but this may be the result of incomplete reporting. An increasing trend has occurred between 1998 and 2002, but a lower rate was reported in 2003. The difference in the rate reported for 2002 may be statistically insignificant, in which case mortality has been stable in recent years.

<table>
<thead>
<tr>
<th>Years</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>New TB cases</td>
<td>2,447</td>
<td>2,552</td>
<td>2,779</td>
<td>3,504</td>
<td>3,402</td>
<td>3,971</td>
</tr>
<tr>
<td>Notification rate</td>
<td>40.8</td>
<td>42.1</td>
<td>45.3</td>
<td>56.1</td>
<td>53.3</td>
<td>61.0</td>
</tr>
<tr>
<td>Mortality rate</td>
<td>6.1</td>
<td>6.0</td>
<td>6.4</td>
<td>7.1</td>
<td>9.7</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Source: MOH Tajikistan.
**Age and Gender**

The age and gender specific notification rates show that TB is most prevalent in the 15–34 age group and is twice as high among men as among women.

**MDRTB**

There is no information on the level of MDRTB, but it may be assumed that it is lower than in neighboring countries, given the total absence of TB drugs during the civil war years. This assumption is supported by the relatively low failure rates (8.5 percent) in DOTS pilot areas (Project HOPE, 2003).

**HIV/AIDS**

Around 40,000 injecting drug users have been identified in the country. HIV prevalence is estimated at about 4 percent in this group, which is the largest risk group for HIV transmission, although heterosexual transmission has been increasing. A total of 119 HIV positive persons have been reported, of which 42 percent were new cases in 2003. Of these, 70 percent have contracted the infection through intravenous drug use, 9 percent through sexual intercourse and 4 percent through blood transfusion (Tajik Republic AIDS Centre 2004). Three patients were reported to be co-infected with HIV and TB in 2003.

**TB in Prisons**

There are about 11,000 prisoners. In 2003, a total of 399 new TB cases were identified, of which 94 were sputum smear positive cases. The total notification rate was 3,600 per 100,000. The notification rate of new infectious cases was 847 per 100,000. TB prevalence data

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**Source:** MoH of Tajikistan.

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**Figure 60. TB Notification and Mortality Rates 1998–2003**

- Notification rate
- Mortality rate

- Source: MoH of Tajikistan.
provided by the Ministry of Justice (MoJ) show that about 9 percent of male prisoners and 3 percent of female prisoners are registered as TB patients. According to a survey undertaken by the Ministry of Health (MoH), up to 78 percent of patients who die from TB are prisoners.

As expected, the cumulative effects of poor investments in prisons have had a negative effect on TB outcomes:

1. With the prison population almost doubling in the 1998–2003 period, the number of TB deaths in prisons jumped from 8 cases in 1998 to 73 in 2003, a nine-fold increase. Thus, TB mortality rate among prisoners has increased from 129 to 658 deaths per 100,000 prisoners.

<table>
<thead>
<tr>
<th>Table 43. TB Case Notification and Mortality among Prisoners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years</strong></td>
</tr>
<tr>
<td>Number of prisoners</td>
</tr>
<tr>
<td>Registered TB cases</td>
</tr>
<tr>
<td>New TB cases in prisons</td>
</tr>
<tr>
<td>Notification rate</td>
</tr>
<tr>
<td>Mortality rate</td>
</tr>
</tbody>
</table>

*Source: Ministry of Justice Tajikistan.*
2. The total number of active TB cases has also increased progressively. For the same period, the coefficient has escalated from 362 cases to 727, while the proportion in the total population has remained stable (from 6.1 percent to 6.6 percent).

3. The number of new TB cases has also doubled, increasing from 192 to 399.

**Tuberculosis Control**

**Government Commitment**

Political commitment for DOTS implementation is high, as demonstrated by the approval of an order in 2002 endorsing the main components of DOTS strategy and creating a central TB team. Another order approved an eight year strategic Development Plan (2002–2010). A Country Coordination Mechanism (CCM) has been established chaired by the Vice Prime Minister, and has successfully applied for grant funding from the Global Fund Against AIDS, TB and Malaria.

**TB Services**

In a recent analysis, UNDP considered that TB resources in Tajikistan are inadequate to meet the global targets (UNDP 2003). Tajik TB services include the National TB Center in Dushanbe, three regional TB Centers, five city centers and 50 district TB facilities. The TB
The hospital system comprises 26 hospitals with 2,270 beds. The number of hospitals has remained the same, while the number of TB beds has grown by 2 percent in the last six years. In 2003, the average hospital capacity was 88 beds. Throughout this period, only TB Dispensaries and labs have grown by 8.5 and 13 percent, respectively.

TB services have 245 physicians, of which 136 are TB specialists. Human capital needs are substantial. However, strong measures will be needed to recruit and train new TB staff. Extremely low salaries do not attract new staff. The average age of TB specialists in the country is 55. The situation with nurses and lab technicians is similar. The TB system physical infrastructure also needs considerable investment of resources. The laboratory infrastructure needed to support TB diagnostics, including x-ray equipment, microscopes and reagents, requires almost a total renovation. International donors have supplied enough pharmaceuticals and microscopes to meet the country’s needs, but other essential supplies—including chemical reagents needed to use the donated microscopes—are still in short supply.

**DOTS Coverage**

In 2002, with direct support from Project HOPE, the Ministry of Health successfully implemented DOTS in Dushanbe city and Leninski Oblast covering 13 percent of the population. Intermediate indicators and outcome data suggest that implementation has been successful.

**Case Finding and Diagnosis**

Provision of laboratory services was interrupted due to the civil war. The National TB Institute Laboratory is dysfunctional and the building needs refurbishment. The country lacks a Reference Laboratory, although equipment for such laboratory has been donated by Project HOPE. Except in pilot districts, most laboratories are in poor condition. Most premises need repair or modifications, and binocular microscopes and reactive agents are lacking. The NTP plans to establish and/or strengthen 66 laboratories with funding from the GFATM. KfW has provided 50 microscopes, and Project HOPE has been training laboratory staff.

**Direct Observation of Treatment and Followup**

Tajikistan is still at an early stage of implementation of DOTS. In pilot sites, the TB Control Program has been well integrated into the general health care service. However, resources to follow up patients in the districts are limited. Access to some mountainous

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>NA</td>
<td>NA</td>
<td>6</td>
<td>24</td>
<td>32</td>
</tr>
</tbody>
</table>

Source: Ministry of Health of Tajikistan 2002.
regions during winter time is not possible, which hampers adherence to treatment. Health education of patients, their families and the general public is necessary to prevent massive defaulting.

**TB Control in Prisons**

Authorities are eager to start DOTS in prisons in Tajikistan. In 2002, the Penitentiary System was transferred from the Ministry of Internal Affairs (MoIA) to the Ministry of Justice (MoJ) as part of the penal reform program. When considering infrastructure, the most striking feature of the period from 1998 through 2003, is the absence of new facilities to care for TB prisoners. There are five SIZOs and 18 prisons, but no colonies. In general prison hospitals, 100 beds have been allocated for TB patients. This complicates the quality of the services and the response capacity within TB hospitals. For instance, while in 1998, there were 60 prisoners per bed, this figure increased to 111 prisoners in 2003, an 84 percent growth rate. It is clear that prisons have not been targeted by TB control programs. This is evidenced by the lack of infrastructure and worsening of TB outcomes. Poor nutrition, lack of space and acute shortage of drugs in prison TB hospitals need to be addressed.

**TB/HIV**

There is no integrated TB/HIV program in place yet. With funds from the GFATM, 14 labs are being refurbished to be able to carry out Elisa testing; and the Republican AIDS Center will be able to provide Western Blot to confirm HIV cases.

*Source:* Estimates based on data from MoJ of Tajikistan.
TB Drug Management

In the capital and districts, TB services do not have storage and staff capacity to adequately stock the annual supply of TB drugs. Capacity in TB drug management must be developed, including training of trainers, and the development of training modules that are integrated in DOTS training. Tajikistan applied successfully to the Global Drug Facility (GDF), ensuring drug support for areas covered by DOTS during three years. By 2005, however, the whole country is expected to be covered by GDF drugs. TB drugs are delivered mainly to the Tajik Firm Fabrika, a private company in charge of preparing 18 type of patient kits. The average cost per kit prepared is about US$3. This packaging allows easier drug distribution, management, and conservation of TB drugs. Financial support for this activity comes from Project HOPE.

Recording and Reporting

The old Soviet notification system continues to be in use. Registration forms and registers as recommended by WHO have been prepared but are distributed only in pilot districts. Lack of communication equipment and transport hampers data collection.

Supervision and Monitoring of the Program

A team of seven trainers has been trained by Project HOPE and WHO. However, district supervisors have to be identified in each region and trained. In addition, there are not enough cars for supervisors, and no budget for recurrent costs. The Republican TB staff and Project HOPE conduct joint supervision visits and discuss findings with district staff; and a supervision check list has been developed by Project HOPE and adopted in pilot regions.

Hospital Performance

To evaluate hospital performance, two indicators are considered: the average length of stay (ALOS) and the bed occupancy rate (BoR). The ALOS is 103.5 days or almost 3.5 months. Compared with other countries in the region, Tajikistan has the highest ALOS. However, it has one of the lowest BoR at 62 percent. The poor performance at the hospital level is the result of inadequate infrastructure, poor medical practices, shortages of drug provision, and reduced DOTS coverage of the population. The lack of a strong primary health care level creates excess demand for hospital services and impedes the transfer and care for TB patients outside of the hospital system.

Figure 64 consolidates the previous indicators into a single chart that evaluates the overall hospital performance by oblast (except Dushanbe City). The graph has four quadrants where each quadrant represents a particular feature. Quadrant II represents efficiency, as it combines a low ALOS with a high utilization rate. On the contrary, Quadrant IV demonstrates inefficiency since the average stay is long (i.e. above-the-average) and the hospitals are underutilized. The remaining quadrants, Q-I and Q-III, represent a combination of one efficient and one inefficient indicator. Using this model, most hospitals are characterized by a higher ALOS and an equally high BoR. This means that patients in these hospitals are being kept traditionally more days than the national average. Q-III institutions
Figure 64. TB Hospital Performance, 2003

Source: Estimates based on data from MoH of Tajikistan.

Table 45. Treatment Outcome of New Smear Positive Cases in Dushanbe City (3 Cohorts)

<table>
<thead>
<tr>
<th>Period</th>
<th>2002/Q3</th>
<th>2002/Q4</th>
<th>2003/Q1&lt;sup&gt;15&lt;/sup&gt;</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>REvaluated</td>
<td>39</td>
<td>68</td>
<td>58</td>
<td>165</td>
</tr>
<tr>
<td>Cured</td>
<td>74.4</td>
<td>80.9</td>
<td>75.9</td>
<td>77.6</td>
</tr>
<tr>
<td>Completed</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Failed</td>
<td>7.7</td>
<td>13.2</td>
<td>3.4</td>
<td>8.5</td>
</tr>
<tr>
<td>Died</td>
<td>10.2</td>
<td>1.5</td>
<td>3.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Defaulted</td>
<td>7.7</td>
<td>2.9</td>
<td>3.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Transferred</td>
<td>NA</td>
<td>1.5</td>
<td>NA</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Source: Project Hope Tajikistan.

<sup>15</sup> Preliminary data: 8 patients have not been included in the cohort; they are conditionally cured, but have not finished the complete course of treatment (2 to 4 weeks remain until the end of their treatment). In case of completion and negative smear results at the end of the treatment, these patients will add to the cohort of cured and the parameter of treatment will increase to 90 percent.
have ALOS that is 14 percent higher than the national mean. A clear signal of the poor performance of the overall hospital system is that only one oblast, Sugd, is in Q-II.

Treatment Outcome

Initial smear conversion rates among new cases tested at month 2 reached 80 percent. In the project HOPE pilot projects the success rate of the program was high: 75 percent at the start, 88 percent three cohorts later.

Financing TB Control

According to the Global Fund application, the estimated cost of the TB Program in the period from 2004 to 2008, including investments in laboratory equipment, training and pharmaceuticals, is over US$3 million. Ultimately, the actual cost of halting and reversing the spread of TB in Tajikistan will depend in large part on how effectively authorities are able to reform the TB control system.

Public Spending

The most important finding of the assessment is that more public action is required to improve TB outcomes. Although public spending increased in 2003, it is clear that the Government is not yet a driving force in the efforts to control the disease. The current contribution is not enough to effectively control the disease and to achieve, in the medium and long term, the global targets for TB control. Tajikistan has the lowest TB financing indicators for all variables considered in this study, among the countries under study.

Although there has been a 20 percent growth rate between 2002 and 2003, the public TB control budget did not exceed US$0.5 million for a population of over six million people. Consequently, the percentage of GDP (0.039 percent) and public health budget (0.8 percent) allocated to TB control were very low, and spending per capita (real US$0.08) was also low in 2003. Evaluating 4,392 patients during 2003, the average cost per person was US$112—or US$0.31 per day (Figure 65). Similarly, the daily cost for each new case was estimated at US$0.34 and the cost per bed-day was US$0.86. Taking both patients and bed-day figures, and having an ALOS of 103 days into account, the cost per patient per bed-day was US$0.24.

Donor Assistance

Most of the TB control spending in Tajikistan is contributed by donors. The CCM received $0.6 million from the GFATM for TB control and has applied for additional funding of $1.3 million. Most of the funds (62 percent) will be disbursed in 2004 and 2005. After that, if no additional grants are identified the projected flow of funds will decrease by almost half in 2006, and be reduced further in the following years.

As a percentage of GDP, external contributions were expected to increase from 0.07 percent in 2002 to 0.2 percent in 2004, or almost three-fold within two years, albeit from low levels. The contribution per capita has grown even more dynamically. Due to the low
Figure 65. TB Public Spending per Capita and as a Share of GDP, 2002–2003

Source: Estimates based on data from MoH and MoF of Tajikistan.

Figure 66. Daily Costs of TB Inputs 2003

Source: Estimates based on data from MoH and MoF of Tajikistan.
population growth and the accelerated rate of growth of contributions between 2002 and
2004, TB aid per capita was US$0.13 in the first year and was expected to increase to
US$0.30 in 2003 and US$0.41 in 2004 (real 2004 US$).

Although no data on total public spending are available, estimates indicate that donor
contributions are from 1.9 to 3.7 times greater than the public budget for TB. However, insuf-
ficient public funding for TB and the limited amount of external resources in the medium-
term may endanger the sustainability of current programs and indicate the urgent need to
increase public spending and fund-raising. In contrast with the situation in neighboring
countries, contributions in Tajikistan are less concentrated and there are several international
agencies that provide support for TB control. This diversification reduces the risk of failure
if a single agency decides to cut its budget or a particular program faces problems.

Donor activities are mainly centered on drug provision, diagnostic and laboratory
equipment and training, but there are also small projects in fields such as food support,
surveillance and vaccination. The most important contributions have been made by USAID
(35 percent) and the Swiss Development Cooperation (31 percent) as represented in
Figure 67. KfW has provided €1.5 million for microscopes and X-ray equipment across
the country. The Swiss Agency for Development and Cooperation has developed a project
financed by the World Bank, the “Sino Project.” The project brings together health sector
reform and family medicine support and implements the DOTS strategy in the rayons of
Dangara and Varzob. Merlin provides rehabilitation and equipment for laboratories in the
most southern province of Tajikistan. It also plans a morbidity/mortality study which
includes tuberculosis. Since 2002, the World Food Program has provided food support for

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Table 46. Donor Funding for TB Control Programs (US$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donors</td>
<td>787</td>
<td>1,845</td>
<td>2,681</td>
<td>2,458</td>
<td>1,420</td>
<td>620</td>
<td>620</td>
<td>10,431</td>
</tr>
</tbody>
</table>

Source: Ministry of Finances.

---

Figure 67. Structure of International Assistance by Donor 2002–2005

Source: Donors
1,000 TB patients and 5,000 family members during the follow-up phase in the Project HOPE pilot sites. IFRC has established a soup kitchen for vulnerable patients in Dushanbe since 2003, and is planning to expand this to Khojand and Khatlong as well. WFP has also considered food parcels for staff as an incentive for their work.

The Agha Khan Foundation developed activities focusing primarily on PHC and TB health education in Gorno Badakhshan, with a population of 200,000. This region has 3 percent of the population and 49 percent of the area of Tajikistan. AKF has been active in health sector reform and training of staff. GTZ finances drugs that have been distributed by the AKF in Gorno Badakhshan.

**Budgetary Analysis**

This section includes a detailed analysis of TB budgets at national and oblast levels. Some key issues considered in the next paragraphs are the composition of TB budgets and the differences among oblasts.

The total public TB budget of US$0.49 million for 2003 was the lowest in the region. TB funds are allocated among three main programs, as seen in Figure 68—TB hospitals and dispensaries, the Centre for Prophylaxis, and the Epidemiological Fund. The first absorbed 70 percent of TB resources during 2003, showing however a decline since 2002. A similar situation is observed in the Epidemiological Fund, while the TB Centre is the only program with a growing share of the TB budget.16

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**Figure 68. Composition of TB Budget by Program 2002–2003**

![Bar chart showing budget distribution by program.](chart.png)

*Source: Estimates based on data from MoH and MoF of Tajikistan*

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16. Detailed information by oblast is only available for TB hospitals and dispensaries.
The main source of funding are the oblasts, which are responsible for financing of most expenditures. For instance, during 2002, the share of local budgets in TB spending was 69 percent, while that of the Republican budget was 31 percent. However, the local budget spending has decreased to 64 percent in 2003, implying that Republican contribution has increased at a faster pace. The budgetary structure of each group differs considerably. Local budgets do not finance the Epidemiological Fund, while TB hospitals absorb 86 percent of their budget. TB hospitals received a two percent increase in their share during 2003. However, the Epidemiological Fund received most of the TB Republican resources (57 percent), although it declined sharply in 2003 (41 percent). This dramatic reduction in Fund’s share is the result of the increased priority given to the Center for Prophylaxis: the Center’s budget has risen from 3 percent to 21 percent of the Republican budget.

Finally, by line item, the most important feature is the relative stability in the share of each item. Interestingly, the “Other” category is the line item with the largest share of the budget, although it represents a group of unidentified items. Civil works is the next most important single line item—regardless of its cut in 2003 as compared to 2002, it still has the largest share. Salaries, traditionally the most important line item, absorb one fifth of the budget, while drugs represent a low and constant 10 percent of the total spending. These results, however, should be interpreted with caution, as they only incorporate public financing and exclude external donations. Similar to other countries in the region, excluding donor contributions highly underestimates the real expenditures on drugs. However, what remains clear is that in Tajikistan most of the public budget is devoted to financing infrastructure and salaries, giving low priority to key inputs, such as equipment and drugs.

The distribution of TB hospital and dispensary budgets by oblasts is illustrated in Figure 70. The Sugd oblast has been traditionally the most favored region, absorbing 40 percent of the public TB budget, followed by Khatlon oblast with 36 percent of the budget.
The high concentration characterizes resource allocation in Tajikistan: in 2002, 83.5 percent of the funds were dispersed between these two oblasts. However, in 2003, the share of the Sugd oblast fell by 9.5 points, which resulted in an increased allocation for other oblasts. The concentration rate decreased to 75 percent, showing a more equitable allocation of public resources, although two oblasts (RRS and Dushanbe) still received less than 10 percent each.

In terms of TB spending per capita (Figure 71), allocation tends to favor GBAO while RRS is the least favored oblast. According to Figure 71, the gap between those two oblasts was 6.1 times, increasing to 12.6 times in 2003 because spending per capita practically doubled in GBAO in that period while in RRS it remained basically the same. Between 2002 and 2003, spending per person remained the same in two oblasts, increased in two and decreased in one, Sugd.

**TB Control Expenditures**

Data on unit costs are mainly limited to the cost of fluorography and some unit costs of drugs and lab exams. The average cost per fluorography is estimated at US$0.66, totaling US$0.14 million for the 208,529 exams performed in 2003. The rate of detection is 0.38 percent; therefore, the unit cost per case is US$175. Differences among oblast are considerable where the cost per case detected in Khatlon is US$47, while in Sugd it is US$600. Treatment costs are also reported and, in general, drugs tend to be more expensive than in other countries in the region. For instance, the unit cost of one 250-mg injection of streptomycin is US$0.17 in Tajikistan, as compared with US$0.02 in the Kyrgyz Republic, a seven-fold difference.
Only one drug, izoniazid, is cheaper in Tajikistan than in the rest of the region. Lab exams are also cheaper in the Kyrgyz Republic where, for the tests considered, prices are between 7 percent (bacteriology) and 53 percent (flurography) cheaper than in Tajikistan.

**Input-Outcome Analysis**

Outcomes refer to mortality rates per 100,000 persons, which is the only outcome indicator available for that period. For the assessment, the outcome indicator is evaluated through an input-related indicator (physical or monetary). For each relationship, the chart is divided into quadrants, quadrant I (Q-I) being at the lower left segment of the figure. The quadrants are organized clockwise. The intersection point illustrates the average of each variable; therefore, the performance of each indicator is evaluated with regard to the average of the five oblasts considered. Expected results are those located in Q-II and Q-IV, as the final results are predictable according to input allocation. For example, a possible interpretation of Q-II is that a low spending per person results in a high mortality rate. The efficient quadrant is Q-I (lower left quadrant) because with a low input the oblast is capable of

---

17. Success and case fatality rates were available for 2002; Dushanbe and Leninabad were the only oblasts with information for 2003. Thus, one must be cautious in comparing this country with other countries in the region.
achieving above-the-average results (in this case, a low mortality rate). Finally, Q-III is the inefficient quadrant with the inverse relationship to Q-I. Importantly, Q-I shows that, compared with the other regions and the national average, an oblast is performing well.

Figure 72 depicts this relationship. Overall, the results are as expected: three out of five oblasts belong to either Q-II or Q-IV. Only Sugd and Khatlon, with a below-the-average spending, achieve a low mortality rate, being both efficient oblasts.

The analysis of beds per 100,000 persons and death rates indicates a similar relationship as per capita spending and mortality rates (Figure 73). Thus, four oblasts belong to the expected quadrants and only one, GBAO, is considered efficient and belongs to Q-I. The bed indicator in GBAO is one-sixth the national average, yet it has the second lowest mortality rate (5 per 100,000 inhabitants). However, these results should be interpreted with caution since the outlier, Sugd, seems to indicate some problems with data quality.

Finally, an essential input for satisfactory TB outcomes, the percentage of drug spending in the total budget is considered in Figure 74. Due to the absence of data on allocation of donor funds (traditionally focused on drugs), this figure considers public contribution only, and not the entire spending for the item. Interesting results arise in this case, as Sugd, which devotes the smallest share to drugs, has the lowest mortality rate. In this respect, Sugd is an efficient oblast and the rest of the oblasts are equally distributed, with two oblasts being in Q-IV and two in Q-III. Note that, among all the indicators evaluated, spending on drugs is the only indicator based on which the majority of oblasts are put in the inefficient quadrants.

Source: Estimates based on data from MoH and MoF of Tajikistan.
Figure 73. TB Beds and Death Rates

Source: Estimates based on data from MoH of Tajikistan.

Figure 74. TB Drugs and Death Rates

Source: Estimates based on data from MoH and MoF of Tajikistan.
A summary of the performance per oblast is shown in Table 47. To evaluate the aggregate performance, each oblast received 1 point for each efficient position, –1 for an inefficient performance, and 0 for an expected result. The main conclusions of the assessment are:

1. Dushanbe and RSS are the poorest performers, having a net negative balance. The relatively poor performance, however, could be explained by the poor quality of data in other regions. As Dushanbe is part of the pilot DOTS implementation, it is collecting more reliable data and showing worse results. Dushanbe, the capital, scores as inefficient in 60 percent of the indicators and is never represented in the efficient quadrant. It reports having more inputs such as TB doctors, facilities and drug spending, yet its mortality rate is 25 percent greater than that of the rest of the country.

2. Khatlon and Sugd present expected results, with a moderate trend toward efficiency. Khatlon shows efficiency only with respect to utilization of facilities and Sugd with drug spending, while the rest of their coefficients are mediocre.

3. GBAO is the best performer as in 60 percent of the indicators it is deemed efficient. The interesting feature is its low mortality rate despite the absence of adequate inputs.

4. An interesting result is a close and positive correlation between drug spending and mortality rate. The graph shows that higher mortality rate corresponds to higher drug expenditure. This suggests that drugs, instead of being one of the factors that explain low rates, respond to the epidemiological situation. Therefore, those regions with higher mortality rates devote a larger share to purchasing drugs.

5. In summary, there are two groups of oblasts, Sugd and the rest, with respect to input distribution in Tajikistan. The amount of resources in Sugd is far greater than those in other five regions. As a result, it has the lowest death rate and its overall performance is as expected. The rest of the regions show mixed results.

**Cost-Benefit and Cost-Effectiveness Analyses of the TB Control Program**

This section includes a cost-benefit and a cost-effectiveness analyses to estimate the impact of the TB program in Tajikistan. The assumptions for Tajikistan are the same as for the previous countries. Final results indicate that most benefits come from indirect sources,
accounting for 98 percent of total benefits. Total benefits from the TB program in Tajikistan are estimated at US$10.8 million (discounted value) while total net benefits reach US$6.5 million. The broad outcomes of the program are presented in Table 48, which shows that the program would yield important health benefits to the population. The B-C ratio yields a 2.5 coefficient. That is, for each dollar invested in TB control, the economy would receive US$2.5 in benefits. Finally, the IRR yields 89 percent, which, although it is not as significant as in other countries, indicates that TB control is still a highly valuable investment for society.

To measure effectiveness, the study defined the following parameters. First, one-round patients experience a mild disability, 0.05, for eight months, while two-round patients have a 0.1 disability weight during 16 months. Second, under the No Intervention case, the incidence rate is kept in 0.7 cases per 1,000 population, but with intervention the rate falls by 50 percent. Furthermore, the mortality rate remains at 8 per 100,000 population and declines to 4 per 100,000 under the Intervention. Finally, the cure rate was fixed at 80 percent. Marginal costs of the intervention are estimated at US$0.36 million during the 2003–2015 period. The program has the potential to save 62,029 DALYs and to avert 1,848 deaths. The cost per DALY is estimated at US$5.7, and the cost per death averted is US$4,036. The DALY cost is close to the international standards according to which it is in the range US$3-10, depending on the components of the treatment package.

### Table 48. Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Year</th>
<th>Discounted Costs</th>
<th>Discounted Direct Benefits</th>
<th>Discounted Indirect Benefits</th>
<th>Total Benefits</th>
<th>Net Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>477,548.3</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>(477,548.25)</td>
</tr>
<tr>
<td>1</td>
<td>447,518.8</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>(447,158.82)</td>
</tr>
<tr>
<td>2</td>
<td>418,703.3</td>
<td>31,389.4</td>
<td>1,779,786.2</td>
<td>1,811,175.67</td>
<td>1,392,472.41</td>
</tr>
<tr>
<td>3</td>
<td>392,058.5</td>
<td>27,475.9</td>
<td>1,557,890.8</td>
<td>1,585,366.75</td>
<td>1,193,308.25</td>
</tr>
<tr>
<td>4</td>
<td>367,109.3</td>
<td>23,990.2</td>
<td>1,360,251.1</td>
<td>1,384,241.36</td>
<td>1,017,132.04</td>
</tr>
<tr>
<td>5</td>
<td>343,747.8</td>
<td>20,888.7</td>
<td>1,184,394.7</td>
<td>1,205,283.46</td>
<td>861,535.64</td>
</tr>
<tr>
<td>6</td>
<td>321,873.0</td>
<td>18,132.0</td>
<td>1,028,090.5</td>
<td>1,046,222.57</td>
<td>724,349.60</td>
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<tr>
<td>7</td>
<td>301,390.1</td>
<td>15,684.7</td>
<td>889,325.8</td>
<td>905,010.49</td>
<td>603,620.36</td>
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<tr>
<td>8</td>
<td>282,210.8</td>
<td>13,514.7</td>
<td>766,285.5</td>
<td>779,800.24</td>
<td>497,589.47</td>
</tr>
<tr>
<td>9</td>
<td>264,251.9</td>
<td>11,593.1</td>
<td>657,333.7</td>
<td>668,926.82</td>
<td>404,674.92</td>
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<tr>
<td>10</td>
<td>247,435.9</td>
<td>9,894.1</td>
<td>560,995.9</td>
<td>570,889.95</td>
<td>323,454.08</td>
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<tr>
<td>11</td>
<td>231,689.9</td>
<td>8,394.0</td>
<td>475,944.2</td>
<td>484,338.24</td>
<td>252,648.29</td>
</tr>
<tr>
<td>12</td>
<td>216,946.0</td>
<td>7,072.0</td>
<td>400,983.0</td>
<td>408,054.97</td>
<td>191,108.92</td>
</tr>
</tbody>
</table>

| Total | B-C Ratio | 2.52 |
|       | NPV Benefits | 10,849,310.5 |
|       | IRR | 89% |
Economic Impact of TB

In this section, the potential economic impact of TB is estimated by measuring both productivity losses (in terms of deaths, disability and hospital visits) and direct fiscal expenditures. The results from the exercise are summarized in Table 49. During a typical year and given the current epidemiological profile, the total costs for the economy are estimated to be US$5 million. Of these costs, 55 percent are direct costs (US$2.8 million) and the other 45 percent come from productivity losses. In some oblasts, like GBAO, fiscal expenditures represent 97 percent of costs. In others, like in the capital Dushanbe, their share is only 35 percent. For the country as a whole they represent 0.43 percent of GDP. Compared with other countries of the region, this figure is somewhat low, but not surprising. First, public spending is low, never exceeding US$0.5 million per year. Second, indirect costs are below public spending, when the stylized fact points toward a higher participation rate.

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Direct Costs</th>
<th>Visits</th>
<th>Disability</th>
<th>Deaths</th>
<th>Total Costs</th>
<th>Direct Costs</th>
<th>Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dushanbe</td>
<td>136,849</td>
<td>4,199</td>
<td>9,607</td>
<td>239,575</td>
<td>253,381</td>
<td>35%</td>
<td>390,229</td>
</tr>
<tr>
<td>RRS</td>
<td>187,338</td>
<td>3,800</td>
<td>8,685</td>
<td>309,129</td>
<td>321,624</td>
<td>37%</td>
<td>508,963</td>
</tr>
<tr>
<td>GBAO</td>
<td>357,519</td>
<td>786</td>
<td>1,799</td>
<td>7,728</td>
<td>10,313</td>
<td>97%</td>
<td>367,833</td>
</tr>
<tr>
<td>Khatlon oblast</td>
<td>1,002,711</td>
<td>7,846</td>
<td>17,952</td>
<td>993,077</td>
<td>1,018,875</td>
<td>50%</td>
<td>2,021,586</td>
</tr>
<tr>
<td>Sugd oblast</td>
<td>1,090,161</td>
<td>4,128</td>
<td>9,445</td>
<td>614,394</td>
<td>627,966</td>
<td>63%</td>
<td>1,718,127</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>2,774,578</td>
<td>20,759</td>
<td>47,498</td>
<td>2,163,903</td>
<td>2,232,159</td>
<td>55%</td>
<td>5,006,737</td>
</tr>
</tbody>
</table>
CHAPTER 8

The Republic of Uzbekistan
Main Challenges in Achieving Global TB Targets

The main results of the evaluation show that the country has been performing moderately well in recent years. However, despite efforts to improve TB outcomes, the economic burden of TB in the Uzbek economy is one of the heaviest in the region. Considering both direct and indirect costs, US$55 million are lost on average each year due to fiscal and productivity costs. This represents 0.57 percent of GDP. This makes a strong case for Government intervention in order to achieve, in the medium and long terms, significant TB prevalence reduction that will improve living standards and reduce the negative impact on the economy. Specifically, the study suggests that important reforms should be undertaken to improve the epidemiological situation in prisons, budget allocation, and hospital performance.

The low case detection rate (44 percent as estimated by WHO) is a challenge for TB services. Ensuring outpatient management of TB patients is urgent to decrease high default rates. The experience from the primary health care project to improve efficiency and effectiveness must be transferred and adapted to the TB control system.

The most affected group are prisoners. Political commitment should focus on decreasing TB among prisoners, where relevant indicators have been deteriorating over the 1998–2002 period. Although some progress was observed in 2003, the net balance is unsatisfactory. The situation of the penitentiary system does not differ from other Central Asian countries. The main causes for the spread of TB in prisons are inadequate infrastructure (practically no new facilities and equipment between 1998 and 2003) and lack of drugs. DOTS implementation in the penitentiary system will start soon, but technical assistance is needed.
The high level of MDRTB (13 percent primary and 40 percent acquired), with a significantly higher proportion among prisoners, makes it imperative to launch a DOTS Plus Program in Uzbekistan.

There is no coordination between TB and HIV/AIDS Centers. The AIDS Centers have neither equipment, nor expertise to diagnose TB among HIV patients. Furthermore, HIV positive people who are diagnosed with TB do not have access to DOTS programs.

Project HOPE has piloted health education for patients, their families and the general public in several districts. However, a comprehensive IEC strategy to raise awareness about TB among the population is needed. Lack of proper incentives for health workers and patients impedes the change in behavior necessary for TB treatment and control. Salaries for medical personnel are low. Patients receive sick leave pay while being treated for extended and multiple times, which gives disincentives for receiving a successful DOTS treatment.

The parallel systems of data collection decrease the willingness of doctors to complete updated forms and make surveillance data unreliable. Hence, data collection needs to be unified. Although the National Reference Laboratory has been equipped for these tasks, it has insufficient staff and means to undertake them properly.

The importance of infrastructure has declined in recent years as the number of facilities and beds decreased during 1998–2002. Further analysis is required to ascertain whether this is a result of DOTS implementation and does not have a negative impact on detection and success rates.

There is a shortage of trained TB doctors and skilled laboratory technicians. Several training modules have been developed by different NGOs. These need to be unified by the National DOTS Center. Training of trainers and cascade training should be expanded.

Monitoring and Program Management need to be strengthened through training of relevant staff of the National DOTS Center, including by foreign experts and outside of the country. Transport for monitoring should be provided.

Uzbekistan is the moderate performer among the countries under study with generally average hospital outcomes (i.e. with most of the results balanced between good performers and bad performers). Three oblasts performed efficiently while three performed inefficiently. The remaining three oblasts generated expected (neutral) outcomes.

Of the four countries analyzed, Uzbekistan is among those with the highest public TB budget, representing 0.14 percent of GDP, with only Kazakhstan spending more than Uzbekistan. Donors contribute approximately one fifth of the Government contribution. Together they provide a significant budget for TB programs and equal almost 0.2 percent of GDP.

Differences in resources among oblasts are considerable and indicate the need to reduce the 10-fold gap that exists between those oblasts that receive the highest and the lowest share of resources. Improved budget allocation mechanisms are required to correct this highly uneven distribution of resources.

There is a close and negative relationship between high salary costs and overall performance. The evaluation shows that those regions where the share of wages is high perform poorly as few resources are devoted to other vital inputs such as drugs and infrastructure. A more balanced budget seems to be the best strategy to improve TB outcomes. The input-outcome evaluation generally confirms previous conclusions. Out of nine oblasts in the country, three perform efficiently, three inefficiently, and three below the average.
Profile Introduction

Uzbekistan is a low income country with a Gross National Income per Capita of US$460. It has a population of 25.3 million with 28 percent living below the poverty line. It is the most densely populated country of the five Central Asian Republics (CAR). Embedded between the Syr-Darya and Amu-Darya rivers, it is the only Central Asian republic which borders all other four republics: Kazakhstan in the north, Turkmenistan in the west and south, and Tajikistan and Kyrgyzstan to the East. It has a short border (137 km) in the south with Afghanistan, which has a sizeable Uzbek minority. Uzbekistan is now the world’s third largest cotton exporter, a large producer of gold and oil, and a regionally significant producer of chemicals and machinery.

Uzbekistan can be divided into five regions in terms of climatic, economic, environmental, health and population indicators. The arid and environmentally degraded Autonomous Republic of Karakalpakstan in the Aral Sea area resembles the neighbouring Kzyl Orda Oblast in Kazakhstan (the region in Kazakhstan with the highest TB incidence). The central region of Bukhara and Navoi oblasts are deserts with vast distances. The Ferghana Valley with a dominant Uzbek population is fertile and partly the cause of the environmental disaster of the Aral Sea area, as it uses the water of the Syr-Darya river for irrigation of cotton fields. Ferghana Valley has the densest population in the country, with 400 inhabitants per square km. Tashkent, Dizzak and Syr Darya oblasts are the industrial centres of the country. The southern region consists of Samarkand, Surkhandarya, and Karshi Oblasts, which are situated in the foothills of the mountains between Uzbekistan and Tajikistan. A large portion of the population in these oblasts are ethnic Tajiks.

This Country Profile is divided into three sections. The first section analyzes epidemiological data. The second section describes the TB Control program. The third section analyzes the financial and institutional issues governing TB control in Uzbekistan. Among others, the section evaluates public spending, the contribution of international donors and the outcomes achieved in both the penitentiary and the civilian hospital systems. The section evaluates TB budgets by oblasts and assesses the main mechanisms for allocation of resources in the country. Finally, the section estimates the economic costs of TB and develops an input-outcome evaluation.

TB Epidemiology

Notification

Uzbekistan has a serious tuberculosis problem, and TB incidence and mortality have been on the rise since independence in 1991. There was a peak in notifications in 1994, but this may have been a recording artifact (Figure 75). In 2003 and 2004, a slight decrease in notification was observed. The next few years will show if an epidemiological plateau has been reached. Given the ongoing DOTS implementation and expansion, it is likely that notifications will continue to increase. Karakalpakstan and Kashkadarya were the regions with highest notification in 2003 and 2004 (Table 51). Among new TB patients, the proportion of sputum positive pulmonary cases was around 27 percent.
Figure 75. TB Notification and Mortality Rates per 100,000 Population

Source: National DOTS Centre, Ministry of Health.

Age and Gender

In 2002, of the 19,960 patients in DOTS Regions, 11,474 were men and 8,486 women, a gender ratio of 1.4. A large share of patients are young: 47 percent were 15–34 years old (Figure 76).

Mortality

The TB mortality rate peaked in 2001, with an increase of 30 percent between 1995 and 2001, and a decrease of almost 20 percent between 2001 and 2004. This may be an early indication that the DOTS strategy is successful. Karakalpakstan is the region with highest mortality, followed by Tashkent City.

Table 50. TB Notification and Mortality Rates per 100,000

<table>
<thead>
<tr>
<th>Rate/Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notification</td>
<td>58</td>
<td>62.1</td>
<td>64.5</td>
<td>72.4</td>
<td>79.1</td>
<td>77.2</td>
<td>75.4</td>
</tr>
<tr>
<td>Mortality</td>
<td>11.1</td>
<td>10.7</td>
<td>11.5</td>
<td>12.5</td>
<td>12.3</td>
<td>11.5</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Source: National DOTS Centre, Ministry of Health.
Table 51. TB Notification and Mortality Rates per 100,000 by Oblast

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Notification Rate 2003</th>
<th>Notification Rate 2004</th>
<th>Mortality Rate 2003</th>
<th>Mortality Rate 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karakalpakstan</td>
<td>154.8</td>
<td>122.6</td>
<td>34.2</td>
<td>30.1</td>
</tr>
<tr>
<td>Tashkent city</td>
<td>83.2</td>
<td>82.9</td>
<td>17.4</td>
<td>14.1</td>
</tr>
<tr>
<td>Andijan</td>
<td>74.2</td>
<td>79.1</td>
<td>9.6</td>
<td>8.1</td>
</tr>
<tr>
<td>Bukhara</td>
<td>61.2</td>
<td>61.0</td>
<td>7.8</td>
<td>8.1</td>
</tr>
<tr>
<td>Jizak</td>
<td>67.3</td>
<td>73.2</td>
<td>10.2</td>
<td>7.2</td>
</tr>
<tr>
<td>Kashkadariya</td>
<td>98.0</td>
<td>92.7</td>
<td>4.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Navoi</td>
<td>83.2</td>
<td>75.4</td>
<td>7.8</td>
<td>6.6</td>
</tr>
<tr>
<td>Namangan</td>
<td>73.7</td>
<td>76.3</td>
<td>8.3</td>
<td>8.9</td>
</tr>
<tr>
<td>Samarkand</td>
<td>57.5</td>
<td>60.0</td>
<td>9.8</td>
<td>9.6</td>
</tr>
<tr>
<td>Surhandyriya</td>
<td>68.6</td>
<td>66.4</td>
<td>8.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Syrdariya</td>
<td>71.1</td>
<td>69.0</td>
<td>10.7</td>
<td>9.4</td>
</tr>
<tr>
<td>Taskent Oblast</td>
<td>62.9</td>
<td>70.8</td>
<td>12.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Fergana</td>
<td>70.0</td>
<td>66.8</td>
<td>11.6</td>
<td>10.8</td>
</tr>
<tr>
<td>Korezm</td>
<td>73.6</td>
<td>64.4</td>
<td>9.6</td>
<td>7.4</td>
</tr>
<tr>
<td>Total</td>
<td>77.2</td>
<td>75.4</td>
<td>11.5</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Source: National DOTS Centre, Ministry of Health.

Figure 76. Percentage TB Notification per Age Group in 2003

Source: National DOTS Centre, Ministry of Health.
**MDRTB**

Given the results of DST in neighbouring countries, it may be assumed that MDRTB in Uzbekistan in new cases is about 10–15 percent and in previously treated cases 35–50 percent. In the semi-autonomous Republic of Karakalpakstan, MSF has conducted a drug susceptibility testing (DST) survey in collaboration with a reference laboratory in Germany. According to the results of this survey, primary MDR was as high as 13 percent and acquired MDR was 40 percent. As a result of this survey, MSF started a pilot in MDRTB treatment, with a cohort of 100 patients.

**HIV/AIDS**

By November 2003, there were 3,365 cases of PLWHA, with 1,664 cases in Tashkent city and an additional 703 cases in the Tashkent Oblast. It is expected that in 2005, there will be over 10,000 HIV positive people in Uzbekistan. It is estimated that 11–12 percent of people living with HIV/AIDS are co-infected with TB.

**TB in Prisons**

Data about the epidemiological situation of TB in prisons is depicted in Table 52. Three indicators, morbidity, new TB cases and incidence per 100,000 prisoners show a stable, but slightly downward-trend over the last five years (from 1998 to 2003), with the exception of morbidity in 2001. On average, 2,146 new TB cases appear in Uzbek prisons each year, representing 3.7 percent of their population. The total number of TB cases, however, presents a much different pattern. Although there was a similar number of TB cases in 1998 (6,314) and in 2003 (6,322), the total number of prisoners declined from 70,370 to 43,234. Therefore, the percentage of prisoners with TB has risen from 9 percent to 15 percent.

**Figure 77. Newly-Registered HIV/AIDS Cases in Uzbekistan**

![Figure 77](image)

Almost all cases are among males, with only eight cases among females in 2003. These results suggest inadequate TB treatment, a low share of effectively treated persons and/or a high rate of failure. While changes in results are insufficient to conclude that the trend has been reversed, the constraints under which they are achieved show that better outcomes can be expected if more resources are allocated to the sector.

**TB/HIV in Prisons**

Over 400 HIV infected prisoners were registered in 2003. A total of 97 prisoners are co-infected with HIV and TB.

**Tuberculosis Control**

**Government Commitment**

There has been a growing Government commitment for TB Control and implementation of the DOTS Strategy in Uzbekistan. All official decrees on TB support the DOTS Strategy. In 2001, the Parliament passed a law on population protection from TB that provided a systematic approach to TB interventions, including the provision of free treatment to all Uzbek citizens and resident foreigners at inpatient, outpatient and sanatorium facilities. The same level of TB treatment should be also made available to the prison population. In 2001, a Resolution of the Cabinet of Ministers was adopted making DOTS the approved best practice for TB control in Uzbekistan. In 2003, an order was issued by the Government to expand the DOTS strategy to the entire Republic. The Strategic National TB Program on Prevention and Reduction of TB Morbidity in Uzbekistan 2004–2008 was also endorsed. An interdepartmental Coordinating Council exists and co-ordination between MoI, MoJ, MoH, and other ministries has been established in the context of the Country Coordination Mechanism that has successfully applied for grants for TB and HIV/AIDS from the GFATM. The Ministry of Health has been increasing the budget for TB Control.
on an annual basis. A decree of the Ministry of Health has also addressed TB drug policy. According to this decree, selling TB drugs that are listed in the Essential Drugs List is prohibited.

**Health Sector Reform**

At the end of the 1980s, Uzbekistan was left with a dilapidated and inefficient health care structure inherited from the Soviet Union. Discussions and negotiations between the Government of Uzbekistan, the World Bank and USAID regarding primary health care reforms began in 1996. In November 1998, the President issued an order on “The National Health Care System Reform Program in the Republic of Uzbekistan.” Although the decree addressed many issues of the health care system, restructuring and strengthening emergency and primary care services became the number one priority. Both of these levels of care were guaranteed free services by the government. The oblast general hospitals were converted into the oblast Emergency Care Hospital. At the national level, the best hospital in the city was refurbished and turned into the Republican Emergency Care and Research Centre. The majority of the resources for these reforms were allocated from outside the health care budget.

In early 1998, USAID began providing technical assistance in this area through the ZdravReform Project (now known as the ZdravPlus Project). Then, in 1999 a five-year Bank loan of $30 million, which complemented the USAID project, was approved. The project (Uzbek Health I) focused on restructuring primary health care in rural pilot areas comprising three components: strengthening the quality of services, training of GPs and community nurses, and developing new financing and management mechanisms. USAID and DFID provided most of the technical assistance, while the Bank loan financed equipment and other materials. This Project is now closed and a follow up project has been approved in 2004, for implementation in the period from 2005 to 2010. The new project (Uzbek Health II) includes a Public Health Component, which in turn includes subcomponents on TB and HIV/AIDS control.

**TB Services**

The country is divided in 12 oblasts, one City (Tashkent) and one autonomous Republic (Karalkalpakstan). The total number of raions ranged from 230 to 256, but recently it has been reduced to 192. A National DOTS Centre has been established, which is housed in the Republican TB Institute, but has its own independent budget. The Director reports to the Minister of Health. The National DOTS Centre is responsible for planning and supervision of TB services. At the oblast level, DOTS Centers have been created that act independently from the TB hospitals and conduct training, supervision and monitoring. These centers oversee the implementation of the TB program. At the raion level, hospitals/dispensaries are the primary pillars of the TB structure, with some raions sharing facilities (inter-raion hospitals). There are 11,230 beds in TB hospitals. The number of TB hospitals increased between 1998 and 2003 by ten. Contrary to this, the number of TB Dispensaries fell by 11 units, from 122 in 1998 to 111 in 2003. The long term plan foresees six TB laboratories. Presently there are 1,449 doctors in the TB services or one TB doctor for 1,700 inhabitants and 14 patients.
**DOTS Coverage**

The Republic of Uzbekistan intended to complete the expansion of the DOTS strategy throughout the country by the end of 2004. This was an ambitious objective, that was almost entirely achieved: in 2002, 41 percent of the population was covered by DOTS, in 2003, 53 percent, and in 2004, 90 percent. KFW and the GDF are providing first-line drugs to all oblasts. Recently, with KfW support, the Tashkent Oblast and Ferghana Valley have been fully covered. In addition, the Uzbek Health II Project includes funds to improve DOTS in an additional two Oblasts; and recently the country has obtained a grant from the GFATM to further expand DOTS implementation throughout the country.

Since 1998, Médecins Sans Frontières—Holland (MSF-H) has successfully implemented a DOTS program in the autonomous Republic of Karakalpakstan and, more recently, in the Khorezm Velayat (province) as well. A multidisciplinary approach has been applied. An epidemiological survey, professional training, provision of quality drugs and laboratory supplies, training on drug management, and waste and sharp objects management have been carried out. However, the DOTS program has not been implemented in the penitentiary system in those regions. A model Training Centre has been set up in Nukus in collaboration with the New Jersey TB Training Center. MSF has officially handed over this DOTS project to the Ministry of Health in December 2003, but it will continue providing support for two years to the DOTS Plus pilot project in Karakalpakistan.

Project HOPE and CDC, funded by USAID, implemented DOTS in ten pilot raions. Project HOPE has a comprehensive approach for information, education and communication (IEC). It has developed a large training effort. A pool of trainers has been created through TOT trainings, using modern adult learning techniques, and Project HOPE uses these trainers and their own staff to conduct training in pilot regions. The NDC also uses these trainers in the new DOTS areas. Project HOPE has already trained trainers in 6 oblasts, and MSF in another 2 oblasts.

As DOTS implementation will cover the whole country in the near future, intensive training and supervision will be required from the National DOTS Center. The MoH and NDC therefore have looked for expanded NGO involvement. The Belgian Damien Foundation, financed by KfW, will support DOTS implementation in Bukhara, Khaskadarya and Surkhandarya Oblasts.

**Case Finding and Diagnosis**

An indication of the rapid expansion of the DOTS program is the increase in notified cases: 2,828 patients were enrolled in the DOTS program in 2001, 8,500 in 2002, and 10,205 patients in 2003. Yet, this is still only half of the patients registered in 2003. According to WHO estimates, in 2003, only 44 percent of sputum smear positive patients were detected in Uzbekistan. The rate of sputum positive pulmonary patients in relation to the total number of patients is much higher in the regions covered by DOTS than in other regions of the country. In regions where the DOTS strategy has been implemented, the percentage of newly diagnosed patients with pulmonary tuberculosis excreting bacteria is 45 percent, while in other regions it is 23 percent.
In pilot sites, diagnosis is made through sputum smear microscopy and X-ray if available. Fluorography and X-ray screening are routine for high risk groups. In DOTS sites, laboratories have been equipped with binocular microscopes. In several DOTS areas, an increase of cases was reported, sometimes doubling the number of diagnosed cases compared to the previous year. This is likely the result of an increased trust in the system due to availability of treatment. Overall, only a quarter of diagnosed cases have their diagnosis confirmed by a positive sputum smear (Table 53).

Uzbekistan had 289 laboratories in 2004, which carried out 211,516 smear tests. The National Reference Laboratory undertook quality assurance of oblast laboratories, which in turn oversee the quality of rayon laboratories (sensitivity is 86 percent and specificity is 96 percent). Nine oblast laboratories received new equipment and reagents from KfW, the Samarkand Oblast lab received equipment from Project HOPE, but three regions (Fergana Oblast, Navoi Oblast, and Syrdarya Oblast) use the services of laboratories from central polyclinics and SVPs, which have been equipped under the Bank-financed health project. CDC has established a Laboratory Training Center in the Republican TB Research Institute. Lab staff from all over the country, including prisons, is currently being trained by Project HOPE, CDC, MSF and Damien Foundation.

**Table 53. New Pulmonary TB Cases**

<table>
<thead>
<tr>
<th>Years</th>
<th>All New Cases</th>
<th>Absolute nr.</th>
<th>New Pulmonary TB Cases (PTB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Percent</td>
</tr>
<tr>
<td>1998</td>
<td>13,958</td>
<td>12,318</td>
<td>88,2</td>
</tr>
<tr>
<td>1999</td>
<td>15,080</td>
<td>13,324</td>
<td>88,3</td>
</tr>
<tr>
<td>2000</td>
<td>15,912</td>
<td>14,151</td>
<td>88,9</td>
</tr>
<tr>
<td>2001</td>
<td>18,106</td>
<td>16,325</td>
<td>90,2</td>
</tr>
<tr>
<td>2002</td>
<td>19,960</td>
<td>10,304</td>
<td>51,6</td>
</tr>
<tr>
<td>2003</td>
<td>19,725</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: National DOTS Centre, Ministry of Health.

Direct Observation of Treatment and Followup

In most DOTS regions, general health care facilities are involved in early detection and followup of patients. ‘DOTS corners’ have been established in PHC services and in some policlinics of regions where DOTS has been implemented. In these regions, PHC services deliver treatment to patients in the continuation phase. Yet, there is a relatively high rate of treatment interruption (7–9 percent). Default tracing procedures are weak and need to be strengthened. Resources should be allocated for transportation of staff for followup with patients. The International Federation of Red Crescent has started a pilot providing social support for patients as an incentive, which should be expanded if successful.
TB/HIV

PLWHA who are suspected of TB are sent to the TB Center for diagnosis. The TB Institute plans to build TB/HIV wards with proper conditions for infection control in the Tashkent City TB hospital and in each oblast TB hospital. The AIDS Center needs to be equipped with a sputum collection room and X-ray, and a TB specialist should be designated to diagnose TB suspects among HIV positive people at an early stage. There are 15 AIDS Centers in the Republic of Uzbekistan, and 92 labs, 14 of which have been equipped by CDC; 230 Trust Points have been established aiming at having 1 Trust Point per 50,000 population.

TB Control in Prisons

The Ministry of Interior is responsible for TB control in the penitentiary system. There are three TB prison hospitals and TB colonies in Navoi, Bukhara and Tashkent; there is no specific TB facility for female prisoners. Recently, the Ministry of Interior has improved incarceration conditions, and nutrition of TB patients in prisons. Isolation procedures have been introduced. New and re-treatment cases of TB are already separated. In collaboration with WHO and KfW, the Ministries of Interior and Health have drafted a concept note that addresses the major technical issues of TB control in prisons. DOTS implementation has started in two colonies in the Tashkent Oblast in 2004. Project HOPE has trained some of the prison staff and KfW has provided microscopes. However, technical capacity must be further increased and laboratory equipment has to be provided to five oblasts not covered by KfW. In the penitentiary system, diagnosis is still done by radiography. TB treatment in prisons is limited.

In terms of infrastructure, no improvements were observed during the period 1999–2003. There are one TB prison hospital and two TB colonies. The total number of TB beds in prisons has varied between 2,000–2,500 since 1998. On average, in 2003 there were 2.4 TB prisoners per bed.

TB/HIV in Prisons

In the penitentiary system, there is no special policy concerning HIV/AIDS. Prisoners are all tested, but the results are only shared if the prisoner requests it. HIV positive prisoners are not segregated, but other inmates harass them and the rate of suicide is high. Health education materials (brochures) have been prepared in cooperation with the MoH. Condom provision is impossible as homosexuality is illegal in the country. However, the establishment of needle exchange programs has been under discussion; and methadone substitution therapy is planned, but has not started yet; and there is no ARV treatment for HIV/AIDS.

Table 54. Inputs for TB Control in Prisons 1998–2002

<table>
<thead>
<tr>
<th>Years</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB beds in prisons</td>
<td>2,000</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
<td>2,170</td>
<td>2,170</td>
</tr>
</tbody>
</table>

Source: Ministry of Interior, Uzbekistan.
**TB Drug Management**

The TB drug supply system is a mix of centralized and decentralized procurement and distribution; and the MOH relies heavily on international donor support for drug supply. Supply of the non-DOTS areas is the responsibility of local authorities and budgets. However, due to lack of funding at the local level, the MOH made several centralized purchases of some first-line TB drugs in recent years. TB drugs for DOTS areas are all supplied by donors: KfW has provided drugs for nine Oblasts; and GDF has provided drugs for the remaining Oblasts (Samarkhand, Syrdaria, Navoi and Jizzak Oblasts, and Tashkent City) in 2003. Resources should be secured for regular drug supply and a reserve of drugs should be established for at least two cohorts of patients.

**Recording and Reporting**

In regions where DOTS has been implemented, WHO standard recording and reporting have been introduced. The DOTS Centre has adopted the WHO standard forms and has been mandated by the Ministry of Health to introduce them across the country in 2003. CDC plans to initiate Electronic Surveillance and Case Management (ECSM), which has been piloted in Kazakhstan. However the old reporting system is still in place and parallel reporting by old methods continues.

**Supervision and Monitoring**

The National TB Institute has a team of supervisors that visits oblasts to assess compliance with the old Soviet style guidelines. In parallel, there is a growing DOTS monitoring system, backed-up by the decree enforcing the DOTS strategy. KfW has provided office equipment and vehicles to oblast DOTS Centers.

**TB Hospital Performance**

In terms of beds, the average size of each hospital is 93.4 beds per facility and this figure has been relatively stable over time. In terms of beds per 100,000 population, after experiencing a downward trend between 1999 and 2002, the country reached 1998 levels in 2003 with 43 beds per 100,000. A similar trend is observed in terms of beds per 1,000 new TB cases. The 2003 recovery is the net balance of two forces: the decline in new TB cases and the increase in the number of beds.

By oblast, 95 percent of beds belong to local governments, while the other 5 percent are located in Republican facilities. Four oblasts (Karakalpakstan, Fergana, Samarqand, and Andijan) had 43 percent of the 11,938 beds in 2002. Ninety percent of TB beds care for adults and 10 percent for children. Differences among oblasts, though, are considerable. As described in Figure 79, while Karakalpakstan had 21 beds per 1,000 population, Bukhara has a coefficient that is almost ten times lower.

In terms of hospital outcomes, two variables are considered, the Average Length of Stay (ALOS) and Bed Occupancy Rate (BoR), and both are taken for the same period. ALOS is 72 days and the average BoR is 344 days. For ALOS, the Tashkent City (86 ALOS)
Figure 78. TB Beds per 100,000 Population and per 1,000 New Cases, 1998–2003

Source: Estimates based on data from MoH of Uzbekistan.

Figure 79. TB Beds per 10,000 Habitants per Oblast, 2002

Source: Estimates based on data from MoH of Uzbekistan.
and Navoi Oblast (60) have extremely high values, while Karakalpakstan (405 days) and Andijan (307 days) have the highest BoR. Looking carefully at the ALOS in Navoi with the correspondent third lowest number of beds per 10,000 persons, the notion that a low bed coefficient can impact quality negatively should be considered.

An integrated perspective of hospital performance is presented in Figure 80, where both ALOS and BoR are assessed jointly. The ideal situation is Quadrant II, where the oblast presents an above-average BoR (capacity of utilization) with a low ALOS. However, one must take these general principles cautiously because in some cases, a low ALOS may provide evidence of poor quality service, lower bed availability or a recurrent desertion of patients, with the correspondent negative effects. Following these criteria, there is no clear trend about hospital performance. Out of 15 units assessed (including Republican facilities), three (20 percent) are located in Q-II, three are in Q-IV and eight (53 percent) are in “intermediate” quadrants, that is, one of the two performance indicators is poor. Only one oblast is located on the average point. The most common situation combines low ALOS with a low BoR.

These results draw attention to the performance of Uzbek hospitals. On the one hand, as mentioned previously, being in the efficient quadrant is more the exception than the rule. On the other hand, for most facilities, at least, one indicator is below average. The fact that 33 percent of hospitals are in Q-I, however, casts doubt on the managerial and medical capabilities of these institutions. Under such circumstances, the existence of a low ALOS cannot be associated with capacity problems because the hospital is using a less-than-average rate of utilization. Thus, other factors, like drug availability, for instance, are influencing the poor performance of most of the hospitals.

Figure 80. TB Hospital Performance in Uzbekistan 2002

Source: Estimates based on data from MoH of Uzbekistan.
An increasing number of patients have been included in the cohorts that are evaluated. Treatment success in the period from 1999 to 2002 varied between 76.0 and 79.5 percent. For a new program, these results are acceptable. However, irregular trends on failure and death rates indicate that recording and reporting are still weak.

In the well-monitored project of MSF-Holland in Karakalpakstan, the success rate decreased in recent years (Figure 81). A possible explanation is that in the early stages of DOTS implementation, patient enrolment was selective, aiming at definite new cases to

### Table 55. Treatment Outcome in New Sputum Smear Positive TB Cases

<table>
<thead>
<tr>
<th></th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluated</td>
<td>41</td>
<td>107</td>
<td>430</td>
<td>854</td>
<td>2,553</td>
</tr>
<tr>
<td>Cured</td>
<td>78.0</td>
<td>69.2</td>
<td>65.1</td>
<td>55.7</td>
<td>65.3</td>
</tr>
<tr>
<td>Completed</td>
<td>4.9</td>
<td>7.5</td>
<td>13.0</td>
<td>20.3</td>
<td>14.2</td>
</tr>
<tr>
<td>Failed</td>
<td>2.4</td>
<td>8.4</td>
<td>1.6</td>
<td>4.2</td>
<td>5.0</td>
</tr>
<tr>
<td>Died</td>
<td>2.4</td>
<td>7.5</td>
<td>11.2</td>
<td>11.7</td>
<td>8.0</td>
</tr>
<tr>
<td>Defaulted</td>
<td>9.8</td>
<td>5.6</td>
<td>7.2</td>
<td>6.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Transfered out</td>
<td>2.4</td>
<td>1.9</td>
<td>1.9</td>
<td>1.6</td>
<td>NA</td>
</tr>
<tr>
<td>Treatment success</td>
<td>82.9</td>
<td>76.6</td>
<td>78.1</td>
<td>76.0</td>
<td>79.5</td>
</tr>
</tbody>
</table>

**Source:** National DOTS Centre, Ministry of Health.

### Treatment Outcome

The treatment outcome is shown in Table 55. The treatment success rate varied between 76.0 and 79.5 percent in the period from 1999 to 2002. For a new program, these results are acceptable. However, irregular trends on failure and death rates indicate that recording and reporting are still weak.

### Figure 81. Outcomes of DOTS in New SS (+) Cases in Karakalpakstan 1998–2002

The success rate decreased in recent years (Figure 81). A possible explanation is that in the early stages of DOTS implementation, patient enrolment was selective, aiming at definite new cases to

**Source:** MSF Aral Sea Area Program.
increase the chance of success. Once the program became a routine, enrollment is less selective and the automatic result is a somewhat lower success rate.

**Financing TB Control**

Uzbekistan’s TB program performs moderately in the region with the country ranking second in terms of public TB budget allocation, with more than US$10 million provided each year. On average, for each dollar contributed by donors, the Government spends $4.5. In per capita terms, external agencies provide an additional US$0.12 per person, so, by adding both public and donor resources, in 2004, the joint contribution per capita is US$0.59, or 0.17 percent of GDP.

**Public Budget**

Total public TB expenditures increased from US$10.7 million (real 2004 dollars) in 2002 to US$14.0 million in 2003 and were expected to reach US$14.2 million in 2004. Despite this yearly increase, there is a decline in the rate of expenditure in 2004. After a growth in expenditure by 30 percent in 2003, there is only 2 percent growth in 2004. This same pattern is observed in TB spending per capita and as a percent of GDP as seen in Figure 82. Both indicators increase significantly in 2002 and 2003, but TB spending per capita remains relatively consistent ($US 0.54) in 2004. However, in 2004 as compared to 2003 the TB budget in terms of GDP (0.13 percent in 2004) has decreased when spending reached a high of 0.14 percent.

**Figure 82. TB Expenditures as a Percentage of GDP, 2002–2004**

![Bar chart showing TB expenditures as a percentage of GDP from 2002 to 2004](chart.png)

*Source:* Estimates based on data from MoH and MoF of Uzbekistan.
The previous figures represent the 2004 approved budget; however it cannot be implied that the entire budget will be fully executed. Some international TB programs execute only up to 75 percent of the overall budget. If one is to simulate the 2004 situation by using the same execution rate as in previous years, then the decline in TB resources during this year would be significant. The final resources for TB control would be US$10.7 million, representing a per capita expenditure of US$0.42 and 0.10 percent of GDP as well as a negative 24 percent growth rate. These results highlight the importance of improving financial management and budgetary discipline by avoiding long bureaucratic procedures that delay the correct implementation of TB programs and, thereby, lead to the negative effects on TB epidemiological profiles.

Other relevant costs for the analysis are the cost per new case, the cost per patient and the cost per bed, which are depicted in Figure 83 and are expressed in costs per day. Additionally, a comparison with GDP per capita for 2002 (US$1.80 in 2004 dollars) is illustrated. The cost per TB patient is the only one that exceeds the daily income per capita by 27 percent. The cost per new case is slightly below the daily income and equals 65 percent of the cost per patient. Finally, the cost per bed-day per person is estimated at US$0.45 in 2002.\textsuperscript{18} The magnitude of this cost is great. If a person stays in a hospital for 60 days, the subsidy from the Government will represent, for the stay alone at the end of a six-month treatment, an equivalent 4 percent of the average income per capita.

\textsuperscript{18} For this estimate, the analysis assumed that each patient stays 60 days in a hospital during TB treatment.
To summarize, the public contribution to TB control provides an important insight into the impact of the disease on the economy and its negative effects on public finances. It represents an increasing share of total output, averaging 0.13 percent of GDP during the last three years. The fiscal impact of public TB spending has been increasing dramatically during the last three years, growing from 1.9 percent of public health expenditure to 4 percent in 2004. That is, in two years, its share in the health budget has doubled. Each year, the fiscal burden of TB grows: it is the only program within the health sector that is growing faster than the sector as a whole.

**Donor Assistance**

Donors contribute a high share to the overall spending on TB in Uzbekistan. For the 2002–2004 period, international agencies contributed US$8.9 million, with a further US$5.4 million expected over the next five years (Table 56). International contributions are expected to fall sharply between 2008 and 2009, unless additional funding can be secured. It will not present a significant problem if TB outcomes improve substantially during the key years (2002–2007) of the process, when international aid flows at high rates. However, if TB targets are not achieved, long term plans are needed and, thus, additional financing will be required. Even if expected targets for TB control are attained, some basic activities remain, forcing the Government to look for alternative sources of funds.

As in other countries of the region, it is projected that from 2002 to 2009 almost 90 percent of donor funds will have been provided by two agencies, KfW (58.3 percent) and USAID (31.3 percent) (Figure 84). KfW mainly funds the provision of TB drugs and diagnostic and laboratory equipment, while USAID supports training. In addition, the Government has recently obtained GFATM grants for the TB Program ($13.8 million) and HIV/AIDS Programs ($2.5 million).

Donor co-ordination still needs considerable effort, although a TB Working Group has been organized by the local WHO office to evaluate training modules. Since 1998, Médecins Sans Frontières- Holland (MSF-H) have successfully implemented a DOTS program in the autonomous Republic of Karakalpakstan and, since 2002, in the Khorezm Velayat (province). Project HOPE and CDC, funded by USAID, implemented DOTS in ten pilot raions. WHO has supported DOTS implementation with training. TB drugs have been provided by KfW and the GDF. The Uzbek Health II Project, financed by the World Bank, will provide $0.5 million for lab equipment and training in the Navoi and Jizzak Oblasts, including for prisons.

### Table 56. Donor Assistance to TB Control (US$ thousands)

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donors</td>
<td>2,160</td>
<td>4,140</td>
<td>2,662</td>
<td>2,418</td>
<td>1,996</td>
<td>936</td>
<td>30</td>
<td>34</td>
<td>14,376</td>
</tr>
</tbody>
</table>

*Source: Donors 2004.*
Table 57. Donor Assistance to TB Control in Uzbekistan

<table>
<thead>
<tr>
<th>Partners</th>
<th>Area of Work</th>
<th>Targets</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Korezm Oblast</td>
<td>training centres, Drugs, Training, TA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDRTB management pilot</td>
<td>2004–2006</td>
</tr>
<tr>
<td>WHO</td>
<td>Munyak Rayon</td>
<td>Health and TB</td>
<td>1996</td>
</tr>
<tr>
<td></td>
<td>Fergana Rayon</td>
<td>Training</td>
<td>1998</td>
</tr>
<tr>
<td></td>
<td>Urgut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDF</td>
<td>DOTS patients</td>
<td>Provision of drugs</td>
<td>2002</td>
</tr>
<tr>
<td></td>
<td>in 5 Oblasts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOPE</td>
<td>10 Raions</td>
<td>DOTS training, TOT, IEC</td>
<td></td>
</tr>
<tr>
<td>CDC</td>
<td>19 laboratories</td>
<td>Lab equipment, training</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TB institute</td>
<td>Electronic surveillance</td>
<td></td>
</tr>
<tr>
<td>KfW</td>
<td>9 oblasts</td>
<td>Drugs, Lab equipment</td>
<td>2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consumables</td>
<td></td>
</tr>
<tr>
<td>TB 1</td>
<td></td>
<td>Office equipment</td>
<td></td>
</tr>
<tr>
<td>TB 2</td>
<td></td>
<td>Transport</td>
<td></td>
</tr>
<tr>
<td>TB 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damien foundation</td>
<td>3 oblasts</td>
<td>TA</td>
<td></td>
</tr>
<tr>
<td>IFRC</td>
<td></td>
<td>Food supplies</td>
<td></td>
</tr>
<tr>
<td>Uzbek Health II</td>
<td>2 oblasts</td>
<td>Navoi and Jiazzak oblasts</td>
<td>2004–2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PenSys: 3 labs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Civil society—labs, vehicles, training, monitoring</td>
<td></td>
</tr>
<tr>
<td>GFATM</td>
<td>Countrywide</td>
<td>DOTS implementation</td>
<td>2005–2009</td>
</tr>
</tbody>
</table>

Figure 84. Projected Donor Participation in TB Control, 2002–2009

Source: Donors 2003 (does not include GFATM grant for TB).
Budgetary Analysis

As mentioned in the previous section, the total budget that has been devoted by the Government to TB control has been increasing in real terms and is expected to reach US$14.2 million in 2004. With the addition of KfW contributions, the level of TB spending increases from US$7.2 million to US$15.6 million between 2002 and 2004.

Local units or oblasts fund most TB spending. On average, 87 percent of the expenditures are financed locally, with 13 percent being financed through Republican entities, mainly hospitals and TB institutes. This means that, for each dollar spent by Republican institutions, the local units spend US$6.6. This figure has increased from US$5.7 in 2002 to US$6.8 in 2004. This fast growth indicates two issues: a positive bias in favor of primary health care efforts to control the disease throughout the country, and the increasing critical role played by oblasts in fighting TB. This situation raises the issue of administrative capacity of oblasts to efficiently manage increasing funds, especially since the correct execution of budgets is a cornerstone of successful programs.

The distribution of TB expenditures, by oblast, is shown in Figure 85 where a significant concentration of resources is observed. For instance, the three top oblasts receive 33 percent of TB funds while the bottom three oblasts receive only eight percent of funds.

Figure 85. Distribution of TB Resources by Oblast, 2002–2004

Source: Estimates based on data from MoH and MoF of Uzbekistan

19. Only KfW planned donations are considered in this analysis, as this agency provided data by oblast and budgetary category, and represented 58 percent of expected donations at the time of the analysis.
In terms of per capita spending, the gaps are also significant as shown in Figure 86. The difference between Karakalpakstan (US$1.8, the highest per capita spending) and Syrdarya (US$0.13, the lowest per capita), is 13.8. This gap has been widening during the last few years: in 2002, it was nine and in 2004, it has become fourteen, although between 2003 and 2004 it has decreased. These outcomes indicate a widening gap over time.

The individual daily cost per TB patient in the most expensive oblast (Kashkadarya, US$3.6) is almost seven-times that of cost in the region with lowest cost (Republic of Karakalpakstan, US$0.53). The variation between oblasts is mainly explained by significant differences in the number of TB cases, and not by budget differentials. For instance, Kashkadarya absorbed 7.5 percent of TB funds during 2002, while Karakalpakstan received 5 percent. However, looking into the share of TB cases for each oblast, it is clear that Karakalpakstan should receive higher level of resources as it has 13 percent of all TB cases whereas Kashkadarya has 3 percent. Regardless of these two cases, there is a positive and moderately strong correlation between TB resource allocation and the number of cases in each oblast, as shown in Figure 87. The positive trend is an indication that fund allocation follows an epidemiological criterion, but the existing gaps suggest that further improved guidelines should be formulated.

Analysis of budget distribution by line item shows that the highest share of spending is devoted to salaries (43 percent in the 2002–2004 period), although this figure has declined over the three year period. Drug expenditures have stayed around 16 percent of total TB expenses, while equipment and utilities absorbed 6 and 4 percent, respectively. If external contributions are deducted from total spending, the share of drugs falls to 10 percent.

Source: Estimates based on data from MoH and MoF of Uzbekistan.
By 2004, the importance of KfW contribution grows significantly bringing the share of TB expenditures allocated for drugs to 18 percent. Finally, equipment expenditures have experienced an up-and-down trend—in 2003, they accounted for 10 percent of total expenditures, but in 2004 their share fell to 4 percent.

Budget structures by oblast and Republican facilities are shown at the aggregate level in Figure 88. Important similarities are depicted between salaries and equipment, while strong differences appear between drugs and repairs. For instance, oblasts almost double their spending on drugs as a result of KfW support. At the same time, hospitals allocate more resources to repairs and utilities. In both cases, the budget structures are congruent with the nature of their primary and tertiary-level orientations.

Oblasts were ranked according to budgetary orientation in three areas: salaries, drugs and equipment (Table 58). There is a strong and negative correlation between drug and salary oriented oblasts. Therefore, high salary and low drug-oriented oblasts are considered equivalent, as are high drug and low salary-oriented oblasts. The determination coefficient for the logs of both variables yields 0.66. There is a positive relationship between drug and equipment orientation. Although it is not as high as stated above, the linear R² for both logs is 0.40. Finally, as expected, the relationship between salary and equipment orientations is strongly negative, in this case, the value of the determination coefficient is 0.63.

In sum, highly salary-oriented oblasts tend not to allocate many resources for drugs and equipment (hard and soft equipment). In principle, this may have minimal significance, as this situation could be the result of opposite forces. For instance, some may be highly bureaucratic oblasts with little chance for investing in other categories apart from wages. In that sense, they are tied-up by staff disbursements. In other oblasts, budget structures could be a result of the epidemiologic stage of the disease. For example, oblasts with a long

Source: Estimates based on data from MoH and MoF of Uzbekistan.
**Figure 88. TB Budget Structure by Group of Institutions, 2002–2004**

![Bar chart showing TB budget structure by group of institutions.](chart.png)

**Source:** Estimates based on data from MoH and MoF of Uzbekistan

**Table 58. Oblast Orientation by TB Budget Category, 2002–2004**

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Salary (28–60%)</th>
<th>Drug (5–30%)</th>
<th>Equipment (0.5–18%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fergana</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Karakalpakstan</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Namangan</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Kashkadarya</td>
<td>Low</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Khorezm</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Andizhan</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Bukhara</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Surkhandarya</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Samarkand</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Tashkent</td>
<td>Moderate</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Tashkent city</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Navoi</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Syrdarya</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Jizzak obl</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Note:** The range of participation of each category is in parentheses.

**Source:** Estimates based on data from MoH and MoF of Uzbekistan.
running TB program may currently have the infrastructure to control TB; therefore, these oblasts focus their expenditures on medical efforts. In this sense, the budget follows a beneficial and efficient pattern.

In order to test the relationship between budget orientation and the epidemiologic profile of the oblast, several outcomes of oblasts grouped according to budget orientation were observed (Table 58):

1. The best success rates are observed among those oblasts where drugs and equipment have a high or moderate share in the overall budget. This is an expected outcome. Regions where salaries absorb a high share of the budget (Group 1) show the lowest success rate among the four groups considered. In other words, the evidence suggests that those oblasts with drug rates below 12 percent (low-oriented drug budgets) have little chance to experience high rates of success.

2. In terms of hospital performance, the wage-based oblasts also present the worst hospital outcomes where two out of four wage-based oblasts are located in the inefficient Quadrant (Q-IV), and only one belongs to Q-II. In the regions without clear budget priorities (Group IV), Q-I oblasts dominate with low ALOS and BOR.

The analysis suggests that the allocation of an important part of the budget to staff salaries rather than drugs does not contribute to reduction and control of TB. Moderate budgets with a significant portion devoted to drugs, above 12 percent, seem to be much more effective than oblasts that overspend on wages and have relatively large staff. In those cases

<table>
<thead>
<tr>
<th>Oblast Groups</th>
<th>Profile</th>
<th>Success Rate (cure + completed treatment)</th>
<th>Hospital Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tashkent City, Navoi, Syrdarya, Jizzak</td>
<td>High salary, Low drug and equipment</td>
<td>76.2</td>
<td>4 (2), 2 and 3</td>
</tr>
<tr>
<td>2. Fergana, Khorezm</td>
<td>Low salary, High drug and equipment</td>
<td>84.0</td>
<td>1 and 2</td>
</tr>
<tr>
<td>3. Surkhandarya, Andizham</td>
<td>Moderate salary, drug and equipment</td>
<td>84.7</td>
<td>1 and 3</td>
</tr>
<tr>
<td>4. Karakalpakstan, Namangan, Kashkadarya, Bukhara, Samarkand, Tashkent oblast</td>
<td>No clear trend, either low/moderate salary with low/moderate or high drug and equipment</td>
<td>77.7</td>
<td>1 (3), 2, 3 and 4</td>
</tr>
</tbody>
</table>

20. Sum of cured patients and treatment completed divided by total cases.
21. For some oblasts, no information was available for 2002, so for some groups their averages may not be fully accurate as only one or two oblasts were considered.
where the oblast has a salary-oriented budget, few resources remain for drugs and equipment, thereby leaving a physician without important inputs necessary for treating and curing TB.

Finally, the distribution of KfW contributions by oblasts was analyzed. This was done with two aims: first, to evaluate the importance of donor contribution to TB control in each oblast; and second, to assess if there is an appropriate resource distribution. The distribution of these funds is presented in Figure 89. Only nine oblasts receive international financing, even though the other five oblasts had 37 percent of 2002 TB cases. For those oblasts that are financed by KfW, differences are equally significant. By region, 22 percent of the donor financing flows to Taskhent oblast, followed by the Republic of Karakalpakstan (18 percent) and Fergana (13 percent). At the bottom of the ranking, Bukhara, Surkhandarya and Kashkadarya receive less than five percent each. Taken together, the top three oblasts (11 percent of the population) receive 53 percent of the international funds, and the bottom three oblasts (26 of the people) receive just 13 percent of the available donor resources.

However, a population criterion may not be relevant to assess donors’ policy effectively. Instead, it is more useful to match the distribution of resources with the number of TB cases. As it has been noted previously, there is a positive correlation between the individual share of TB cases and KfW contributions (Figure 90). The coefficient of determination yields a 0.68 correlation for the sample of oblasts shown below. This suggests that KfW has been allocating funds according to appropriate criteria.

The percentage of total funds that is contributed by this international agency, and flow of donor funds to oblasts that have a larger or smaller share of public funds were analyzed.

Figure 89. Distribution of Donor Contributions by Oblast, 2002–2004

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Share in donors contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tashkent oblast</td>
<td>21.7%</td>
</tr>
<tr>
<td>Karakalpakstan</td>
<td>17.9%</td>
</tr>
<tr>
<td>Fergana oblast</td>
<td>13.2%</td>
</tr>
<tr>
<td>Andizhan oblast</td>
<td>11.0%</td>
</tr>
<tr>
<td>Namangan oblast</td>
<td>9.7%</td>
</tr>
<tr>
<td>Khorezm oblast</td>
<td>9.6%</td>
</tr>
<tr>
<td>Kashkadarya oblast</td>
<td>4.9%</td>
</tr>
<tr>
<td>Surkhandarya oblast</td>
<td>4.3%</td>
</tr>
<tr>
<td>Penitentiary</td>
<td>3.8%</td>
</tr>
<tr>
<td>Bukhara oblast</td>
<td>3.6%</td>
</tr>
<tr>
<td>DOTS center</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

Source: Estimates based on data from Donors.
One primary characteristic about donations is that they were mainly distributed to those regions with a higher public budget per capita. On average, the five oblasts that did not receive external funds during the period had lower public spending per capita (41 percent). For 2004, three of the five least-favored oblasts belong to the non-targeted group. Within the targeted group, those regions with the largest public allocation per capita also experienced the largest donor contribution per person. While this has been apparent for the past three years, the relationship was particularly strong in 2003. The Tashkent Oblast and the Republic of Karakalpakstan receive four times more public spending per capita and six times more international aid than the rest of the country. The coefficient of determination for this relationship is high at 0.88 (Figure 92).

**TB Costs**

Data on unitary costs are scarce and generally devoted to two elements, the cost per fluoroscopy exam and the cost of DOTS implementation per laboratory. During 2002, 2.7 million fluorography tests have been practiced with a 0.4 percent detection rate (11,896 cases). The total cost of the exam is US$13,366, averaging US$1.1 per case detected. This figure, however, should be taken cautiously as all oblasts report the same value. In terms of DOTS implementation, Wuest (2004) estimated the average cost per facility at US$17,270. Three categories (car, lab supplies and furniture) absorb 89 percent of total costs, although some other accounts, such as TB doctors salaries (US$1,097) and binocular microscopes (US$1,000) also represent a significant share of TB costs.

*Source:* Estimates based on data from MoH of Uzbekistan and Donors.
Figure 91. Importance of Donations in Oblast Budgets, 2002–2004

Source: Estimates based on data from MoH of Uzbekistan and Donors.

Figure 92. TB Public and Donor Allocations per Capita, 2003 (in Real US$)

Source: Estimates based on data from MoH of Uzbekistan and Donors.
**Input-Outcome Analysis**

This section relies on 2002 outcome variables, which is the only available information at a disaggregated level. An additional limitation is that only DOTS treated patients are reported; therefore, only nine oblasts generate indicators for the analysis. The analysis develops an input-outcome evaluation between an outcome indicator (success rate) and an input-related indicator (physical or monetary). For each relationship, the chart is divided into quadrants, with quadrant I (Q-I) at the lower left segment of the figure and other quadrants organized clockwise. The intersection point illustrates the average rate of each variable; therefore, the performance of each indicator is evaluated with regard to the average of the total oblasts considered. Expected results are those located in Q-I and Q-III, as the final results are predictable according to input allocation. For example, a possible interpretation of Q-I is that a low spending per person yields a low success rate as expected. The efficient or outstanding quadrant is Q-II (upper right quadrant) because with a low input the oblast is capable of achieving above-the-average results (in this case, a high success rate). Finally, Q-IV is the inefficient quadrant with the inverse relationship to Q-II. Importantly, Q-II does not imply that outcomes alone are efficient. It shows that, compared with the other regions and the national average, an oblast is performing in a specific way.

Based on the above information, the relationship between per capita allocations and success rates are analyzed in Figure 93. Following the criteria outlined previously, four oblasts performed efficiently in 2002 as they managed lower spending per capita but presented success rates above 78 percent (the sample average). The most extreme example is Samarqand, with a US$0.16 allocation (real terms) and a 92 percent success rate.

**Figure 93. TB Spending per Capita and Success Rate, 2002**

![Graph showing TB spending per capita and success rate for different oblasts in 2002.](source)

*Source:* Estimates based on data from MoH and MoF of Uzbekistan.
This is in contrast to two oblasts (Tashkent Oblast and Karakalpakstan) that are ranked below the rest of the regions and are located in Q-IV. Taken together, their average spending is US$0.61 per person, but their success rate does not reach 75 percent. Finally, three oblasts belong to either Q-I or Q-III. Andijan, with the highest spending in 2002, had 85 percent success rate, which is seven points above the average. In summary, based on per capita spending and success rate indicators, the country presents highly positive results.

The relationships between different inputs (TB doctors per 100,000 population in Figure 94; facilities per 100,000 population in Figure 95; and share of drug expenditures in total budget in Figure 96) and the success rate were also analyzed. The first variable mainly supports our previous conclusion about the general performance of the country. In this case, five oblasts (56 percent) are located in Q-II and only one, Karakalpakstan, is in Q-IV. Three regions also generate expected outcomes; however, in this case, all belong to Q-I. The strong concentration in Q-I and Q-II indicates that doctors play a highly relevant role in TB cure and control strategies. The situation in Q-II clearly indicates that hiring enough doctors (without overstaffing, as analyzed earlier) has positive results. Similarly, Q-I suggests that not having an adequate number of TB doctors can be a significant barrier to achieving better outcomes.

The results of the relationship between infrastructure and success rates are more dispersed throughout the figure. The number of outstanding oblasts falls to three (33.3 percent) as two are now represented in Q-IV and four other regions yield expected results. As in the first two situations, the Republic of Karakalpakstan is ranked as inefficient while Samarqand, Khorezm and Tashkent city have remained in Q-II for the three cases considered.

**Figure 94. TB Doctors and Success Rate, 2002**

*Source: Estimates based on data from MoH of Uzbekistan.*
Finally, drugs and outcomes were evaluated (Figure 96). First, the general distribution of oblasts is quite similar to that for facilities. The three oblasts that have been classified as efficient in previous analyses performed well in relation to this indicator too; while five oblasts have expected results, and only one performs inefficiently (Namangan). However, Karakalpakstan, usually in Q-IV, now reports an expected result as it has a low drug expenditure and a low success rate.

Source: Estimates based on data from MoH of Uzbekistan.
A summary of Oblast performance is shown in the Table 60. To evaluate the aggregate performance, oblasts received 1 point for each outstanding performance, –1 for an inefficient result, and 0 for expected results.

The main conclusions of the assessment are:

1. The worst performers are, from the most inefficient to the most efficient, the Republic of Karakalpakstan, Tashkent Oblast, and Namangan Oblast, but the three oblasts present a different combination of results. Karakalpakstan performs inefficiently in all cases except drugs, while Tashkent ranks as being inefficient in two cases and expected in other two. Finally, Namangan is generally an expected performer except drugs, where it is ranked as inefficient.

2. Three oblasts are at the top of the list with a perfect score, achieving an efficient level in every single indicator. These are Tashkent City, Khorezm, and Samarqand.

3. Finally, Syrdarya, Fergana, and Andijan are mediocre performers, that is, they have a grade above zero in the consolidated sum. Syrdarya is a typical expected oblast receiving this label in all categories. For drugs and facilities these groups share the same grade, a zero.

Cost-Benefit and Cost-Effectiveness Analyses

Cost-benefit and cost-effectiveness analyses were conducted to assess the TB programs in Uzbekistan (Table 61). The analysis followed similar assumptions as in the previous countries. The most important source of savings is the reduction in mortality of TB patients, totaling US$28.8 million, or 93 percent of total discounted benefits. From direct sources, a total US$1.7 million savings is expected, which represents only 2 percent of the spending
reductions. This implies that indirect sources are the key factors in the success of the project by contributing to more than 97 percent of the total savings. The results indicate that the program would yield important health benefits to the population. The total expected discounted benefits during the period are US$144.5 million while the discounted net benefits would reach US$48.9 million. The B-C ratio is 1.5; therefore, for each dollar invested in TB control, the whole economy receives US$1.5 in benefits. Importantly, the IRR yields 52 percent.

To measure effectiveness, the study defined four parameters. First, one-round patients experience a mild disability (0.05) for eight months, while two-round patients have a 0.1 disability weight for 16 months. Second, under the No Intervention case, the incidence rate remains at 0.88 cases per 1,000 inhabitants, but with intervention the same falls by 50 percent. Third, the mortality rate is consistent at 34 percent and declines to 17 percent under the intervention. Finally, the cure rate is fixed at 80 percent. Marginal costs of the intervention are estimated to be US$9.9 million during the 2003–2015 period. The program could save 1.95 million DALYs, and 57,300 deaths could be averted. The cost per DALY is estimated at US$4.1, while the cost per death averted is US$2,884. The cost per DALY is close to the international standards of US$3–10 per DALY.

<table>
<thead>
<tr>
<th>Year</th>
<th>Discounted Costs</th>
<th>Discounted Direct Benefits</th>
<th>Discounted Indirect Benefits</th>
<th>Total Benefits</th>
<th>Net Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10,581,126</td>
<td></td>
<td></td>
<td></td>
<td>(10,581,125.61)</td>
</tr>
<tr>
<td>1</td>
<td>9,907,781</td>
<td></td>
<td></td>
<td></td>
<td>(9,907,781.26)</td>
</tr>
<tr>
<td>2</td>
<td>9,277,286</td>
<td>145,338.81</td>
<td>28,639,476.91</td>
<td>28,784,815.76</td>
<td>19,507,529.67</td>
</tr>
<tr>
<td>3</td>
<td>8,686,913</td>
<td>128,991.22</td>
<td>23,950,353.59</td>
<td>24,079,344.81</td>
<td>15,392,431.47</td>
</tr>
<tr>
<td>4</td>
<td>8,134,110</td>
<td>114,182.83</td>
<td>19,929,344.20</td>
<td>20,043,527.03</td>
<td>11,909,417.27</td>
</tr>
<tr>
<td>5</td>
<td>7,616,485</td>
<td>100,782.93</td>
<td>16,492,044.86</td>
<td>16,592,827.79</td>
<td>8,976,343.20</td>
</tr>
<tr>
<td>6</td>
<td>7,131,799</td>
<td>88,671.09</td>
<td>13,563,837.67</td>
<td>13,652,508.76</td>
<td>6,520,709.55</td>
</tr>
<tr>
<td>7</td>
<td>6,677,957</td>
<td>77,736.34</td>
<td>11,078,824.00</td>
<td>11,156,560.34</td>
<td>4,478,602.90</td>
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<tr>
<td>8</td>
<td>6,252,997</td>
<td>67,876.54</td>
<td>8,978,868.72</td>
<td>9,046,745.26</td>
<td>2,793,748.75</td>
</tr>
<tr>
<td>9</td>
<td>5,855,079</td>
<td>58,997.69</td>
<td>7,212,744.45</td>
<td>7,271,742.15</td>
<td>1,416,663.59</td>
</tr>
<tr>
<td>10</td>
<td>5,482,483</td>
<td>51,013.38</td>
<td>5,735,365.59</td>
<td>5,786,378.97</td>
<td>303,896.33</td>
</tr>
<tr>
<td>11</td>
<td>5,133,597</td>
<td>43,844.18</td>
<td>4,507,103.16</td>
<td>4,550,947.34</td>
<td>(582,650.05)</td>
</tr>
<tr>
<td>12</td>
<td>4,806,914</td>
<td>37,417.11</td>
<td>3,493,172.21</td>
<td>3,530,589.31</td>
<td>(1,276,324.60)</td>
</tr>
</tbody>
</table>

Total

| B-C Ratio | 1.51 |
| NPV Benefits | 144,495,987.52 |
| IRR | 52% |
**Economic Impact of TB**

Finally, the study estimated the economic costs of TB in terms of productivity losses and fiscal expenditures. As Table 62 shows, during a typical TB year, total expenditures and losses represent US$55.2 million. Out of this, 24 percent of the costs, or US$13.1 million, are due to direct costs (fiscal expenditures). These expenditures come from hospitalizations, TB control programs and similar categories. As a share of GDP, current costs and losses represent 0.57 percent of the total output (this figure is underestimated). In five cases, it is not possible to calculate the indirect costs due to lack of data for visits, deaths or disabilities. If a similar pattern of behavior is assumed for those five missing oblasts, the TB burden for the economy would be close to 0.85 percent of GDP.

<table>
<thead>
<tr>
<th>Oblast</th>
<th>Direct Costs</th>
<th>Indirect Costs</th>
<th>% Direct Costs</th>
<th>Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andizhan obl.</td>
<td>1,541,194</td>
<td>16,219</td>
<td>18,555</td>
<td>4,937,153</td>
</tr>
<tr>
<td>Fergana obl.</td>
<td>902,275</td>
<td>16,378</td>
<td>18,737</td>
<td>6,042,486</td>
</tr>
<tr>
<td>Namangan obl.</td>
<td>315,632</td>
<td>13,982</td>
<td>15,996</td>
<td>5,010,842</td>
</tr>
<tr>
<td>Republic of Karakalpakstan</td>
<td>1,548,454</td>
<td>15,880</td>
<td>18,167</td>
<td>18,201,148</td>
</tr>
<tr>
<td>Khorezm obl.</td>
<td>477,462</td>
<td>8,788</td>
<td>10,054</td>
<td>4,200,265</td>
</tr>
<tr>
<td>Bukhara obl.</td>
<td>741,204</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kashkadarya obl.</td>
<td>1,017,289</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Surkhandarya obl.</td>
<td>979,413</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Samarkand obl.</td>
<td>1,325,432</td>
<td>1,579</td>
<td>1,807</td>
<td>1,105,333</td>
</tr>
<tr>
<td>Jizzak obl.</td>
<td>565,264</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Syrdarya obl.</td>
<td>273,953</td>
<td>570</td>
<td>652</td>
<td>368,444</td>
</tr>
<tr>
<td>Navoi obl.</td>
<td>484,587</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tashkent obl.</td>
<td>1,334,425</td>
<td>1,623</td>
<td>1,857</td>
<td>1,105,333</td>
</tr>
<tr>
<td>Tashkent city</td>
<td>1,654,878</td>
<td>1,585</td>
<td>1,813</td>
<td>957,955</td>
</tr>
<tr>
<td>Republic of Uzbekistan</td>
<td>13,161,463</td>
<td>76,604</td>
<td>87,638</td>
<td>41,928,960</td>
</tr>
</tbody>
</table>
References


Stopping Tuberculosis in Central Asia is part of the World Bank Working Paper series. These papers are published to communicate the results of the Bank’s ongoing research and to stimulate public discussion.

Tuberculosis is still a significant health and economic problem in Central Asia, despite some recent progress that may be due to improvements of the overall economic situation in these countries, and partial adoption of the DOTS Strategy recommended by WHO. Over 50,000 new cases have been detected in 2004 and over 7,000 people died due to TB in the four countries studied. This study has confirmed that it is highly unlikely that these Central Asian republics will succeed in achieving the global targets for tuberculosis control in the short term, particularly with regard to case detection. In the meantime, the epidemic continues to have a serious epidemiological impact and affects the economies of these countries, which incur productivity losses and indirect costs that are estimated to range from 0.5 to 0.8 percent of GDP annually.

This study reviews the epidemiological situation, control efforts, and financing of tuberculosis programs in Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan. It was based on a review of existing statistics and reports, and on consultation with key stakeholders—Governments, NGOs, and donors in Central Asia. This work contributes an agenda for action to address the impending epidemiological crisis that has been posed by the sudden increase in cases of HIV/AIDS infection combined with a prevalent epidemic of TB.

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