

Master of Public Health Field Experience Report

WITH PROJECT HOPE – THE PEOPLE-TO-PEOPLE HEALTH FOUNDATION, INC. “TUBERCULOSIS TRENDS IN UZBEKISTAN”

by

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Summary

Introduction. Despite the availability of effective anti-tuberculosis treatment and public health interventions, tuberculosis (TB) remains a major global health problem. The emergence of resistance to anti-tuberculosis drugs, particularly of multidrug-resistant TB (MDR-TB), continues to threaten the progress made in controlling the disease.

Methods. This report summarizes the field experience completed with Project HOPE – People-to-People Health Foundation, Inc. in Uzbekistan from June 17 to August 23, 2013. The primary focus of the field experience was to analyse tuberculosis trends and factors associated with the increasing incidence of multidrug-resistant tuberculosis in Uzbekistan. The analysis is based primarily on data reported by World Health Organization's (WHO) Member States in annual rounds of global TB data collection.

Results. The descriptive analysis of the WHO TB surveillance data shows number of positive changes in trends of TB in Uzbekistan. From 2000 to 2012, both TB incidence and prevalence had gradually decreased. Similar picture was observed in TB mortality rate. Despite some decrease in the notification rate of new and relapse cases, notification rate of previously treated TB cases has noticeable increased during the reporting period. Pulmonary TB remains the main form of TB in Uzbekistan. The age group 25-34 constituted the highest prevalence between 2006 and 2012. The drug susceptibility test (DST) is becoming more accessible in the country and it shows increase in prevalence of multidrug-resistant tuberculosis (MDR-TB). During the study period, there was no much progress in the treatment success rate, because of increasing prevalence of MDR-TB.

Conclusion. All aforementioned, even with taking into consideration the limitations of the data, we conclude that the National TB Program is on the right track to reach and close to Millennium Development Goals for 2015.

Subject Keywords: Tuberculosis, MDR-TB, TB burden, HIV, Uzbekistan, Project HOPE.

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List of Abbreviations

ACSM	Advocacy, Communication and Social Mobilization
AIDS	Acquired immunodeficiency syndrome
CAR	Central Asian Republics
DOTS	Directly Observed Treatment, Short-course
DST	Drug susceptibility testing
EQA	External Quality Assurance
HIV	Human immunodeficiency virus
HOPE	Health Opportunities for People Everywhere
IEC	Information, Education and Communication
LMIS	Logistics Management and Information System
MARPs	Most-at-Risk Populations
MDR-TB	Multidrug-resistant tuberculosis
NGO	Non-governmental organization
NTP	National TB Program
PHC	Primary health care
PSI	Population Services International
QHCP	Quality Health Care Project
TB	Tuberculosis
USAID	United States Agency for International Development
WHO	World Health Organization
XDR-TB	Extensively drug-resistant tuberculosis

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Chapter 1 - Field Experience Scope of Work

Current field experience took place at the Branch Office of Project HOPE – People-to-People Health Foundation, Inc. (Project HOPE) in Uzbekistan from June 17 to August 23, 2013.

The primary focus of the field experience is to apply theories and concepts learned in the classroom within a public health agency setting and investigate tuberculosis trends in Uzbekistan.

I was assigned to work with the United States Agency for International Development (USAID) funded Quality Health Care Project being implemented by Project HOPE in Uzbekistan and supervised by Dr. Shalva Gamtsemlidze, TB Director for the Quality Health Care Project in Uzbekistan as well as Regional TB Infection Control specialist for the Central Asian countries. Dr. Gamtsemlidze has over 17 years of experience in managing TB programs in Caucasian and Central Asian countries. In his current position with Project HOPE, Dr. Gamtsemlidze is responsible for technical leadership and guidance to staff of Quality Health Care Project in Uzbekistan and coordination of implementation of TB Infection Control component of the same project on a regional scale. Dr. Gamtsemlidze has M.Sc. from Tbilisi State University, Georgia and Ph.D. from the Institute of Physics, Georgian Academy of Sciences.

While being an employee of the Project HOPE in Uzbekistan, I had full access to the organization's internal computer network and participated in regular staff meetings, various project events, and meetings with local partners and donors.

As a part of my field experience with Project HOPE, I completed a capstone project aimed at investigating tuberculosis trends in Uzbekistan for the period of 2000-2012. The capstone project was carried out under the supervision of my agency mentor, Dr. Shalva Gamtsemlidze and Dr. Bakhtiyar Babamuradov, Regional TB Technical Director for the Quality Health Care Project. At the end of my field experience, I presented results of the capstone project at the general meeting of Branch Office of Project HOPE in Uzbekistan. A detailed description and results of the capstone project are stipulated in Chapter 3 of this report.

1.1. Project HOPE Overview

Project HOPE (an acronym for Health Opportunities for People Everywhere) is an international not-for-profit health organization dedicated to providing long-lasting solutions to health problems and improving the quality of life of the world's most vulnerable people, especially women and children [1].

1.2. History

Dr. William B. Walsh, M.D., being a medical officer during World War II, was touched by the poor health conditions and death of young children that could have been easily prevented. Having witnessed all these, he dreamed about a floating medical center with the mission of spreading health education and improved care to communities around the world [2].

Dr. Walsh's desire of creating a floating medical center was so strong that he persuaded U.S. President Dwight D. Eisenhower to donate a U.S. Navy hospital ship, the USS Consolation, towards realization of his plan. Thus, with \$150, a dream and the support of corporations and individuals, the ship was transformed into the SS HOPE, and in 1958 the organization presently known as Project HOPE was established in the United States [2].

During the next two years, in order to fit its new role as a peace-time hospital ship, SS HOPE was renovated and equipped. Moreover, an announcement was placed among American doctors, nurses and technologists inviting them to share their knowledge and skills with the people in need in developing countries [2].

The SS HOPE made its maiden voyage on September 22, 1960 to Indonesia. Over its lifetime, the SS HOPE made 11 journeys visiting to Indonesia, Vietnam, Peru, Ecuador, Guinea, Nicaragua, Colombia, Ceylon (Sri Lanka), Tunisia, Jamaica and Brazil. On these voyages, doctors and nurses provided most needed medical care and training to people in each country visited. In 1974, the SS HOPE was retired and since that time Project HOPE's mission changed entirely to land-based operations [2]

1.3. Mission

The mission of Project HOPE is “to achieve sustainable advances in health care around the world by implementing health education programs and providing humanitarian assistance in areas of need” [1].

1.4. Organizational structure

There are two levels of control structure at Project HOPE, which are the Board of Directors and the Executive Team. Organizational structure of Project HOPE combines two national organizations (Germany and United Kingdom), eight administrative areas and five technical areas (**Figure 1.1**). Geographically Project HOPE’s global health programs that provide health education and humanitarian assistance to vulnerable population are spread out to 31 countries in Asia, Africa, Latin America, Europe and the United States (**Figure 1.2**). Project HOPE's Leadership Team is located at the headquarters in Millwood, Virginia [24].

1.5. Operations in Uzbekistan

In Uzbekistan, since 1999 in collaboration with the Ministry of Health, Project HOPE has been implementing various Health Education and Humanitarian Assistance programs aimed at improving quality of maternal, neonatal, child and reproductive health and family planning services as well as fighting diseases such as TB and HIV/AIDS. Branch office of Project HOPE is legally registered at the Ministry of Justice of the Republic of Uzbekistan and carries out its operations based on the following two agreements with the local government:

- Inter-governmental agreement between the United States of America and the Republic of Uzbekistan concerning mutual cooperation to facilitate the provision of assistance dated March 1, 1994.
- Agreement between Project HOPE and the Ministry of Health of the Republic of Uzbekistan concerning development and implementation of joint programs in the field of healthcare dated February 9, 2010.

Currently, Project HOPE is implementing two USAID funded projects in Uzbekistan: Dialogue on HIV and Tuberculosis Project and the Quality Health Care Project.

A five year USAID funded Dialogue on HIV and TB Project began in October 2009. This project is a partnership between Project HOPE and Population Services International (PSI) with an objective to reduce the spread of the HIV and TB epidemics among Most at Risk Populations (MARPs) in four Central Asian Republics (Uzbekistan, Tajikistan, Kazakhstan, & Kyrgyzstan) [3]. Project HOPE's specific role in this project is to increase access to TB prevention and treatment among these most at-risk populations and to improve adherence to and decrease default from TB treatment among MARPs. To do so, the project provides direct outreach services and training to MARPs including injection drug users, sex workers, and people living with HIV/AIDS. The program also works with health providers, journalists, non-governmental organization (NGO) representatives and community members to reduce stigma, enhance communications with MARPs and increase utilization of the referral system for MARPs.

A five year USAID funded Quality Health Care Project began in October 2010. Under the Quality Health Care Project (QHCP) Project HOPE, in partnership with Abt Associates, is assisting national governments in improving the health status of people in five CAR countries (Uzbekistan, Tajikistan, Kazakhstan, Kyrgyzstan and Turkmenistan) [4]. Project HOPE's role is to strengthen integration of Directly Observed Treatment, Short-course (DOTS) strategy into primary health care (PHC), helping to remove barriers and to improve policy dialogues needed due to the vertical nature of TB control.

In addition to the above mentioned programs, Project HOPE has coordinated the delivery of more than \$98 million in donated medicines and medical supplies to Uzbekistan since its independence in 1991.

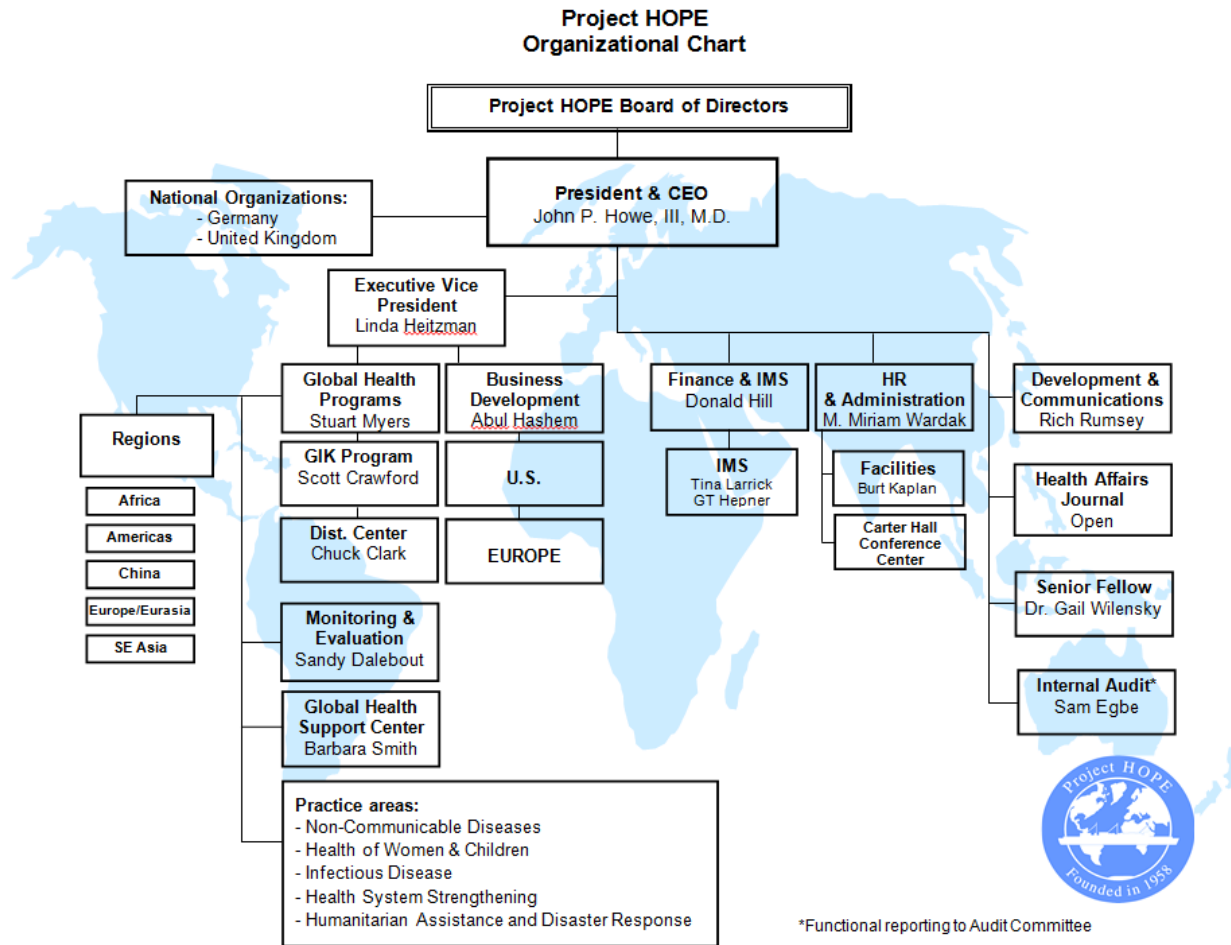


Figure 1.1: Project HOPE Organizational Chart

Source: Project HOPE

CEO - Chief Executive Officer

GIK - Gifts-In-Kind

HR - Human Resources

IMS - Information Management Systems

SE - Southeast Asia

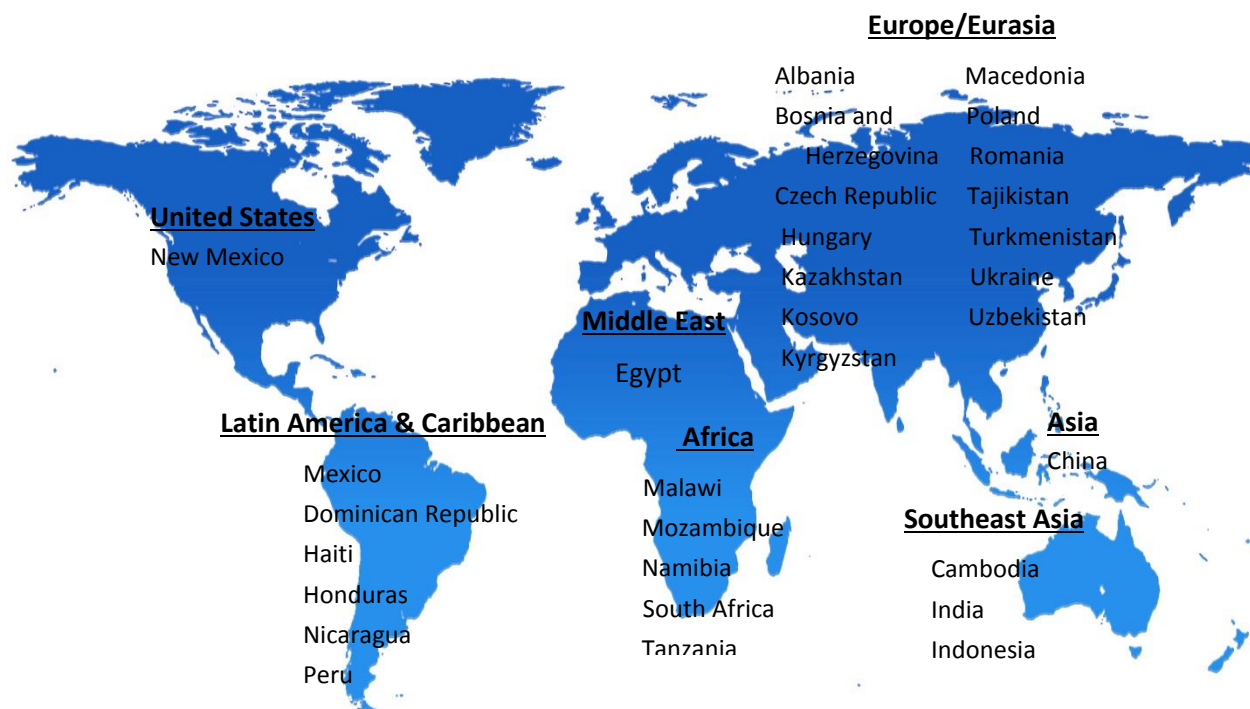


Figure 1.2: Regions and countries where Project HOPE operates

Map source: <http://www.pomlearning.org/Conferences/ConfWorldMap.aspx>

Chapter 2 - Learning Objectives

My major learning objectives from the present field experience with Project HOPE were the following:

- i. Learn more about challenges in data analysis and results interpretation;
- ii. Gain an experience and skills in dealing with possible challenges in data analyses and results interpretation;
- iii. Improve data comparison skills;
- iv. Reinforce the knowledge and skills gained during my studies in Kansas State University.

2.1. Activities Performed

While on my field experience, along with the capstone project I was also involved in various project activities and events.

One of the important activities that I took an active part was the process of quarterly work plan development for the Quality Health Care Project. This also involved discussions of the work plan with the prime implementer (Abt. Associates) and USAID, donor agency. Throughout the whole period of the field experience, I closely engaged in the organization of program events that included in particular obtaining Ministry of Health's approval, notifying the Ministry of Justice concerning ongoing activities, preparing pre-event documents and activity/event reports, and communicating them with local partners and donor agency.

Being a part of Project HOPE Uzbekistan team, I also participated in development of quarterly reports for the Quality Health Care Project which involved communication of aforementioned reports with the local partners, prime implementers, donor agency as well as Project HOPE's Headquarters.

Another great experience was participation in the process of preparing of cost extension documents for the Dialogue on HIV and TB Project filed by Project HOPE. It included preparation of program work plan and budget for the period of cost extension from October 1, 2013 to September 30, 2014. Consecutively, submitted cost extension proposal was approved by USAID and the Dialogue on HIV and TB Project was extended for another year.

Indispensable lesson was learned from unsuccessful funding submission by Project HOPE to the Republican DOTS Center, a Principal Recipient of the program called “Consolidating and Expanding DOTS Framework in Uzbekistan by Scaling up the Management of Drug-Resistant Tuberculosis” funded by the Global Fund to Fight AIDS, Tuberculosis and Malaria. I had an opportunity to be engaged in preparation of sub-contract requesting funds for development of TB Information, Education and Communication (IEC) materials and procurement of incentives (food packages) for patients in TB treatment. Unfortunately, due to long and time-consuming pre-implementation procedures required by local regulations, Project HOPE could not receive project funding.

An integral part of Project HOPE’s work in Uzbekistan is supplying much needed medical equipment and pharmaceuticals. During the field experience, I was involved in monitoring of the humanitarian aid donated by Project HOPE. Donated pharmaceuticals and medical supplies were mainly distributed among medical facilities of Tashkent city. In order to ensure that donated medicines reach the receiving hospitals and used for the designated purposes, three monitoring visits to randomly selected health facilities were held.

In addition to above mentioned experiences, I participated in ongoing project activities and various meetings with project beneficiaries, local and international partners and donor organization representatives. Below is the brief information on some of the important meetings that I took a part.

Tashkent, June 27, 2013 - TB partners meeting. The meeting was organized by the WHO Uzbekistan country office on June 27, 2013. The objective of the meeting was to discuss efficiency of the GeneXpert MTB/RIF, a rapid molecular test that can diagnose TB and rifampicin resistance within two hours. This event also was an opportunity for national and international stakeholders to share progress of ongoing activities in TB control in the Republic of Uzbekistan, achievements, obstacles and future plans.

Parkent district, July 17, 2013 – Patients’ support group meeting. A total of 8 TB patients participated at the meeting organized by Parkent district TB Dispensary together with the Quality Health Care Project. During the meeting TB patients had a

chance to discuss problems they are facing in the course of TB treatment and their experiences in handling such problems. Moreover, a representative of the district health department provided to participants with comprehensive information regarding side effects of TB drugs, possible problems during the treatment and where to seek support in such cases.

Tashkent, July 30, 2013 – USAID Implementing Partners meeting. The present meeting was held at USAID Uzbekistan country office on July 30, 2013. Primary purpose from conducting this meeting was to discuss compliance issues with USAID Ethics Issues as well as U.S. Government Environmental Regulations by the USAID funded Projects in Uzbekistan. During the meeting, participants raised concerns regarding current condition of such compliance and challenges surrounding compliance with those requirements.

Tashkent, August 6, 2013 - HIV/AIDS Partners Forum. This forum was organized by the Women Committee of Republic of Uzbekistan which is a sub-recipient of the Project “Continuing scale up of the response to HIV with particular focus on Most At Risk Populations and strengthening systems and capacity for universal access to HIV prevention, diagnosis, treatment and care in Uzbekistan”, funded by the Global Fund to Fight AIDS, Tuberculosis and Malaria. The forum aimed at strengthening partnership among state, public and international organizations in implementation of HIV/AIDS programs and stigma reduction towards people living with HIV.

Moreover, at the Project HOPE, I carried out an extensive research of existing scholarly articles and reports in the field of TB. Going even further, I reviewed most of the publicly available best TB control practices such as Advocacy, communication and social mobilization (ACSM), GeneXpert technology, External Quality Assurance (EQA), Laboratory Quality Management System, Logistic Management Information System (LMIS), patient support group, e-TB manager and others.

However, due to the fact that WHO's global TB database does not provide numbers on MDR-TB cases breakdown by treatment outcomes such as treatment success rate, failure and default, I was not able to conduct investigation of association between the treatment outcomes and increasing MDR-TB cases in Uzbekistan. Nonetheless, it did

not negatively impact on the outcomes of my field experience and deviate trend analysis used in the present report.

2.2. Products Developed

As the result of field experience and capstone project held with Project HOPE Uzbekistan country office, the following products were developed:

1. Written Field Experience and Capstone Project Report
2. Final oral presentation of Field Experience and Capstone Project Outcomes

Above reports combine in themselves my experience with Project HOPE as large international public health organization, special assignments handled and working environment.

Chapter 3 - Capstone Project / Culminating Experience: Trends of tuberculosis in Uzbekistan

3.1. Introduction

Tuberculosis (TB) remains an important public health problem worldwide [5]. Despite the availability of effective anti-tuberculosis treatment and public health interventions, it causes illness among millions of people each year. According to WHO, TB ranks as the second leading cause of death due to a single infectious agent, after the human immunodeficiency virus (HIV). In 2012, there were an estimated 8.6 million incident cases of TB and 1.3 million people died from this disease globally. Out of those 1.3 million deaths caused by TB, an estimated 170,000 people died from MDR-TB, which is relatively high compared with 450,000 incident cases of MDR-TB [6].

3.1.1. Uzbekistan

Uzbekistan is a landlocked country located in central Asia (**Figure 3.1**). It is bordered to the north and north-east by Kazakhstan, to the west and south-west by Turkmenistan, to the south by Afghanistan and to the east by Tajikistan and Kyrgyzstan. Uzbekistan's territory is 447,400 sq. km. with a population of over 28.6 (July 2013 est.) million. It is the most populous and densely populated country among all other Central Asian countries. Almost 2/3 of the population lives in rural areas, and over 25% of its population is younger than 15 years [7].

Uzbekistan is a multiethnic country. According to statistics from the year 1996, 80% of the population were ethnic Uzbeks, 5.5% Russians, 5% Tajiks, 3% Kazakhs, 2.5% Karakalpaks and 1.5% Tatars, with the remaining 2.5% belonging to smaller ethnic groups (1996 est.). In terms of religious belief, 88% of the population are considered Muslim, 9% Eastern Orthodox and 3% other religions [7].

Geographically, Uzbekistan consists of 14 administrative territories: 12 oblasts (regions), one autonomous republic (Karakalpakstan) and one administrative city, which is the capital city Tashkent [7].

Uzbekistan's economy is mostly oriented towards services and agriculture. 11% of Uzbekistan consists of intensely irrigated river valleys. The country is the world's fifth

largest cotton exporter. It is one of the large producers of gold and oil and a major producer of chemicals and machinery in the region [7].

According to the WHO Regional Office for Europe, Uzbekistan recorded a life expectancy at birth of 68.3 (male 68.8, female 70.8) years in 2011 which gives Uzbekistan a World Life Expectancy ranking of 121 [8].

Cardiovascular diseases are the most common cause of death in Uzbekistan, accounting for 62% of total mortality in 2012. Malignant neoplasms are the second most prevalent cause of death in Uzbekistan (8%), closely followed by accidents (7%) and respiratory diseases (6%). 1% of the mortality in 2012 was attributed to tuberculosis [9]. Uzbekistan is among the 18 high TB priority countries in the WHO European Region and 27 high multidrug-resistant tuberculosis (MDR-TB) burden countries in the world [20, 21].

3.1.2. Tuberculosis

Tuberculosis (TB) is an infectious disease caused by the bacillus *Mycobacterium tuberculosis*. TB usually affects the lungs (pulmonary TB) but it can also affect other organs, such as the bones, kidneys, or spine (extrapulmonary TB) [10, 11]. When people with pulmonary TB cough, sneeze or spit, they expel the TB bacilli into the air and spread the disease to others. According to WHO, about 1/3 of the world's population has latent TB. In other words, these people are infected by TB bacteria, however are not yet ill with TB and cannot spread the disease to public. People infected with TB bacteria have 10% risk of developing active TB during their lifetime. However persons with weak immune systems, such as people living with HIV, diabetes, and people who use tobacco have a much greater risk of developing active disease [12]. For instance, people living with HIV and infected with TB are 30 times more likely to develop active TB than people without HIV. HIV and TB together constitute a fatal combination, mutually speeding up each other's progress. As per smoking, according to WHO, more than 20% of TB cases worldwide are attributable to smoking [12].

Tuberculosis is spread more among men than women. It affects mostly people in the economically productive age groups. However, this does not mean that other age groups are not at risk [13].

Persistent cough for two weeks or more, chest pains, weakness, weight loss, fever and night sweats are the most common symptoms of active lung TB disease [14].

The most common method for diagnosing TB worldwide is sputum smear microscopy [15]. In countries with more advanced laboratory capacity, cases of TB are also diagnosed using bacteriologic (culture) method. In recent years, a new rapid molecular test proven to be increasingly effective in diagnosing TB and the presence of rifampicin resistance [15, 17].

It is not a myth that TB is a curable disease. Active, drug-sensitive TB is treated with a standard six-month course of combination of four first-line drugs such as isoniazid, rifampicin, ethambutol and pyrazinamide. If TB patients are properly and timely treated, most of them will not be infectious in two weeks [16].

Multidrug-resistant tuberculosis (MDR-TB) is a form of TB caused by bacteria that do not respond to, at least, isoniazid and rifampicin, the two most powerful, available first-line drugs [5, 12]. Main causes of MDR-TB are incorrect use of first line drugs and/or poor quality medicines [18]. Nevertheless, even MDR-TB is curable using second-line drugs. Unlike the treatment of drug-sensitive TB, the MDR-TB treatment regimens are longer (about 20 months) and more costly. In addition, such long term treatment with the use of second line drugs can produce severe side effects. In some rare cases more severe forms of drug resistance can develop. An example of such cases is extensively drug-resistant tuberculosis (XDR-TB). This form of multi-drug resistant tuberculosis can respond to even fewer available medicines, including the most effective second-line drugs [12, 22].

3.2. Methods

Surveillance of various TB related indicators have started in Uzbekistan in different points of time. Therefore some indicators were not available at earlier years. For instance, WHO's global TB database consists of WHO-generated estimates of TB mortality, prevalence, incidence for 1990-2012, TB case notification data for 1980-2012 and treatment outcomes for 1994-2011. Complete data for the most of the indicators was available starting 2000 to 2012.

We performed a descriptive analysis of surveillance data to investigate tuberculosis trend in Uzbekistan between the period from 2000 until 2012. Data, used for these analysis, was extracted from the WHO's global TB database (from www.who.int) reported by its member countries and territories, including Uzbekistan in annual rounds of global TB data collection.

All indicators were calculated and compared using paired t-test as well as tables and charts were constructed using Microsoft Excel 2010.

3.3. Results

3.3.1. Trends in TB burden

The burden of disease caused by the *Mycobacterium tuberculosis* is measured and expressed in incidence, prevalence and mortality [6].

From 2000 to 2012, Uzbekistan has recorded a gradual decrease in TB incidence, the number of new and relapse cases of TB arising in a given time period. In 2012, a total of 22,000 new TB cases were reported in the country (**Table 3.1**). It demonstrates a decrease of 73% compared to incidence reported in 2000. The estimated annual incidence rate was 77.1 per 100,000. (**Figure 3.2**).

A similar trend was observed in the TB prevalence, the number of all cases of TB at a given point. There were 39,000 estimated prevalent cases of TB in 2012, equivalent to 136.6 per 100,000 population (**Table 3.1**). The decrease in TB prevalence constituted 78% for the reporting period (**Figure 3.3**).

TB mortality rate, the number of deaths caused by TB in a given time period, slightly increased between 2000 (17.3 per 100,000) and 2002 (17.8 per 100,000). However, over the following 10 years, the TB mortality rate consistently decreased to 2.1 per 100,000, which made up 600 TB deaths (**Table 3.1**). Overall decrease for the reporting period was 89%. Mean annual decline was 1.18 per 100,000 (**Figure 3.4**).

3.3.2. Trends in TB case notification rate

TB case notification rate refers to the total number of people diagnosed with TB and notified by National TB Program (NTP) to WHO during the reporting period, which are categorized by case type, age and sex. It is generally accepted that the case rate is expressed in terms of a population size of 100,000 persons [6].

In 2012, a total of 16,810 people with TB were reported by Uzbekistan NTP. Out of this number, 14,787 (88%) had a new episode of TB (new and relapse cases), 1978 (11.8%) were previously treated (retreatment case) and 45 (0.2%) were cases whose history of treatment was not recorded (**Table 3.2**).

Between 2000 and 2001, total number of notified TB cases per 100,000 has declined for 56% and as of 2001 it has sharply increased reaching its pick in 2005 (110.9 per 100,000). Over the next seven years, the total TB cases consistently decreased to 58.9 per 100,000 in 2012, which demonstrated an overall decrease of 46% from 2005 (**Table 3.2**).

During the study period the prevalence of new cases and relapses varied from 74.5% in 2005 to 100% in 2001 and 2002 in relation to all TB cases notification of corresponding years. The variance of the prevalence of new case and relapses is due to variation of previously treated notification's prevalence, which varies from 0 in 2001 and 2002 to 25.5% in 2005 (**Table 3.2**).

In 2003 and 2009 TB notification rate with unknown previous treatment history was unusually high in relation to other years (13.3% and 11.3% respectively). The possible explanation of this is there might be some errors in data entry or misclassification (**Table 3.2**).

Between 2006 and 2012, the number of new TB cases decreased by 23.9% in both men and women equally (**Table 3.3**). Our observation showed that new notified TB case is more likely to be a male than female: the prevalence of males is 58.3% versus 41.7% for females. The male to female ratio almost did not change during the reporting period with the average ratio of 1.4. Since male/female ratio among total population of Uzbekistan is 1.0, we can conclude that men have 1.4 times higher risk of TB than women.

One of the objectives of my field experience was to analyze changes in trend of prevalence of TB by site of impairment disease. The data required for the analysis was available for 2008-2012 only (**Figure 3.5**). The analysis showed that in spite of the decrease in total number and incidence over the years, no changes were observed in prevalence of TB disease by its site. Average prevalence of pulmonary TB was 72.5% and average prevalence of extrapulmonary TB was 27.5% for the reported period.

Case notification data by age groups was available for the period of 2006-2012 only. The **table 3.3** shows distribution of the prevalence of new cases by age groups for the reporting period of 2006-2012. Age grouping for TB notification used by WHO was different from the one used in the national statistics. Moreover, WHO's database did not provide any information on age specific size of the population. Therefore, we were not able to calculate age specific case notification rates. Out of total reported new TB cases, age group of 25-34 constituted 20.3%, which is the highest among other age groups and remains constant for the study period. In 2012, the second, third and fourth highest prevalence were reported for the age groups of 15-24 (16.2%), 35-44 (15%) and 45-54 (14.4%) respectively. The prevalence of 0-14 and 15-24 age groups among notified new TB cases decreased over the seven years. This decrease was distinctly obvious for the age group of 0-14. In its turn, the prevalence of 45-54 year olds slightly increased among all new TB notifications. Despite the lowest prevalence of 55-64 and 65+ year old age groups among all new TB cases in 2006 (7.5% and 10.5% respectively), their prevalence steadily increased till 2012 (11.6% and 11.5% respectively). These changes in prevalence of age groups have to be interpreted very carefully. It does not represent the actual risk of TB among representative of different age groups, but only age distribution of notified new TB cases, since we don't have actual population size by age groups used by WHO.

Because of low migration rate to Uzbekistan prevalence of new TB cases among foreign-borns is very low and remains unchanged for the study period. (**Table 3.3**)

From 2004 to 2012, a gradual increase in proportion of HIV positive TB cases has been recorded in Uzbekistan. In 2012, all 16,810 notified TB case were tested for

HIV. Of 16,810 tested, 820 (4.9%) had positive results. This represents 10 times increase from the number of HIV positive TB cases reported in 2004 (**Figure 3.6**). This increase can be explained in different ways. One of them is that proportion of HIV positive TB patients has actually increased in real numbers. Another explanation is that the screening for HIV has technically improved and became widely accessible and affordable in developing countries, including in Uzbekistan.

In Uzbekistan, a total of 1,728 MDR-TB cases were reported among 4217 notified TB cases tested for first-line DST in 2012 (**Table 3.4**). The proportion of MDR-TB among new laboratory-confirmed TB cases tested for first-line DST was 27%; among previously treated TB cases - 46.7%; and among TB cases whose treatment history unknown - 81.7%.

During the last several years, much work has been done to improve the coverage with DST in Uzbekistan. As a result, DST became more accessible and affordable. Evidence of this can be seen in numbers of DST tested TB cases which increased from 295 in 2006 to 4217 out of 16,810 total notified TB cases in 2012.

The proportion of MDR-TB among new TB cases tested for DST has doubled from 2006 to 2012 (14.1% and 27.9% respectively). Whereas, MDR-TB among DST tested previously treated TB cases had decreased from 60.7% in 2006 to 46.7% in 2012 which constitutes 23% of reduction. We were not able to analyze the trend among TB cases with unknown treatment history, since there were no data available for the period of 2006-2010. In 2011 and 2012 the prevalence of MDR-TB among TB cases with unknown treatment history was 69.9% and 81.7% respectively, which are very high.

3.3.3. Trends in TB treatment outcomes

In 2011, the treatment success rate among 4,198 new laboratory confirmed pulmonary TB cases was 78.4%. For the study period of 2000-2011 the peak of treatment success rate was observed in 2003 (85%). Mean success rate for the study period was 81%. Among new laboratory-confirmed pulmonary TB cases the lethal outcome ranged from 2.7% in 2000 to 7% in 2003 and 2007. The prevalence of pulmonary TB cases who failed a treatment ranged from 3.7% in 2003, when the highest prevalence of success was observed (85%), to 11.7% in 2001, when the

success of treatment was the lowest. The lowest percentage of new pulmonary TB cases who defaulted the treatment observed in 2008 (4.1%) and the highest was in 2002 (7.2%) (**Figure 3.7**).

Unlike the treatment success rate among newly detected TB cases, the treatment success rate among previously treated TB cases was significantly lower (71.7%, $p < 0.0001$). Despite different levels of success rate of treatment in different years, there was overall positive trend in treatment success rate among previously treated laboratory-confirmed pulmonary TB cases. The prevalence of cases that failed or defaulted the treatment taken together was highest in 2002 (29%). The lowest sum prevalence observed in 2004 (8%). In 2011 it was 17.7%, which shows overall decrease for the study period (**Figure 3.8**).

In 2010, out of 628 MDR-TB cases notified, 366 (58.8%) had been treated successfully, 60 (9.6%) had died, 89 (14.2%) had experienced treatment failure, 95 (15.1%) had defaulted, and 18 (2.9%) had been transferred or had an unknown outcome. These represent 7% increase in treatment success, 42% in failures, and 8% in other treatment outcomes from the treatment outcomes in 2007. The prevalence of defaulters decreased from 23% in 2007 to 15.1% in 2010 (35%). The highest treatment success rate among MDR-TB cases was observed in 2008 (65.6%) (**Figure 3.9**).

3.4. Conclusion

The descriptive analysis of the WHO TB surveillance data shows number of positive changes in trends of TB in Uzbekistan. From 2000 to 2012, both TB incidence and prevalence had gradually decreased. Similar picture was observed in TB mortality rate. Despite some decrease in notification rate of new and relapse cases, notification rate of previously treated TB cases has noticeable increased during the reporting period. Pulmonary TB remains the main form of TB in Uzbekistan. The age group 25-34 constituted the highest prevalence between 2006 and 2012. The DST is becoming more accessible in the country and it shows increase in prevalence of MDR-TB. During the study period, there was no much progress in the treatment success rate, because of increasing prevalence of MDR-TB.

Unavailability of data for whole study period and absence of data for certain variables as population size by age groups are important threats for the quality of the analysis. In addition, the absence of information on sampling methodology, if there is any, for DST and HIV testing is not allowing us to make stronger conclusions about the prevalence and risk among TB patients.

Summarizing all aforementioned, also taking into consideration the limitations of the data, we conclude that the National TB Program is on the right track to reach and close to Millennium Development Goals for 2015.



Figure 2.1: Map of Uzbekistan

Source: United Nations Cartographic Section [23].

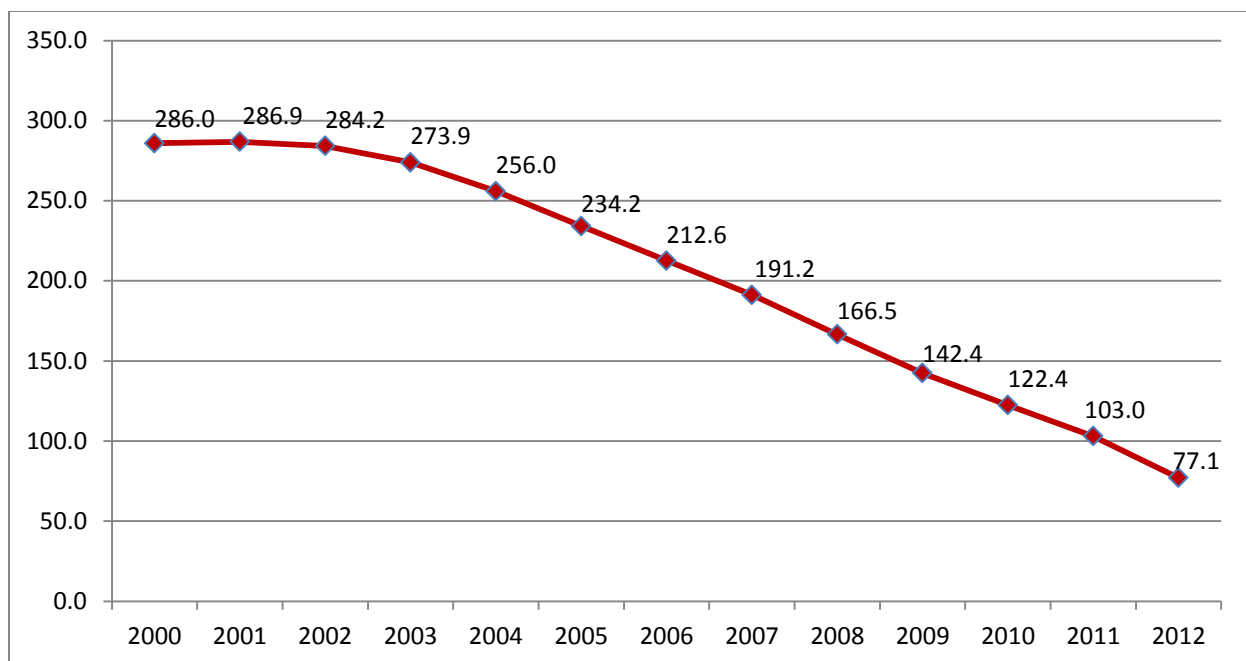


Figure 3.2: Estimated TB incidence per 100,000 population per year, Uzbekistan, 2000-2012

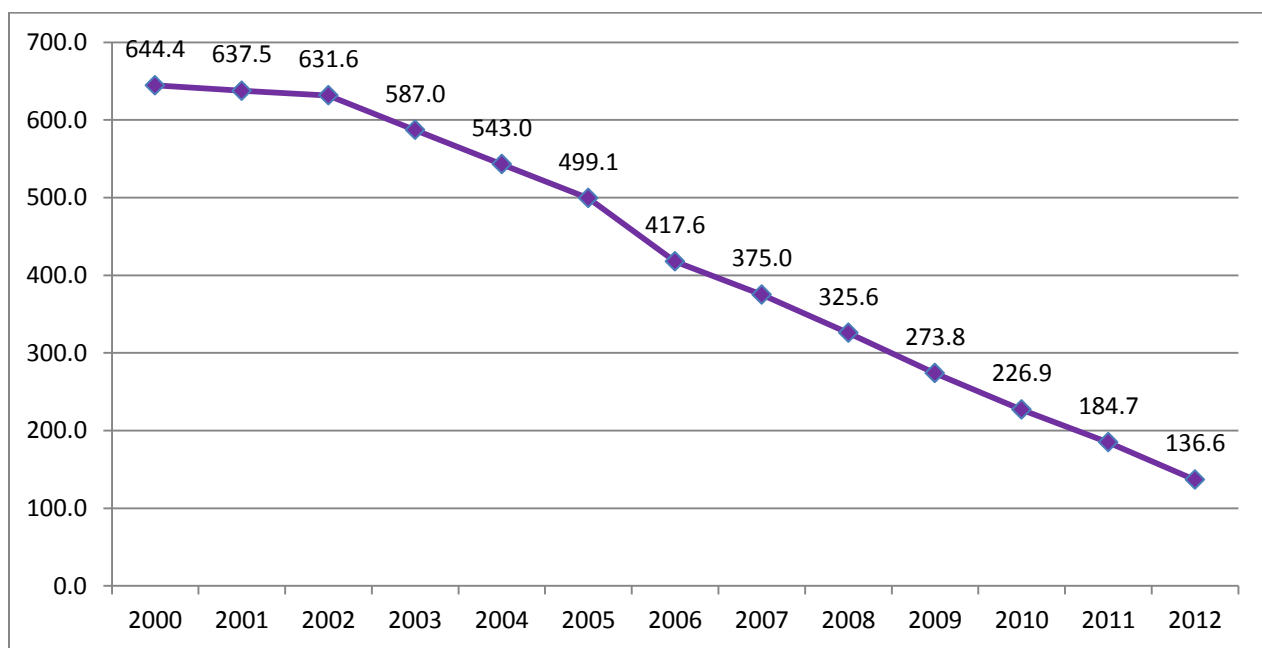


Figure 3.3: Estimated TB prevalence per 100,000 population, Uzbekistan, 2000-2012

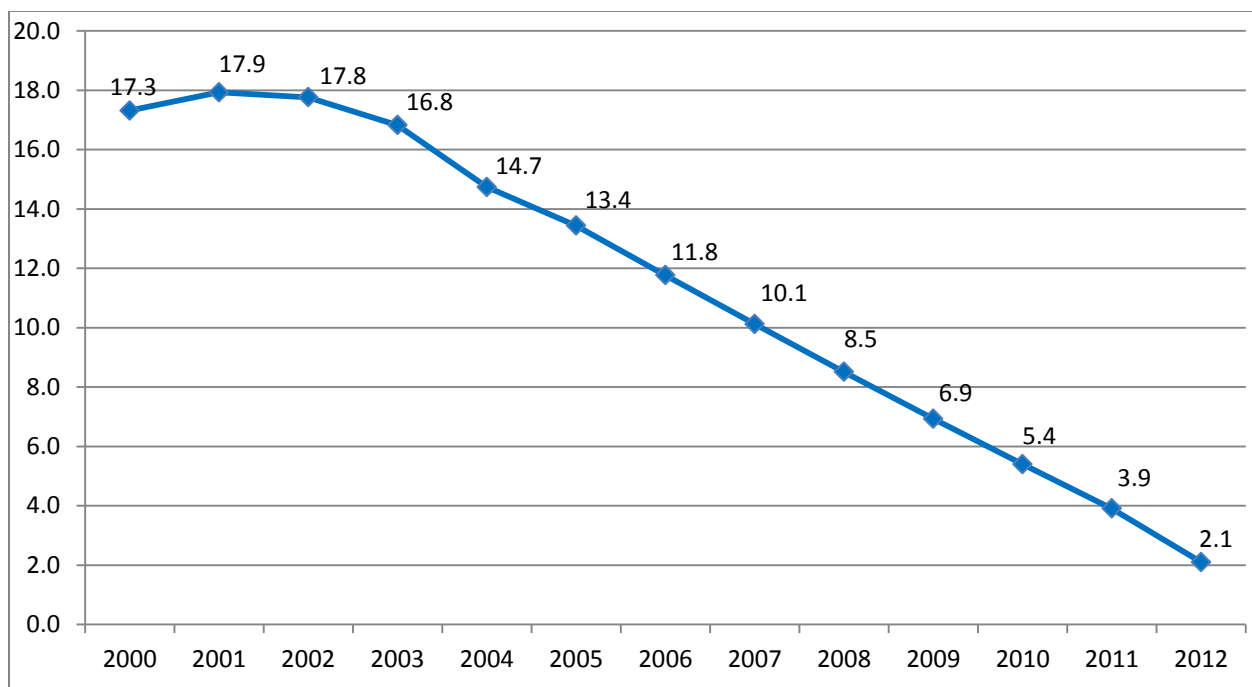


Figure 3.4: Estimated TB mortality per 100,000 population per year, Uzbekistan, 2000-2012

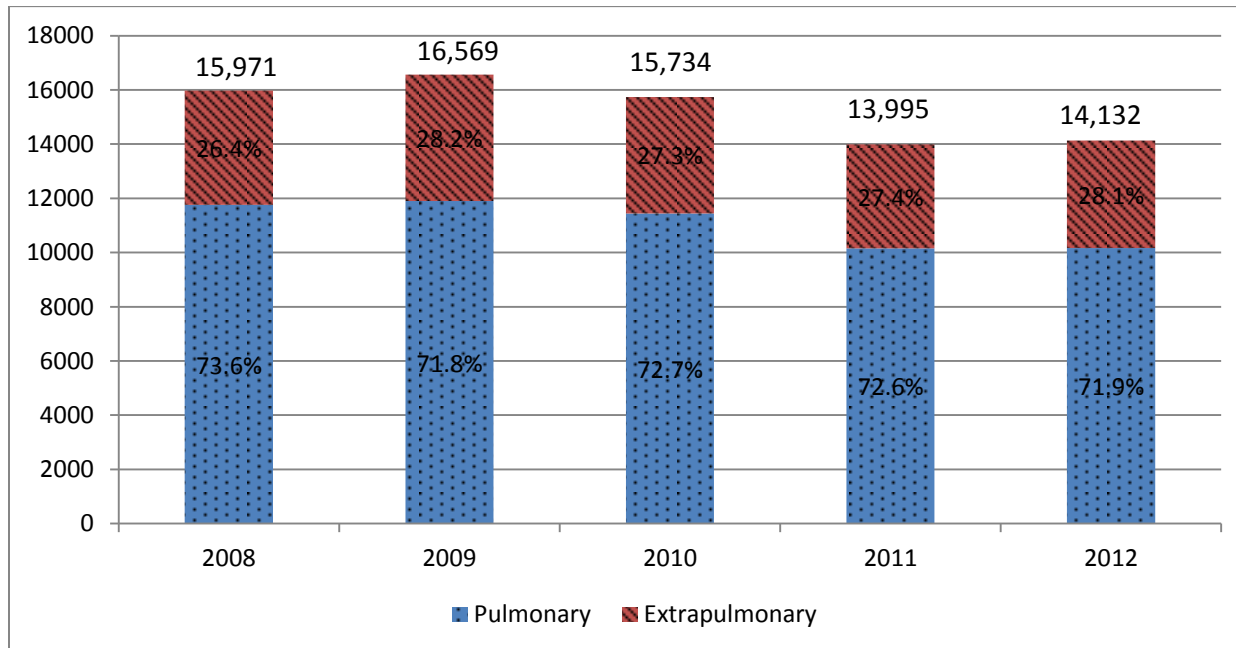


Figure 3.5: Percentages of new TB cases by site of disease, Uzbekistan, 2008-2012

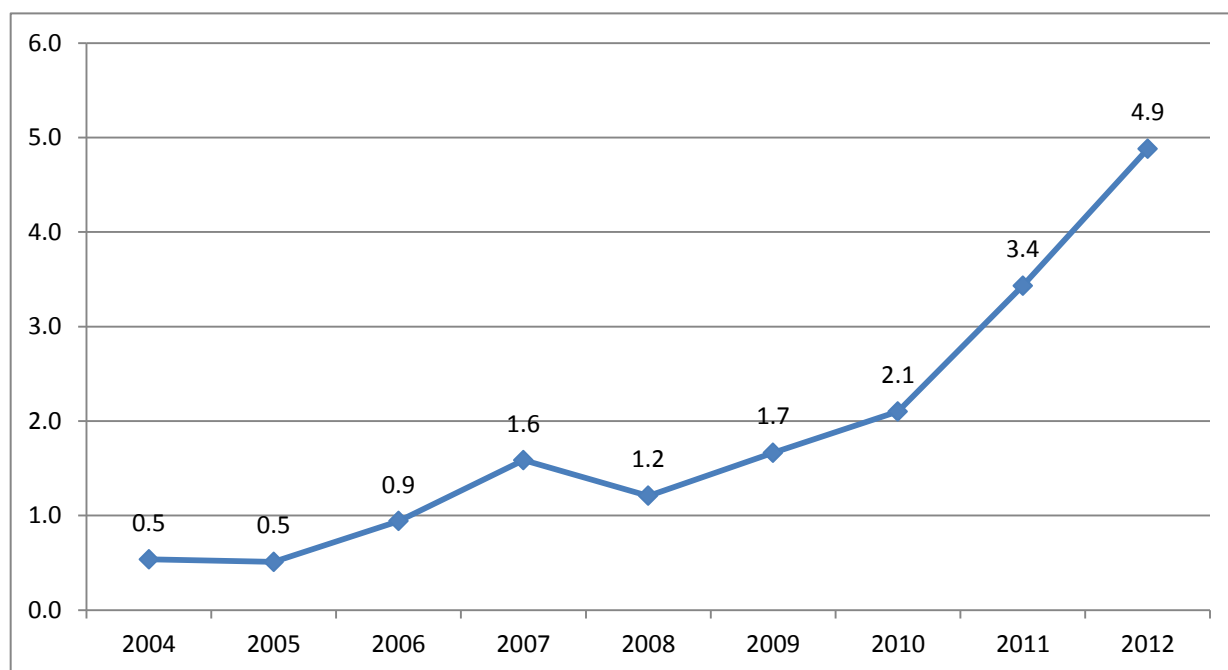


Figure 3.6: Proportion of HIV positive cases among TB cases, Uzbekistan, 2004-2012

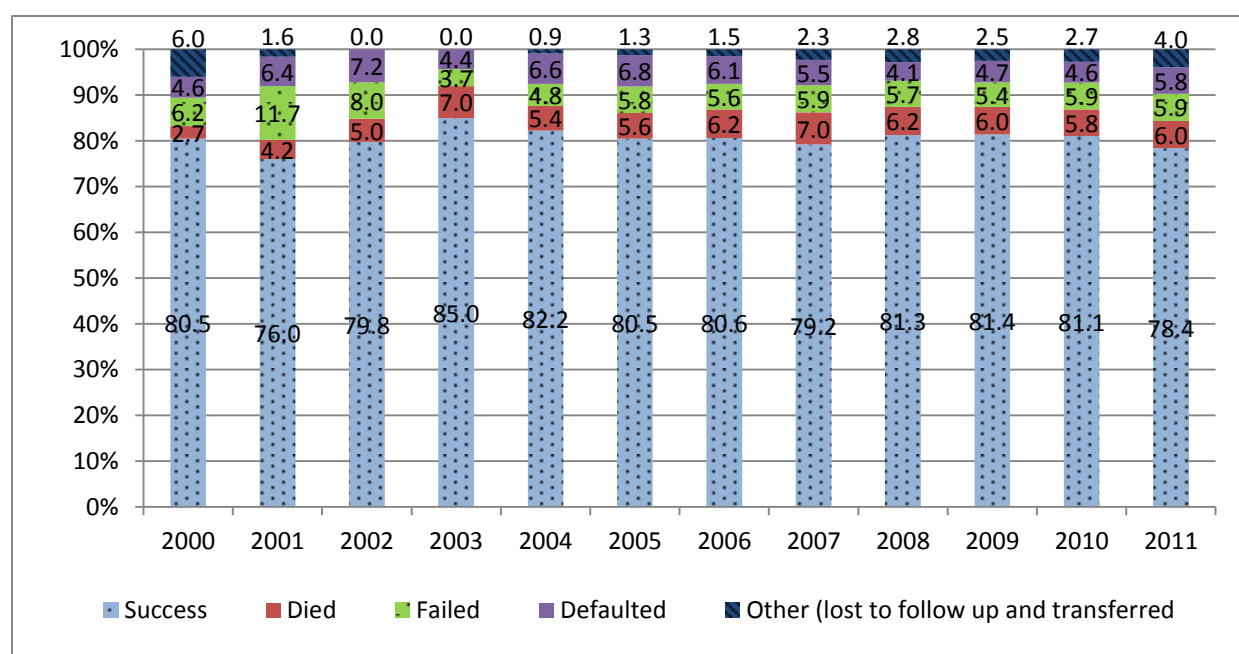


Figure 3.7: Treatment outcome, new laboratory-confirmed pulmonary TB cases, Uzbekistan, 2000-2011

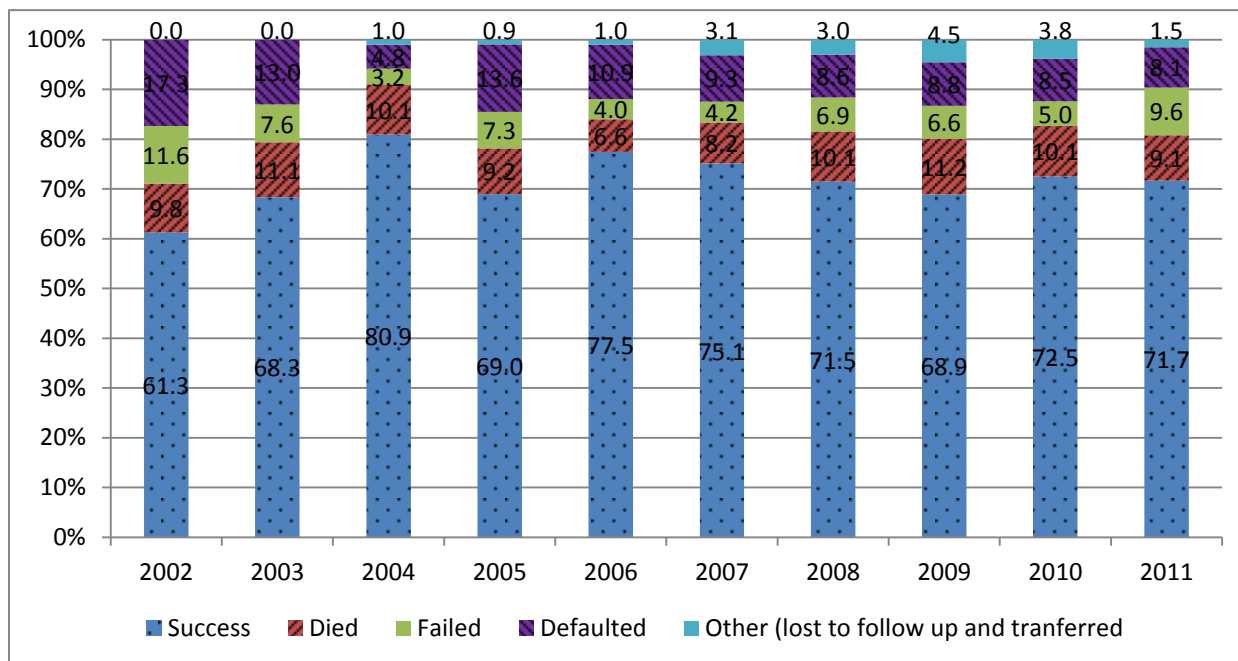


Figure 3.8: Treatment outcome, previously treated laboratory-confirmed pulmonary TB cases, Uzbekistan, 2002-2011

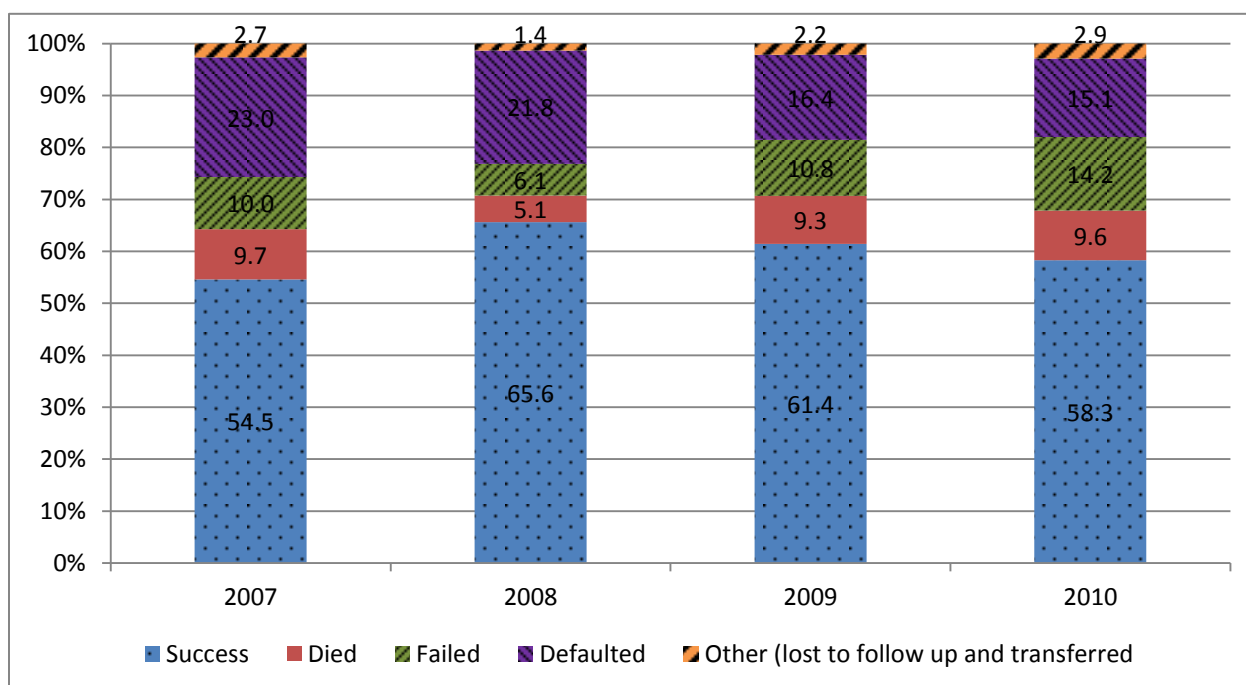


Figure 3.9: Treatment outcome after 24 months of MDR-TB cases, Uzbekistan, 2007-2010

Table 3.1: Estimates of Burden of TB, Uzbekistan, 2000-2012

Year	Population	Incidence (all forms, including HIV)		Prevalence (all forms, including HIV)		Deaths (all forms, excluding HIV)	
		Number	per 100,000	Number	per 100,000	Number	per 100,000
2000	24828562	71000	286.0	160000	644.4	4300	17.3
2001	25098636	72000	286.9	160000	637.5	4500	17.9
2002	25334021	72000	284.2	160000	631.6	4500	17.8
2003	25553928	70000	273.9	150000	587.0	4300	16.8
2004	25784397	66000	256.0	140000	543.0	3800	14.7
2005	26044401	61000	234.2	130000	499.1	3500	13.4
2006	26340696	56000	212.6	110000	417.6	3100	11.8
2007	26668950	51000	191.2	100000	375.0	2700	10.1
2008	27023200	45000	166.5	88000	325.6	2300	8.5
2009	27392784	39000	142.4	75000	273.8	1900	6.9
2010	27769270	34000	122.4	63000	226.9	1500	5.4
2011	28151746	29000	103.0	52000	184.7	1100	3.9
2012	28541423	22000	77.1	39000	136.6	600	2.1

Table 3.2: TB notification by previous treatment history, Uzbekistan, 2000-2012

Year	Population	New and relapse			Previously treated			Treatment history unknown			All TB cases	
		#	Rate	% from all TB cases	#	Rate	% from all TB cases	#	Rate	% from all TB cases	#	Rate
2000	24828562	15750	63.4	98.0	324	1.3	2.0	0	0.0	0.0	16074	64.7
2001	25098636	7095	28.3	100.0	0	0.0	0.0	0	0.0	0.0	7095	28.3
2002	25334021	20588	81.3	100.0	0	0.0	0.0	0	0.0	0.0	20588	81.3
2003	25553928	20700	81.0	79.1	1987	7.8	7.6	3485	13.6	13.3	26172	102.4
2004	25784397	20289	78.7	78.9	5425	21.0	21.1	0	0.0	0.0	25714	99.7
2005	26044401	21513	82.6	74.5	7378	28.3	25.5		0.0	0.0	28891	110.9
2006	26340696	23900	90.7	94.4	1410	5.4	5.6	0	0.0	0.0	25310	96.1
2007	26668950	19779	74.2	84.6	3611	13.5	15.4	0	0.0	0.0	23390	87.7
2008	27023200	17040	63.1	80.4	4018	14.9	19.0	136	0.5	0.6	21194	78.4
2009	27392784	17540	64.0	81.8	1480	5.4	6.9	2433	8.9	11.3	21453	78.3
2010	27769270	16883	60.8	83.0	3447	12.4	17.0	0	0.0	0.0	20330	73.2
2011	28151746	14501	51.5	91.1	568	2.0	3.6	844	3.0	5.3	15913	56.5
2012	28541423	14787	51.8	88.0	1978	6.9	11.8	45	0.2	0.2	16810	58.9

Table 3.3: TB notification (all new cases) by sex, age and country of origin, 2006-2012

Characteristic	2006		2007		2008		2009		2010		2011		2012	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Total new cases	18574		17911		15971		16569		15734		13995		14132	
Sex (all new cases):														
Male	10718	57.7	10577	59.1	9527	59.7	9673	58.4	9084	57.7	8069	57.7	8239	58.3
Female	7856	42.3	7334	40.9	6444	40.3	6896	41.6	6650	42.3	5926	42.3	5893	41.7
M/F ratio	1.4		1.4		1.5		1.4		1.4		1.4		1.4	
Age Group:														
0-14	2833	15.3	2583	14.4	2008	12.6	2263	13.7	1878	11.9	1592	11.4	1561	11.0
15-24	3329	17.9	3204	17.9	2853	17.9	3031	18.3	2852	18.1	2380	17.0	2294	16.2
25-34	3751	20.2	3669	20.5	3304	20.7	3431	20.7	3321	21.1	2805	20.0	2866	20.3
35-44	2908	15.7	2628	14.7	2485	15.6	2451	14.8	2381	15.1	2098	15.0	2113	15.0
45-54	2411	13.0	2324	13.0	2114	13.2	2111	12.7	2097	13.3	1958	14.0	2036	14.4
55-64	1393	7.5	1437	8.0	1355	8.5	1520	9.2	1514	9.6	1613	11.5	1633	11.6
65+	1949	10.5	2066	11.5	1852	11.6	1762	10.6	1691	10.7	1549	11.1	1629	11.5
Country of Origin:														
Native	-		-		15941	99.8	16531	99.8	15730	100.0	13971	99.8	14115	99.9
Foreign-born	-		-		30	0.2	38	0.2	4	0.0	24	0.2	17	0.1

Table 3.4: Multidrug-resistant TB among laboratory-confirmed TB cases by previous treatment history, Uzbekistan, 2006-2012

Year	New			Previously treated			Treatment history unknown			Total		
	Cases with DST results	MDR-TB		Cases with DST results	MDR-TB		Cases with DST results	MDR-TB		Cases with DST results	MDR-TB	
		#	%		#	%		#	%		#	%
2006	206	29	14.1	89	54	60.7	0	0	0	295	83	28.1
2007	385	119	30.9	463	365	78.8	0	0	0	848	484	57.1
2008	274	52	19.0	470	290	61.7	0	0	0	744	342	46.0
2009	571	115	20.1	732	539	73.6	0	0	0	1303	654	50.2
2010	2845	430	15.1	1180	593	50.3	0	0	0	4025	1023	25.4
2011	484	170	35.1	123	89	72.4	1610	1126	69.9	2217	1385	62.5
2012	2524	703	27.9	1025	479	46.7	668	546	81.7	4217	1728	41.0

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