National Tuberculosis Indicators Project (NTIP)

USER GUIDE 2015

Centers for Disease Control and Prevention
National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention

Dedication

To the state and local TB control partners who help bring NTIP vision to reality:

- Members of the Evaluation Workgroup (EWG)
- Members of the first NTIP Development Workgroup
- Members of the NTIP Workgroup for their tireless review of indicators
- Local partners and CDC field staff whose dedication and commitment to TB control and prevention continue to inspire us all

National Tuberculosis Indicators Project (NTIP) User Guide

2015

The purpose of this NTIP user guide is to provide technical guidance in the use and interpretation of NTIP reports.

None of the contents of this manual are intended to be specific guidance for tuberculosis medical practice, public health practice, program evaluation, or program management. However, NTIP is designed to be useful for workers in each of these areas. General knowledge in these areas is helpful for understanding NTIP and making optimal use of its reports, and this guide refers the user to national guidelines or policies that form the basis for the indicators and the interpretation of the reports in NTIP.

For future updates of this User Guide, please access
http://www.cdc.gov/tb/programs/evaluation/pdf/ntipuserguide.pdf

The National Tuberculosis Indicators Project (NTIP) Companion for Data Managers can be accessed at **http://www.cdc.gov/tb/programs/evaluation/pdf/companionfordatamanagers.pdf**

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Abbreviations

AFB: Acid-fast bacilli

ARPE: Aggregate Reports for Tuberculosis Program Evaluation (for contact investigations)

CDC: Centers for Disease Control and Prevention

COT: Completion of therapy

Chest X-ray: Chest radiograph

DOT: Directly observed therapy

DTBE: Division of Tuberculosis Elimination

DST: Drug susceptibility test

EDN: Electronic Disease Notification System

HIV: Human immunodeficiency virus

LTBI: Latent TB infection

M&E: Monitoring and evaluation

MTBC: *M. tuberculosis* complex

NAA: Nucleic acid amplification

NTCA: National Tuberculosis Controllers Association

NTIP: National Tuberculosis Indicators Project

NTSS: National Tuberculosis Surveillance System

RVCT: Report of Verified Case of Tuberculosis

TAT: Turnaround time

TB: Tuberculosis

TB GIMS: Tuberculosis Genotyping Information Management System

I. Introduction

Tuberculosis (TB) remains a public health threat and a major challenge in the United States. Operational research, monitoring, and evaluation are critical to help TB program managers find opportunities, understand barriers, and prioritize efforts for improving program effectiveness.

In collaboration with local and state TB partners, the Division of Tuberculosis Elimination (DTBE) selected national TB program objectives and developed the National Tuberculosis Indicators Project (NTIP) to enhance capacity for monitoring and evaluating through standardized indicators and reports. NTIP, implemented in 2009, facilitates the use of nationally collected data to help program officials monitor progress.

The goal of NTIP is to help TB program officials and staff members —

- Use data they have submitted for surveillance to report progress
- Monitor achievements toward national objectives
- Work with community partners and local program staff to inform decisions on program planning, evaluation, and resource allocation

National TB Indicators

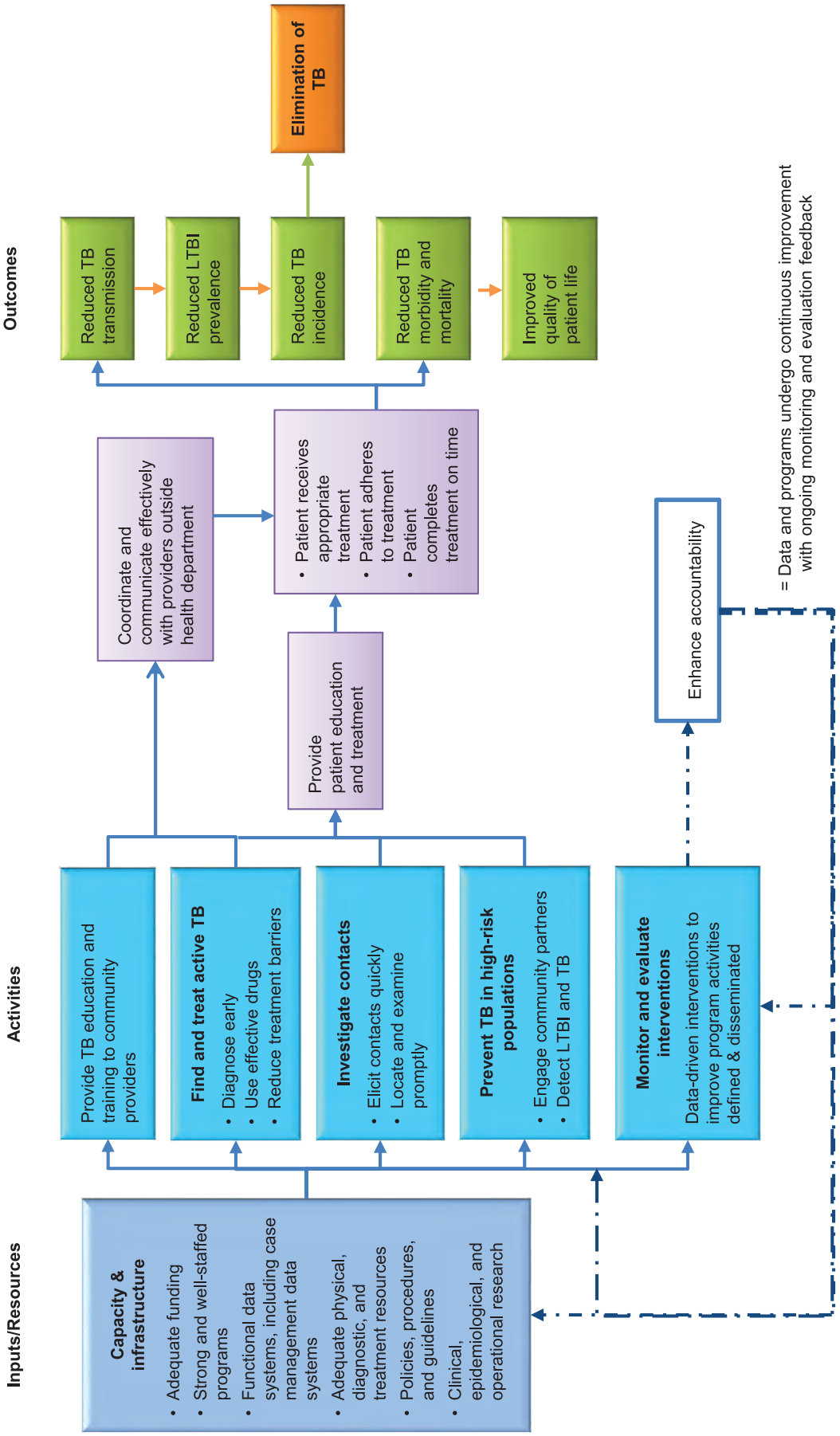
The national TB program objectives reflect priorities for TB control in the United States.

The five major programmatic activities (see **Figure 1.1, Activities**) are to —

- Provide education and training to community providers
- Find and treat active TB
- Investigate contacts
- Prevent TB in high risk populations
- Monitor and evaluate interventions

Figure 1.1, Logic model for TB Elimination in the United States, illustrates the core functions and key strategies undertaken by TB programs to eliminate TB in the United States.

Figure 1.1: Logic model for TB Elimination in the United States



The national objectives, which are key outputs from these activities, were recommended by the National TB Objectives Workgroup as essential measurements of activities related to effective TB control and prevention. A comprehensive list of the national objectives and performance targets is included in **Appendix A**.

For each national objective, a standardized indicator was developed to set program goals and measure progress. Using data that are routinely reported to the Centers for Disease Control and Prevention (CDC) through four different systems, NTIP monitors the indicators related to TB cases, contacts, and immigrants and refugees who arrived in the United States with TB Class B notification or are suspected of having TB disease. Objectives related to education, training, and program evaluation are not monitored in NTIP. **Table 1.1** lists the national TB indicators (For more specific information about TB indicators and performance targets for 2020, see **Appendix A.**)

Historically, managers in TB programs have calculated their own performance indicators and reported progress to CDC. Variations in the calculations have hindered the ability to observe and compare performance between programs and to track progress nationwide. NTIP provides a standardized method for calculating indicators, assessing TB control efforts, and tracking progress within and across TB programs.

NTIP reports are based on de-identified surveillance data submitted to CDC; thus, they contain no personally identifiable information. The data sources include

- National Tuberculosis Surveillance System (NTSS)
- TB Genotyping Information Management System (TB GIMS)
- Aggregate Reports for Tuberculosis Program Evaluation (ARPE)
- Electronic Disease Notification (EDN) System

Table 1. List of national TB indicators included in NTIP

TB Incidence

- TB Incidence Rate (Overall)
- U.S.-Born Persons
- Foreign-Born Persons
- U.S.-Born Non-Hispanic Blacks or African Americans
- Children Younger than 5 Years of Age

Case Management and Treatment

- Known HIV Status
- Treatment Initiation
- Recommended Initial Therapy
- Sputum Culture Result Reported
- Sputum Culture Conversion
- Completion of Therapy

Laboratory Reporting

- Laboratory Turnaround Time – Culture
- Laboratory Turnaround Time – NAA
- Drug-Susceptibility Results
- Universal Genotyping

Contact Investigations

- Contact Elicitation
- Examination
- Treatment Initiation
- Treatment Completion

Examination of Immigrants and Refugees

- Examination Initiation
- Examination Completion
- Treatment Initiation
- Treatment Completion

Who can use NTIP?

NTIP reports are provided to public health officials in TB programs. The reports are available for states and selected counties with high TB incidence. They are also available for specially defined geographic regions (e.g., publc health districts, health centers) at the requests of TB program officials. The personnel in TB programs do not have to do any additional work or collect any additional data to generate NTIP reports. Program personnel can only access reports for their own jurisdiction. Access to NTIP is authorized by state TB system administrators or local TB program officials.

Program managers can use NTIP reports to —

- Monitor local progress toward achieving the national TB program objectives
- Help conduct cohort reviews
- Report progress under the terms of cooperative agreements
- Set priorities for improvements and resource allocation
- Validate data
- Provide technical assistance to community partners and local programs
- Provide outreach and training

CDC staff members use NTIP reports as a source of information when working with cooperative agreement recipients. This helps to select TB programs that might need additional technical assistance. Additionally, NTIP data are used to assess national progress toward achieving objectives and established performance targets.

The national performance targets are provided as guidance. Achieving the national performance targets will not be feasible in all settings. Managers in TB programs should work with their DTBE program consultants to set performance targets based on what is feasible for their setting.

Interpreting and Using NTIP Reports

Correct interpretation of NTIP reports is critical, and it requires understanding the context under which a specific TB program is operating. TB program managers and partners can use NTIP reports to facilitate discussions and generate questions, to solicit inputs, and to encourage problem-solving among staff members. While NTIP provides quantitative progress reports on the recommended objectives, program staff members who are intimately involved in the day-to-day operation of the program have the most specific information for providing insight and helping to interpret the reports in NTIP.

Indicator data for states or program areas with low TB incidence should be interpreted with caution since estimates for these program areas are sparse.

While NTIP Workgroup strives to achieve high level of precision in the formulation of indicators, the accuracy of indicators are limited by surveillance data systems from which indicator data are derived. The quality of surveillance data and data definition affect the accuracy of indicator reported in NTIP. Limited data collected in the national surveillance system may prevent indicators from further analysis. In some indicators, exclusion criteria could not be incorporated in the calculation because of lack of data.

NTIP reports should be used as a monitoring tool. TB program managers and staff are encouraged to conduct additional analysis when possible to provide insights for interpreting NTIP reports.

Organization of This User Guide

This user guide provides an overview of the NTIP system and the indicators. The purpose of this guide is to help the user in the interpretation of NTIP reports. None of the contents are intended to be specific guidance for tuberculosis medical practice, public health practice, program evaluation, or program management. However, NTIP is designed to be useful for workers in each of these areas. General knowledge in these areas is helpful for understanding NTIP and making optimal use of its reports, and this guide refers the user to national guidelines or policies that form the basis for the indicators and the interpretation of the reports in NTIP.

Chapters II, III, and **IV** outline step-by-step instructions on how to navigate and use the functions of the system. This includes how to generate NTIP reports and export line-listed data.

Chapters V to **IX** of this guide introduce indicators and reports related to TB incidence rates, and each of the key programmatic activities including case management and treatment, laboratory reporting, contact investigation, and the examination of immigrants and refugees. Detailed exploration of, and rationale for, the indicators and the public health significance of the objectives are discussed. Data sources and detailed calculations for each indicator are also provided.

Logic models describing key activities, outputs, and the intended outcomes of TB control and prevention activities are included in some sections. Indicators that are measured in NTIP are highlighted in the logic models. These logic models can be used to select relationships between various program activities for further study.

Finally, **Chapter X** highlights how surveillance data quality (i.e., accuracy, completeness and promptness) could impact NTIP indicator reports. This chapter helps users understand how to use NTIP to assess surveillance data quality and identify data issues.

Resources

CDC. National TB Program Objectives and Performance Targets
http://www.cdc.gov/tb/programs/Evaluation/Indicators/default.htm

CDC. TB Program Evaluation Handbook
http://www.cdc.gov/tb/programs/Evaluation/TBEvaluationHandbook_tagged.pdf

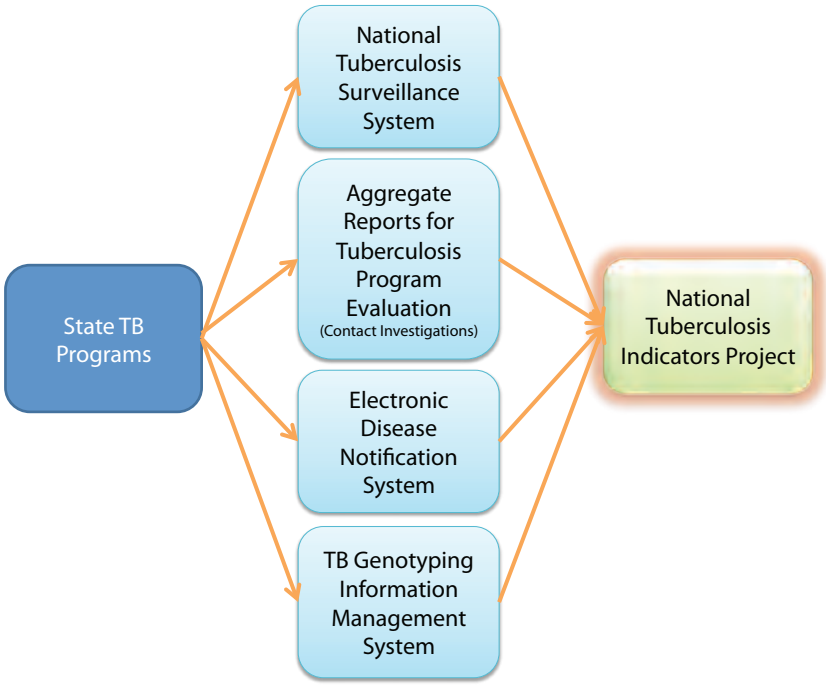
II. NTIP System Overview

This chapter provides an overview of the NTIP system and discusses the NTIP user access policy, the login process, and how to find resources and references available in NTIP.

NTIP System

NTIP reports are available for use by federal, state, and local public health partners to monitor the effectiveness of TB prevention and control activities. Only authorized users have access to data that were reported by their respective public health jurisdictions. **Figure 2.1** illustrates the flow of data from state TB programs to national data reporting systems and finally to NTIP.

Figure 2.1: NTIP Data Flow



Two types of data are shared in NTIP:

1. Indicator data
   Indicator data are calculated statistics presented in a report. The statistics are stratified by relevant characteristics and displayed in tables, charts, and graphs used to track performance trends.

2. Line-listed data
   Line-listed data provide key data elements from the surveillance system that are used to calculate indicators. The line-listed data are only shared with authorized users from the respective reporting jurisdiction where data was reported. State, city, and county case numbers reported in the Report of Verified Case of Tuberculosis (RVCT) are provided in the line list to facilitate communication and help staff members in the reporting jurisdiction assess data issues and programmatic concerns. Personally identifiable information is not shared via the NTIP line list. The line-listed data are exportable in an Excel spreadsheet.

Data Security and Confidentiality

NTIP does not store or share any personally identifiable information on TB patients or individuals suspected of having TB disease or infection. No information is stored related to date of birth, date of TB diagnosis, date of test results, or date of treatment.

Specific jurisdiction information, such as city, county, health districts, name of the public health center, strategic planning areas, and regions, may indirectly lead to the identification of individuals, particularly in geographic regions where TB is rare. This type of jurisdiction information is used in NTIP to provide local level reports.

To ensure confidentiality, CDC does not provide NTIP reports for jurisdictions reporting less than or equal to an average of 15 cases per year (based on counted cases from 2006 through 2008) without a formal request from TB program officials from the respective program. TB program officials can request reports for specific jurisdictions by sending an email to **DTBESupport@cdc.gov**.

User Access

NTIP reports and line-listed data are not available to, or accessible by, the public. Only authorized users from reporting jurisdictions have access to the data. Each state TB control official has designated a TB data system administrator(s) who is authorized to approve users in their jurisdiction for access to NTIP reports. Within a jurisdiction, various levels of access are available. A user can be granted access to reports for a specific geographic region, a public health jurisdiction, or a program area (see definition of program area on page 26). An administrator may also grant access to specific reports relevant to the roles and responsibilities of individual staff members. For example, an administrator may grant access to the Reports on the Examination of Immigrants and Refugees to staff members from Refugee Health without granting access to reports for other indicators. Likewise, an administrator may choose to limit line-list data access to the specific staff members responsible for ensuring the completeness and accuracy of data submitted to CDC. Users may be authorized access to the line list data for indicators calculated using data from the National TB Surveillance System (NTSS), or Electronic Disease Notification (EDN) system, or both.

Data Security on NTIP Server

Procedures developed by the CDC Office of the Chief Information Security Officer (OCISO) for authorizing, credentialing, and authenticating users ensure electronic data security. CDC's Secure Access Management Services (SAMS) registers and authenticates all NTIP users. Information technology security procedures, as stipulated by OCISO, are in place to ensure that only authorized users will have access to surveillance data that were reported by their respective public health jurisdictions.

CDC is committed to maintaining strict confidentiality and security of the national surveillance information through the National TB Surveillance System (NTSS). NTIP is an extension of NTSS and is protected in the following ways:

- Only authorized users who have accounts authenticated via CDC's Secure Access Management Services (SAMS) and who are compliant with regulations of OCISO will be able to gain access to the system.

- NTIP data are housed on CDC servers protected by application firewalls to prevent unauthorized access.
- TB control officials can customize user access to the data and information pertinent to individual staff members.
- TB data system administrators are given authority to grant access to staff members working in their jurisdictions.
- All potential users must be nominated by local TB data systems administrators and verified by CDC administrators.
- No personally identifiable information is stored in NTIP.

Data Sharing Between States

Users will be granted access to data their programs have submitted for their jurisdictions only. Users will not be granted access to data or reports outside of their jurisdiction.

Collaborations Between States

CDC encourages staff members in various TB programs within a state, and among different states, to collaborate and share lessons learned. A specific NTIP report type that enables users to present their data along with other programs' data for use during regional meetings has been developed. Program officials who wish to participate in this should contact the DTBE Helpdesk, **DTBESupport@cdc.gov**, for assistance.

Access for Partners in TB Control

For public health purposes, TB data systems administrators may authorize staff members from other health agencies (i.e., Refugee Health and State Public Health Laboratories) within their jurisdiction to access data for their jurisdiction. Administrators may choose to limit access for the staff members in these agencies to the reports and data pertinent to their work.

Use of NTIP Data

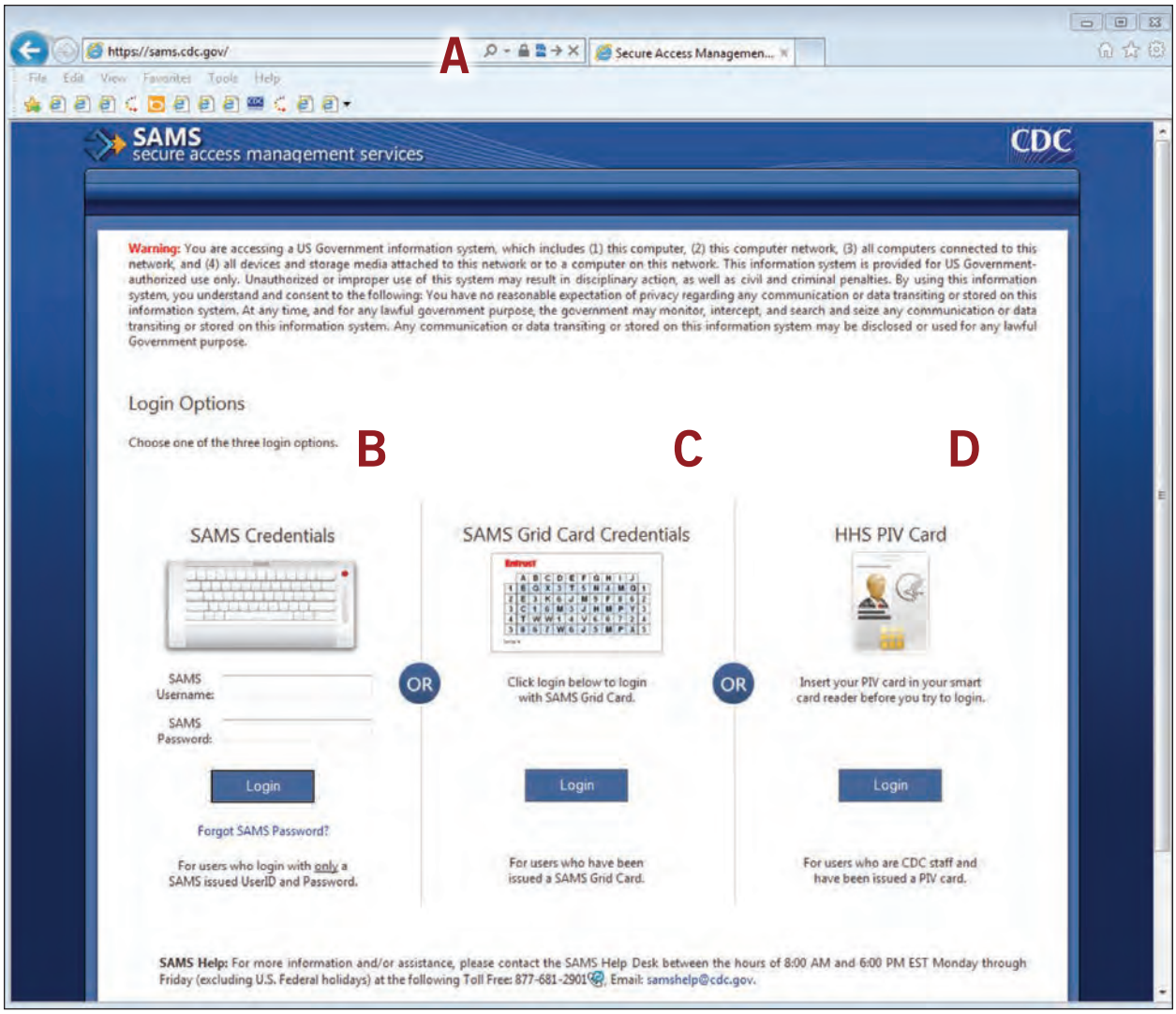
Local and state TB program staff members are encouraged to share data reported in NTIP with other agencies and partner organizations. The reports and tabulations in NTIP are transferrable and can be copied to documents, reports, and presentation slides for sharing with community partners to inform programs serving the community. To ensure that the most current data are made available through NTIP, data submitted to CDC are imported weekly and used to calculate and generate NTIP reports. Data managers from reporting jurisdictions should, therefore, verify that all data reported to CDC are current and accurate.

Login Window

NTIP system login is managed through the Secure Access Management Services (SAMS). Users must obtain a SAMS account prior to logging into NTIP. The NTIP Helpdesk will help users establish a SAMS account once the request and authorization for NTIP has been received from the designated TB systems administrator for the respective TB programs.

Users can attempt to login to the system 3 times. If login is unsuccessful after 3 attempts, users will have to wait 1 hour before attempting to log into the system again. The password can be reset by clicking the "Forgot SAMS password?" link.

Below, is a screenshot of the SAMS homepage.



A URL: Type **https://sams.cdc.gov** to access the NTIP system through CDC's Secure Access Management Services (SAMS) portal and bookmark this page for future access.

B **SAMS Credentials:** This field provides the Login Options to enter a Username and Password. The Username is the user's email address. This password is case sensitive. It must have eight or more characters, must not contain Username, must not have been used for SAMS during the previous 12 months, and must contain at least one each of the following:

- Letters (uppercase or lowercase)
- Numbers
- Special characters or symbols (such as # , @, or %)

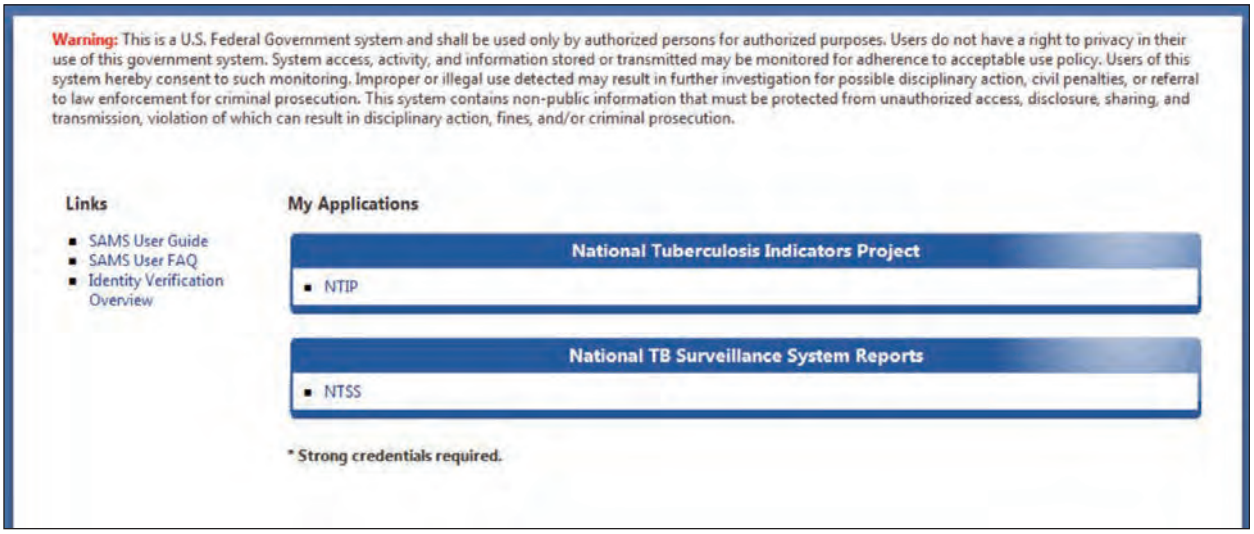
C **SAMS Grid Card Credentials:** shows the login option to use the Grid Card Credentials**.**

D **HHS PIV Card:** shows the login option for the HHS PIV Card. CDC users can login to the system using their government-issued identification card.

SAMS Menu

Once logged into the Secure Access Management Services (SAMS) account, a user can access all TB systems for which he or she has been authorized through the SAMS Menu.

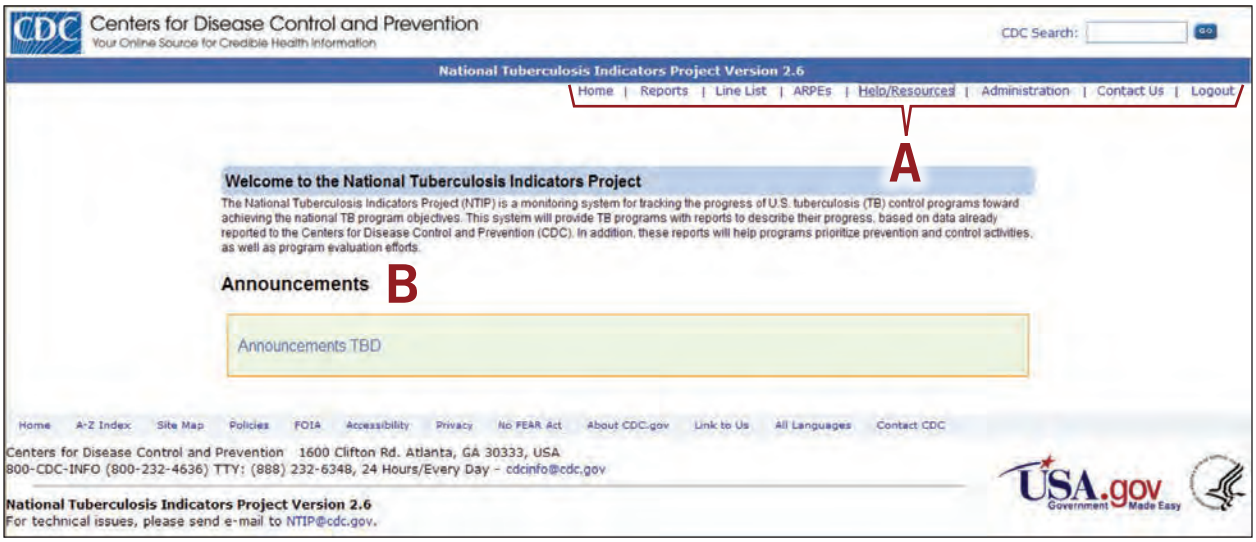
The screenshot below is an example of the SAMS Menu for a user who has been authorized access for NTIP and NTSS.



NTIP Terms of Use

A **Terms of Use:** Users must accept the Terms of Use in order to access the NTIP application.

NTIP Menu and Announcement



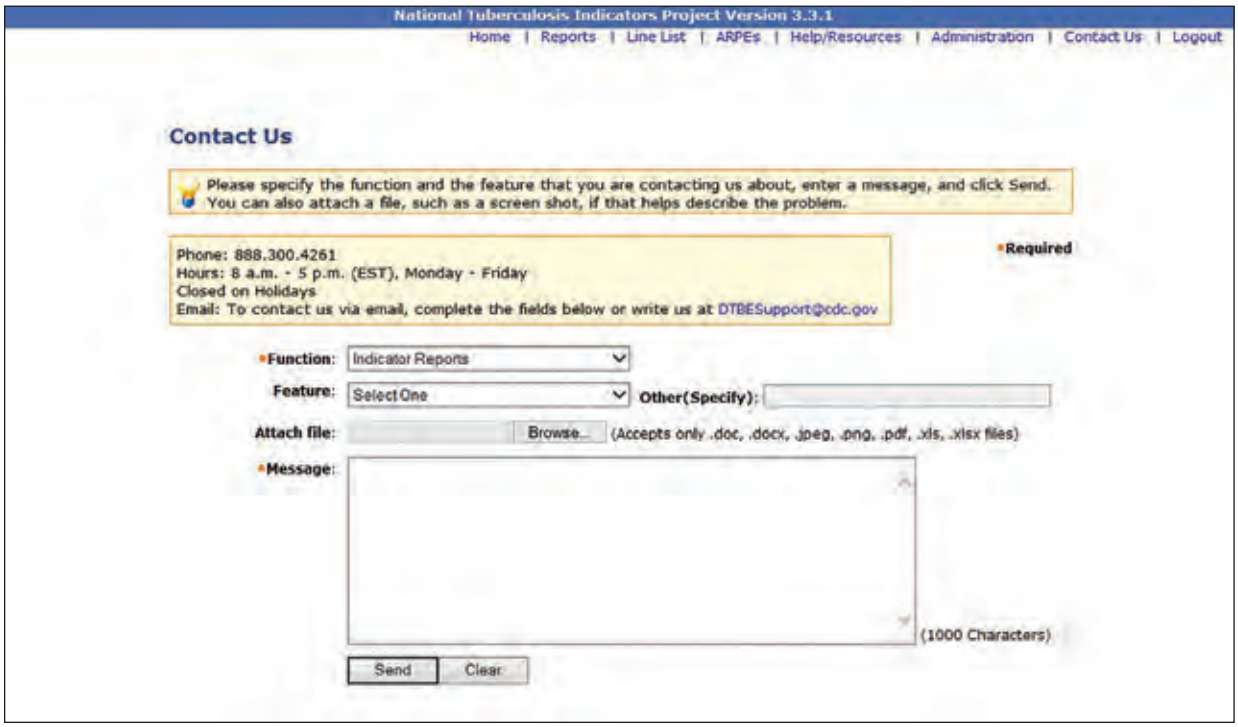
A **NTIP Menu:** This main menu provides user access to key NTIP functions: Reports, Line List, ARPE, and the Help/Resources section. Links to the Line List and ARPE are displayed on this menu only for users who have been granted access by their State TB Systems Administrator.

B **Announcements:** This field is used to communicate general information to NTIP users. Information specific to an individual TB program may also appear in this field.

Contact Us and Accessibility Assistance

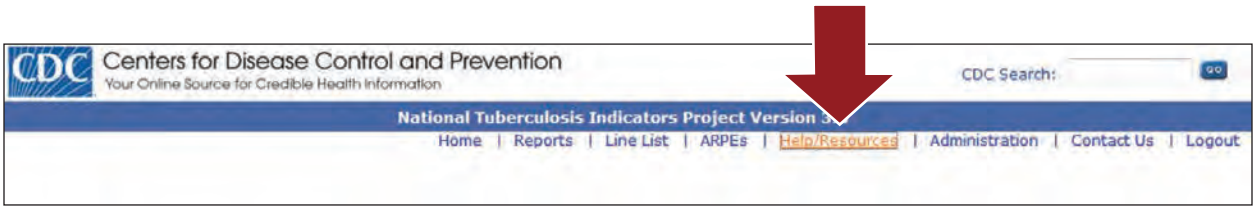
Users can contact the NTIP Helpdesk for assistance by filling out an online form. Users can describe problems, provide comments, and attach a screen shot or a document to the form.

Users who need special assistance in accessing NTIP can contact CDC for help via this contact page.



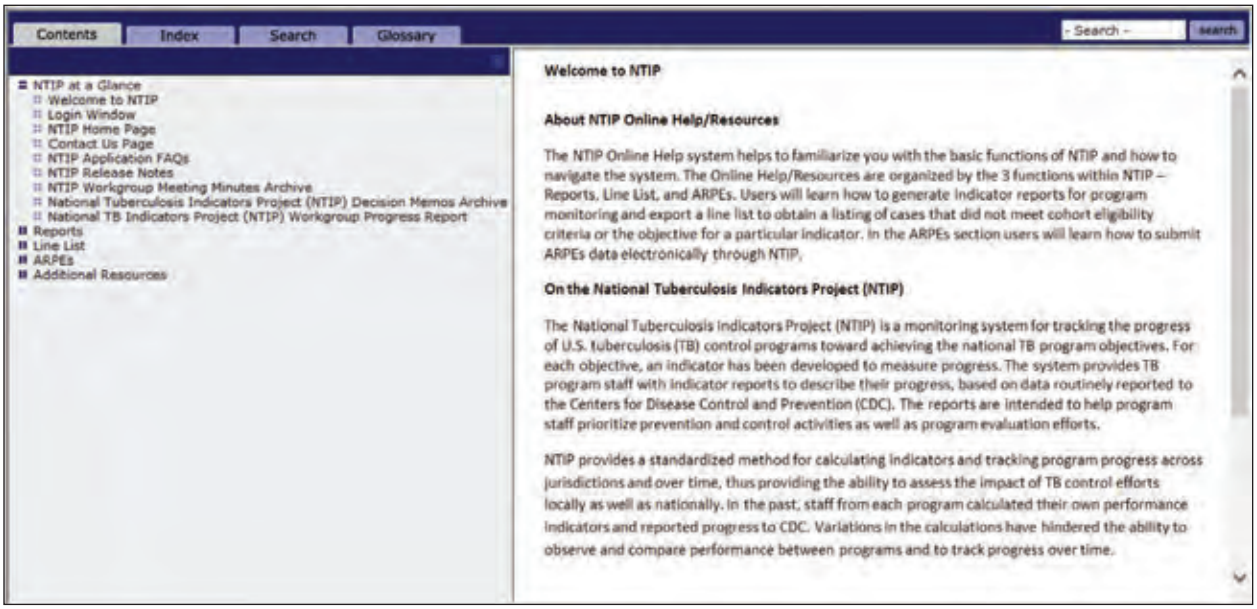
Help/Resources

The Help/Resources section contains reference documents on NTIP and can be accessed from the main menu:



Users can learn about various functions and features of NTIP and how to navigate the system.

Reference documents such as NTIP Workgroup meeting minutes, decision memos on changes to NTIP indicators, and calculations are archived in this section. This section is updated three to fours times a year.

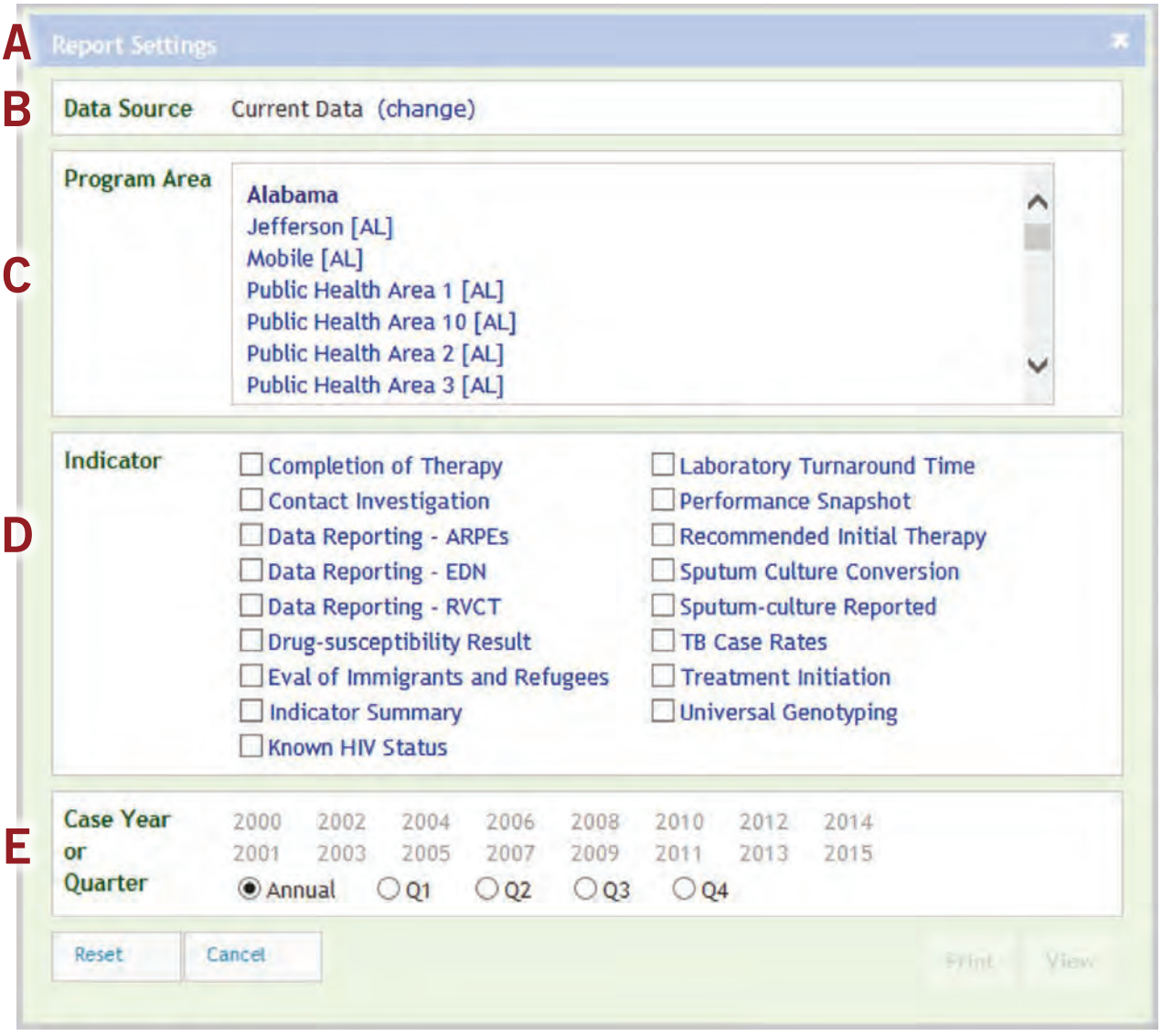


III. Generating NTIP Reports

This chapter discusses the reporting function of NTIP. Users will learn how to generate and review various types of reports available in NTIP.

Reports

NTIP provides standardized methods for calculating indicators and tracking program progress toward national TB program objectives. Reports are available for all TB programs funded by CDC TB cooperative agreement as well as local jurisdictions as requested by the TB program officials providing oversight. Below is a screenshot of the Report Settings page.



A Report Settings: This main control panel allows users to generate NTIP reports.

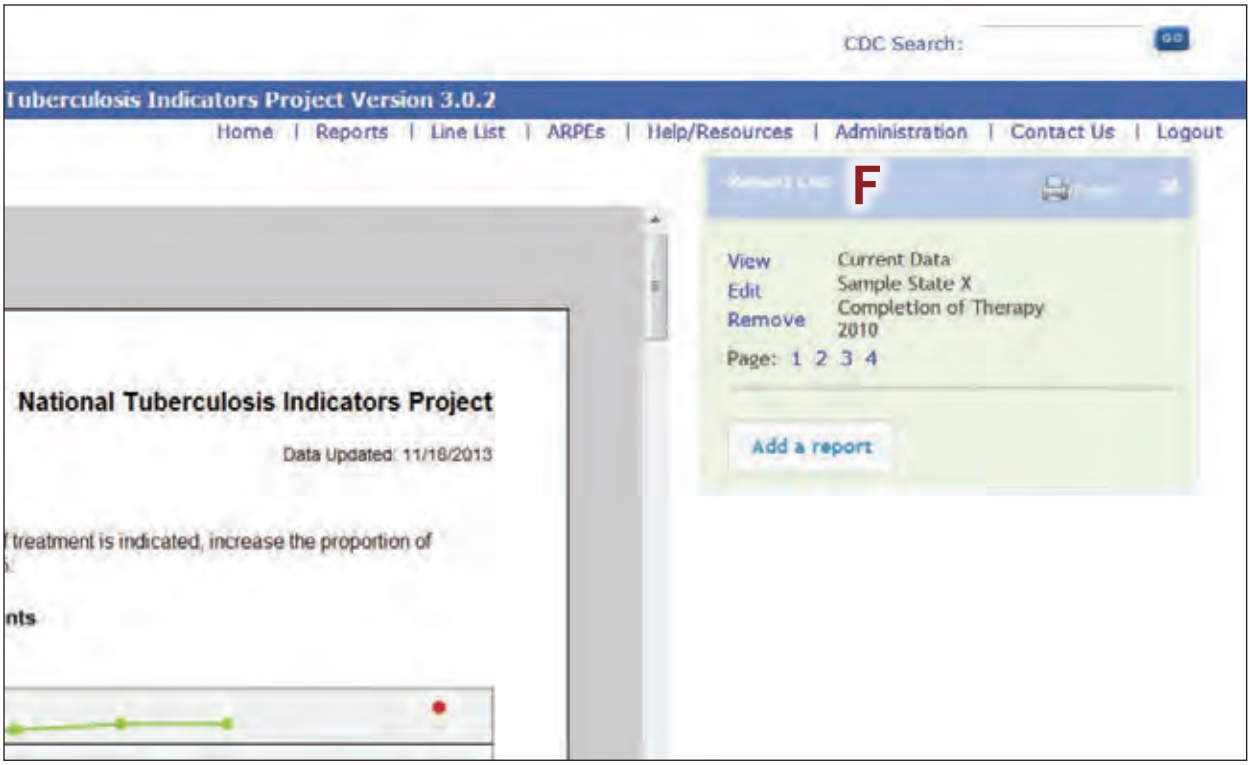
B Data Source: Both current and frozen surveillance datasets are available for generating NTIP reports. As data are transmitted to CDC, they are updated in NTIP weekly under "Current Data."

Frozen datasets are snapshots of the NTSS database. It includes manual corrections to the data that could not be transmitted to CDC, and is created annually and made available on NTIP as soon as it is finalized, usually by early summer of the following year. Both current and frozen datasets include data from the National Tuberculosis Surveillance System (NTSS), Aggregate Reports for Tuberculosis Program Evaluation (ARPE) for Contact Investigations, and the Electronic Disease Notification (EDN) System.

C Program Area: A Program Area in the NTIP system is a geographic region for which an NTIP report is available. A Program Area can be a state or a city that is funded by the CDC cooperative agreement or a local jurisdiction. Users can also select 'United States' as a Program Area to generate a national summary report.

D Indicator: An indicator report is available for each national objective. The reports for Contact Investigation and Examination of Immigrants and Refugees contain a set of four indicators, and the report for Laboratory Turnaround Time contains a set of two indicators. A summary of indicators can be found in reports titled 'Performance Snapshot' or 'Indicator Summary.'

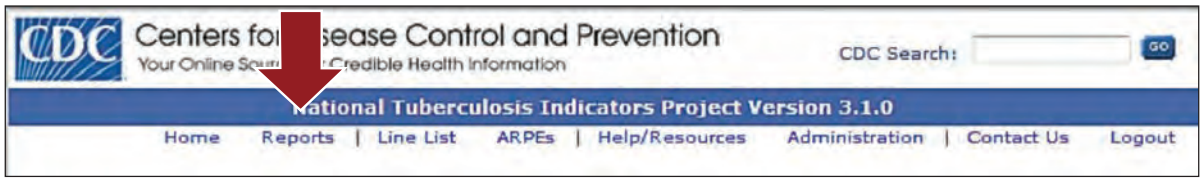
E Case Year or Quarter: NTIP contains data from 2000 to present. The Date Counted is used to determine the cohort year for each case. Users can choose to see an annual or quarterly trend [Q1 (January–March), Q2 (April–June), Q3 (July–September), Q4 (October–December)]. With the exception of the reports for TB Incidence Rates and Contact Investigation, all reports are available in both yearly and quarterly trend. The trend is either 5 years or 5 quarters, ending with the selected year or quarter. Quarterly trends are available only for reports generated from 'Current Data.'



F Report List: Once the first NTIP report is generated for view, users can modify reporting functions using this secondary control panel. Users can add additional reports to the list of reports or modify the parameters of reports. Users can print all the reports at once through this function.

To generate a report,

1. **Select "Reports" from the** *NTIP Menu*.



2. In the *Data Source, Current Data* field, select "(change)" data source.

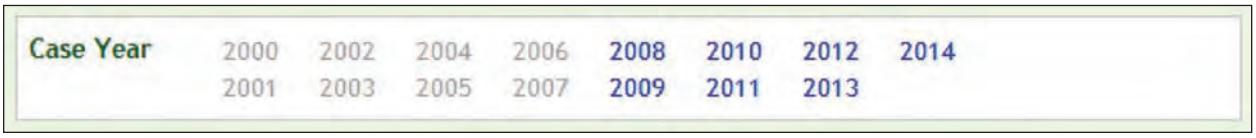
Select a Data Source.

3. Select a Program Area.

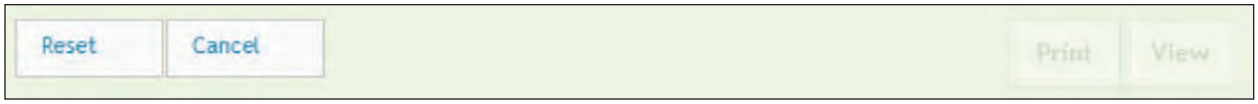
4. Select an Indicator to "view" or multiple indicators for "print."
Note:

- Multi-report selection is only available for printing.
- Funding Formula Variable Snapshot report is available for CDC TB cooperative agreement reporting jurisdictions only. Select "Frozen dataset" as the data source to view or print the report.

5. Select a Case Year or Quarter.

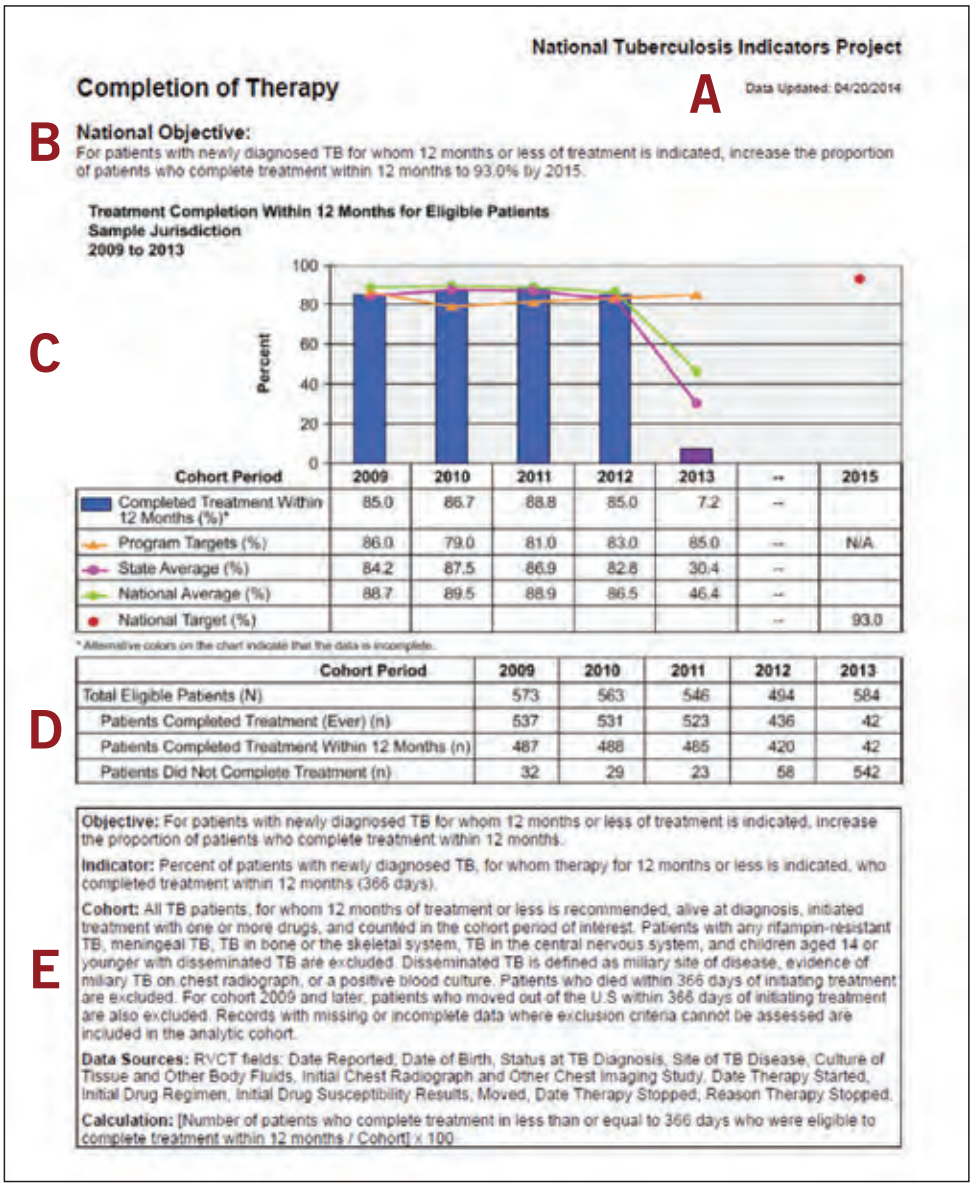


6. Select “Print” or “View” report (s).



Indicator Reports

Indicator reports track a program's performance over time for each objective and indicator. The report includes a trend graph, methods, data sources, and stratifications. An example of page 1 for the Completion of Therapy indicator report is pictured below:



National Tuberculosis Indicators Project

Completion of Therapy

A Data Updated: 04/20/2014

B **National Objective:**
For patients with newly diagnosed TB for whom 12 months or less of treatment is indicated, increase the proportion of patients who complete treatment within 12 months to 93.0% by 2015.

Treatment Completion Within 12 Months for Eligible Patients
Sample Jurisdiction
2009 to 2013

C

Cohort Period	2009	2010	2011	2012	2013	--	2015
Completed Treatment Within 12 Months (%)*	85.0	86.7	88.8	85.0	7.2	--	
Program Targets (%)	86.0	79.0	81.0	83.0	85.0	--	N/A
State Average (%)	84.2	87.5	86.9	82.8	30.4	--	
National Average (%)	88.7	89.5	88.9	86.5	46.4	--	
National Target (%)						--	93.0

* Alternative colors on the chart indicate that the data is incomplete.

D

Cohort Period	2009	2010	2011	2012	2013
Total Eligible Patients (N)	573	563	546	494	584
Patients Completed Treatment (Ever) (n)	537	531	523	436	42
Patients Completed Treatment Within 12 Months (n)	487	488	485	420	42
Patients Did Not Complete Treatment (n)	32	29	23	58	542

E

Objective: For patients with newly diagnosed TB for whom 12 months or less of treatment is indicated, increase the proportion of patients who complete treatment within 12 months.

Indicator: Percent of patients with newly diagnosed TB, for whom therapy for 12 months or less is indicated, who completed treatment within 12 months (366 days).

Cohort: All TB patients, for whom 12 months of treatment or less is recommended, alive at diagnosis, initiated treatment with one or more drugs, and counted in the cohort period of interest. Patients with any rifampin-resistant TB, meningeal TB, TB in bone or the skeletal system, TB in the central nervous system, and children aged 14 or younger with disseminated TB are excluded. Disseminated TB is defined as miliary site of disease, evidence of miliary TB on chest radiograph, or a positive blood culture. Patients who died within 366 days of initiating treatment are excluded. For cohort 2009 and later, patients who moved out of the U.S within 366 days of initiating treatment are also excluded. Records with missing or incomplete data where exclusion criteria cannot be assessed are included in the analytic cohort.

Data Sources: RVCT fields: Date Reported, Date of Birth, Status at TB Diagnosis, Site of TB Disease, Culture of Tissue and Other Body Fluids, Initial Chest Radiograph and Other Chest Imaging Study, Date Therapy Started, Initial Drug Regimen, Initial Drug Susceptibility Results, Moved, Date Therapy Stopped, Reason Therapy Stopped.

Calculation: [Number of patients who complete treatment in less than or equal to 366 days who were eligible to complete treatment within 12 months / Cohort] x 100

A Data updated: Date when the last data transmission was received at CDC from a reporting jurisdiction.

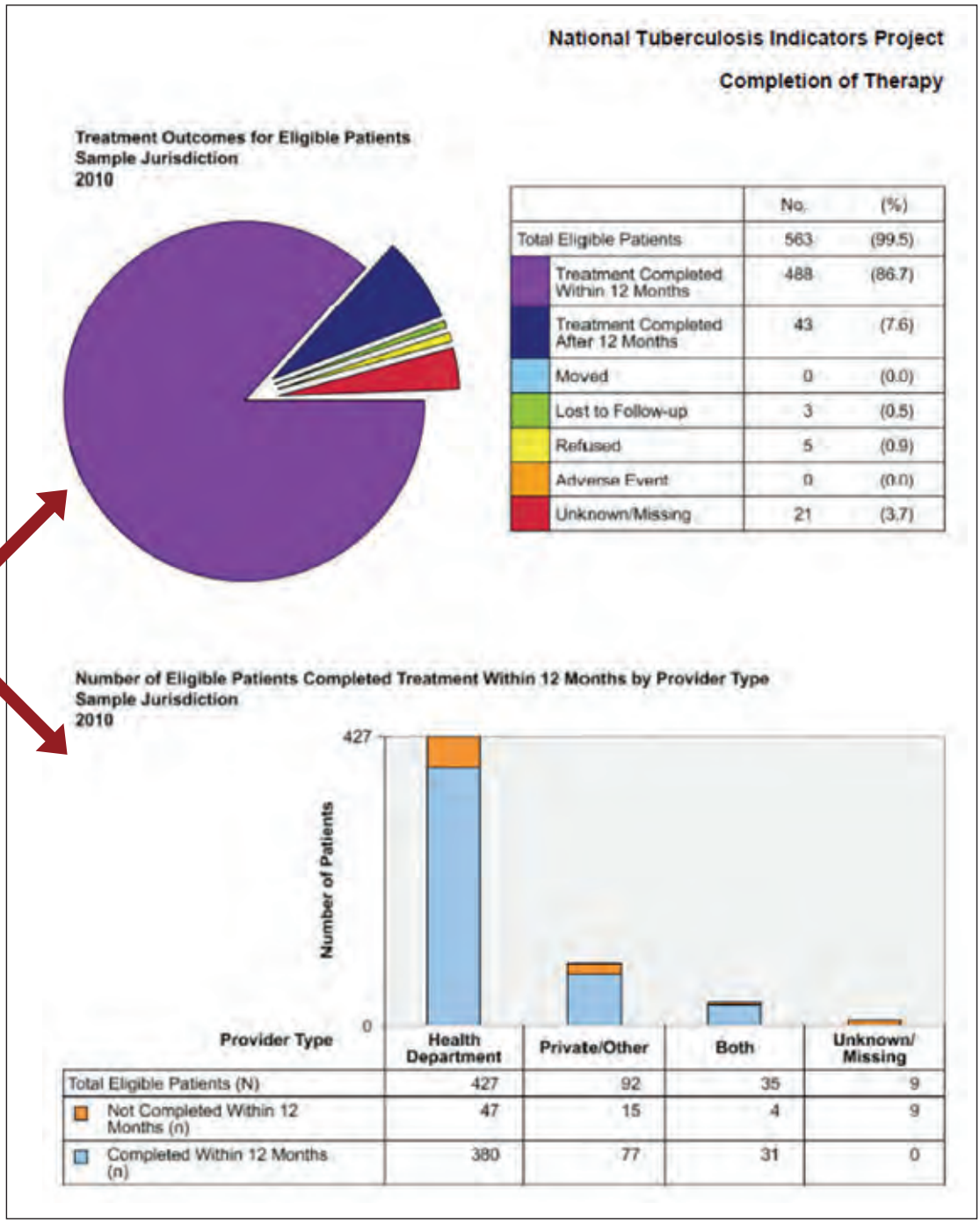
B National objective: The specific objective for which results are shown in the indicator report.

C Trend graph: The main graph in NTIP that tracks indicator trends. The graph includes a 5-year or 5-quarter trend on the national objective, along with national and state data for comparison.

D Data table: The table provides the raw data (total eligible patients in the cohort period) used to calculate the indicator.

E Methods: The method section provides a description of the indicator, the sources from which data are derived, the inclusion and exclusion criteria for the cohort of cases, and the calculation for the indicator.

F Analytic graphs: The graphs provide additional analyses for the indicator. An example of page 2 of the report is pictured below, showing the analytic graphs.



National Tuberculosis Indicators Project

Completion of Therapy

Treatment Outcomes for Eligible Patients
Sample Jurisdiction
2010

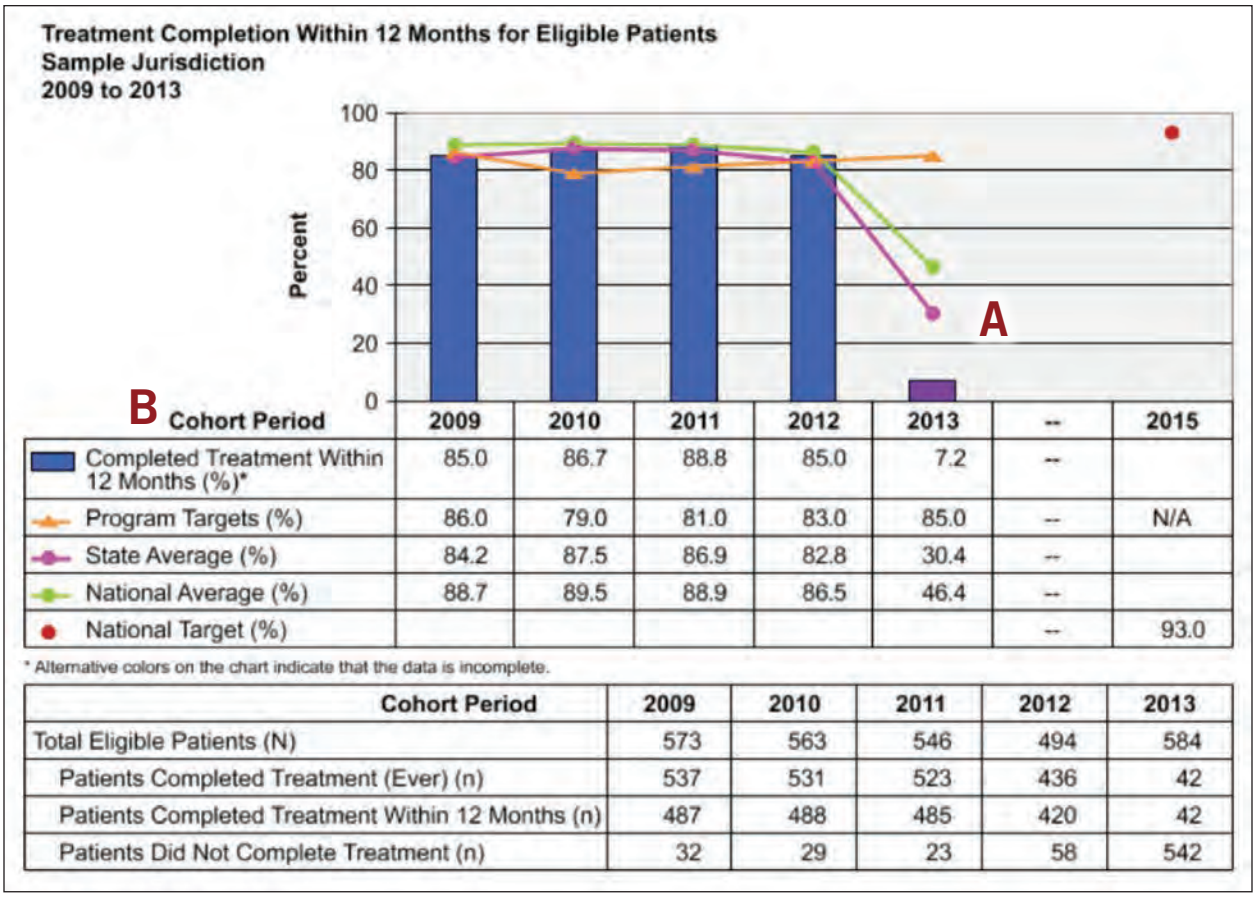
	No.	(%)
Total Eligible Patients	563	(99.5)
Treatment Completed Within 12 Months	488	(86.7)
Treatment Completed After 12 Months	43	(7.6)
Moved	0	(0.0)
Lost to Follow-up	3	(0.5)
Refused	5	(0.9)
Adverse Event	0	(0.0)
Unknown/Missing	21	(3.7)

F

Number of Eligible Patients Completed Treatment Within 12 Months by Provider Type
Sample Jurisdiction
2010

Provider Type	Health Department	Private/Other	Both	Unknown/ Missing
Total Eligible Patients (N)	427	92	35	9
Not Completed Within 12 Months (n)	47	15	4	9
Completed Within 12 Months (n)	380	77	31	0

Trend Graph



B

Cohort Period	2009	2010	2011	2012	2013	--	2015
Completed Treatment Within 12 Months (%)*	85.0	86.7	88.8	85.0	7.2	--	
Program Targets (%)	86.0	79.0	81.0	83.0	85.0	--	N/A
State Average (%)	84.2	87.5	86.9	82.8	30.4	--	
National Average (%)	88.7	89.5	88.9	86.5	46.4	--	
National Target (%)						--	93.0

C D E F

* Alternative colors on the chart indicate that the data is incomplete.

G H

Cohort Period	2009	2010	2011	2012	2013
Total Eligible Patients (N)	573	563	546	494	584
Patients Completed Treatment (Ever) (n)	537	531	523	436	42
Patients Completed Treatment Within 12 Months (n)	487	488	485	420	42
Patients Did Not Complete Treatment (n)	32	29	23	58	542

A Color bar graph: The bar color indicates the completeness of data for the corresponding indicator. The color of the bar changes from purple to blue when the data reaches 90% completeness (for a detailed explanation, see **Using NTIP Graphs to Assess Surveillance Data Quality and Promptness** on page 126.) For the Completion of Therapy indicator, the completeness of the variable "Date Therapy Stopped" is used to determine data completeness. For the Known HIV Status Indicator report, the color of the trend graph changes when the completeness of the "HIV Status" variable reaches 90%. For the Drug Susceptibility Testing Indicator report, the completeness of the "Initial Drug Susceptibility Results" is used to determine when the bar graph turns from purple to blue. The percent completeness of these key variables used in NTIP can be found in the data completeness report titled "Data Reporting: RVCT."

B Cohort period: The cohort period spans 5 intervals. The interval can be year (for example, 2009 through 2013) or quarter (for example, 2010-Q4, 2011-Q1, 2011-Q2, 2011-Q3, 2011-Q4).

C Program target: Program targets are established by managers at TB programs on the basis of program context, epidemiology, feasibility, and available resources.

D **State average:** State average is only shown in the reports for local jurisdictions under a state TB program such as county or city health departments, regions, and health centers. For local jurisdictions reporting to a county or city TB program, the state average reflects the indicator for the county or city TB program.

E **National average:** The national average reflects the overall trend in the indicator for the United States.

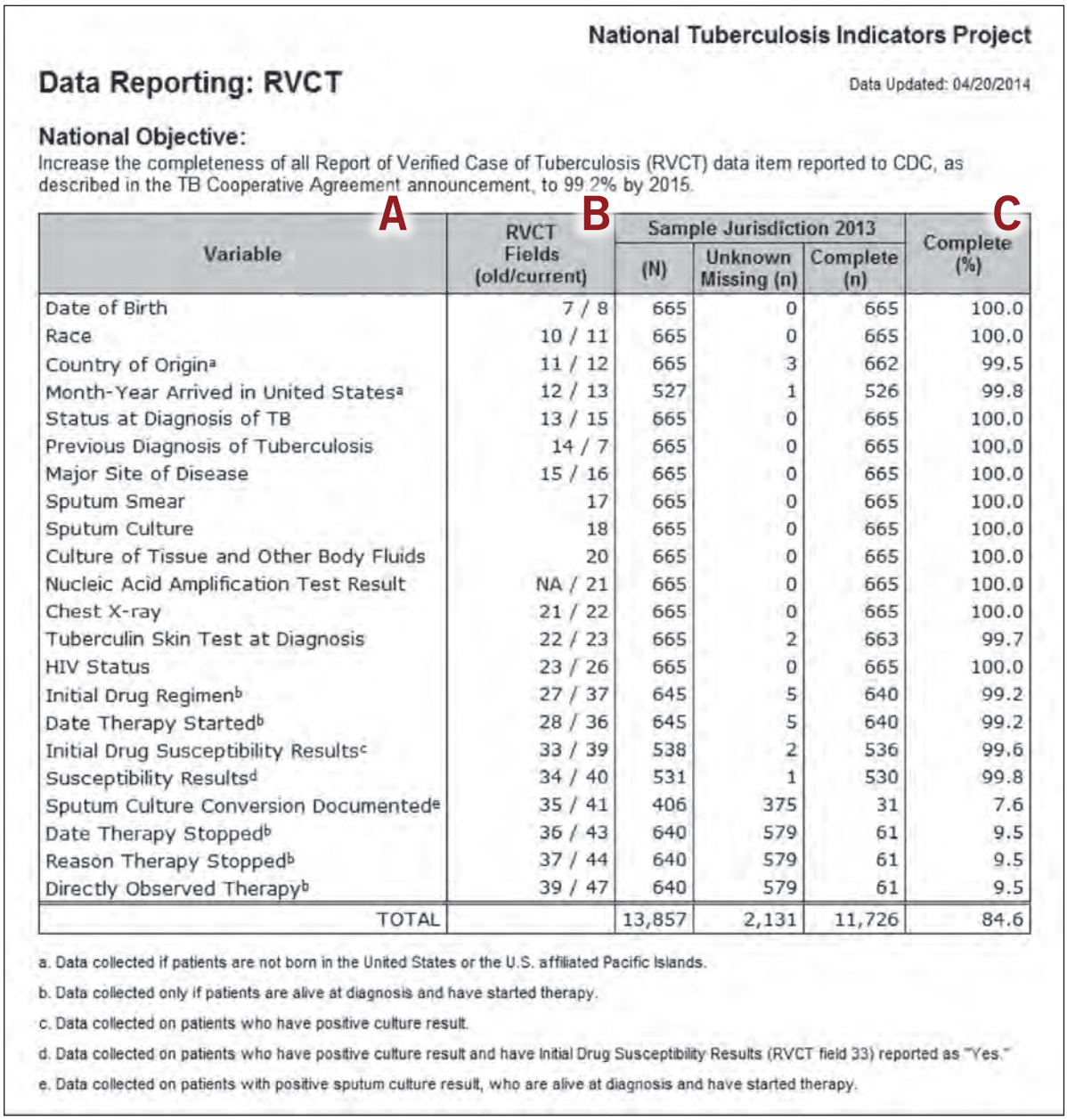
F **National target:** The national targets are overarching targets for the United States. These targets were established based on the performance of the top 90th percentile state TB program that reported more than 150 cases from 2011–2013. The targets are based on a statistical model representing the 90th percentile values in the latest year estimated from a quantile regression on 2000–2013 data.

G **Denominator (N):** The number of cases in the cohort that meet the eligibility criteria for the objective.

H **Numerator (n):** The number of cases meeting the criteria for the objective.

Data Completeness Report

The Data Completeness Report provides the percentage of data completeness for key variables used in NTIP indicator calculations. A separate report is provided for RVCT, ARPE, and EDN. The RVCT Data Reporting provides the percentage of data completeness for key RVCT variables. This report is available by year or quarter.



National Tuberculosis Indicators Project

Data Reporting: RVCT

Data Updated: 04/20/2014

National Objective:

Increase the completeness of all Report of Verified Case of Tuberculosis (RVCT) data item reported to CDC, as described in the TB Cooperative Agreement announcement, to 99.2% by 2015.

A Variable	B RVCT Fields (old/current)	Sample Jurisdiction 2013 (N)	Unknown Missing (n)	Complete (n)	C Complete (%)
Date of Birth	7 / 8	665	0	665	100.0
Race	10 / 11	665	0	665	100.0
Country of Origin[a]	11 / 12	665	3	662	99.5
Month-Year Arrived in United States[a]	12 / 13	527	1	526	99.8
Status at Diagnosis of TB	13 / 15	665	0	665	100.0
Previous Diagnosis of Tuberculosis	14 / 7	665	0	665	100.0
Major Site of Disease	15 / 16	665	0	665	100.0
Sputum Smear	17	665	0	665	100.0
Sputum Culture	18	665	0	665	100.0
Culture of Tissue and Other Body Fluids	20	665	0	665	100.0
Nucleic Acid Amplification Test Result	NA / 21	665	0	665	100.0
Chest X-ray	21 / 22	665	0	665	100.0
Tuberculin Skin Test at Diagnosis	22 / 23	665	2	663	99.7
HIV Status	23 / 26	665	0	665	100.0
Initial Drug Regimen[b]	27 / 37	645	5	640	99.2
Date Therapy Started[b]	28 / 36	645	5	640	99.2
Initial Drug Susceptibility Results[c]	33 / 39	538	2	536	99.6
Susceptibility Results[d]	34 / 40	531	1	530	99.8
Sputum Culture Conversion Documented[e]	35 / 41	406	375	31	7.6
Date Therapy Stopped[b]	36 / 43	640	579	61	9.5
Reason Therapy Stopped[b]	37 / 44	640	579	61	9.5
Directly Observed Therapy[b]	39 / 47	640	579	61	9.5
TOTAL		13,857	2,131	11,726	84.6

a. Data collected if patients are not born in the United States or the U.S. affiliated Pacific Islands.

b. Data collected only if patients are alive at diagnosis and have started therapy.

c. Data collected on patients who have positive culture result.

d. Data collected on patients who have positive culture result and have Initial Drug Susceptibility Results (RVCT field 33) reported as "Yes."

e. Data collected on patients with positive sputum culture result, who are alive at diagnosis and have started therapy.

A Variable: Selected key variables used in indicator calculations are presented.

B RVCT fields (old/current): The corresponding RVCT field numbers are indicated on this list. The first number reflects those on the RVCT form prior to the 2009 revision. The second number refers to the field numbers on the current RVCT form.

C Completeness of variables: Percent completeness of variables reported in the RVCT. The completeness of variables such as “HIV Status,” “Initial Drug Susceptibility Result,” and “Date Therapy Stopped” are used as markers for the completeness of data for each indicator report. More detailed explanation of this reference can be found on page 32, under **Color Bar Graph.**

Performance Snapshot & Indicator Summary

The Performance Snapshot and Indicator Summary reports provide a summary for all NTIP indicators. The Performance Snapshot report includes data for a selected year. The report presents both national and program targets for 2015 and the targets for the cohort period for which the report is generated (cohort year 2010 in the Performance Snapshot example below).

				A	B	C
National TB Program Objectives	National Targets 2015	Sample Jurisdiction Targets 2015	Sample Jurisdiction Targets 2010	Results	N	n
TB Incidence Rates (cases/100,000)				1.6	2,859,169	46
• U.S.-Born Persons	0.7	N/A	N/A	0.7	2,671,836	20
• Foreign-born Persons	14.0	N/A	N/A	13.9	187,333	26
• U.S.-Born Non-Hispanic Blacks	1.3	N/A	N/A	4.0	151,365	6
• Children Younger than 5 Years of Age	0.4	N/A	N/A	1.5	204,747	3
Indicators for Case Management (%)						
• Known HIV Status	88.7	100.0	100.0	95.7	46	44
• Treatment Initiation	N/A	100.0	100.0	100.0	17	17
• Recommended Initial Therapy	93.4	92.5	90.0	97.7	44	43
• Sputum Culture Result Reported	95.7	97.5	95.0	96.6	32	28
• Sputum Culture Conversion	61.5	70.0	67.0	78.3	23	18
• Completion of Treatment	93.0	93.0	90.0	100.0	40	40
Indicators for Laboratory Reporting (%)						
• Turnaround Time – Culture	N/A	N/A	N/A	85.7	28	24
• Turnaround Time – NAA	100.0	100.0	100.0	100.0	40	40
• Drug-Susceptibility Result	94.0	94.0	85.0	97.5	40	39
Indicators for Contact Investigation (%)						
• Contact Elicitation	100.0	100.0	100.0	100.0	18	18
• Examination	93.0	94.0	92.0	94.5	469	443
• Treatment Initiation	88.0	88.0	78.0	93.9	49	46

A **Results:** Performance results for each indicator.

B **N:** The denominator for the respective indicator.

C **n:** The numerator for the respective indicator.

In contrast to the Performance Snapshot, the Indicator Summary report (example below) includes an indicator for each year in a 5-year period without providing detailed denominator and numerator data.

National TB Program Objectives	2009	2010	2011	2012	2013	National Targets 2020
Completion of Treatment (%)	94.3	91.5	93.5	90.8	95.7	95.0
TB Incidence Rates (cases/100,000)						
• U.S.-born Persons	2.8	2.3	2.4	2.3	1.9	0.4
• Foreign-born Persons	28.1	22.9	29.7	16.0	13.3	11.1
• U.S.-born non-Hispanic Blacks	5.5	4.2	5.0	4.9	3.8	1.5
• Children Younger than 5 Years of Age	2.6	2.0	2.4	1.3	1.7	0.3
Contact Investigation (%)						
• Contact Elicitation	98.6	96.4	100.0	100.0	100.0	100.0
• Contact Examination	86.9	94.7	87.8	94.2	81.5	93.0
• LTBI Treatment Initiation	74.2	91.7	74.3	83.1	76.3	91.0
• LTBI Treatment Completion	72.9	82.5	79.8	78.9	60.7	81.0
Laboratory Reporting (%)						
• Turnaround Time — Culture	70.4	77.5	78.4	70.5	77.0	78.0
• Turnaround Time — NAA	54.5	66.7	60.7	64.5	73.2	92.0
• Drug-Susceptibility Results	100.0	99.1	100.0	100.0	100.0	100.0
Treatment Initiation (%)	98.6	100.0	95.6	96.8	100.0	97.0
Sputum Culture Conversion (%)	71.0	64.8	68.5	69.0	61.3	73.0
Data Reporting (%)						
• RVCT	99.9	99.9	100.0	99.9	99.8	100.0
• ARPEs	88.9	100.0	88.9	88.9	88.9	100.0
• EDN	77.7	90.9	87.5	86.2	77.8	93.0
Recommended Initial Therapy (%)	89.1	89.4	87.8	87.1	89.3	97.0
Universal Genotyping (%)	98.5	98.3	97.5	100.0	98.8	100.0
Known HIV Status (%)	91.5	95.1	96.8	96.2	96.1	98.0
Examination of Immigrants and Refugees (%)						
• Examination Initiation	60.0	86.1	75.7	75.0	63.0	84.0
• Examination Completion	57.1	86.1	67.6	69.4	63.0	76.0
• LTBI Treatment Initiation	87.5	92.3	87.5	62.5	83.3	93.0
• LTBI Treatment Completion	14.3	83.3	100.0	80.0	100.0	83.0
Sputum Culture Result Reported (%)	97.9	98.3	96.9	94.8	98.9	98.0

IV. Exporting NTIP Line-Listed Data

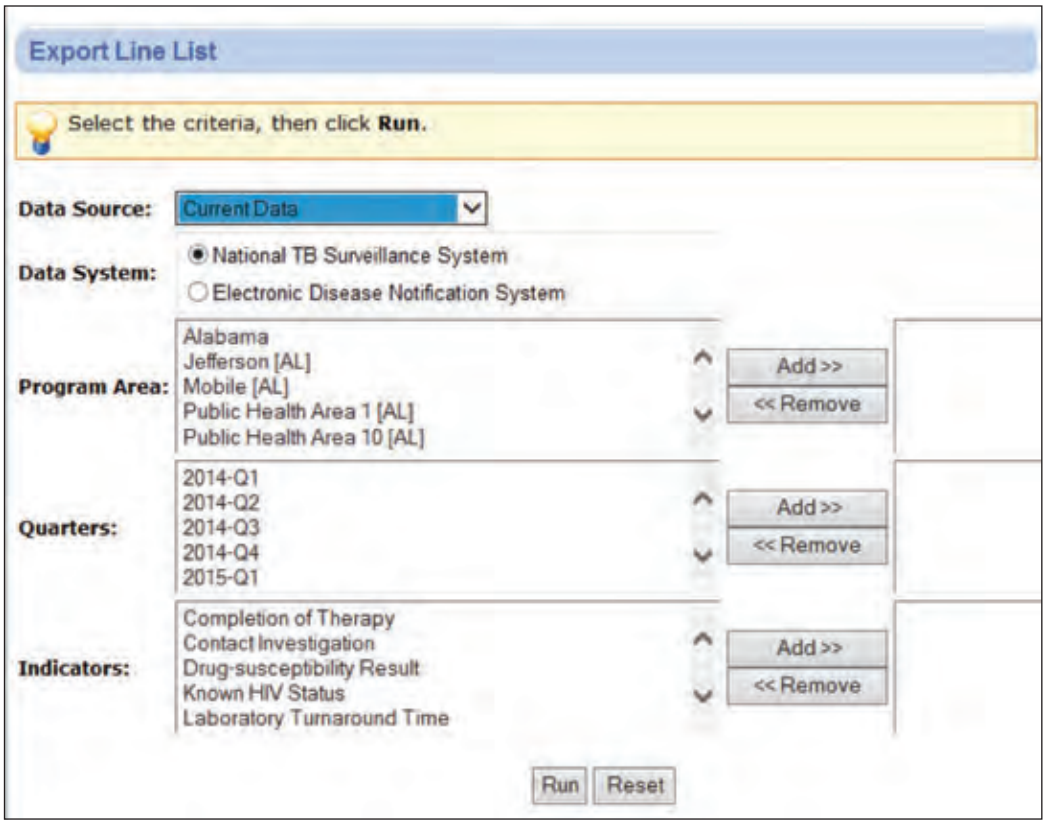
This chapter outlines the steps for exporting line-listed data and the various data elements in a line list spreadsheet. For clarity, the line list spreadsheets are color-coded in this user guide. The actual line list spreadsheets exported from NTIP do not display any color.

The line list function provides a listing of cases, the RVCT fields and values from which data are derived, and their status with respect to NTIP indicators. The list allows users to see which cases are represented in the aggregated indicator reports. This helps users pinpoint specific cases that affected an indicator. The list can also be used to pinpoint the reason for data discrepancies between local program data and data received by CDC and can aid in the examination of a cohort of cases.

Line-listed data are also available for the Examination of Immigrants and Refugees indicators, which are calculated using data from the EDN System.

Line-listed data are shared with authorized users from the reporting jurisdiction where data were reported. Access to line-listed data is granted by the designated state TB systems administrator for the respective user in the TB program. Once approved, requests can be submitted to the NTIP Helpdesk for processing. Users may be granted access to NTSS-based or EDN-based line-listed data, or both.

Export Line List Menu



A Data Source: Current and frozen dataset are available for generating reports.

B Data System: National TB Surveillance System and Electronic Disease Notification Systems are two key data sources for NTIP indicators.

C Program Area: The Program Area corresponds to the Program Area in the Generate Report section.

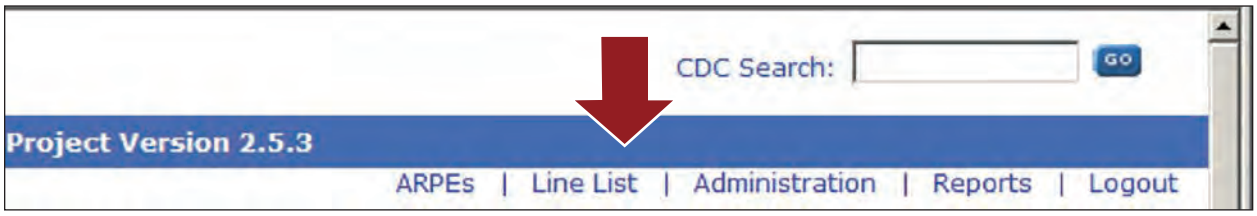
D Quarters: Line lists are available by quarters for year 2006 and forward. To export a line list for a whole year, select 4 quarters (e.g., 2008-Q1, 2008-Q2, 2008-Q3 and 2008-Q4).

E Indicators: Selection for the indicators corresponds to the Indicator Reports section. Users can export a line list to coincide with the indicator report of interest or export a line list that includes multiple indicators.

NOTE: *To examine a cohort of cases for their status on each indicator, select and "Add" all indicators of interest.*

To export a Line List,

1. Select "Line List" from the *NTIP Menu*.



2. On the *Export Line List Menu* (shown on page 40), in the Data Source drop-down menu, select a dataset (e.g., Current Data or Frozen 2014 Dataset).

3. In the Data System option, select the system from which the indicator(s) of interest is calculated.

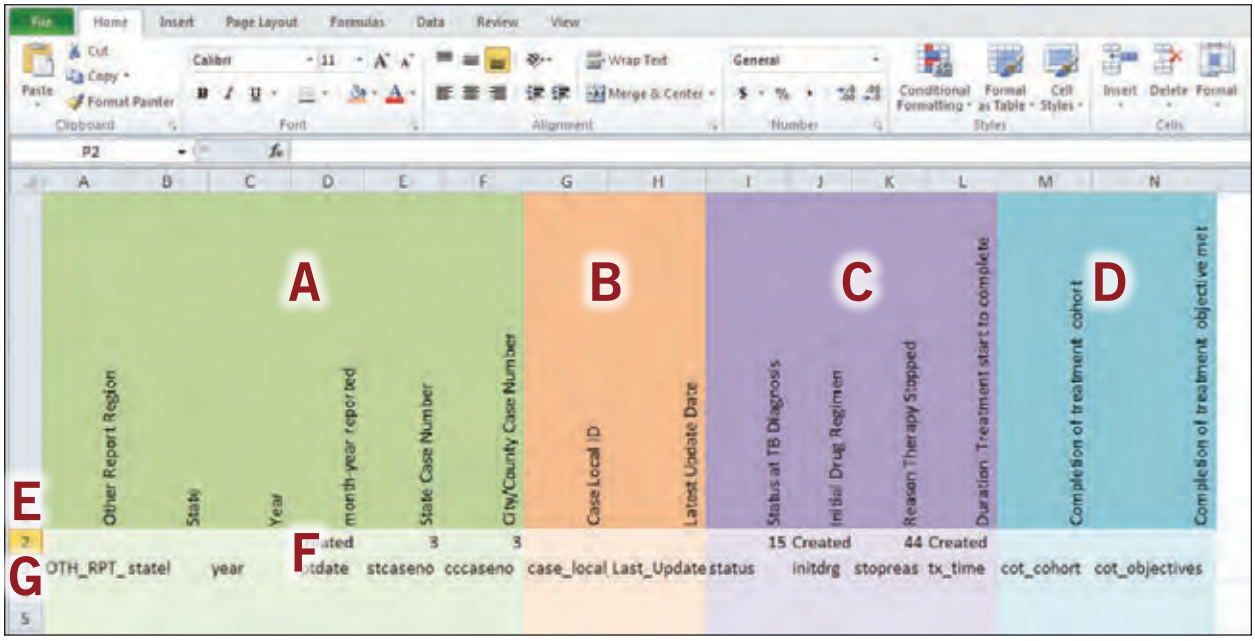
4. In the Program Area field, select the Program Area of interest. Click "Add."

5. Select and "Add" the quarter(s) of interest under Quarters. To export a line list for a complete year, select all 4 quarters for that year.

6. Select and "Add" the Indicator(s) of interest.

7. Click "Run."

Line List Spreadsheet



A Case information details: Basic variables for matching case records to local TB registry.

B Case Local ID and Latest Update Date: A unique identifier for each case with data submitted to CDC and the most recent date that data were received at CDC.

C Data for selected variables used in NTIP calculation: Data used to determine whether a case meets the cohort eligibility criteria and the objective for the selected indicator(s) of interest. For example, in the 'Reason Therapy Stopped' column, users would see one of the eight RVCT responses for this variable such as completed therapy, lost, uncooperative or refused, adverse treatment event, not TB, died, other, or unknown. Users would be able to determine whether the data in this variable is the reason case was included or excluded from the completion of therapy indicator.

D Status toward meeting objective(s): Data denote whether a case is included or excluded in the analytic cohort, and if it is included, whether it is classified as having met the objective. For example, a patient who was dead at diagnosis will be denoted in the "Completion of treatment cohort" with an "N" for not being included in the analytical cohort for the Completion of Therapy indicator. Since this case is not included in the analytical cohort for this indicator, the data field for this case under the "Completion of treatment objective met" will be left blank.

E Variable description: Description of each variable.

F RVCT field number(s): The RVCT field number associated with each variable or from which the variable was derived. If the variable is created from other variables, this is indicated by the word "created."

G Variable name: Variable name used by DTBE.

Case Information Details

	A	B	C	D	E	F
1	Other Report Region	State	Year (or Cohort Period)	Month-year Reported	State Case Number	City/County Case Number
2				Created from 1	3	3
3	T_REGION	statel	year	rptdate	stcaseno	cccaseno
4	SX DKC	State X	2009-Q1	03-2009	2009SX090000000	2009SX12345678
5	SX DKC	State X	2009-Q1	04-2009	2009SX090000001	2009SX12345679
6	SX DKC	State X	2009-Q1	06-2009	2009SX090000002	2009SX12345680

A Other Report Region: Program area(s) in which a single case may be recognized. These regions may include county, city, or jurisdiction(s) for which NTIP reports are available. An abbreviated two- or three-letter code is used to indicate the regions. (Please contact the Helpdesk for assistance if needed.)

B State: State where the case was reported.

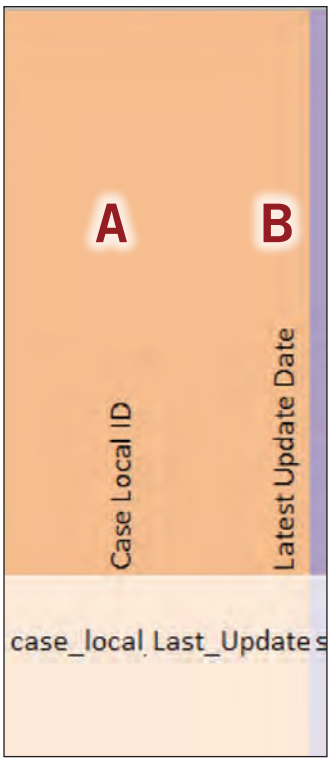
C Year (or Cohort Period): Date used to determine the cohort period for the case. Line lists are available by quarter (e.g., 2009-Q1, 2009-Q2, 2009-Q3, and 2009-Q4). To export a line list for a complete year, select all 4 quarters for that year.

D Month-year Reported: The month and year when the case was reported. This variable can help with organization and review of cases.

E State Case Number: State-specific case numbers provided to help users match records to those in the local TB registry.

F City/County Case Number: City/County case number is a unique number that is provided and used by local TB programs to match to the local TB registry.

Case Local ID and Latest Update Date



A Case Local ID: A unique computer generated code for each case with data submitted to CDC. This identifier can be used to find duplicate records in NTSS.

B Latest Update Date: The date when data was last received at CDC for the respective record.

Example of how to use the Exported Line List to determine patients for whom a particular objective was not met

Background

The Export Line List option in NTIP will produce a list of cases for the Program Area and the time period of interest. The line list can be examined to see which cases contributed to meeting a specific objective and which cases did not. Below are instructions for how to conduct this examination. We will use the Completion of Therapy objective in this example.

1. Within NTIP, follow the steps in Chapter IV, Exporting NTIP Line-Listed Data, to select the Program Area, the cohort period of interest, and the indicator for Completion of Therapy, and export the line list.

2. Click "Run."

3. This downloads and exports your selected line list to a spreadsheet that you can open or save to your computer. In this example, we will open the line list in Excel.

4. Once you open the exported line list, you can use Excel functions to examine the information. We will show how to find cases for which treatment was incomplete according to the definition for this objective.

5. Click the column header for "Completion of treatment cohort" and the column header for "Completion of treatment objective met." After both columns are highlighted, click "Sort & Filter" from the Excel menu, and select "Filter."

6. Click on the downward arrow at the bottom of the column header for "Completion of treatment cohort."

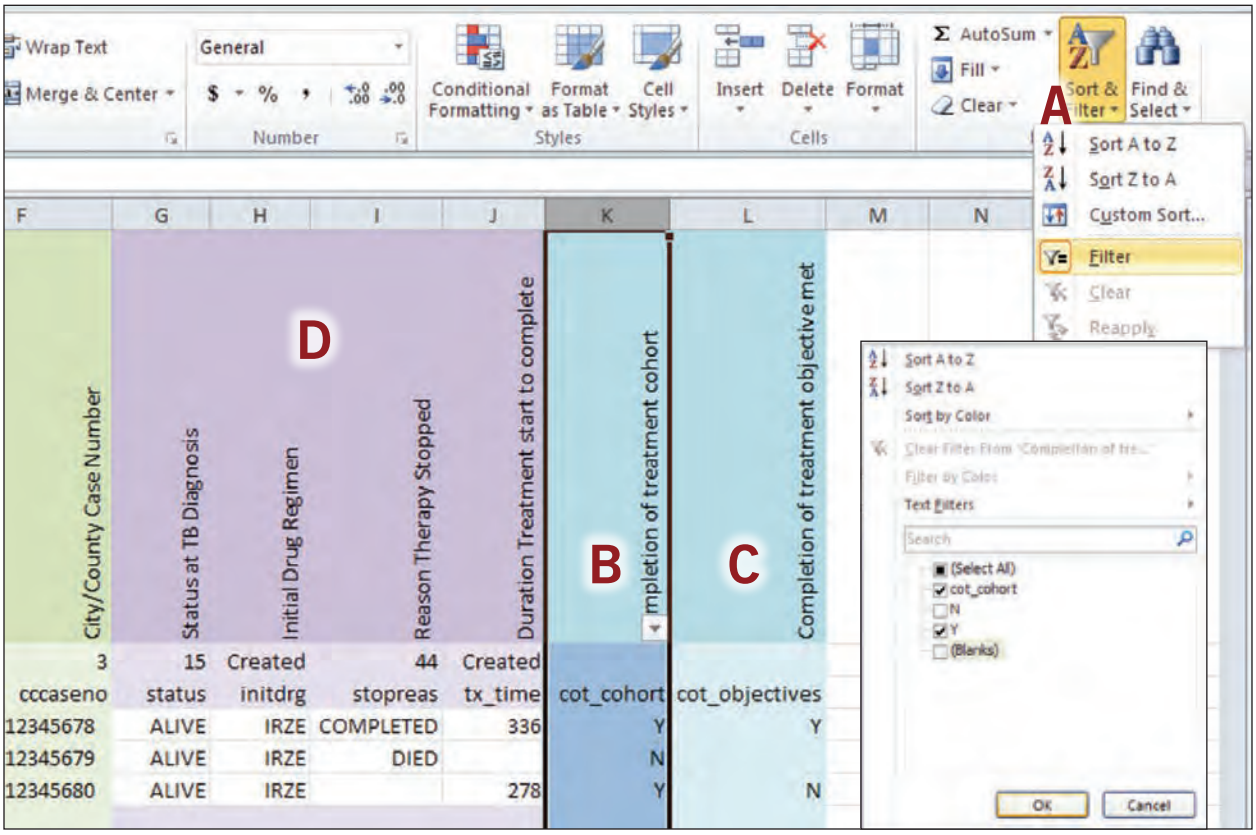
7. In the bottom of the sort & filter box, uncheck the selection for "N" (this instructs Excel to not show cases that did not meet the cohort eligibility criteria). Click "OK."

8. Click the downward arrow at the bottom of the column header for "Completion of treatment objective met."

9. Uncheck the selection for "Y" (this instructs Excel to show cases that did not meet the objective for Completion of Therapy). Click "OK."

10. You should now have a list of cases that met the eligibility criteria to be counted under the Completion of Therapy objective but did not meet the objective.

Exported Line List



A Sort & Filter: Excel's "Sort & Filter" function allows users to filter for cases that fit specific criteria; for example, you can sort those that meet the cohort eligibility criteria for an indicator. After you select a filter, the spreadsheet shows only those cases that meet the selected filter criteria.

B Analytic cohort for a specific indicator: An analytic cohort consists of those cases that meet the eligibility criteria for the objective. "Y"= Yes, the case met the cohort definition and is eligible to meet the objective (for example, patients who according to standard treatment guidelines should be able to complete treatment within 12 months). "N" = No, the case did not meet the cohort definition and is not included in the calculation of the objective.

C Indicator objective met: This variable indicates whether the case met the objective. "Y"= Yes, the case met the objective; "N"= No, the case did not meet the objective (for example, whether or not a patient completed treatment within 12 months). Fields left "blank" indicate the variable does not apply to the case.

D Selected variables (highlighted in purple): Data on key variables that are used to determine whether a case met the cohort eligibility criteria and the objective.

Note: *Another example on using the Line List is provided on page 132.*

V. Monitoring Progress on Reducing TB Incidence

This chapter covers indicators that are related to TB incidence rates.

Indicators for TB Elimination - Incidence Rates

- TB Incidence Rate (Overall)
- U.S.-Born Persons
- Foreign-Born Persons
- U.S.-Born Non-Hispanic Blacks or African Americans
- Children Younger than 5 Years of Age

Data on TB cases are collected in the RVCT form and reported to CDC through the National TB Surveillance System (NTSS). All TB cases included in this set of indicators have been counted by reporting jurisdictions and meet the CDC TB surveillance definition and case verification criteria. (For tuberculosis case definition and recommendations for reporting and counting tuberculosis cases, please refer to Appendices A and B in the CDC Tuberculosis Surveillance Data Training, Report of Verified Case of Tuberculosis (RVCT): Instruction Manual, June 2009. Updates on surveillance definitions can also be found in the most recent publication of Reported Tuberculosis in the United States.

The United States Census Bureau's Population Estimates are used to calculate overall TB incidence rates. American Community Survey population data are used to calculate rates for the sub-populations. Incidence rate reports are available in the yearly trend for states and selected cities receiving direct CDC funding only.

This set of indicators contributes to TB elimination by measuring incidence rates in groups for whom TB incidence is high. While not all four incidence rates are relevant to all settings in the United States, these four incidence rates represent major disparities between various population groups nationally. For some TB programs, incidence rates for different sub-populations may be more important to monitor.

Resources

Treatment of Tuberculosis, *MMWR* 2003; 52 (No. RR-11)
http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf

CDC Tuberculosis Surveillance Data Training, Report of Verified Case of Tuberculosis (RVCT): Instruction Manual, June 2009. Appendices A and B.
http://www.cdc.gov/tb/programs/rvct/InstructionManual.pdf

CDC. Reported Tuberculosis in the United States, 2013. Appendices A and B.
http://www.cdc.gov/tb/statistics/reports/2013/default.htm

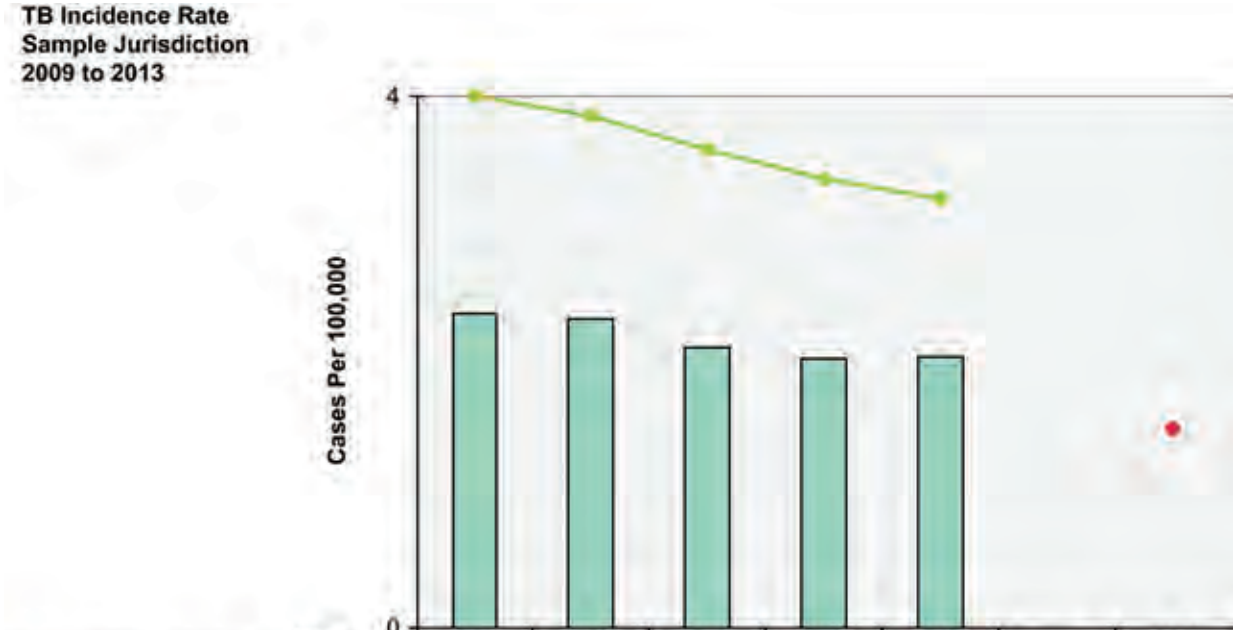
American Community Survey
http://www.census.gov/acs/www

TB Incidence Rate (Overall)

National Objective: Reduce the incidence of TB disease

Indicator

Number of TB cases per 100,000 per year



Year	2009	2010	2011	2012	2013	--	2020
Incidence Rate	2.2	2.2	2.0	1.9	1.9	--	
Program Targets	--	--	--	--	--	--	
National Average	3.8	3.6	3.4	3.2	3.0	--	
National Target						--	1.4

Year	2009	2010	2011	2012	2013
Population in Sample Jurisdiction (N)	11,150,387	11,206,969	11,220,771	11,233,030	11,243,764
Cases (n)	246	243	221	213	215

CALCULATION

Cases Per 100,000	n/N
Numerator (n)	Number of verified counted TB cases
Denominator (N)	Population in the Program Area and year of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT)
- U.S. Census Bureau
  - Population Estimates

    or

  - American Community Survey (ACS)

Note: *Both Census's Population Estimates and ACS provide similar estimates for the overall population.*

The TB incidence rate measures the burden of TB disease in a designated population. It provides a way for public health officials to assess the long-term outcome of TB prevention and control efforts and disease transmission. The TB incidence rate has steadily decreased in the United States since 1993. A substantial increase in TB incidence rate would therefore merit close investigation to determine the cause and to implement interventions. Conversely, a larger than expected decrease warrants investigation to determine whether it represents a true decrease or a gap in case detection, surveillance, or notification.

Calculating the annual incidence rate enables program officials to track progress against previous years. Case stratifications may help identify communities or jurisdictions that require additional attention. These data also help support policy decisions and requests for funding.

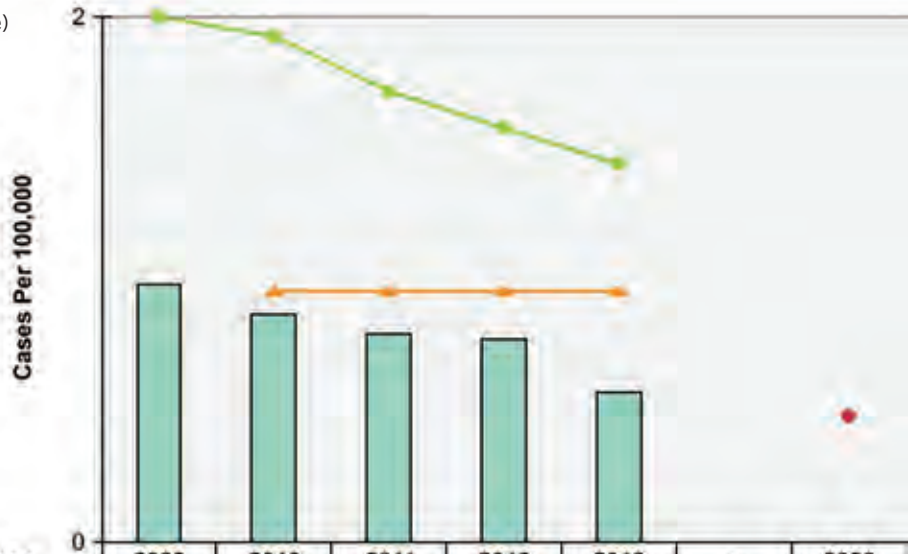
U.S.-Born Persons

National Objective: Decrease the incidence of TB disease among U.S.-born persons

Indicator

Number of TB cases in U.S.-born persons per 100,000 per year

TB Incidence Rate for U.S.-Born Persons
Sample Jurisdiction
2009 to 2013
(Quarterly report NOT available)



Year	2009	2010	2011	2012	2013	--	2020
Incidence Rate	0.8	0.7	0.7	0.6	0.5	--	
Program Targets	--	0.8	0.8	0.8	0.8	--	
National Average	1.7	1.6	1.4	1.3	1.2	--	
National Target						--	0.4

Year	2009	2010	2011	2012	2013
Population of U.S.-Born Persons in Sample Jurisdiction (N)	9,974,227	9,952,262	9,960,621	9,941,077	9,967,891
Cases in U.S.-Born Persons (n)	82	72	66	64	47

CALCULATION

Cases Per 100,000	n/N
Numerator (n)	Number of verified TB cases in U.S.-born persons
Denominator (N)	Population of U.S.-born persons in the Program Area and year of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) field:
    - 12 (Country of Birth)
    - 12 (Country of birth: Specify)
- U.S. Census Bureau
  - American Community Survey

Note: *Patients born in the U.S. territories and affiliated islands are reported as U.S-born.*

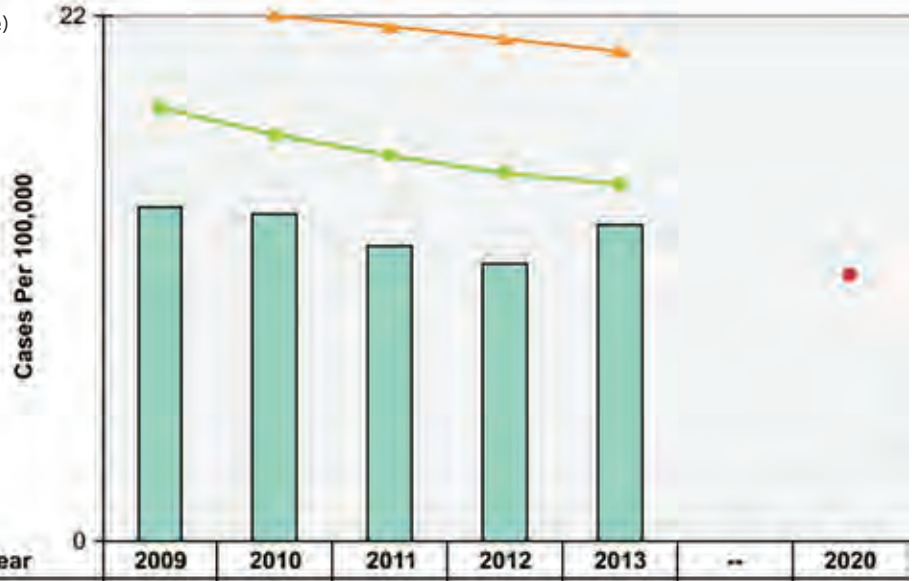
Foreign-Born Persons

National Objective: Decrease the incidence of TB disease among for foreign-born persons

Indicator

Number of TB cases in foreign-born persons per 100,000 per year

TB Incidence Rate for Foreign-Born Persons
Sample Jurisdiction
2009 to 2013
(Quarterly report NOT available)



Year	2009	2010	2011	2012	2013	--	2020
Incidence Rate	13.9	13.6	12.3	11.5	13.2	--	
Program Targets	--	22.0	21.5	21.0	20.5	--	
National Average	18.1	17.0	16.1	15.4	14.9	--	
National Target						--	11.1

Year	2009	2010	2011	2012	2013
Population of Foreign-Born Persons in Sample Jurisdiction (N)	1,176,160	1,254,707	1,260,150	1,291,953	1,275,873
Cases in Foreign-Born Persons (n)	164	171	155	149	168

CALCULATION

Cases Per 100,000	n/N
Numerator (n)	Number of verified counted TB cases in foreign-born persons
Denominator (N)	Population of foreign-born persons in the Program Area and year of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) field:
    - 12 (Country of Birth)
    - 12 (Country of birth: Specify)
- U.S. Census Bureau
  - American Community Survey

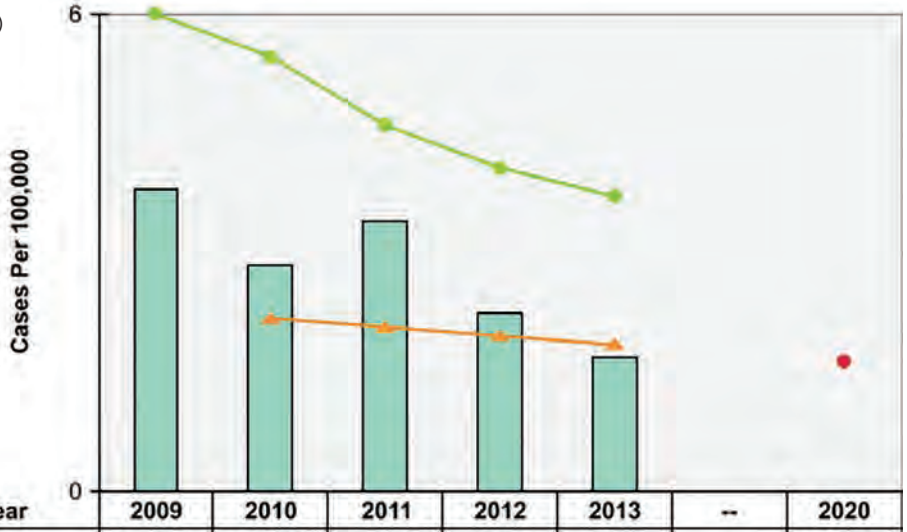
U.S.-Born Non-Hispanic Blacks or African Americans

National Objective: Decrease the incidence of TB disease among U.S.-born non-Hispanic blacks or African Americans

Indicator

Number of TB cases in U.S.-born non-Hispanic blacks or African Americans per 100,000 per year

TB Incidence Rate for U.S.-Born Non-Hispanic Blacks or African Americans
Sample Jurisdiction
2009 to 2013
(Quarterly report NOT available)



Year	2009	2010	2011	2012	2013	--	2020
Incidence Rate	3.5	2.6	3.1	2.1	1.5	--	
Program Targets	--	2.0	1.9	1.8	1.7	--	N/A
National Average	5.5	5.0	4.2	3.7	3.4	--	
National Target						--	1.5

Year	2009	2010	2011	2012	2013
Population of U.S.-Born Non-Hispanic Blacks or African Americans in Sample Jurisdiction (N)	772,985	764,277	765,817	775,925	778,841
Cases in U.S.-Born Non-Hispanic Blacks or African Americans (n)	27	20	24	16	12

CALCULATION

Cases Per 100,000	n/N
Numerator (n)	Number of verified counted TB cases in U.S.-born non-Hispanic blacks or African Americans
Denominator (N)	Population of U.S.-born non-Hispanic blacks or African Americans in the Program Area and year of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 10 (Ethnicity)
    - 11 (Race)
    - 12 (Country of Birth)
    - 12 (Country of birth: Specify)
- U.S. Census Bureau
  - American Community Survey

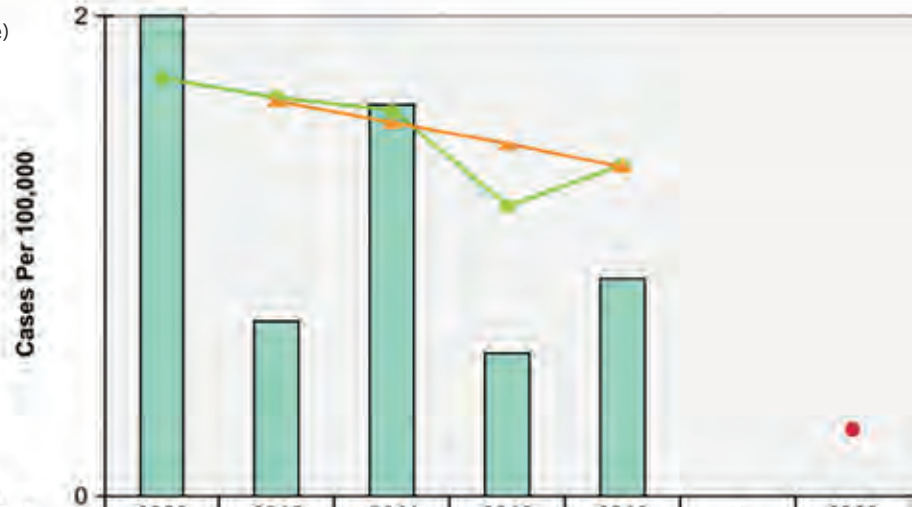
Children Younger than 5 Years of Age

National Objective: Decrease the incidence of TB disease among children younger than 5 years of age

Indicator

Number of TB cases in children younger than 5 years of age per 100,000 per year

TB Incidence Rate for Children Younger Than 5 Years of Age
Sample Jurisdiction
2009 to 2013
(Quarterly report NOT available)



Year	2009	2010	2011	2012	2013	--	2020
Incidence Rate	2.2	0.8	1.8	0.6	1.0	--	
Program Targets	--	1.8	1.7	1.6	1.5	--	
National Average	1.9	1.8	1.8	1.3	1.5	--	
National Target						--	0.3

Year	2009	2010	2011	2012	2013
Population of Children Younger Than 5 Years of Age in Sample Jurisdiction (N)	638,973	633,730	618,884	616,894	607,659
Cases in Children Younger Than 5 Years of Age (n)	14	5	11	4	6

CALCULATION

Cases Per 100,000	n/N
Numerator (n)	Number of verified counted TB cases in children younger than 5 years of age
Denominator (N)	Population of children younger than 5 years of age in the Program Area and year of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 1 (Date Reported)
    - 8 (Date of Birth)
- U.S. Census Bureau
  - American Community Survey

This indicator measures the incidence of TB disease in young children.

It has additional epidemiological implications because TB disease in young children reflects transmission of *M. tuberculosis* within the narrow interval of their lives (i.e., "recent transmission"), and it might represent missed public health opportunities to prevent cases.

VI. Monitoring Progress on Case Management and Treatment

This chapter covers indicators that are related to the case management and treatment of patients diagnosed with TB disease.

Indicators for Case Management and Treatment

- Known HIV Status
- Treatment Initiation
- Recommended Initial Therapy
- Sputum Culture Result Reported
- Sputum Culture Conversion
- Completion of Therapy

Data on TB cases are collected on the Report of Verified Case of Tuberculosis (RVCT) and reported to CDC through the National TB Surveillance System (NTSS).

All TB cases included for this set of indicators have been counted by reporting jurisdictions and meet the CDC TB surveillance definition and case verification criteria. (For tuberculosis case definition and recommendations for reporting and counting tuberculosis cases, please refer to Appendices A and B in the CDC Tuberculosis Surveillance Data Training, Report of Verified Case of Tuberculosis (RVCT): Instruction Manual, June 2009. Updates on surveillance definitions can also be found in the most recent publication of Reported Tuberculosis in the United States.)

This set of indicators contributes to program evaluation by tracking key outputs of TB case management and treatment processes. The public health concept is that TB transmission and eventually incidence can be reduced through prompt initiation of treatment coupled with monitoring to ensure treatment effectiveness and adherence. **Figure 3.1** is a logic model that outlines the activities, outputs, and the desired outcomes of TB prevention through case management and treatment of active TB cases.

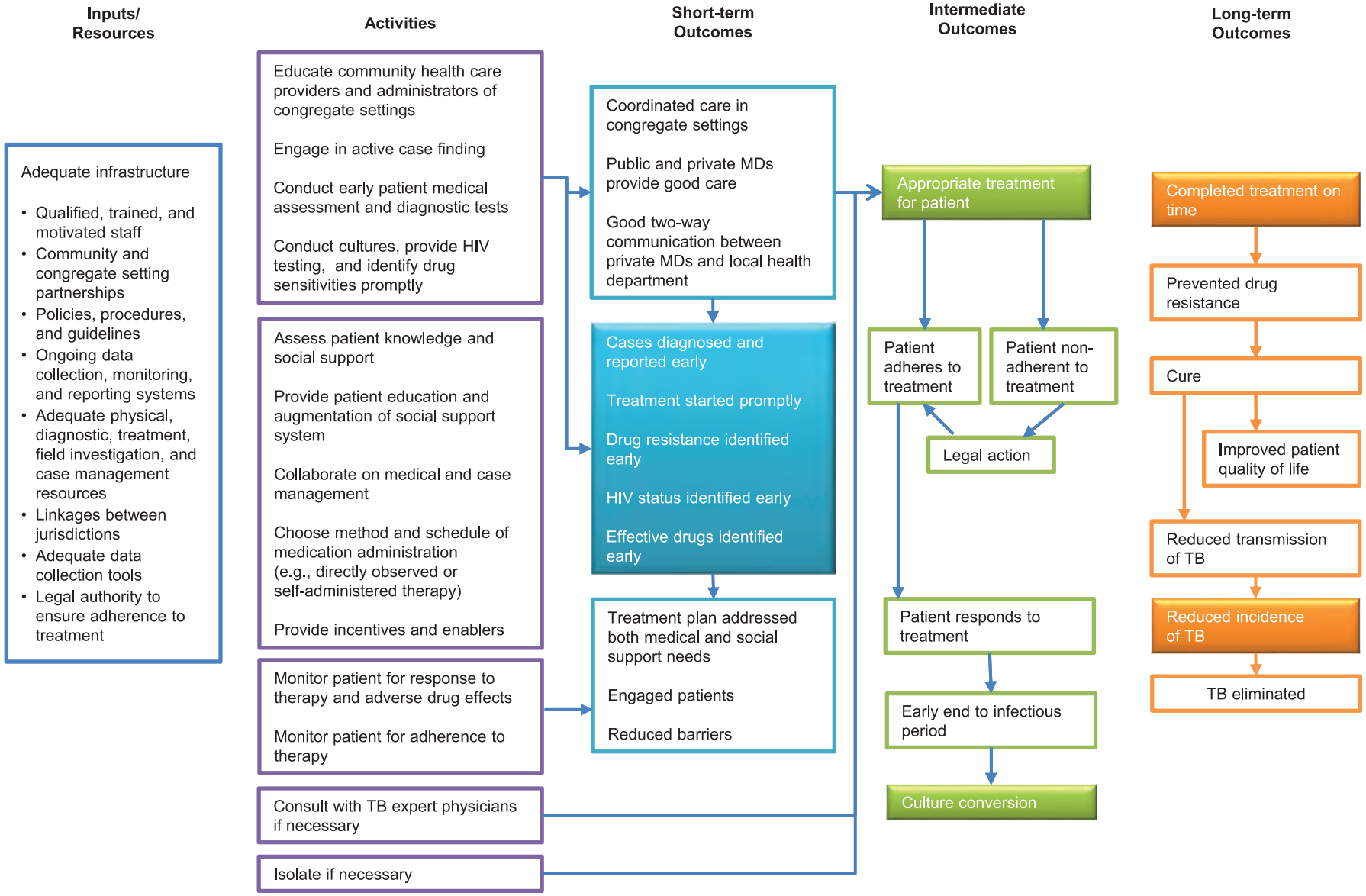
Resources

Treatment of Tuberculosis, *MMWR* 2003; 52 (No. RR-11)
http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf

CDC Tuberculosis Surveillance Data Training, Report of Verified Case of Tuberculosis (RVCT): Instruction Manual, June 2009
http://www.cdc.gov/tb/programs/rvct/InstructionManual.pdf

Red Book, 2015
http://aapredbook.aappublications.org/content/current

Figure 3.1: Logic Model for Tuberculosis Prevention through Case Management and Treatment of Tuberculosis Disease

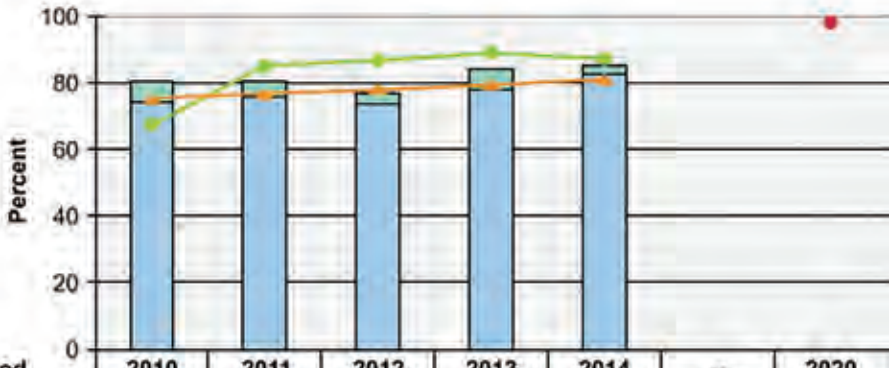


National Objective: Increase the proportion of TB patients who have a positive or negative HIV test result reported

Indicator

Percent of TB patients with HIV test result reported as positive or negative

Reporting of Positive or Negative HIV Test Result for TB Patients
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Cohort Period	2010	2011	2012	2013	2014	--	2020
HIV+ (%)	6.3	4.6	2.9	6.5	3.0	--	
HIV- (%)	74.1	75.7	73.6	77.7	82.2	--	
HIV Test Result Reported (%)	80.3	80.3	76.4	84.2	85.3	--	
Program Targets (%)	75.0	76.5	78.0	79.5	81.0	--	
National Average (%)	67.5	84.8	86.6	89.0	87.0	--	
National Target (%)						--	98.0

Cohort Period	2010	2011	2012	2013	2014
Total TB Patients (N)	239	218	208	215	197
HIV+ (n)	15	10	6	14	6
HIV- (n)	177	165	153	167	162
HIV Test Result Reported (n)	192	175	159	181	168
HIV Test Result Not Reported as Positive or Negative (n)	47	43	49	34	29

CALCULATION

Percent (%)	**n/N x 100**
Numerator (n)	Number of TB patients with HIV test result reported as positive or negative
Denominator (N)	Number of TB patients alive at diagnosis, counted in the cohort period of interest

Data Source

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) field:
    - 15 (Status at TB Diagnosis)
    - 26 (HIV Status at Time of Diagnosis)

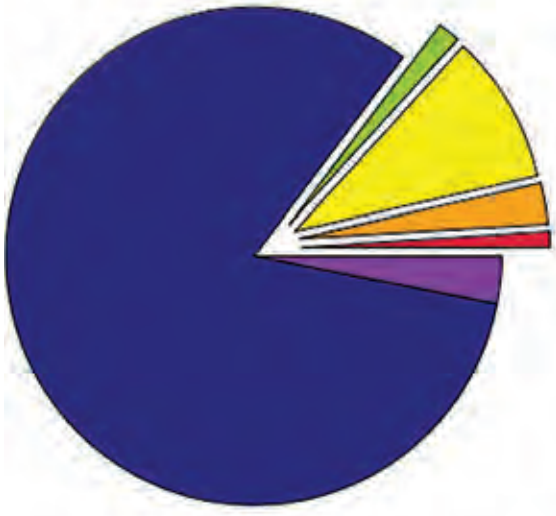
This indicator measures how many cases reported in the RVCT include an HIV test result, which reflects the extent to which the the guidance for testing all TB patients for HIV infection and reporting is being followed.

U.S. guidelines stipulate that all TB patients should be tested for HIV and have the results reported with other TB surveillance findings. TB patients who have HIV infection require special considerations for medical care. This indicator shows whether HIV testing is being offered and the results are being reported.

The trend graph on this indicator provides an estimated proportion of TB-HIV co-infection in the Program Area of interest, as well as the percentage of TB patients with known HIV test results at the time of TB diagnosis. The data quality of this indicator is assessed using the completeness of "HIV Status" variable. The bar graph changes from purple to blue when the completeness of this variable reaches 90%.

'HIV Test Results and Reasons HIV Status Not Determined for TB Patients' is a list of standardized reasons why HIV results are not known.

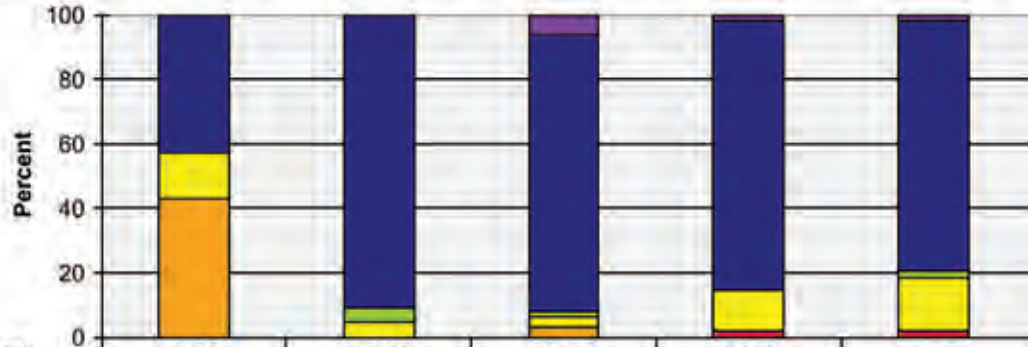
HIV Test Results and Reasons HIV Status Not Determined for TB Patients
Sample Jurisdiction
2014
(Quarterly report available)



	No.	(%)
Total TB Patients	197	(100.0)
HIV+	6	(3.0)
HIV-	162	(82.2)
Indeterminate HIV Test Result	0	(0.0)
HIV Test Done, Result Unknown	3	(1.5)
Refused HIV Test	19	(9.6)
Not Offered HIV Test	5	(2.5)
Unknown/Missing	2	(1.0)

HIV tests may not be offered for many reasons. The graph below, 'HIV Test Results and Reasons HIV Status Not Determined for TB Patients, by Age Group,' allows program staff members to look at the test results and the reasons for not having results, stratified by age.

HIV Test Results and Reasons HIV Status Not Determined for TB Patients, by Age Group
Sample Jurisdiction
2014
(Quarterly report available)



Age (years)	≤14		15-24		25-44		45-64		≥65	
Total TB Patients	7	(100.0)	22	(100.0)	63	(100.0)	56	(100.0)	49	(100.0)
HIV+	0	(0.0)	0	(0.0)	4	(6.3)	1	(1.8)	1	(2.0)
HIV-	3	(42.9)	20	(90.9)	54	(85.7)	47	(83.9)	38	(77.6)
Indeterminate HIV Test Result	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)
HIV Test Done, Result Unknown	0	(0.0)	1	(4.5)	1	(1.6)	0	(0.0)	1	(2.0)
Refused HIV Test	1	(14.3)	1	(4.5)	2	(3.2)	7	(12.5)	8	(16.3)
Not Offered HIV Test	3	(42.9)	0	(0.0)	2	(3.2)	0	(0.0)	0	(0.0)
Unknown/Missing	0	(0.0)	0	(0.0)	0	(0.0)	1	(1.8)	1	(2.0)

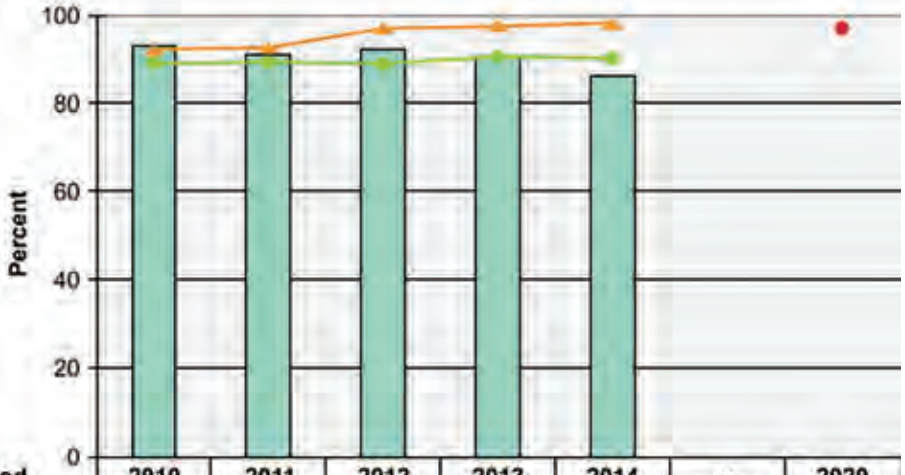
Treatment Initiation

National objective: For TB patients with positive acid-fast bacillus (AFB) sputum-smear results, increase the proportion who initiated treatment within 7 days of specimen collection

Indicator

Percent of TB patients with positive AFB sputum-smear result who initiated treatment within 7 days of specimen collection

Treatment Initiation Within 7 Days of Specimen Collection for Patients with Positive Acid-Fast Bacillus (AFB) Sputum-Smear Results
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Cohort Period	2010	2011	2012	2013	2014	--	2020
Initiated Treatment Within 7 Days (%)	93.2	91.1	92.0	90.5	86.1	--	
Program Targets (%)	92.0	92.5	97.0	97.5	98.0	--	
National Average (%)	89.1	89.3	88.8	90.5	90.1	--	
National Target (%)						--	97.0

Cohort Period	2010	2011	2012	2013	2014
Total Patients with Positive AFB Sputum-Smear Results (N)	73	79	75	63	72
Treatment Initiated Within 7 Days (n)	68	72	69	57	62
Treatment Not Initiated Within 7 Days (n)	5	7	6	6	10

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of TB patients who initiated treatment within 7 days of specimen collection
Denominator (N)	Number of TB patients with positive AFB sputum-smear results, alive at diagnosis, counted in the cohort period of interest

DATA SOURCES

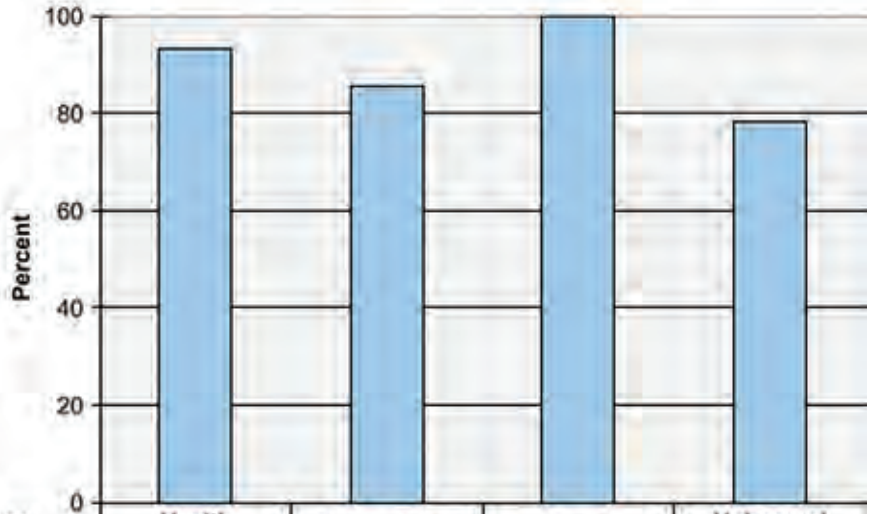
- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 15 (Status at TB Diagnosis)
    - 17 (Sputum Smear-Date Collected)
    - 36 (Date Therapy Started)
    - 37 (Initial Drug Regimen)

This indicator measures the promptness of initiating treatment for the patients who are more likely to be infectious — those who have AFB found on sputum-smear microscopy.

This indicator was recommended by the working group because prompt TB diagnosis and treatment for patients who have AFB found on sputum-smear microscopy are both feasible and urgent, in keeping with national guidelines for medical care, program operations, and infection control. This indicator gives a summary overview of several interrelated activies which routinely could be assessed through reviews of cases and the cohort, and it is not a substitute for those types of review.

'Treatment Initiation within 7 Days of Specimen Collection for TB Patients with Positive AFB Sputum-smear Results, by Provider Type' allows program staff to observe differences, depending on provider type (i.e., health department or private provider), in meeting the objective.

Treatment Initiation Within 7 Days of Specimen Collection for TB Patients with Positive Acid-Fast Bacillus (AFB) Sputum-Smear Results, by Provider Type
Sample Jurisdiction
2014
(Quarterly report available)



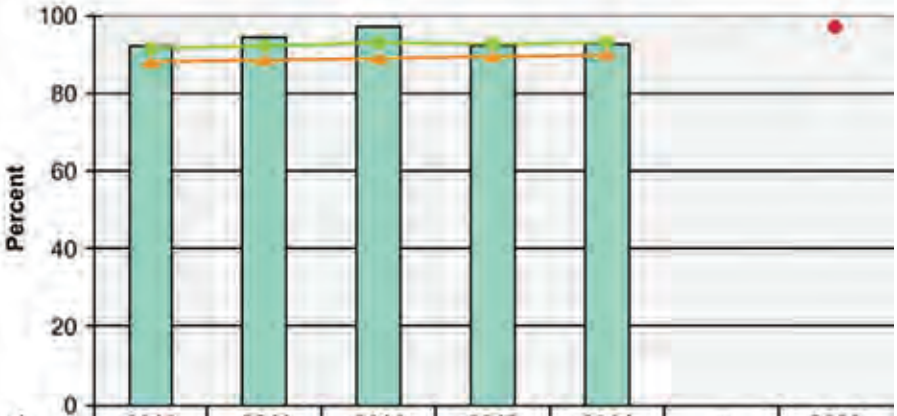
Provider Type	Health Department	Private/Other	Both	Unknown/ Missing
Total Patients with Positive AFB Sputum-Smear Results (N)	29	7	4	32
Treatment Initiated Within 7 Days (n)	27	6	4	25
Treatment Not Initiated Within 7 Days (n)	2	1	0	7

National objective: For patients whose diagnosis is likely to be TB disease, increase the proportion who are started on the recommended initial 4-drug regimen

Indicator

Percent of TB patients with initial drug regimen reported who are started on the recommended initial 4-drug regimen

Patients Who Are Started on the Recommended Initial 4-Drug Regimen When TB Disease is the Likely Diagnosis
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Cohort Period	2010	2011	2012	2013	2014	--	2020
Patients Started on Recommended 4 Drugs (%)	92.1	94.5	97.1	92.1	92.4	--	
Program Targets (%)	88.0	88.5	89.0	89.5	90.0	--	
National Average (%)	91.4	92.2	93.0	92.6	93.1	--	
National Target (%)						--	97.0

Cohort Period	2010	2011	2012	2013	2014
Total Patients Alive at Diagnosis	239	218	208	215	197
With Initial Drug Regimen Reported (N)	239	218	208	214	197
Started on Recommended 4 Drugs (n)	220	206	202	197	182
Did Not Start on Recommended 4 Drugs (n)	19	12	6	17	15

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of TB patients who are started on the recommended initial 4-drug regimen
Denominator (N)	Number of TB patients with initial drug regimen reported, alive at diagnosis, counted in the cohort period of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 15 (Status at TB Diagnosis)
    - 37 (Initial Drug Regimen)

This indicator measures the proportion of TB patients started on treatment with the four-drug regimen including isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB).

Because of isoniazid-resistant tuberculosis, guidance in the United States calls for a four-drug regimen including INH, RIF, PZA, and EMB for the initial phase of TB treatment for patients whose drug susceptibility results are unknown at the time treatment is started.

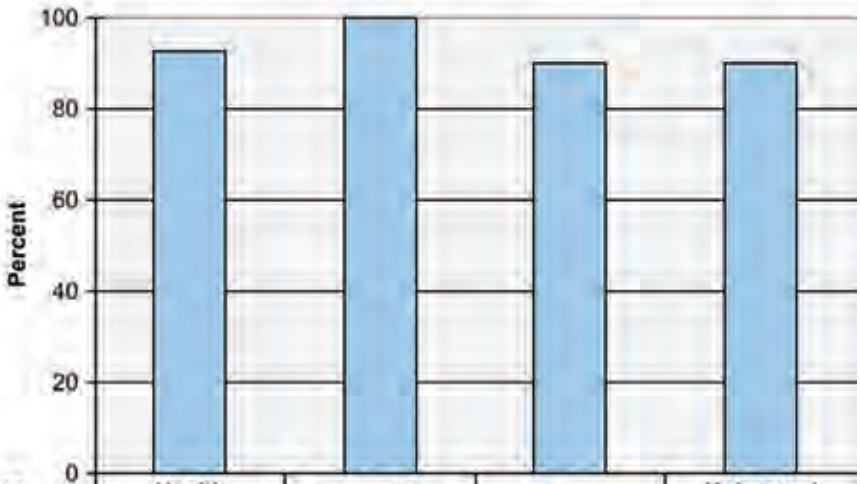
The variable 'initial drug regimen' used in the indicator calculation consists of all drugs prescribed or taken in the first 2 weeks of treatment.

Rifabutin is accepted as an alternative drug to rifampin for the recommended initial drug regimen for all TB patients. Another drug, rifapentine is acceptable for use among HIV co-infected patients in the continuation phase of the treatment, but it is not recommended for use during initial therapy. **Please refer to Treatment of Tuberculosis guidelines for details.**

TB programs are encouraged to monitor this indicator by provider type to determine which providers may not be adhering to the treatment recommendations.

Patients Who Are Started on the Recommended Initial 4-Drug Regimen When TB Disease is the Likely Diagnosis, by Provider Type
Sample Jurisdiction
2014

(Quarterly report available)



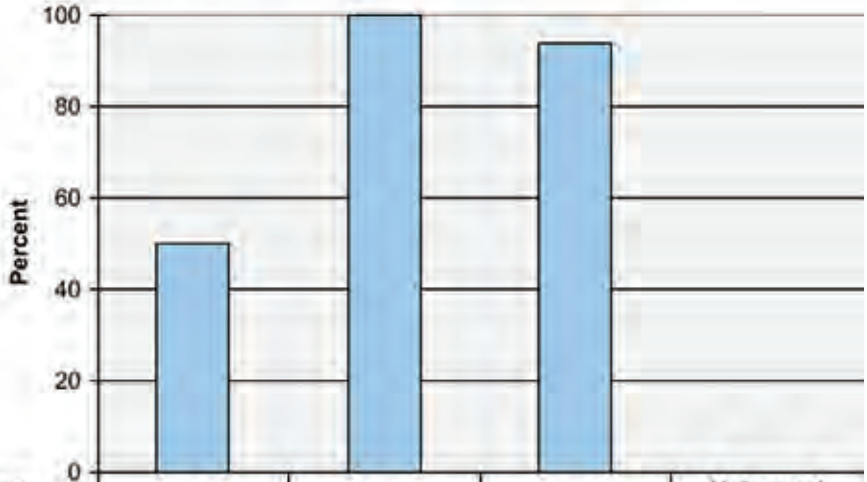
Provider Type	Health Department	Private/Other	Both	Unknown/ Missing
Started on Recommended 4 Drugs (%)	92.7	100.0	90.0	89.7

Provider Type	Health Department	Private/Other	Both	Unknown/ Missing
Total Patients With Initial Drug Regimen Reported (N)	82	27	10	78
Started on Recommended 4 Drugs (n)	76	27	9	70
Did Not Start on Recommended 4 Drugs (n)	6	0	1	8

In some instances, PZA may be withheld for patients with special conditions such as liver disease, gout, or pregnancy. However, these cases cannot be recognized specifically in the national surveillance system because of the lack of data collected on these conditions in the RVCT form, and therefore they cannot be excluded from the cohort. Officials in TB programs should monitor this indicator, review the use of regimens for special conditions, and follow-up with providers.

In pediatric TB patients, physicians may choose to withhold the use of EMB when the visual acuity of the patients cannot be monitored because EMB can cause optic neuritis. The graph below stratifies this indicator by age group to help programs monitor treatment in children younger than 5 years of age.

Patients Who Are Started on the Recommended Initial 4-Drug Regimen When TB Disease is the Likely Diagnosis, by Age Group
Sample Jurisdiction
2014
(Quarterly report available)



Age Group	<5	5 to 14	>14	Unknown/ Missing
☐ Started on Recommended 4 Drugs (%)	50.0	100.0	93.7	—

Age Group	<5	5 to 14	>14	Unknown/ Missing
Total Patients With Initial Drug Regimen Reported (N)	6	1	190	0
Started on Recommended 4 Drugs (n)	3	1	178	0
Did Not Start on Recommended 4 Drugs (n)	3	0	12	0

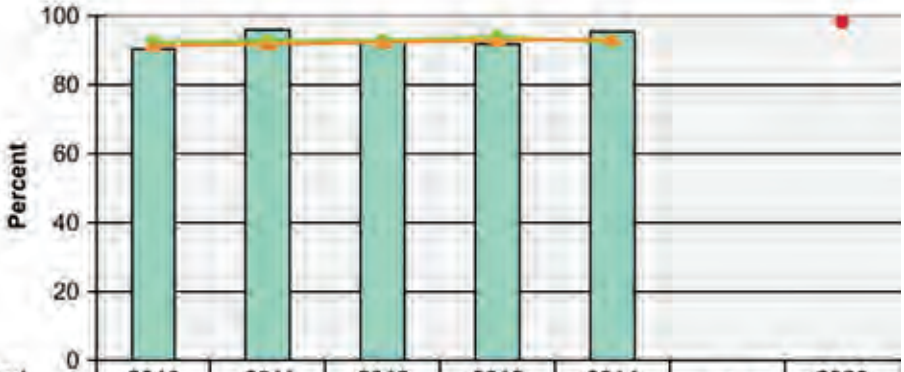
Sputum Culture Result Reported

National Objective: For TB patients ages 12 years or older with a pleural or respiratory site of disease, increase the proportion who have a sputum culture result reported

Indicator

Percent of TB patients ages 12 years or older with a pleural or respiratory site of disease who have sputum culture result reported

Reporting of Sputum Culture Result for Patients Ages 12 Years or Older with a Pleural or Respiratory Site of Disease
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Cohort Period	2010	2011	2012	2013	2014	--	2020
Sputum Culture Result Reported (%)	90.1	95.7	92.1	91.6	94.9	--	
Program Targets (%)	91.0	91.5	92.0	92.5	93.0	--	
National Average (%)	92.1	92.4	92.6	93.7	92.1	--	
National Target (%)						--	98.0

Cohort Period	2010	2011	2012	2013	2014
Total TB Patients with a Pleural or Respiratory Site of Disease	188	173	157	159	162
Total TB Patients Ages 12 Years or Older with Pleural or Respiratory Site of Disease (N)	181	164	151	155	157
Sputum Culture Result Reported (n)	163	157	139	142	149
Sputum Culture Result Not Reported (n)	18	7	12	13	8

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of TB patients with sputum culture results reported
Denominator (N)	Number of TB patients ages 12 years or older with a pleural or respiratory (i.e., pulmonary and laryngeal) site of disease, alive at diagnosis, counted in the cohort period of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 1 (Date Reported)
    - 8 (Date of Birth)
    - 15 (Status at TB Diagnosis)
    - 16 (Site of TB Disease)
    - 18 (Sputum Culture)

This indicator measures the extent to which the TB program or health care providers ensure that sputum specimen is collected and results reported for TB patients.

Obtaining a sputum specimen is necessary to assess a patient's level of infectiousness, identify the organism, test drug susceptibility, and obtain genotype results. Isolation of *M. tuberculosis* from children with pulmonary TB can be a challenge, which is why the working group recommended that the cohort for this objective be limited to TB patients ages 12 years or older. However, specimen collection from children for bacteriology is recommended by the American Throracic Society, the American Academy of Pediatrics, and CDC, without limitations for age.

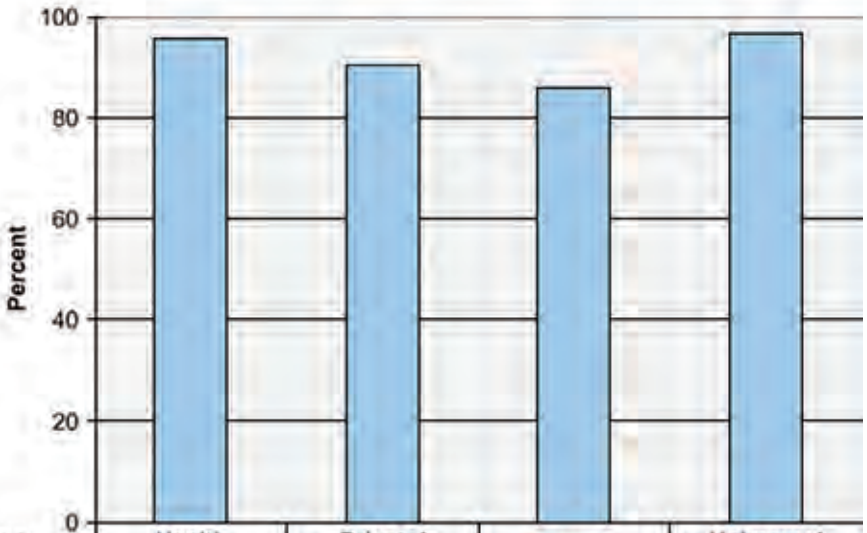
"Sputum culture result reported" is defined as having either a positive or a negative sputum culture result reported to CDC. This specimen should have been collected within 2 weeks after the patient has initiated treatment. "Sputum culture result not reported" includes results that were not done, unknown, or missing.

While sputum culture will not be needed for the diagnosis of tuberculosis and detection of drug-resistance tuberculosis as the use of nucleic acid amplification test and rapid molecular test become more widely adopted, it will remain important and needed for obtaining genotype results.

'Reporting of Sputum Culture Results for TB Patients Ages 12 Years or Older with a Pleural or Respiratory Site of Disease, by Provider Type' allows TB programs to assess practices by provider type.

Reporting of Sputum Culture Result for Patients Ages 12 Years or Older with a Pleural or Respiratory Site of Disease, by Provider Type
Sample Jurisdiction
2014

(Quarterly report available)



Provider Type	Health Department	Private/ Other	Both	Unknown/ Missing
Total TB Patients Ages 12 Years or Older with a Pleural or Respiratory Site of Disease (N)	69	21	7	60
Sputum Culture Result Reported (n)	66	19	6	58
Sputum Culture Result Not Reported (n)	3	2	1	2

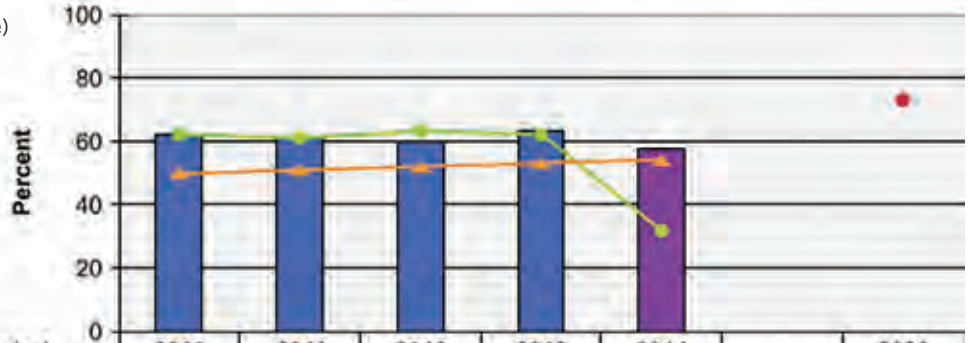
Sputum Culture Conversion

National objective: For TB patients with positive sputum culture results, increase the proportion who have documented conversion to negative results within 60 days of treatment initiation

Indicator

Percent of TB patients with positive sputum culture results who have documented conversion to negative results within 60 days of treatment initiation

Sputum Culture Conversion Documented Within 60 Days of Treatment Initiation for Patients with Positive Sputum Culture Results
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Cohort Period	2010	2011	2012	2013	2014	--	2020
Documented Conversion Within 60 Days (%)*	62.1	60.9	60.0	63.0	57.4	--	
Program Targets (%)	50.0	51.0	52.0	53.0	54.0	--	
National Average (%)	62.0	61.1	63.3	62.0	31.7	--	
National Target (%)						--	73.0

* Alternative colors on the chart indicate that the data are incomplete.

Cohort Period	2010	2011	2012	2013	2014
Total TB Patients with Positive Sputum Culture Results Initiated Treatment (N)	103	110	90	100	115
Converted Within 60 Days (n)	64	67	54	63	66
Converted After 60 Days (n)	29	26	27	28	14
No Documentation of Conversion (n)	10	17	9	9	35

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of TB patients who have documented conversion to negative results within 60 days of treatment initiation
Denominator (N)	Number of TB patients with positive sputum culture results, alive at diagnosis, who have initiated treatment, counted in the cohort period of interest. Patients who died within 60 days of initiating treatment are excluded. For cohort 2009 onward, patients who moved out of the country within 60 days of initiating treatment are also excluded

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 15 (Status at TB Diagnosis)
    - 18 (Sputum Culture)
    - 36 (Date Therapy Started)
    - 37 (Initial Drug Regimen)
    - 41 (Sputum Culture Conversion Documented)
      - Yes/No/Unknown
      - Date specimen collected
    - 42 (Moved)
    - 43 (Date Therapy Stopped)
    - 44 (Reason Therapy Stopped or Never Started)

This indicator measures the extent to which sputum specimens are obtained promptly and culture conversion is documented. While conversion within 60 days is optimal, and documented conversion after 60 days is still acceptable, large numbers of cases with no such documentation suggests the need for improving procedures so that staff members understand the importance of documenting culture conversion.

The completeness of this indicator is marked by the change of the purple bar graph to blue when the completeness of the variable, "Sputum Culture Conversion Documented" reaches 90% for the respective analytical cohort.

The objective of monitoring culture conversion within 60 days has practical significance in the treatment of TB patients. While not all patients have conversion within 60 days, particularly those with cavitary disease and sputum smear-positive result, sputum collection and monitoring for culture conversion around the 60-day period is essential for assessing treatment progress and evaluating the effectiveness of a treatment regimen.

According to the Treatment of Tuberculosis guidelines, approximately 80% of patients with pan-susceptible pulmonary TB who had a positive sputum culture result before starting treatment will have a conversion to culture-negative after receiving 2 months of treatment. Refining treatment regimens, closely monitoring patients to ensure adherence, and extending treatment to a minimum of 9 months may be warranted for treatment success if conversion did not take place within 60 days of treatment initiation.

Sputum culture conversion is defined as 2 consecutive negative cultures with no positive cultures thereafter. The date of conversion is the specimen collection date for the first consistently negative culture.

The Treatment of Tuberculosis guidelines recommend that sputum specimen collection for microscopic exams and culture be done monthly until two consecutive specimens have negative culture results, indicating successful culture conversion. Obtaining specimens and laboratory testing for assessing culture conversion can be costly. TB programs and health care providers need to balance between costs, and optimize return in investment, while striving for increased performance on this indicator.

'Sputum Culture Conversion for Patients with Positive Sputum Culture Results' provides the data for TB programs to assess the proportion of cases with delayed or no documented conversion.

Sputum Culture Conversion for Patients with Positive Sputum Culture Results
Sample Jurisdiction
2014
(Quarterly report available)

	No.	(%)
Total TB Patients with Positive Sputum Culture Results Initiated Treatment (N)	115	(100.0)
No Documentation of Conversion	35	(30.4)
Converted After 60 Days	14	(12.2)
Converted Within 60 Days	66	(57.4)

A stratification of this indicator by provider type is provided to help TB program managers focus further evaluation activities.

Sputum Culture Conversion for Patients with Positive Sputum Culture Results, by Provider Type
Sample Jurisdiction
2014
(Quarterly report available)

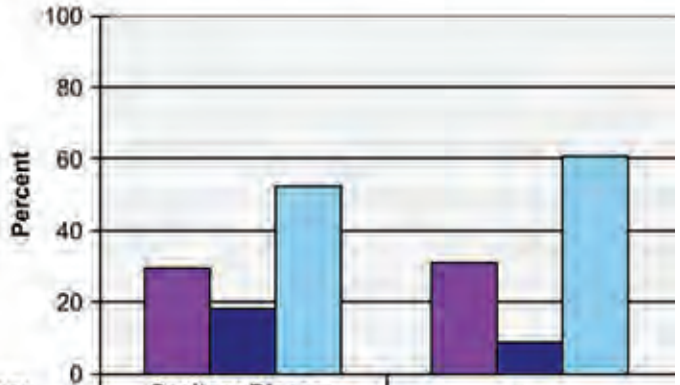
Provider Type	Health Department	Private/Other	Both	Unknown/ Missing
No Documentation of Conversion (%)	14.3	36.4	0.0	49.0
Conversion After 60 Days (%)	14.3	0.0	16.7	12.2
Conversion Within 60 Days (%)	71.4	63.6	83.3	38.8

Provider Type	Health Department	Private/Other	Both	Unknown/ Missing
Total TB Patients with Positive Sputum Culture Results Initiated Treatment (N)	49	11	6	49
No Documentation of Conversion (n)	7	4	0	24
Converted After 60 Days (n)	7	0	1	6
Converted Within 60 Days (n)	35	7	5	19

While most cases convert from a positive to a negative culture result within 60 days, research has found that patients with more severe forms of TB, particularly those with cavitary disease and AFB-positive sputum smears, take longer to convert. Using the graph, **'Sputum Culture Conversion for Patients with Positive Sputum Culture Results, by Cavitary Disease and Positive Sputum Smear Result,'** TB program managers can monitor and assess the sputum culture conversion rates for those with or without cavitary disease and positive smears.

Sputum Culture Conversion for Patients with Positive Sputum Culture Results, by Cavitary Disease and Positive Sputum Smear Results
Sample Jurisdiction
2014

(Quarterly report available)



Disease Category	Cavitary Disease Smear-positive	Other
No Documentation of Conversion (%)	29.5	31.0
Conversion After 60 Days (%)	18.2	8.5
Conversion Within 60 Days (%)	52.3	60.6

Disease Category	Cavitary Disease Smear-positive	Other
Total TB Patients with Positive Sputum Culture Results Initiated Treatment (N)	44	71
No Documentation of Conversion (n)	13	22
Converted After 60 Days (n)	8	6
Converted Within 60 Days (n)	23	43

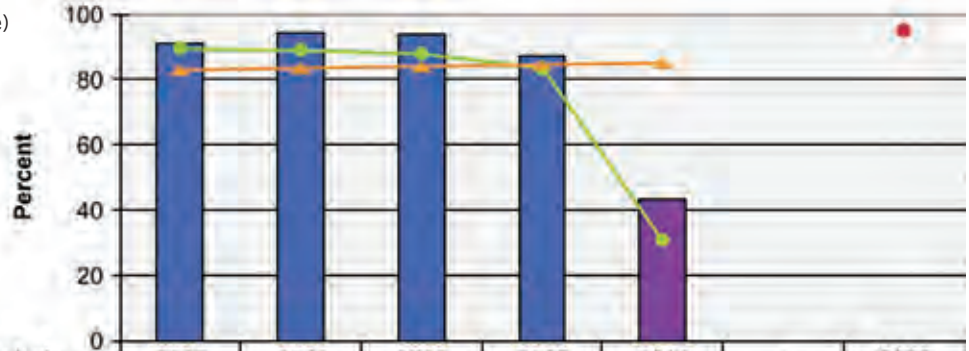
In some instances, culture conversion was reported to have taken place before the date treatment was initiated. These cases are indicated by a negative number of days from treatment initiation to culture conversion on the line listed data for this indicator. While it is possible that patients with low bacterial load may have a subsequent negative culture result reported prior to starting treatment, laboratory contaminations or errors have been found among cases reported with a single positive culture result. TB program staff is encouraged to review cases with negative culture conversion days, in particular for cases recorded with a single positive culture, to ensure laboratory contamination or error is not the cause.

National objective: For patients with newly diagnosed TB disease for whom 12 months or less of treatment is indicated, increase the proportion who complete treatment within 12 months

Indicator

Percent of patients with newly diagnosed TB disease for whom treatment for 12 months or less is indicated who completed treatment within 12 months (366 days)

Treatment Completion Within 12 Months for Eligible Patients
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Cohort Period	2010	2011	2012	2013	2014	--	2020
Completed Treatment Within 12 Months (%)*	91.3	94.1	93.6	87.3	43.0	--	
Program Targets (%)	83.0	83.5	84.0	84.5	85.0	--	
National Average (%)	89.6	89.1	87.9	83.2	30.7	--	
National Target (%)						--	95.0

* Alternative colors on the chart indicate that the data are incomplete.

Cohort Period	2010	2011	2012	2013	2014
Total Eligible Patients (N)	207	188	171	173	172
Patients Completed Treatment (Ever) (n)	204	183	168	164	75
Patients Completed Treatment Within 12 Months (n)	189	177	160	151	74
Patients Did Not Complete Treatment (n)	3	5	3	9	97

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of TB patients who complete treatment in less than or equal to 366 days
Denominator (N)	Number of TB patients who are eligible[1] to complete treatment within 12 months, alive at diagnosis, and have started treatment. Patients who died within 366 days of initiating treatment are excluded. For cohort 2009 onward, patients who moved out of the country[2] within 366 days of initiating treatment are also excluded

NOTE:

[1]Conditions that require patients to have an extended course of treatment and thus not eligible to complete treatment within 12 months are excluded from this cohort. These conditions include

- Meningeal TB
- TB in the central nervous system
- TB in bone or joint and the skeletal system
- Initial drug-susceptibility reported as resistant to rifampin
- Cases in patients age 0–14 years with disseminated TB
    - Disseminated TB is defined as –
        - Evidence of miliary TB on chest radiograph or chest CT scan, or
        - A positive result from culture of blood specimen
        - A positive result of NAA testing from blood specimen

All other patients are included in this calculation (i.e., those with negative culture result, those with an unknown culture status, and those with positive culture result but unknown initial drug-susceptibility test results).

[2] Patients who moved outside of country within 366 days of initiating treatment are excluded for cases reported in 2009 onward.

Patients who moved out of the country are defined as those –

- Reported as "Yes" on the question "Did the patient move during TB therapy?" in the RVCT data item "MOVED"

  And

- Checked the box for "Out of the U.S."

For cases in patients who moved out of the United States, "Reason Therapy Stopped" is reported as "Other." The "Date Therapy Stopped" reflects the date medication was last ingested by the patient prior to moving, or the date the patient moved outside of the country.

Treatment outcome data (i.e., "Reason Therapy Stopped" and "Date Therapy Stopped") for patients who moved outside of the country is updated when available. For these cases, the "Reason Therapy Stopped" may reflect "Completed" or "Died." The "Date Therapy Stopped" reflects the actual date when treatment was completed or date the patient died.

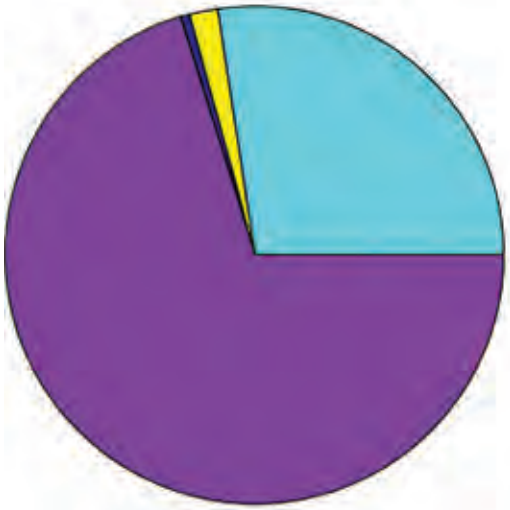
DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 1 (Date Report)
    - 8 (Date of Birth)
    - 15 (Status at TB Diagnosis)
    - 16 (Site of TB Disease)
    - 20 (Culture of Tissue and Other Body Fluids)
      - Anatomic code – Blood
    - 21 (Nucleic Acid AmplificationTest Result)
      - Anatomic code – Blood
    - 22 (Initial Chest Radiograph and Other Chest Imaging Study)
    - 36 (Date Therapy Started)
    - 37 (Initial Drug Regimen)
    - 40 (Initial Drug Susceptibility Results)
    - 42 (Moved)
    - 43 (Date Therapy Stopped)
    - 44 (Reason Therapy Stopped or Never Started)

This indicator measures the degree to which TB patients complete therapy on time. The completeness of the indicator data is determined by the completeness of the variable "Date Therapy Stopped."

Delays in completion of therapy can reflect treatment lapses and other undesirable outcomes such as default and loss to follow up. Most TB patients infected with a drug-susceptible *M. tuberculosis* strain should be able to complete treatment within 6 to 9 months. For drug resistance other than rifampin, TB patients are also expected to complete treatment within one year. The indicator, completion of treatment within 12 months, provides a 3 to 6 month grace period for the majority of TB patients. The following images from the Completion of Therapy Indicator Report illustrate the percentage of cases by treatment outcome and percentage of patients who completed treatment within 12 months by provider type and type of treatment supervision.

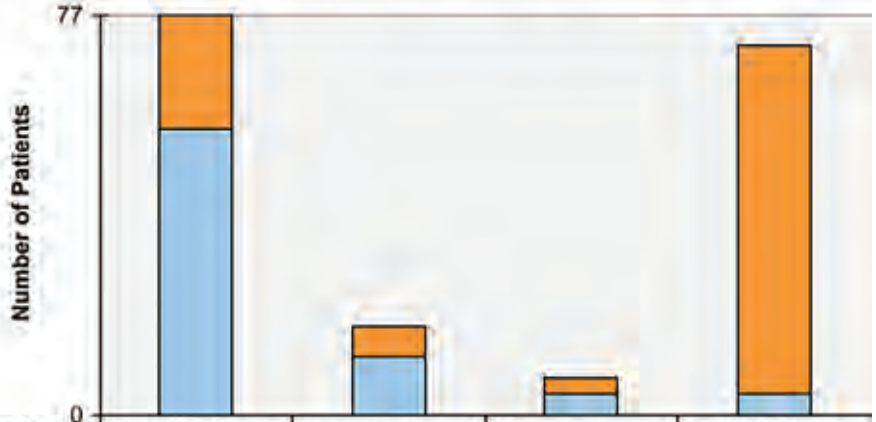
Treatment Outcomes for Eligible Patients
Sample Jurisdiction
2014
(Quarterly report available)



	No.	(%)
Total Eligible Patients	168	(100.0)
Treatment Completed Within 12 Months	118	(70.2)
Treatment Completed After 12 Months	1	(0.6)
Moved	0	(0.0)
Lost to Follow-up	0	(0.0)
Refused	3	(1.8)
Adverse Event	0	(0.0)
Died 1 Year After Initiating Treatment	0	(0.0)
Unknown/Missing	46	(27.4)

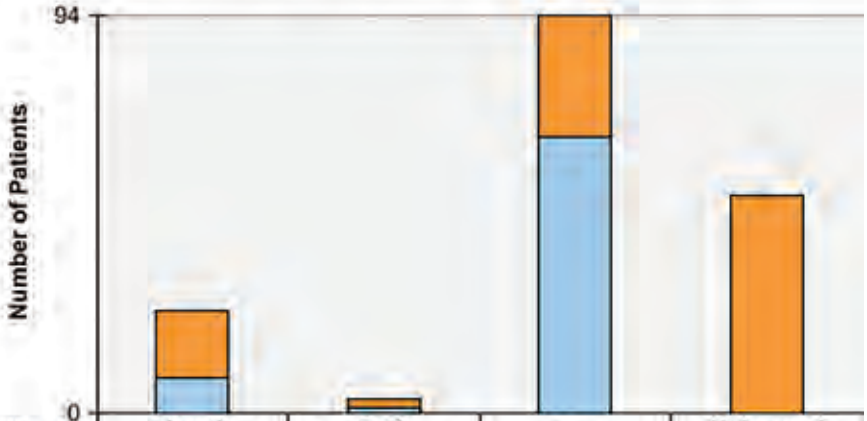
Note: Eligible Patients excludes those who died within 1 year of initiating treatment.

Number of Eligible Patients Completed Treatment Within 12 Months, by Provider Type
Sample Jurisdiction
2014
(Quarterly report available)



Provider Type	Health Department	Private/Other	Both	Unknown/ Missing
Total Eligible Patients (N)	77	17	7	71
Not Completed Within 12 Months (n)	22	6	3	67
Completed Within 12 Months (n)	55	11	4	4

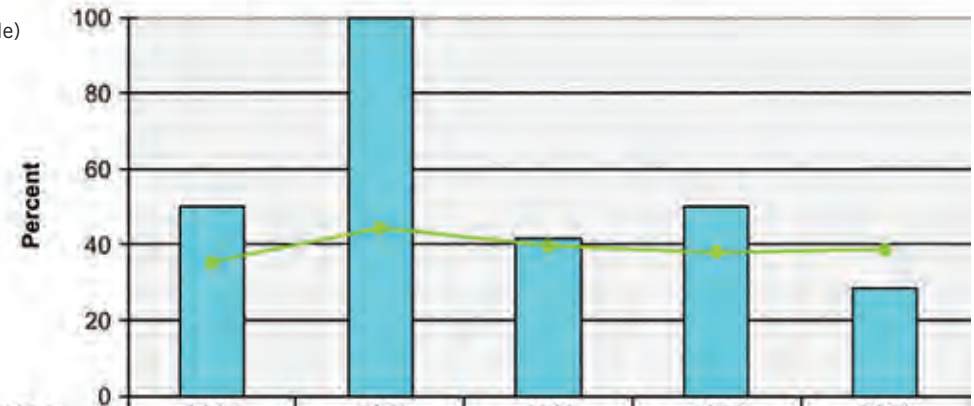
Number of Eligible Patients Completed Treatment Within 12 Months, by Treatment Supervision
Sample Jurisdiction
2014
(Quarterly report available)



Provider Type	Directly Observed	Self-Administered	Both	Unknown/ Missing
Total Eligible Patients (N)	24	3	94	51
Not Completed Within 12 Months (n)	16	2	29	51
Completed Within 12 Months (n)	8	1	65	0

Beginning in 2009, cases in patients who moved out of the United States were excluded from calculation of the COT indicator. However, a graph is provided in this NTIP report to help programs track treatment completion for cases in patients who moved out of the country.

Treatment Completion Within 12 Months for Eligible Patients Who Moved Out of the United States
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Year	2010	2011	2012	2013	2014
Completed Treatment Within 12 Months (%)	50.0	100.0	41.7	50.0	28.6
National Average (%)	35.3	44.4	39.7	38.0	38.6

Year	2010	2011	2012	2013	2014
Total Eligible Patients Who Moved Out of the Country (N)	6	2	12	8	7
Patients Completed Treatment (Ever) (n)	3	2	5	5	3
Patients Completed Treatment Within 12 Months (n)	3	2	5	4	2
Patients Did Not Complete Treatment (n)	3	0	7	3	4

Technical Note on Updates to COT calculation

2005:

1. Exclusion for meningeal disease was expanded from pediatric (age under 15 years) cases to all TB cases.

2. Exclusion for pediatric cases with bone or joint was dropped.

2009:

Reporting of miliary disease changed with RVCT Revision.

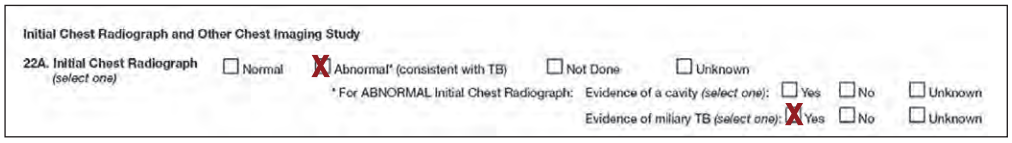
Expired RVCT

Major Site of Disease: Miliary
OR
Additional Site of Disease: Miliary

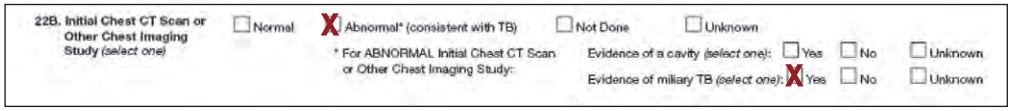
Revised RVCT

Miliary TB is diagnosed through the reading of an 'abnormal' chest radiograph or chest CT scan.

- Initial Chest Radiograph: Abnormal
  AND
  Evidence of miliary TB: Yes



- Initial Chest CT Scan or Other Chest Imaging Study: Abnormal
  AND
  Evidence of miliary TB: Yes



NOTE: *For cases to be classified as miliary TB, the chest radiograph or chest CT scan must be reported as "Abnormal" and "Evidence of miliary TB" is reported as "Yes."*

2012:

Exclusion for TB cases in patients who moved out of the country was added for cases from 2009 onward.

2013:

Exclusion for cases of TB in bone or joint and the skeletal system and TB in the central nervous system. Modification of exclusions for died during therapy and moved out of the country to exclude only those patients who moved or died within one year of initiating treatment.

VII. Monitoring Progress on Laboratory Reporting

This chapter covers indicators that are related to laboratory reporting.

Indicators for Laboratory Reporting

- Laboratory Turnaround Time – Culture
- Laboratory Turnaround Time – NAA
- Drug-Susceptibility Result
- Universal Genotyping

Data on laboratory results for TB cases are collected on the RVCT and reported to CDC through NTSS. All TB cases included in this set of indicators have been counted by reporting jurisdictions and meet the CDC TB surveillance definition and case verification criteria.

This set of indicators contributes to TB elimination by measuring key outputs from activities related to laboratory testing and reporting. Through rapid specimen processing and reporting of findings, laboratories contribute to the diagnosis and effective treatment of patients with active TB disease and the interruption of TB transmission.

While TB programs may not have a direct role in laboratory activities measured in this set of indicators, they are direct beneficiaries of services and partners. Data related to TB cases are also extracted by TB program staff from laboratory reports and reported in RVCT to CDC. This set of indicators help TB program managers monitor laboratory activities, provide feedback, and work with laboratories to ensure information is received on time.

Resources

Treatment of Tuberculosis, *MMWR* 2003; 52 (No. RR-11)
http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf

CDC Tuberculosis Surveillance Data Training, Report of Verified Case of Tuberculosis (RVCT): Instruction Manual, June 2009
http://www.cdc.gov/tb/programs/rvct/InstructionManual.pdf

Laboratory Turnaround Time – Culture

National Objective: For TB patients with cultures of respiratory specimens identified with *M. tuberculosis* complex (MTBC), increase the proportion reported by the laboratory within 25 days from the date the specimen was collected

Indicator

Percent of TB patients who have the identification of MTBC from culture of respiratory specimens reported within 25 days from the date specimen was collected

NOTE: *25 days include 21 days for culture to grow and 4 days for specimen collection and delivery to lab.*

Identification of *M. Tuberculosis* Complex (MTBC) from Culture of Respiratory Specimens Reported Within 25 Days of Specimen Collection
Sample Jurisdiction
2010 to 2014
(Quarterly report available)

Cohort Period	2010	2011	2012	2013	2014	--	2020
Identification of MTBC Reported Within 25 Days (%)	67.5	66.9	72.4	67.0	62.3	--	
Program Targets (%)						--	N/A
National Average (%)	57.9	62.4	61.1	57.3	58.6	--	
National Target (%)						--	78.0

Cohort Period	2010	2011	2012	2013	2014
Total TB Patients with a Positive Result for Culture of Respiratory Specimens (N)	117	118	105	112	122
Identification of MTBC Reported Within 25 Days (n)	79	79	76	75	76
Identification Not Reported Within 25 Days (n)	38	39	29	37	46

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of TB patients who have the identification of MTBC from culture of respiratory specimens reported within 25 days from the date specimen was collected
Denominator (N)	Number of TB patients with positive result for culture in respiratory specimens (i.e., sputum, upper respiratory fluids, tracheal fluid, and bronchial fluid), counted in the cohort period of interest. Patients with positive result for culture in non-respiratory specimen or gastric aspirate are excluded

NOTE: *If two culture results are available, the respiratory specimen with the earliest report date will be assessed for this indicator.*

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 5 (Count Status)
    - 6 (Date Counted)
    - 18 (Sputum Culture)
      - Result
      - Date collected
      - Date result reported
    - 20 (Culture of Tissue and Other Body Fluids)
      - Result
      - Date collected
      - Anatomic codes
        - Upper respiratory fluids or tracheal fluid
        - Bronchial fluid
      - Date result reported

Prompt reporting of laboratory results for the confirmation of *M. tuberculosis* is important for clinical treatment decisions. Two methods commonly used to identify *M. tuberculosis* are 1) liquid culture, and 2) nucleic acid amplification (NAA) test. The recommended laboratory turnaround time (TAT) for these two methods is different: 21 days for liquid culture and 2 days for NAA test. The TAT is the length of time from the date when the specimen is received at the laboratory to the date when the result is reported to the clinician.

Limited by the information known to the TB program staff and collected for surveillance, NTIP assesses the TAT based on the date specimen is collected and the date when the result is reported. Thus, 4 additional days is added to the indicator to allow for specimen delivery to laboratories.

Laboratory Turnaround Time – NAA

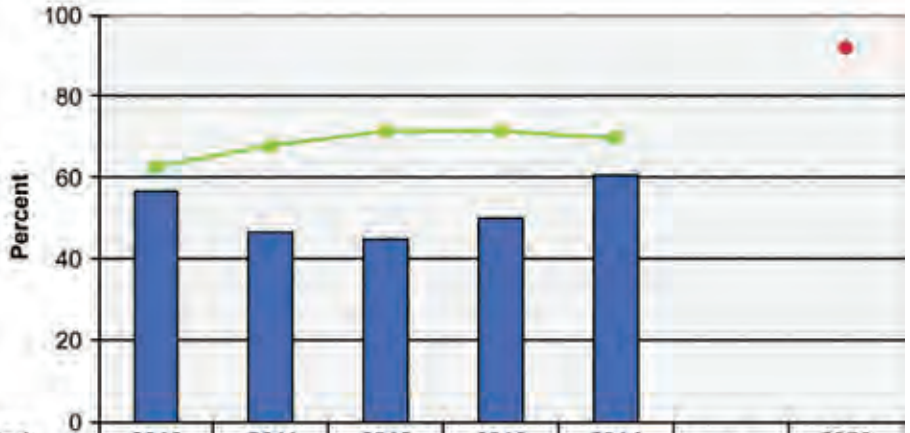
National Objective: For TB patients with respiratory specimens positive for *M. tuberculosis* complex (MTBC) by nucleic acid amplification (NAA), increase the proportion reported by the laboratory within 6 days from the date the specimen was collected

Indicator

Percent of TB patients who have the detection of MTBC by NAA testing from respiratory specimens reported within 6 days from the date specimen was collected

NOTE: *6 days includes 2 days for detection and 4 days for specimen collection and delivery to lab.*

Detection of *M. Tuberculosis* Complex (MTBC) by NAA Testing from Respiratory Specimens Reported Within 6 Days of Specimen Collection
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Cohort Period	2010	2011	2012	2013	2014	--	2020
Detection of MTBC Reported Within 6 Days (%)	56.8	46.4	44.9	50.0	60.7	--	
Program Targets (%)						--	N/A
National Average (%)	62.5	67.7	71.5	71.6	69.8	--	
National Target (%)						--	92.0

Cohort Period	2010	2011	2012	2013	2014
Total TB Patients with a Positive Result for NAA Test in Respiratory Specimens (N)	74	97	89	86	89
Detection of MTBC Reported Within 6 Days (n)	42	45	40	43	54
Detection Not Reported Within 6 Days (n)	32	52	49	43	35

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of TB patients who have the detection of MTBC reported within 6 days from the date of specimen collection
Denominator (N)	Number of TB patients with positive result for NAA test in respiratory specimens (i.e., sputum, upper respiratory fluids, tracheal fluid, and bronchial fluid), counted in the cohort period of interest. Patients with positive result for NAA test on non-respiratory specimen or gastric aspirate are excluded

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 5 (Count Status)
    - 6 (Date Counted)
    - 21 (Nucleic Acid Amplification Test Result)
      - Result
      - Date collected
      - Anatomic codes
        - Upper respiratory fluids or tracheal fluid
        - Bronchial fluid
      - Date result reported

Prompt reporting of laboratory results for the confirmation of *M. tuberculosis* is important for clinical treatment decisions. Nucleic acid amplification (NAA) test is a rapid test, performed directly on patient specimens. The benefit of using NAA to detect *M. tuberculosis* complex is that it has a quick turnaround time (TAT). The recommended TAT for NAA test is 2 days, although the test results are often available immediately. The TAT is the length of time from the date when the specimen is received at the laboratory to the date when the result is reported to the clinician.

NTIP calculates laboratory TAT based on surveillance data collected in the RVCT, thus the TAT is calculated based on the date specimen is collected and the date when the result is reported, instead of the date the laboratory received the specimen and the date when the result is reported. Four additional days is added to the indicator to allow for specimen delivery to laboratories.

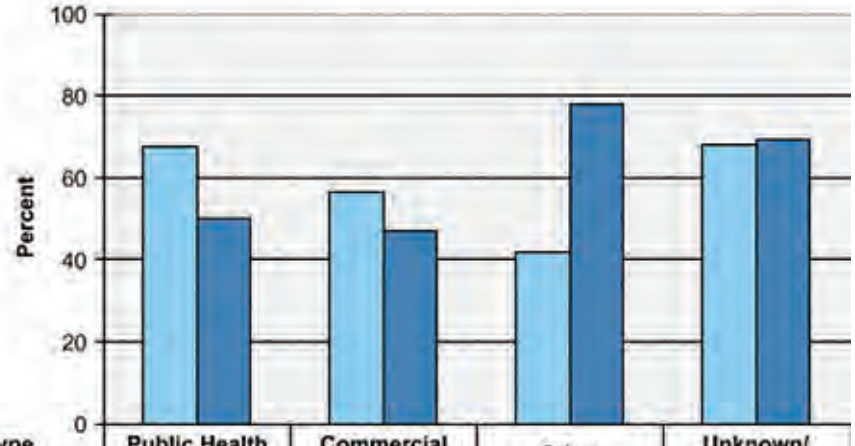
Recent analysis suggests that often times NAA testing have been done on culture specimens, not direct patient specimens, which prolonged the TAT beyond that indicated for rapid testing, defeating the purpose of using NAA testing for quick TAT.

Culture Identification and Nucleic Acid Amplification (NAA) Detection of *M. Tuberculosis* Complex (MTBC) Reported within the Indicated Turnaround Time, by Laboratory Type

Sample Jurisdiction

2014

(Quarterly report available)



Laboratory Type	Public Health Laboratory	Commercial Laboratory	Other	Unknown/ Missing
Culture Identification of MTBC Reported Within 25 Days (%)	67.6	56.2	41.7	68.2
NAA Detection of MTBC Reported Within 6 Days (%)	50.0	47.1	77.8	69.2

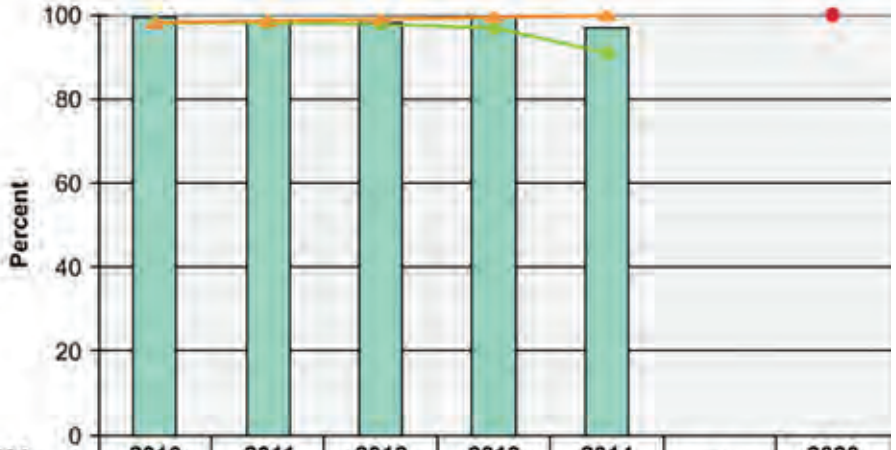
Laboratory Type	Public Health Laboratory	Commercial Laboratory	Other	Unknown/ Missing
Total TB Patients with Positive Results for Culture in Respiratory Specimens (N)	34	32	12	44
Identification of MTBC Reported Within 25 Days (n)	23	18	5	30
Identification Not Reported Within 25 Days (n)	11	14	7	14
Total TB Patients with Positive Results for NAA Testing from Respiratory Specimens (N)	24	17	9	39
Detection of MTBC Reported Within 6 Days (n)	12	8	7	27
Detection Not Reported Within 6 Days (n)	12	9	2	12

National objective: For TB patients with positive culture results, increase the proportion who have initial drug-susceptibility results reported

Indicator

Percent of TB patients with a positive culture result who have initial drug-susceptibility results reported

Reporting of Initial Drug-Susceptibility Results for Patients with Positive Culture Result
Sample Jurisdiction
2010 to 2014
(Quarterly report available)



Year	2010	2011	2012	2013	2014	--	2020
Initial Drug-Susceptibility Results Reported (%)	99.4	98.3	98.1	99.4	96.9	–	
Program Targets (%)	98.0	98.5	99.0	99.5	100.0	–	
National Average (%)	98.0	98.1	97.8	96.9	90.8	–	
National Target (%)						–	100.0

Year	2010	2011	2012	2013	2014
Total TB Patients with Positive Culture Result (N)	170	172	161	157	163
Initial Drug-Susceptibility Results Reported (n)	169	169	158	156	158
Initial Drug-Susceptibility Results Not Reported (n)	1	3	3	1	5

CALCULATION

Percent (%)	**n/N x 100**
Numerator (n)	Number of TB patients with initial drug-susceptibility results reported
Denominator (N)	Number of TB patients with positive culture result, counted in the cohort period of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 18 (Sputum Culture)
    - 20 (Culture of Tissue and Other Body Fluids)
    - 39 (Initial Drug Susceptibility Testing)
    - 40 (Initial Drug Susceptibility Results)

This indicator measures the proportion of TB patients with positive culture result for which drug susceptibility testing (DST) is done and reported. DST results are important in characterizing the organism and guiding TB treatment and treatment of contacts with newly-diagnosed latent TB infection. Failure to test for drug susceptibilities may lead to the use of less-than-optimum treatment regimens.

The completeness of the indicator data is determined by the completeness of the variable "Initial Drug Susceptibility Testing."

Drug susceptibility testing for INH, RIF, EMB, and PZA is recommended on the initial isolates of *M. tuberculosis* from all patients. However, because some public health laboratories do not have the capacity to perform PZA susceptibility testing, the calculation for this NTIP indicator currently includes DST testing for INH, RIF, and EMB only for cases reported after 2013. For cases reported prior to 2013, the calculation for this NTIP indicator includes DST for INH and RIF.

Inclusion of PZA in the calculation for DST will be implemented within the next few years. State TB program officials should work closely with their respective state public health laboratories to increase laboratory capacity to perform testing for PZA.

TB program staff should also ensure that DST results are recorded and reported according to the RVCT. "Initial drug-susceptibility results reported" is defined as initial drug susceptibility results reported as "Yes" and the susceptibility results for INH, RIF, and EMB reported as either resistant or susceptible.

National objective: For TB patients with a positive culture result, increase the proportion who have a MTBC genotyping result reported

Indicator

Percent of TB patients with a positive culture result who have an isolate submitted for genotyping and linked to the RVCT record

Patients with Positive Culture Result Who Have an Isolate Submitted for Genotyping and Linked to the RVCT Record
Sample Jurisdiction
2010 to 2014
(Quarterly report available)

Cohort Period	2010	2011	2012	2013	2014	--	2020
With an Isolate Submitted and Linked to RVCT (%)	97.6	95.9	93.2	81.5	82.2	--	
Program Targets (%)	80.0	82.0	84.0	86.0	88.0	--	
National Average (%)	91.7	94.2	94.7	95.0	86.8	--	
National Target (%)						--	100.0

Cohort Period	2010	2011	2012	2013	2014
Total TB Patients with Positive Culture Result (N)	170	172	161	157	163
With an Isolate Submitted and Linked to RVCT (n)	166	165	150	128	134
With No Isolate Submitted and Linked to RVCT (n)	4	7	11	29	29

CALCULATION

Percentage (%)	**n/N x 100**
Numerator (n)	Number of TB patients with an isolate submitted for genotyping and linked to the RVCT record
Denominator (N)	Number of TB patients with a positive culture result, counted in the cohort period of interest

DATA SOURCES

- National Tuberculosis Surveillance System (NTSS)
  - Report of Verified Case of Tuberculosis (RVCT) fields:
    - 18 (Sputum Culture)
    - 20 (Culture of Tissue and Other Body Fluids)
- National Tuberculosis Genotyping Information Management System (TB GIMS)

This indicator measures the proportion of culture-positive TB cases for which genotyping is done and reported. Genotyping results are important in guiding contact investigations and discovering or delineating TB outbreaks.

An initial isolate should be submitted for genotyping by a CDC-funded genotyping laboratory, for all TB patients with positive culture results.

VIII. Monitoring Progress on Contact Investigations

This chapter covers indicators that are related to investigations of contacts to smear-positive TB cases.

Indicators for Contact Investigations

- **Contact Elicitation**
- **Examination**
- **Treatment Initiation**
- **Treatment Completion**

Data on contact investigations are collected and reported by TB programs to CDC via the Aggregate Reports for Tuberculosis Program Evaluation (ARPE) annually in September. Submissions of paper-based reports are then entered into NTIP by the DTBE ARPE Coordinator. TB program staff can also submit ARPE data to CDC electronically and update them through NTIP's Electronic Data Submission for ARPE function on a real-time basis as data become available. Data submitted electronically are reflected in NTIP immediately. A step-by-step instruction guide on submitting ARPE data through NTIP is provided in the **NTIP Companion for Data Managers**. Contact Investigation reports are only available in the yearly trend.

While data on all contact investigations are documented and reported to CDC through ARPE, NTIP indicators focus on contacts to smear-positive TB cases, which are most likely to transmit TB. This set of indicators contributes to TB elimination by measuring the examination and follow-up of contacts to highly infectious cases. By finding, evaluating, and treating contacts diagnosed with latent TB infection, TB programs contribute to decreasing TB incidence. **Figure 4.1** outlines the activities, outputs, and the desired outcomes of TB prevention through contact tracing.

Resources

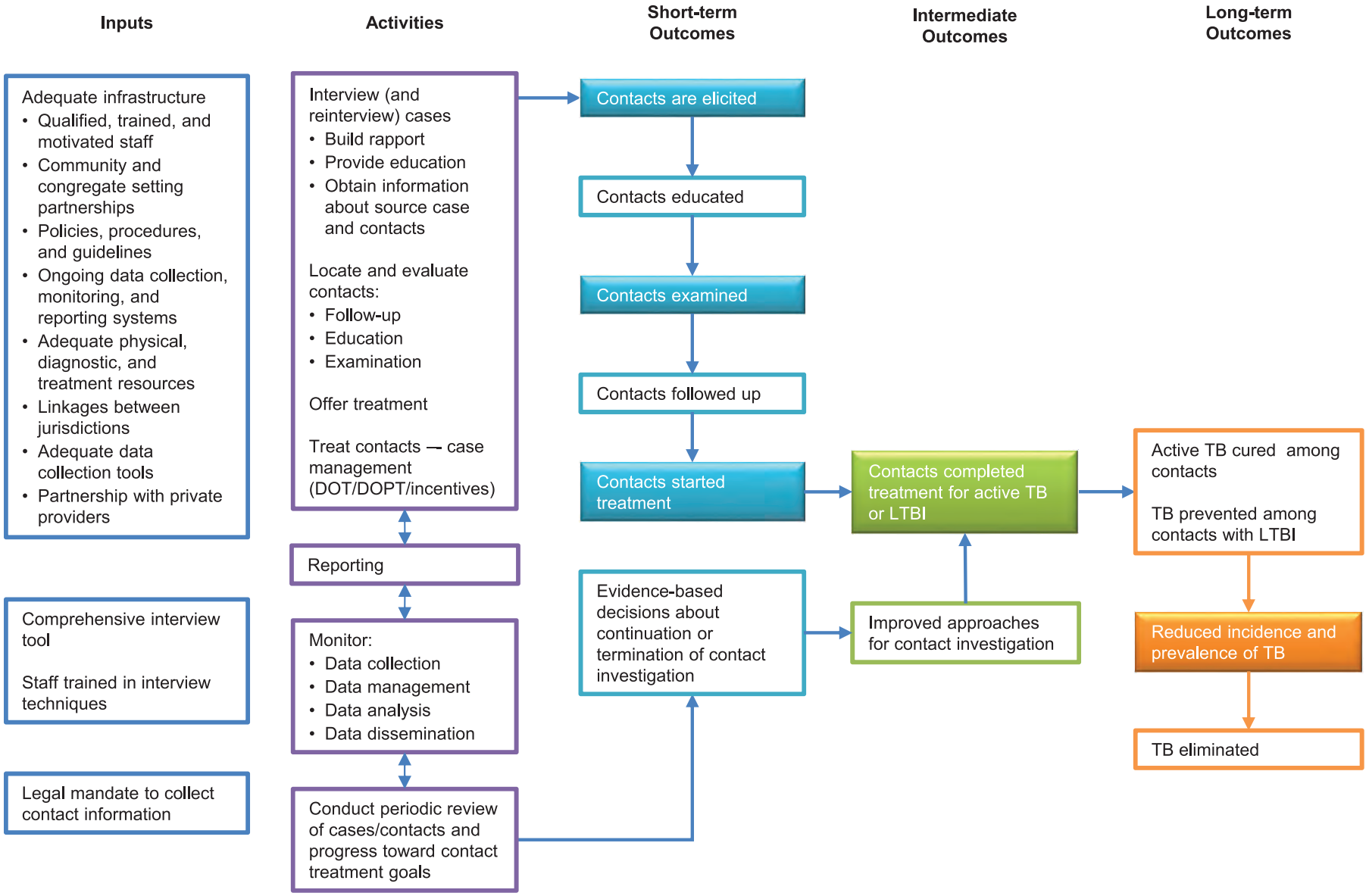
Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis: Recommendations from the National Tuberculosis Controllers Association and CDC
MMWR 2005; 54 (No. RR-15, 1-37)
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5415a1.htm

Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection
MMWR 2000; 49 (No. RR-6)
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4906a1.htm

Latent Tuberculosis Infection: A Guide for Primary Health Care Providers
http://www.cdc.gov/tb/publications/LTBI/treatment.htm

Aggregate Reports for Tuberculosis Program Evaluation: Training Manual, CDC, April 2005
http://www.cdc.gov/tb/publications/PDF/ARPEs_manualsm1.pdf

Figure 4.1: Activities, Outputs, and the Desired Outcomes of Tuberculosis Prevention through Contact Tracing

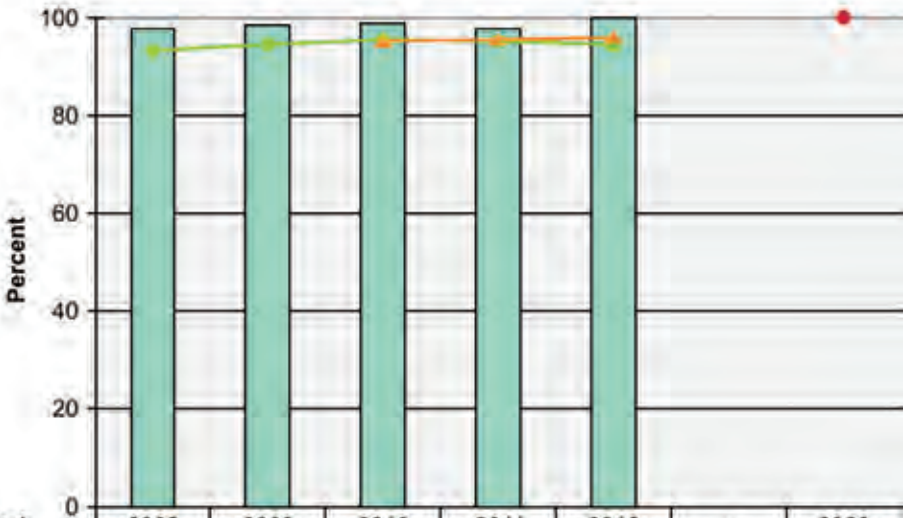


National objective: For TB patients with positive AFB sputum-smear results, increase the proportion who have contacts elicited

Indicator

Percent of sputum AFB smear-positive TB cases with contacts elicited

Sputum Acid-Fast Bacillus (AFB) Smear-Positive TB Cases with Contacts Elicited
Sample Jurisdiction
2008 to 2012



Cohort Period	2008	2009	2010	2011	2012	--	2020
Cases with Contacts Elicited (%)	97.8	98.5	98.6	97.5	100.0	--	
Program Targets (%)	N/A	N/A	95.0	95.5	96.0	--	
National Average (%)	93.1	94.4	95.4	95.1	94.2	--	
National Target (%)						--	100.0

Cohort Period	2008	2009	2010	2011	2012
Total Sputum AFB Smear-Positive TB Cases for Investigation (N)	92	66	73	80	75
Cases with Contacts Elicited (n)	90	65	72	78	75
Cases with No Contacts (n)	2	1	1	2	0

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of sputum AFB smear-positive TB cases with contacts elicited
Denominator (N)	Number of sputum AFB smear-positive TB cases counted in the cohort period of interest

Sputum AFB smear-positive TB cases with contacts elicited is calculated by the number of sputum AFB smear-positive TB cases for investigation minus the number of sputum AFB smear-positive TB cases with no contacts.

DATA SOURCE

- ARPE (Contacts) fields:
  - Cohort Year
  - a1 (Sputum smear+ Cases for Investigation)
  - b1 (Sputum smear+ Cases with No Contacts)

This indicator measures the performance in finding at least one contact per sputum smear-positive TB case and indirectly measures whether a contact investigation was initiated.

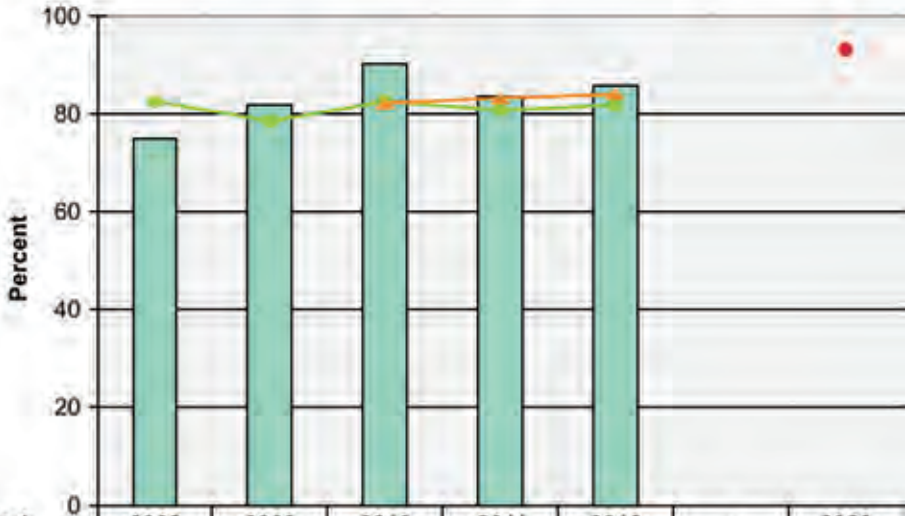
Contacts to sputum smear-positive cases are a high priority in contact investigations because of increased risk of transmission from smear-positive cases. Listing contacts is the first step of a contact investigation, followed by examination for infection and TB disease and treatment.

National objective: For contacts to sputum AFB smear-positive TB cases, increase the proportion who are examined for infection and disease

Indicator

Percent of contacts to sputum AFB smear-positive TB cases examined for infection and disease

Examination of Contacts to Sputum Acid-Fast Bacillus (AFB) Smear-Positive TB Cases
Sample Jurisdiction
2008 to 2012



Cohort Period	2008	2009	2010	2011	2012	--	2020
Contacts Examined (%)	74.6	81.8	89.9	83.3	85.7	--	
Program Targets (%)	N/A	N/A	82.0	83.0	84.0	--	
National Average (%)	82.4	78.4	82.5	80.6	81.7	--	
National Target (%)						--	93.0

Cohort Period	2008	2009	2010	2011	2012
Total Contacts to Sputum AFB Smear-Positive TB Cases (N)	3,549	1,768	2,253	3,662	1,851
Contacts Examined (n)	2,647	1,447	2,027	3,049	1,587
Contacts Not Examined (n)	902	321	226	613	264

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of contacts to sputum AFB smear-positive TB cases examined
Denominator (N)	Number of contacts to sputum AFB smear-positive TB cases counted in the year of interest

DATA SOURCE:

- ARPE (Contacts) fields:
  - Cohort Year
  - c1 (Number of Contacts to Sputum smear+ Cases)
  - d1 (Contacts to Sputum smear+ Cases Evaluated)

This indicator measures the extent that contacts to sputum smear-positive cases are fully evaluated for TB infection and disease. Contacts to sputum smear-positive cases are a high priority in contact investigations because of the increased risk of transmission from smear-positive cases.

Ensuring examination and treatment of high-risk contacts is important to prevent future TB cases. In addition, results of the medical examinations provide the basis for making overall decisions about contact investigation.

Contacts are counted as "examined" if they have been tested and examined to the point where a final determination of diagnosis is either latent TB infection, TB disease, or no infection or disease. A full medical examination among certain high-risk contacts may involve completion of chest X-ray or other examinations to rule out TB disease or infection, regardless of TST or interferon-gamma release assays (IGRA) test results.

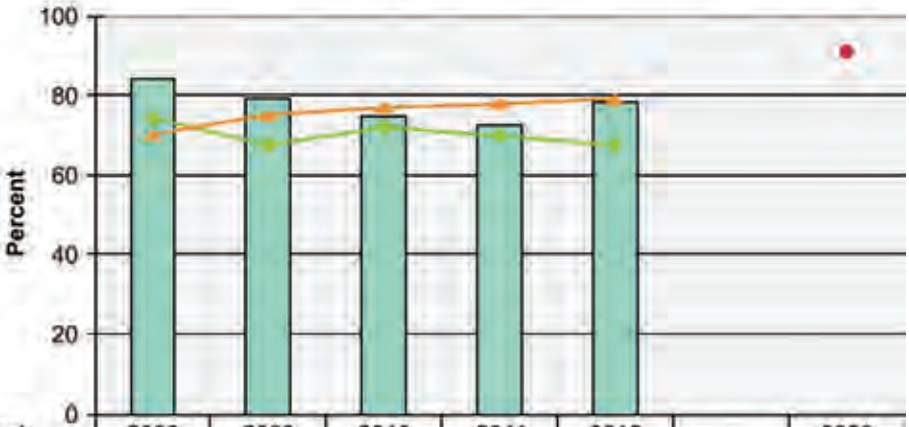
National objective: For contacts to sputum AFB smear-positive TB cases diagnosed with latent TB infection (LTBI), increase the proportion who start treatment

Indicator

Percent of contacts to sputum AFB smear-positive TB cases diagnosed with LTBI who started treatment

NOTE: *Contacts are counted as having started treatment after taking the first dose of a treatment course.*

Contacts to Sputum Acid-Fast Bacillus (AFB) Smear-Positive TB Cases Diagnosed with Latent TB Infection (LTBI) Who Started Treatment
Sample Jurisdiction
2008 to 2012



Cohort Period	2008	2009	2010	2011	2012	--	2020
Contacts to Sputum AFB Smear-Positive TB Cases Diagnosed with LTBI Who Started Treatment (%)	83.9	79.2	74.7	72.3	78.4	--	
Program Targets (%)	70.0	75.0	77.0	78.0	79.0	--	
National Average (%)	74.1	67.5	72.0	69.9	67.6	--	
National Target (%)						--	91.0

Cohort Period	2008	2009	2010	2011	2012
Contacts to Sputum AFB Smear-Positive TB Cases Diagnosed with LTBI (N)	311	192	293	364	227
Contacts Who Started Treatment (n)	261	152	219	263	178
Contacts Who Did Not Start Treatment (n)	50	40	74	101	49

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of contacts started treatment
Denominator (N)	Number of contacts to sputum AFB smear-positive TB cases diagnosed with LTBI, counted in the year of interest

DATA SOURCE

- ARPE (Contacts) fields:
  - Cohort Year
  - f1 (Contacts to Sputum smear+ Cases with Latent TB Infection)
  - g1 (Contacts to Sputum smear+ Cases Diagnosed with Latent TB Infection Who Started Treatment)

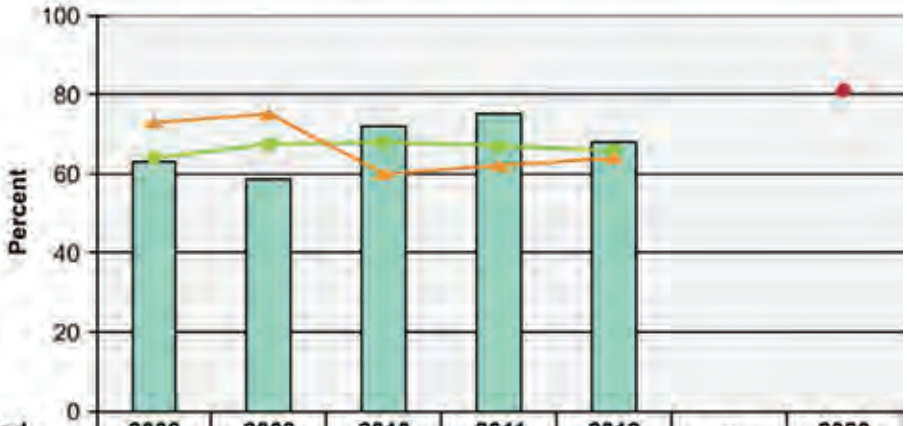
This indicator measures the extent to which newly-infected contacts are started on an approved full-course treatment for LTBI. Although LTBI treatment is recommended for most infected contacts, newly-infected contacts to pulmonary cases are a priority for LTBI treatment because TB is most likely to develop in the first 1 to 2 years after a new infection. Treating contacts who have LTBI helps prevent future cases of TB.

National objective: For contacts to sputum AFB smear-positive TB cases who have started treatment for latent TB infection (LTBI), increase the proportion who complete treatment

Indicator

Percent of contacts to sputum AFB smear-positive TB cases diagnosed with LTBI and started treatment who completed treatment

Treatment Completion for Contacts to Sputum Acid-Fast Bacillus (AFB) Smear-Positive TB Cases Who Have Started Treatment for Latent TB Infection (LTBI)
Sample Jurisdiction
2008 to 2012



Cohort Period	2008	2009	2010	2011	2012	--	2020
Contacts to Sputum AFB Smear-Positive TB Cases Who Completed Treatment (%)	63.2	58.6	72.1	75.3	67.9	--	
Program Targets (%)	73.0	75.0	60.0	62.0	64.0	--	
National Average (%)	64.1	67.5	67.9	66.9	65.9	--	
National Target (%)						--	81.0

Cohort Period	2008	2009	2010	2011	2012
Total Contacts to Sputum AFB Smear-Positive TB Cases Who Have Started Treatment for LTBI (N)	261	152	219	263	178
Contacts Who Completed Treatment (n)	165	89	158	198	121
Contacts Who Did Not Complete Treatment (n)	96	63	61	65	57

CALCULATION

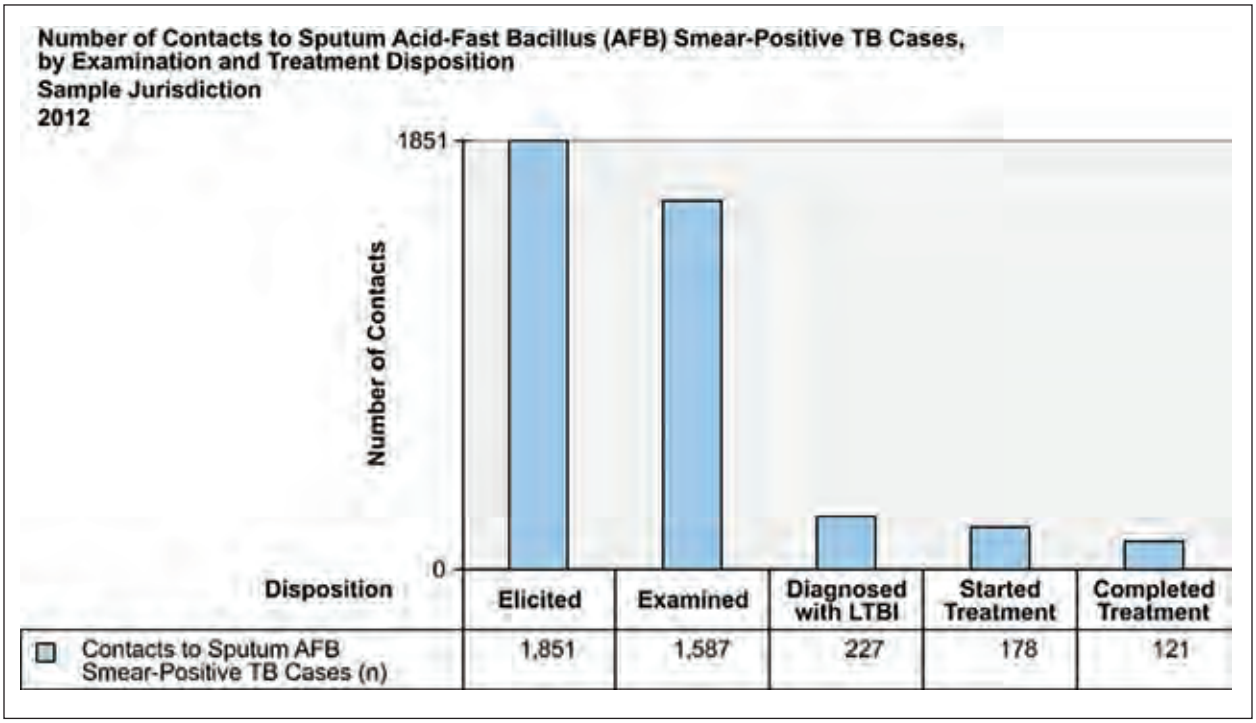
Percent (%)	**n/N x 100**
Numerator (n)	Number of contacts diagnosed with LTBI who completed treatment
Denominator (N)	Number of contacts to sputum AFB smear-positive TB cases diagnosed with LTBI who have started treatment, counted in the cohort period of interest

DATA SOURCE

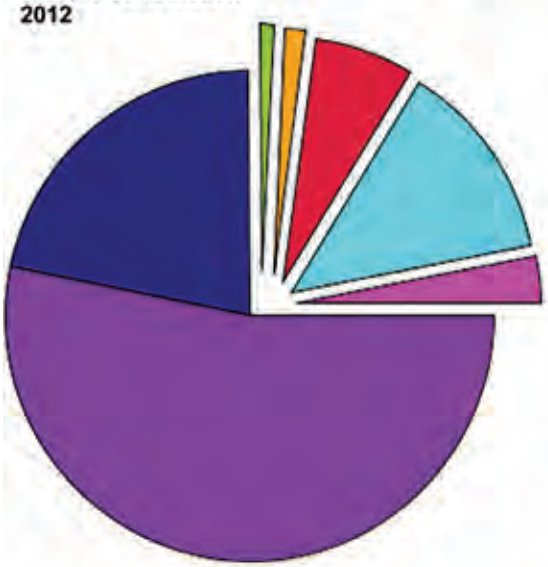
- ARPE (Contacts) fields:
  - Cohort Year
  - g1 (Contacts to Sputum smear+ Cases Diagnosed with Latent TB Infection Who Started Treatment)
  - h1 (Contacts to Sputum smear+ Cases Diagnosed with Latent TB Infection Who Completed Treatment)

This indicator measures the extent that newly-infected contacts to pulmonary cases starting a full-course of LTBI treatment complete this treatment.

Although LTBI treatment is recommended for most infected contacts, newly-infected contacts to pulmonary cases are a priority for LTBI treatment because individuals are most likely to have active TB within the first 1-2 years of becoming infected. Contacts who complete treatment for LTBI are less likely to have TB disease than those who do not complete treatment.



Treatment Outcomes for Contacts to Sputum Acid-Fast Bacillus Smear-Positive TB Cases Diagnosed with Latent TB Infection (LTBI)
Sample Jurisdiction
2012



Outcomes	No.	(%)
Total Contacts Diagnosed with LTBI	227	(100.0)
Completed Treatment	121	(53.3)
Did Not Start Treatment	49	(21.6)
Died	0	(0.0)
Moved	2	(0.9)
Developed Active TB	0	(0.0)
Adverse Effect	3	(1.3)
Patient Chose to Stop	15	(6.6)
Lost to Follow-Up	30	(13.2)
Provider Decision to Stop	7	(0.0)
Unknown/Missing	0	(0.0)

Note: See ARPE Manual for definition and outcomes.

IX. Monitoring Progress on Examination of Immigrants and Refugees

This chapter covers indicators that are related to the follow-up medical examination of immigrants and refugees arriving in the United States with TB Class B notification, specifically those with abnormal chest X-rays read overseas as suggestive of TB.

Data for this set of indicators derives from the Electronic Disease Notification (EDN) system. The system contains immigrant and refugee applicant medical data from the U.S. Department of State. EDN notifies state and local health departments of individuals with TB Class B notification arriving in their jurisdiction to facilitate follow-up. Data on the follow-up of these individuals are collected on the TB Follow-up Worksheet and submitted back to CDC through EDN.

This set of objectives contributes to TB elimination by monitoring the screening and completion of preventative treatment for tuberculosis among immigrants and refugees, who are considered a high risk group for TB disease. Through targeted testing and treatment of Class B immigrants and refugees, TB programs contribute to decreasing TB incidence among foreign-born persons. **Figure 5.1**, the logic model for the prevention of TB among high-risk populations, describes the activities, outputs, and the desired outcomes for the medical examination of this group.

Indicators for Examination of Immigrants and Refugees

- Examination Initiation
- Examination Completion
- Treatment Initiation
- Treatment Completion

Class B Notifications

Immigrants and refugees arriving in the United States are given classifications based on certain health conditions recorded during required pre-immigration medical examinations. These medical examinations are done by overseas panel physicians using technical instructions developed by the Division of Global Migration and Quarantine. Persons who are diagnosed with active TB are required to complete treatment prior to being approved to enter the United States. Persons who completed treatment for TB or who are noninfectious are given B classification and approval to enter the country. These classifications help immigration officers and public health officials prioritize individuals for follow-up medical examination after their arrival. For definitions and guidance, please refer to the **Guidelines for Screening for Tuberculosis Infection and Disease during the Domestic Medical Examination for Newly Arrived Refugees**.

While immigrants and refugees may have class conditions designated for various health conditions requiring follow-up upon arrival in the United States, the national TB objectives or NTIP indicators focus on the medical follow-up examinations of persons with TB-related conditions, specifically those with abnormal chest X-rays read overseas as consistent with TB. These individuals may or may not include persons who are contacts to infectious TB patients or persons with latent TB infection. Individuals included in the analytical cohort of interest for NTIP are those with "abnormal finding" checked for chest X-rays and indicated to have conditions that are suggestive of tuberculosis on the Department of State Chest X-ray and Classification or Tuberculosis Worksheet.

For individuals examined using TB Technical Instruction (TI) 1991:

- U.S. Department of State, Chest X-ray and Classification Worksheet DS-3024 published September 2007
    - Chest X-ray Findings: Abnormal Findings
        - Can suggest active TB
        - Can suggest inactive TB

For individuals examined using TB TI 2007:

- U.S. Department of State, Chest X-ray and Classification Worksheet DS-3030 published July 2010
    - Chest X-ray Findings: Abnormal Findings
        - Can suggest Tuberculosis

    Or

- U.S. Department of State, Tuberculosis Worksheet DS-3030 published September 2014
    - Chest X-ray Findings: Abnormal Findings
        - Can suggest Tuberculosis

NOTE: *NTIP indicators are calculated based on the primary jurisdiction of arrival. TB program managers can use EDN to electronically notify other jurisdictions of Class B individuals who move to another jurisdiction before completing their Class B examination and treatment.*

Resources

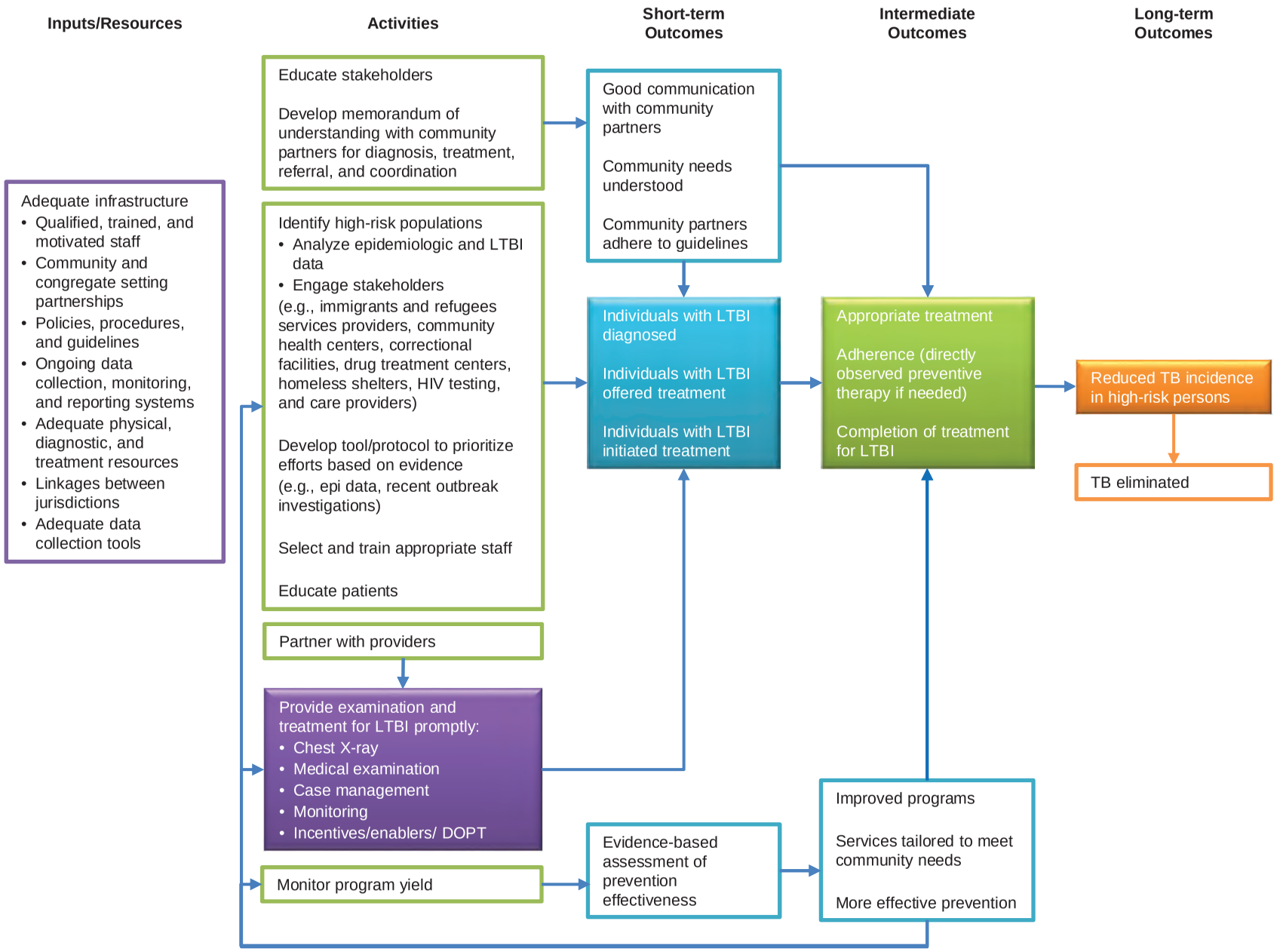
Guidelines for Screening for Tuberculosis Infection and Disease during the Domestic Medical Examination for Newly Arrived Refugees
http://www.cdc.gov/immigrantrefugeehealth/guidelines/domestic/tuberculosis-guidelines.html

Recommendations for Prevention and Control of Tuberculosis among Foreign-Born Persons, *MMWR* 1998; 47 (No. RR-16)
http://www.cdc.gov/mmwr/preview/mmwrhtml/00054855.htm

TB Follow-up Worksheet Guide

Treatment of Tuberculosis, *MMWR* 2003; 52 (No. RR-11)
http://www.cdc.gov/mmwr/PDF/rr/rr5211.pdf

Figure 5.1: Logic Model for the Prevention of TB among all High-risk Populations



Strategies: Identify and prioritize high-risk persons; targeted testing and treatment for LTBI; develop partnerships with providers treating high-risk populations

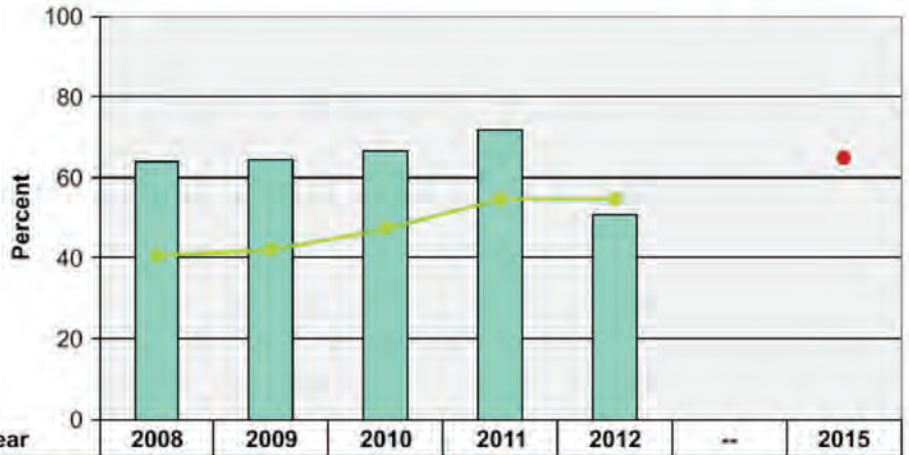
Immigrants and Refugees – Examination Initiation

National Objective: For immigrants and refugees with abnormal chest radiographs (X-rays) read overseas as consistent with TB, increase the proportion who initiate medical examination within 30 days of notification

Indicator

Percent of immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who initiated medical examination within 30 days of notification

Immigrants and Refugees with Abnormal Chest X-rays Read Overseas as Consistent with TB Who Initiated Medical Examination Within 30 Days of Notification
Sample Jurisdiction
2008 to 2012
(Quarterly report available)



Year	2008	2009	2010	2011	2012	--	2015
Examination Initiated Within 30 Days (%)	63.6	64.3	66.5	71.5	50.5	--	
Program Targets (%)	--	--	N/A	N/A	N/A	--	N/A
National Average (%)	40.5	42.0	47.3	54.5	54.6	--	
National Target (%)						--	64.8

Year	2008	2009	2010	2011	2012
Total Immigrants and Refugees with Abnormal Chest X-rays Read Overseas as Consistent with TB (N)	217	429	421	365	489
Examination Initiated (n)	192	368	370	327	386
Examination Initiated Within 30 Days (n)	138	276	280	261	247
Examination Not Initiated (n)	25	61	51	38	103

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of immigrants and refugees who initiated medical examination within 30 days of notification by EDN
Denominator (N)	Number of immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who arrived in the cohort period of interest

DATA SOURCES

- Electronic Disease Notification (EDN) System
  - U.S. Department of State, Chest X-ray and Classification Worksheet
    - DS-3024 Form (published September 2007) field:
      - Chest X-ray Findings
    - DS-3030 Form (published July 2010) field:
      - Chest X-ray Findings
  - U.S. Department of State, Tuberculosis Worksheet
    - DS-3030 Form (published September 2014) field:
      - Chest X-ray Findings
  - TB Follow-up Worksheet fields:
    - A4 (Initial U.S. Entry Date)
    - C1 (Date of Initial U.S. Medical Evaluation)
  - EDN system notification date

This indicator measures the extent that a follow-up medical examination of immigrants and refugees who arrived with a TB Class B notification is initiated within the recommended interval. Failure to initiate an examination shortly after arrival in the United States can lead to delayed diagnosis of active TB or to missed opportunities to diagnose and treat latent TB infection among foreign-born persons.

The Date of Notification to the "primary jurisdiction of arrival" is used to determine the denominator of this indicator.

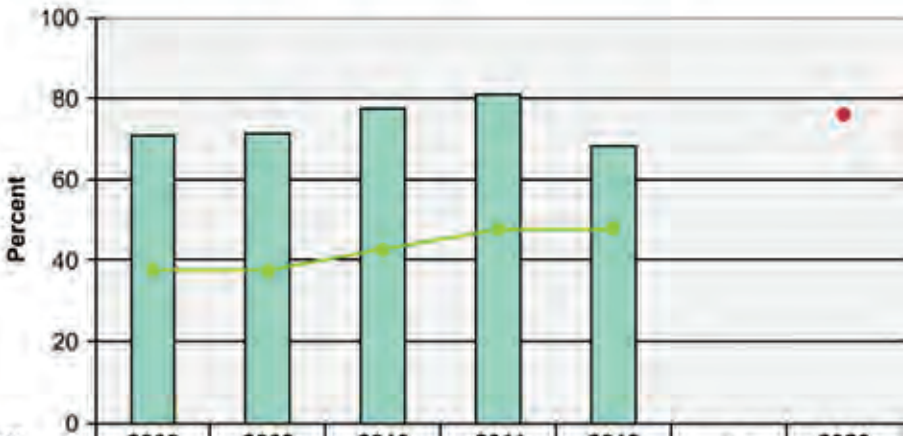
Immigrants and Refugees – Examination Completion

National objective: For immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB, increase the proportion who complete a medical examination within 90 days of notification

Indicator

Percent of immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who completed a medical examination within 90 days of notification

Immigrants and Refugees with Abnormal X-Rays Read Overseas as Consistent with TB Who Completed Medical Examination Within 90 Days of Notification
Sample Jurisdiction
2008 to 2012
(Quarterly report available)



Year	2008	2009	2010	2011	2012	--	2020
Examination Completed Within 90 Days (%)	71.0	71.3	77.4	81.1	68.1	--	
Program Targets (%)	--	--	N/A	N/A	N/A	--	
National Average (%)	37.6	37.4	42.6	47.6	47.8	--	
National Target (%)						--	76.0

Year	2008	2009	2010	2011	2012
Total Immigrants and Refugees with Abnormal Chest X-Rays Read Overseas as Consistent with TB (N)	217	429	421	365	489
Examination Completed (n)	187	355	366	323	367
Examination Completed Within 90 Days (n)	154	306	326	296	333
Examination Not Completed (n)	30	74	55	42	122

CALCULATION

Percent (%)	n/N x 100
Numerator (n)	Number of immigrants and refugees who completed medical examination within 90 days of notification by EDN
Denominator (N)	Number of immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who arrived in the cohort period of interest

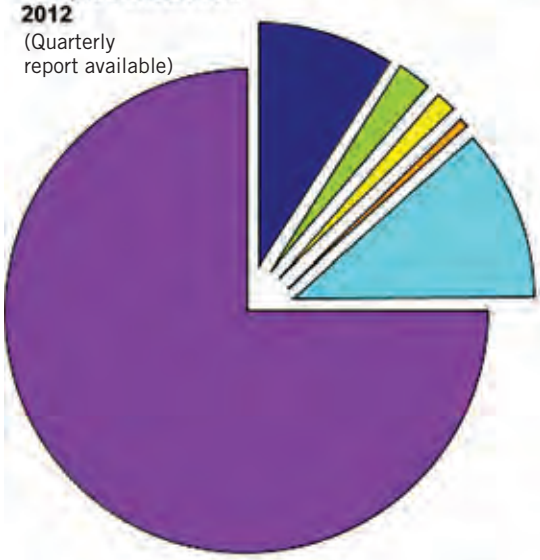
DATA SOURCES

- Electronic Disease Notification (EDN) System
  - U.S. Department of State, Chest X-ray and Classification Worksheet
    - DS-3024 Form (published September 2007) field:
      - Chest X-ray Findings
    - DS-3030 Form (published July 2010) field:
      - Chest X-ray Findings
  - U.S. Department of State, Tuberculosis Worksheet
    - DS-3030 Form (published September 2014) field:
      - Chest X-ray Findings
  - TB Follow-up Worksheet fields:
    - A4 (Initial U.S. Entry Date)
    - D1 (Disposition Date)
    - D2 (Evaluation Disposition)
      - Completed evaluation
      - Treatment Recommended
    - D3 (Diagnosis)
  - EDN system notification date

This indicator measures the extent that a follow-up medical examination of immigrants and refugees who arrived with a TB Class B notification is completed within the recommended interval. Failure to complete an examination shortly after arrival in the United States can lead to delayed diagnosis of active TB or to missed opportunities to diagnose and treat latent TB infection among foreign-born persons.

Examination Completed is defined as no missing information for whether treatment is recommended or not, and the diagnosis is not missing. The end points of domestic medical examination are indicated in D2. (i.e., Completed Evaluation, Initiated Evaluation/Not Completed, Did Not Initiate Evaluation). Once an examination end-point has been reached and a treatment recommendation has been made, the examination is considered to be completed. The objective is to reach a determination or disposition within 90 days after health department was notified of immigrants and refugees' arrival. Once a disposition is reached, (if treatment is initiated or not) this data should be obtained by the appropriate jurisdiction and reported back to EDN promptly (See page 28 of TB Follow Up Guide).

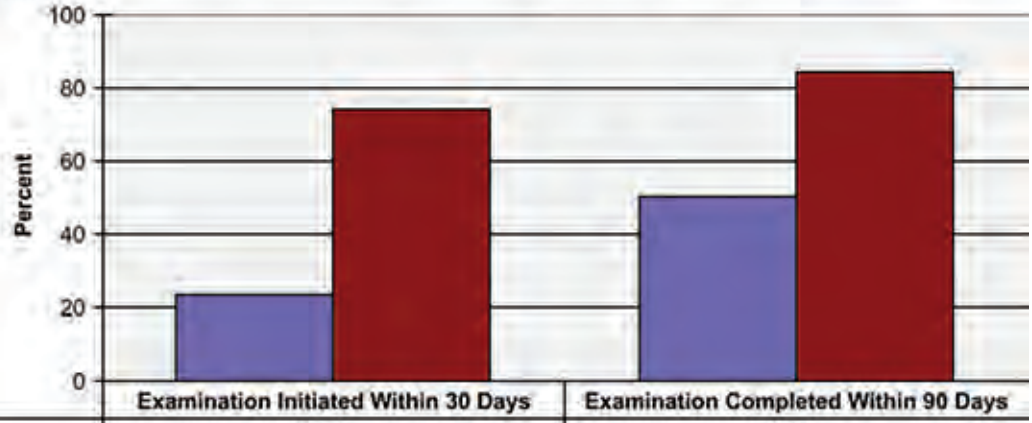
Medical Examination Status and Reasons Examination Not Completed for Immigrants and Refugees with Abnormal Chest X-Rays Read Overseas as Consistent with TB
Sample Jurisdiction
2012
(Quarterly report available)



	No.	(%)
Total Immigrants and Refugees with Abnormal Chest X-Rays Read Overseas as Consistent with TB	489	(100.0)
Completed Examination	367	(75.1)
Not Located	44	(9.0)
Died	0	(0.0)
Moved Within U.S.	11	(2.2)
Returned to Country of Origin	7	(1.4)
Lost to Follow-Up	3	(0.6)
Refused	1	(0.2)
Unknown/Other	56	(11.5)

Note: Unknown/Other include those completed examination, but have no diagnosis recorded.

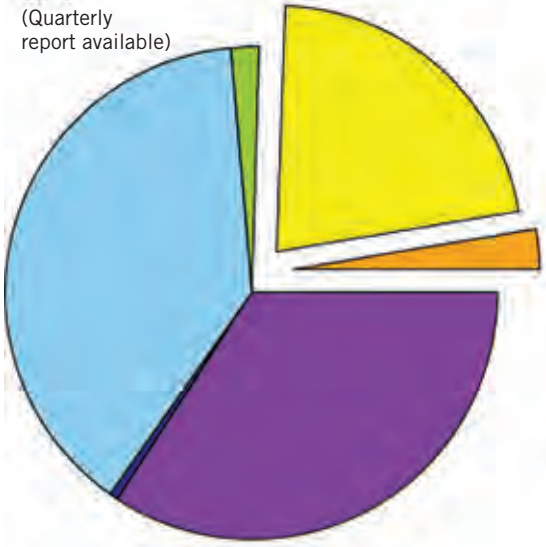
Percent of Immigrants and Refugees with Abnormal Chest X-Rays Read Overseas as Consistent with TB Who Have Initiated Medical Examination within 30 Days and Completed within 90 Days of Notification
Sample Jurisdiction
2012
(Quarterly report available)



	Examination Initiated Within 30 Days	Examination Completed Within 90 Days
Immigrants	23.3	49.8
Refugees	74.0	84.0

	Total with Abnormal Chest X-Rays Consistent with TB (N)	Examination Initiated Within 30 Days (n)	Examination Initiated Ever (n)	Examination Completed Within 90 Days (n)	Examination Completed Ever (n)
Immigrants	227	53	145	113	137
Refugees	262	194	241	220	230

Diagnosis for Immigrants and Refugees with Abnormal Chest X-Rays Read Overseas as Consistent with TB Who Have Reported Examination Being Complete
Sample Jurisdiction
2012
(Quarterly report available)



	No.	(%)
Total Immigrants and Refugees with Abnormal Chest X-Rays Read Overseas as Consistent with TB and Reported Examination Being Complete	380	(100.0)
No Exposure to TB	130	(34.2)
Exposure, No Infection	2	(0.5)
Latent TB Infection	148	(38.9)
Active TB Disease	7	(1.8)
Old, Healed, Inactive TB Disease	83	(21.8)
Unknown/Missing	10	(2.6)

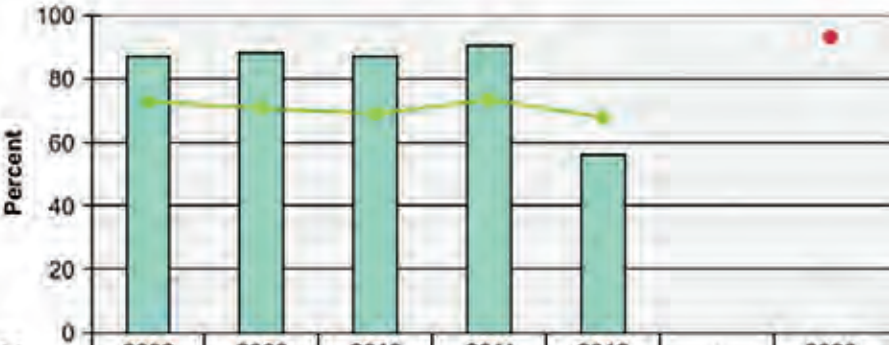
Note: The immigrants and refugees reported as having completed examination in this cohort includes those with incomplete responses on the 'Evaluation Disposition Date,' 'Treatment Recommended,' 'Diagnosis' fields on the TB Follow-up Worksheet.

National objective: For immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with latent TB infection or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) on the basis of examination in the U.S., for whom treatment was recommended, increase the proportion who start treatment

Indicator

Percent treatment initiation for immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with latent TB infection (LTBI) or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) and who are recommended for treatment on the basis of examination in the U.S.

Treatment Initiation for Immigrants and Refugees Who Are Diagnosed with Latent TB Infection (LTBI) or Prior Pulmonary TB and Recommended for Treatment on the Basis of U.S. Examination
Sample Jurisdiction
2008 to 2012
(Quarterly report available)



Year	2008	2009	2010	2011	2012	--	2020
Started Treatment (%)	86.8	88.2	86.9	90.2	56.2	--	
Program Targets (%)	--	--	N/A	N/A	N/A	--	N/A
National Average (%)	72.4	70.6	68.9	73.3	67.5	--	
National Target (%)						--	93.0

Year	2008	2009	2010	2011	2012
Total Immigrants and Refugees Diagnosed with LTBI or Prior Pulmonary TB During U.S. Examination	107	213	213	182	231
Recommended for Treatment (N)	68	152	153	123	130
Started Treatment (n)	59	134	133	111	73
Did Not Start Treatment (n)	9	18	20	12	57

CALCULATION

Percent (%)	**n/N x 100**
Numerator (n)	Number of immigrants and refugees who started treatment
Denominator (N)	Number of immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with LTBI or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) and who are recommended for treatment on the basis of examination in the U.S., arrived in the cohort period of interest

DATA SOURCES

- Electronic Disease Notification (EDN) System
  - U.S. Department of State, Chest X-ray and Classification Worksheet
    - DS-3024 Form (published September 2007) field:
      - Chest X-ray Findings
    - DS-3030 Form (published July 2010) field:
      - Chest X-ray Findings
  - U.S. Department of State, Tuberculosis Worksheet
    - DS-3030 Form (published September 2014) field:
      - Chest X-ray Findings
  - TB Follow-up Worksheet fields:
    - A4 (Initial U.S. Entry Date)
    - D2 (Evaluation Disposition)
      - Completed Evaluation
      - Treatment recommended
    - D3 (Diagnosis)
    - E1 (U.S. Treatment Initiated)
    - E2 (U.S. Treatment Start Date)

LTBI treatment helps prevent future cases of TB. This indicator measures the extent to which local TB programs ensure that immigrants and refugees diagnosed with LTBI or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) on the basis of examination in the United States are started on treatment.

According to the guidelines, all persons diagnosed with LTBI or have a radiographic finding consistent with prior pulmonary TB, who have not been treated for TB are recommended for LTBI treatment. Individuals with prior pulmonary TB (ATS/CDC Class 4) who have not been treated are at increased risk for progression to active disease. Other terminologies used when referring to prior pulmonary TB (ATS/CDC Class 4) include inactive TB disease, or old healed TB. Please refer to the guideline for **Treatment of Tuberculosis** for more information.

Under special circumstances, treatment may not be recommended for persons who are pregnant or have liver disease. Because these conditions are not captured in the TB Follow-up Worksheet, the NTIP Workgroup recommended that only individuals who are recorded as 'Treatment Recommended' be included in this indicator cohort.

TB program staff are encouraged to review records for individuals diagnosed with LTBI or who have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) for whom treatment was not recommended, to understand why treatment was not prescribed.

Immigrants and Refugees – Treatment Completion

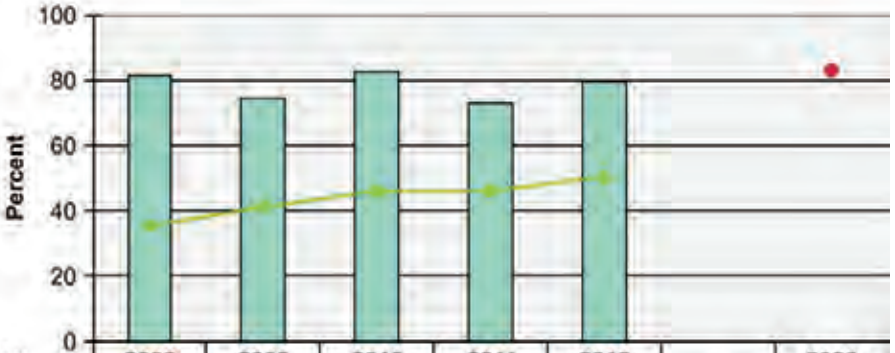
National objective: For immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with latent TB infection or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) on the basis of examination in the U.S., and who have started on treatment, increase the proportion who complete treatment

Indicator

Percent treatment completion for immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with latent TB infection (LTBI) or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) and recommended for treatment on the basis of examination in the U.S., who have started treatment

Treatment Completion for Immigrants and Refugees Who Are Diagnosed with Latent TB Infection (LTBI) or Prior Pulmonary TB and Recommended for Treatment on the Basis of U.S. Examination and Have Started Treatment
Sample Jurisdiction
2008 to 2012

(Quarterly report available)



Year	2008	2009	2010	2011	2012	--	2020
Completed Treatment (%)	81.4	74.6	82.7	73.0	79.5	--	
Program Targets (%)	--	--	N/A	N/A	N/A	--	N/A
National Average (%)	35.4	41.1	45.8	46.0	50.1	--	
National Target (%)						--	83.0

Year	2008	2009	2010	2011	2012
Total Immigrants and Refugees Diagnosed with LTBI or Prior Pulmonary TB and Recommended for Treatment Who Have Started Treatment (N)	59	134	133	111	73
Completed Treatment (n)	48	100	110	81	58
Started and Did Not Complete Treatment (n)	11	34	23	30	15

CALCULATION

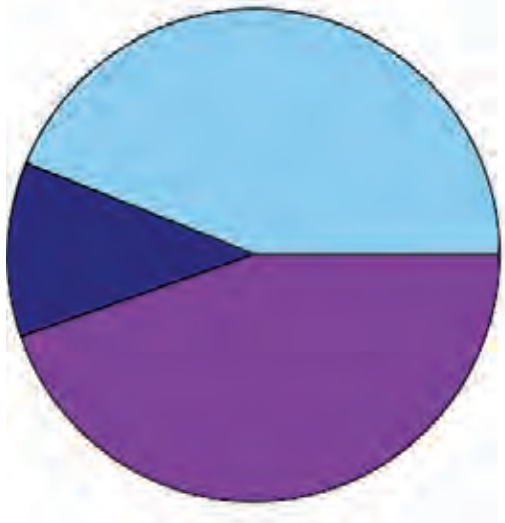
Percent (%)	**n/N x 100**
Numerator (n)	Number of immigrants and refugees who completed treatment
Denominator (N)	Number of immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with LTBI or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) and recommended for treatment on the basis of examination in the U.S., who started treatment, arrived in the cohort period of interest

DATA SOURCES

- Electronic Disease Notification (EDN) System
  - U.S. Department of State, Chest X-ray and Classification Worksheet
    - DS-3024 Form (published September 2007) field:
      - Chest X-ray Findings
    - DS-3030 Form (published July 2010) field:
      - Chest X-ray Findings
  - U.S. Department of State, Tuberculosis Worksheet
    - DS-3030 Form (published September 2014) field:
      - Chest X-ray Findings
  - TB Follow-up Worksheet fields:
    - A4 (Initial U.S. Entry Date)
    - D2 (Evaluation Disposition)
    - D3 (Diagnosis)
    - E1 (U.S. Treatment Initiated)
    - E2 (U.S. Treatment Start Date)
    - E3 (U.S. Treatment Completed)
    - E4 (U.S. Treatment Completion Date or End Date)

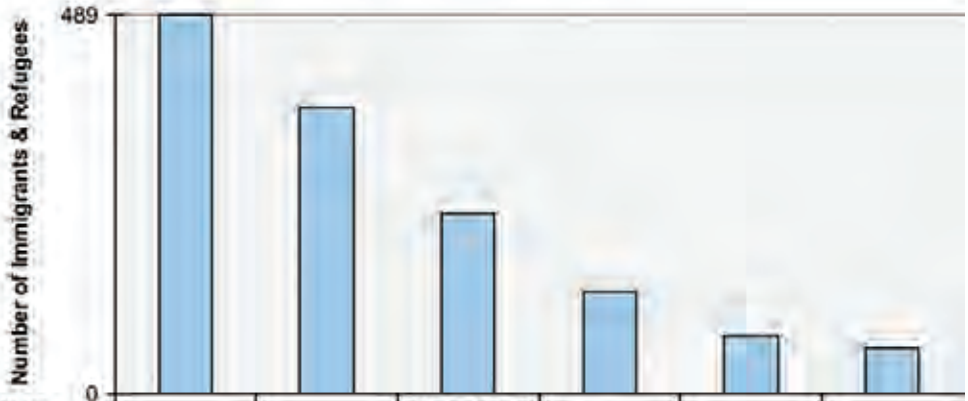
This indicator measures the extent to which immigrants and refugees who are diagnosed with LTBI or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) on the basis of U.S. examination and who started treatment complete treatment. Preventative treatment helps prevent future cases of TB.

Treatment Status for Immigrants and Refugees Diagnosed with LTBI or Prior Pulmonary TB and Recommended for Treatment on the Basis of U.S. Examination
Sample Jurisdiction
2012



	No.	(%)
Total Immigrants and Refugees Diagnosed with LTBI or Prior Pulmonary TB and Recommended for Treatment	130	(100.0)
Completed Treatment	58	(44.6)
Started Treatment / Not Complete	15	(11.5)
Did Not Start Treatment	57	(43.8)

Number of Immigrants and Refugees Arrived with Abnormal Chest X-Rays Read Overseas as Consistent with TB by Examination and Treatment Disposition
Sample Jurisdiction
2012
(Quarterly report available)



	Arrived	Examined	Diagnosed with LTBI or Prior Pulmonary TB	Recom-mended for Treatment	Started Treatment	Completed Treatment
With Abnormal Chest X-Ray Overseas (TB)	489	369	231	130	73	58

Disposition	Arrived	Examined	Diagnosed with LTBI or Prior Pulmonary TB	Recom-mended for Treatment	Started Treatment	Completed Treatment
Diagnosed with LTBI on the Basis of U.S. Examination	N/A	N/A	148	109	61	48
Diagnosed with Prior Pulmonary TB on the Basis of U.S. Examination	N/A	N/A	83	21	12	10

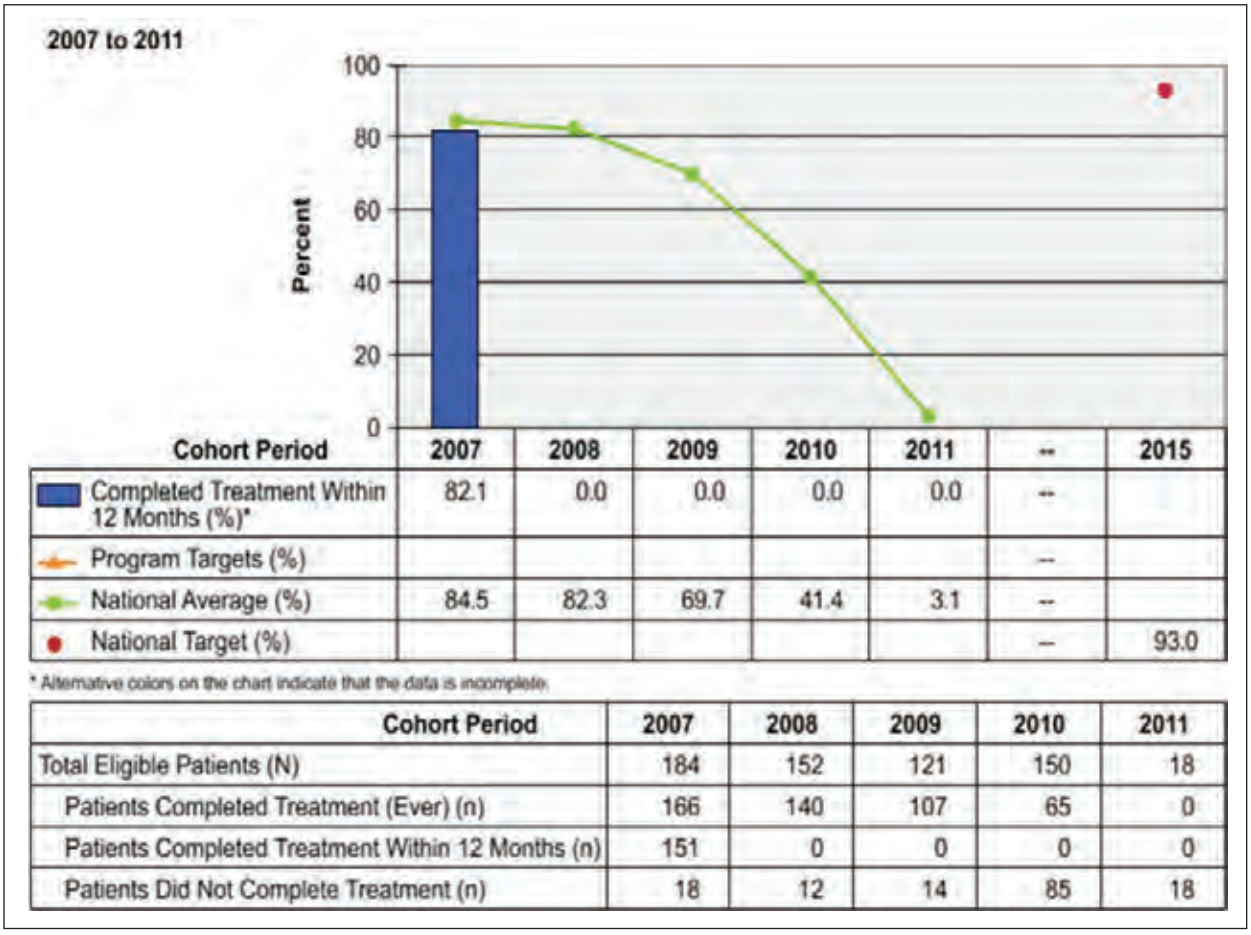
X. Evaluating Data Quality and Promptness

This chapter describes how surveillance data quality (i.e., accuracy, completeness and promptness) affects the data in NTIP indicator reports, and demonstrates how an user can use NTIP to assess surveillance data quality and delineate data problems.

Impact of Inaccurate or Incomplete Surveillance Data on NTIP Indicators

Inaccurate or incomplete surveillance data from the RVCT has tremendous impact on NTIP indicators. Missing or incorrect data in an RVCT variable used in an indicator calculation incorrectly classifies a TB case in the eligibility criteria for an indicator. A case may be incorrectly included or excluded from the denominator leading to inaccurate indicator results. Similarly, inaccurate or missing data in a variable for the numerator (used to determine whether a case met a particular objective) may lead to a lower than expected indicator result.

Figure 6.1: Completion of Therapy Trend Graph with Missing Data



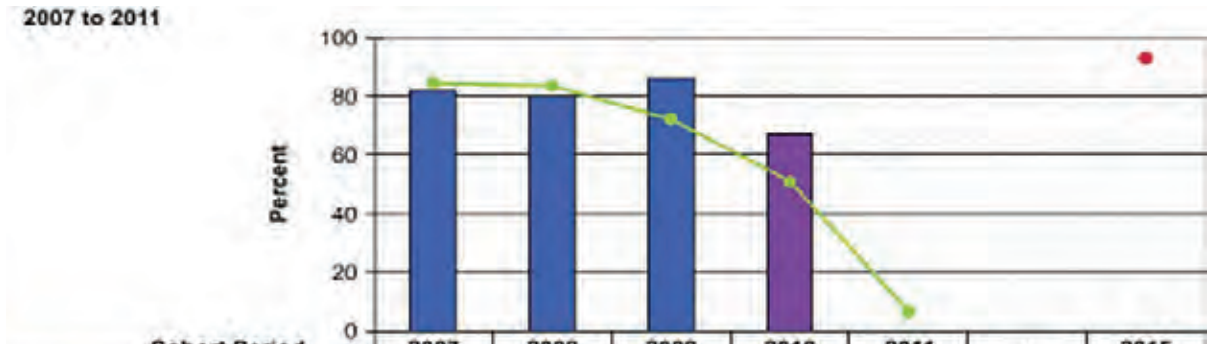
Cohort Period	2007	2008	2009	2010	2011	--	2015
Completed Treatment Within 12 Months (%)*	82.1	0.0	0.0	0.0	0.0	--	
Program Targets (%)						--	
National Average (%)	84.5	82.3	69.7	41.4	3.1	--	
National Target (%)						--	93.0

* Alternative colors on the chart indicate that the data is incomplete

Cohort Period	2007	2008	2009	2010	2011
Total Eligible Patients (N)	184	152	121	150	18
Patients Completed Treatment (Ever) (n)	166	140	107	65	0
Patients Completed Treatment Within 12 Months (n)	151	0	0	0	0
Patients Did Not Complete Treatment (n)	18	12	14	85	18

Figure 6.1 provides an example from the Completion of Therapy objective. The figure illustrates how missing data in a variable, which determines whether cases met the objective, affect the indicator calculation. The NTIP graph indicates that none of the cases eligible to complete treatment within 12 months from 2008 to 2011 met the objective. The table accompanying the graph indicates that most of the patients have completed treatment, though none of the patients completed treatment within 12 months. This results in 0% treatment completion rate for this objective. Completion of Therapy indicator, two variables, the "Date Therapy Started" and "Date Therapy Stopped," are used to calculate the treatment duration. While all completion of treatment is important, in order to meet the objective for this indicator treatment has to be completed within 366 days. Missing data in one key variable, such as "Date Therapy Stopped," has a tremendous effect on the indicator result as shown in **Figure 6.1**. **Figure 6.2** shows the graph after the missing variables are corrected.

Figure 6.2: Completion of Therapy Trend Graph without Missing Data



Cohort Period	2007	2008	2009	2010	2011	--	2015
Completed Treatment Within 12 Months (%)*	81.6	80.1	86.1	67.1	0.0	--	
Program Targets (%)						--	
National Average (%)	84.5	83.5	72.2	50.8	6.6	--	
National Target (%)						--	93.0

* Alternative colors on the chart indicate that the data is incomplete.

Cohort Period	2007	2008	2009	2010	2011
Total Eligible Patients (N)	185	151	122	155	32
Patients Completed Treatment (Ever) (n)	166	139	109	109	0
Patients Completed Treatment Within 12 Months (n)	151	121	105	104	0
Patients Did Not Complete Treatment (n)	19	12	13	46	32

Using NTIP Graphs to Assess Surveillance Data Quality and Promptness

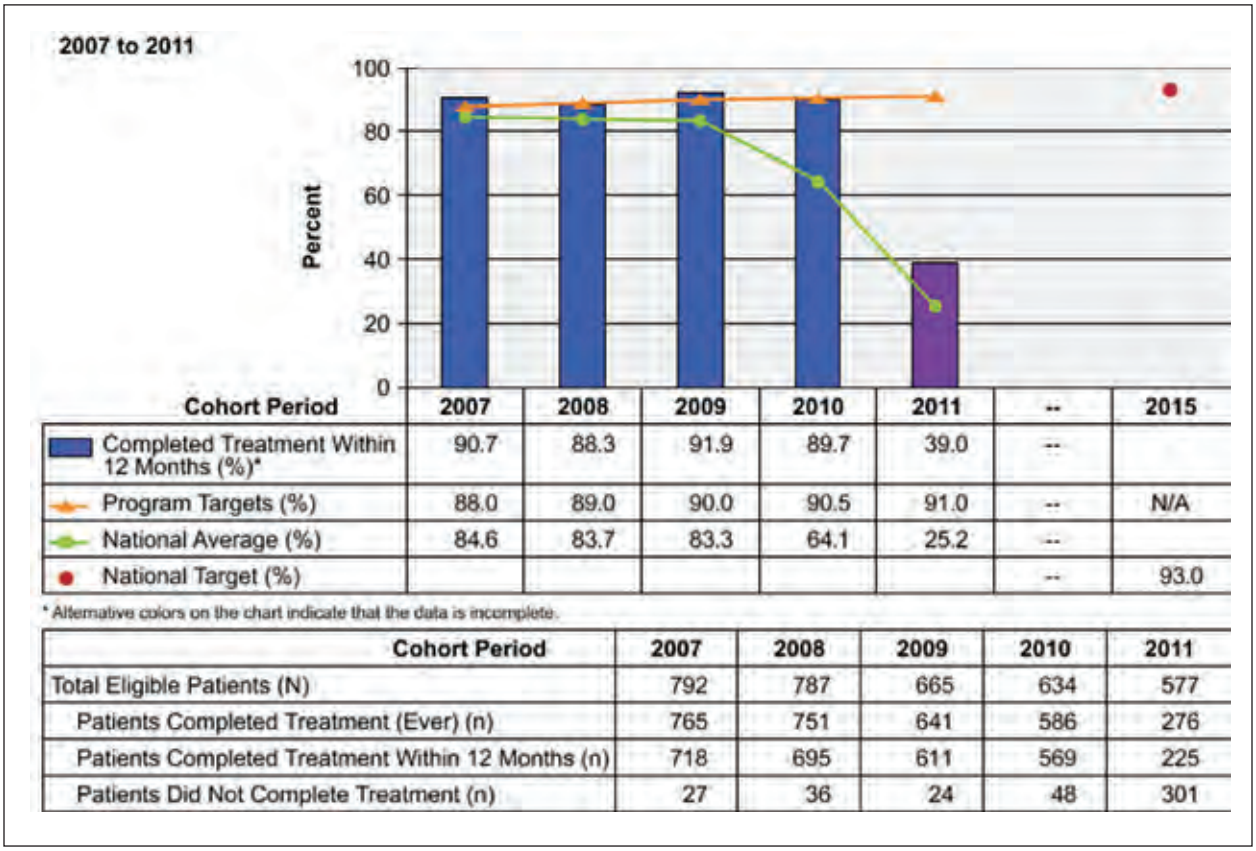
NTIP reports can be used to assess and monitor the quality of surveillance data submitted to CDC. Understanding how indicators are calculated, how data are presented, and the timing of surveillance data transmission to CDC, staff members from each TB program can use NTIP reports to assess the accuracy, completeness, and promptness of surveillance data and take the necessary action to ensure high quality surveillance data.

Purple vs. Blue Bar Graph

The trend graph on each indicator report is a visual tool that provides clues on the accuracy, completeness, and promptness of surveillance data received by CDC.

The color of the bar graph serves as an "indicator" of how complete surveillance data are for a particular cohort period. The color of the bar graph changes from purple to blue when the data are 90% complete (See **Figure 6.3**). For the Completion of Therapy indicator, the variable "Date Therapy Stopped" is used to determine data completeness. When the color of the graph turns blue, it signals that at least 90% of the patients in the reporting cohort period have a "Date Therapy Stopped." When reviewing the indicator reports, noting the time period where the color of the bar graph remains purple gives a sense of the data completeness for the time-period.

Figure 6.3: Completion of Therapy Trend Graph Illustrating Data Completeness



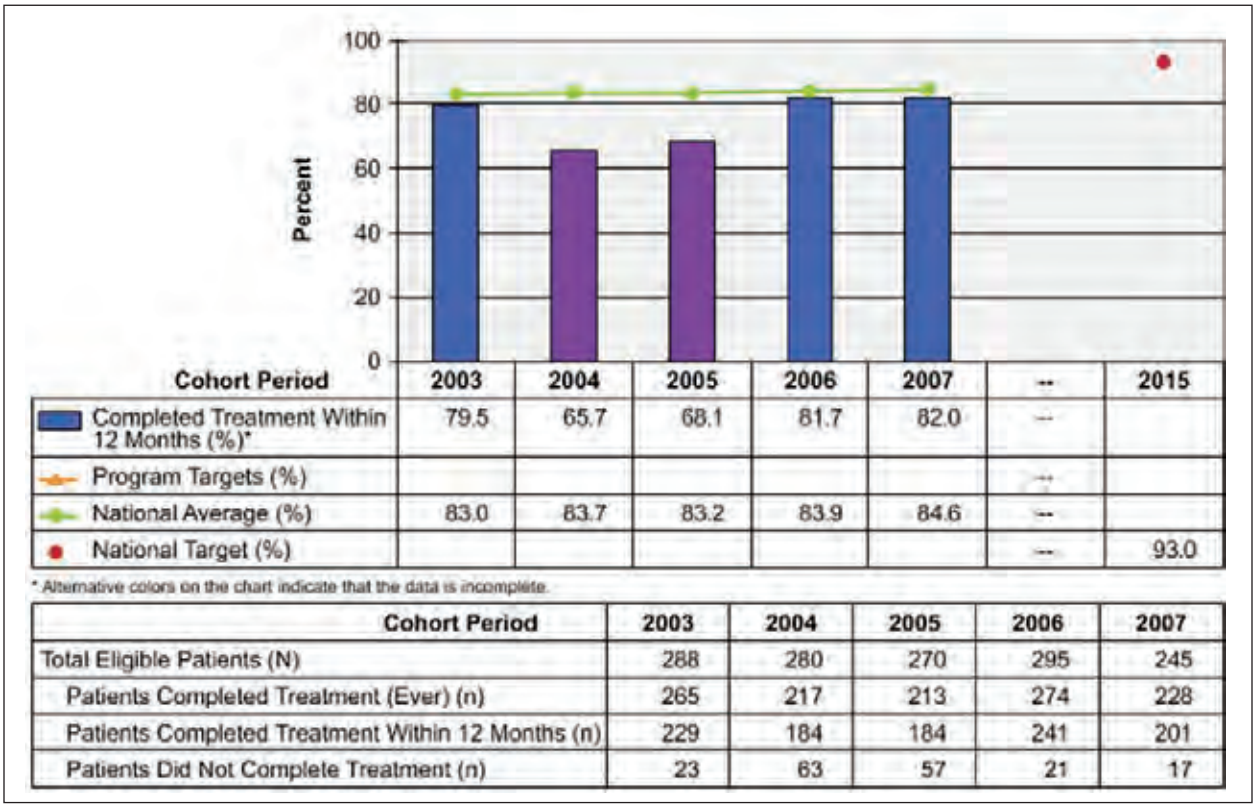
Cohort Period	2007	2008	2009	2010	2011	--	2015
Completed Treatment Within 12 Months (%)*	90.7	88.3	91.9	89.7	39.0	--	
Program Targets (%)	88.0	89.0	90.0	90.5	91.0	--	N/A
National Average (%)	84.6	83.7	83.3	64.1	25.2	--	
National Target (%)						--	93.0

* Alternative colors on the chart indicate that the data is incomplete.

Cohort Period	2007	2008	2009	2010	2011
Total Eligible Patients (N)	792	787	665	634	577
Patients Completed Treatment (Ever) (n)	765	751	641	586	276
Patients Completed Treatment Within 12 Months (n)	718	695	611	569	225
Patients Did Not Complete Treatment (n)	27	36	24	48	301

A bar graph that remains purple in a time-period where most patients should have completed treatment, and therefore should have a stop therapy date, may indicate data quality issues. In **Figure 6.4**, the bar graphs for 2004 and 2005 data remained purple where the bar graphs for 2006 and 2007 have changed to blue suggesting possible data issues for the years 2004 and 2005.

Figure 6.4: Completion of Therapy Trend Graph Illustrating Data Quality



Cohort Period	2003	2004	2005	2006	2007	--	2015
Completed Treatment Within 12 Months (%)*	79.5	65.7	68.1	81.7	82.0	--	
Program Targets (%)						--	
National Average (%)	83.0	83.7	83.2	83.9	84.6	--	
National Target (%)						--	93.0

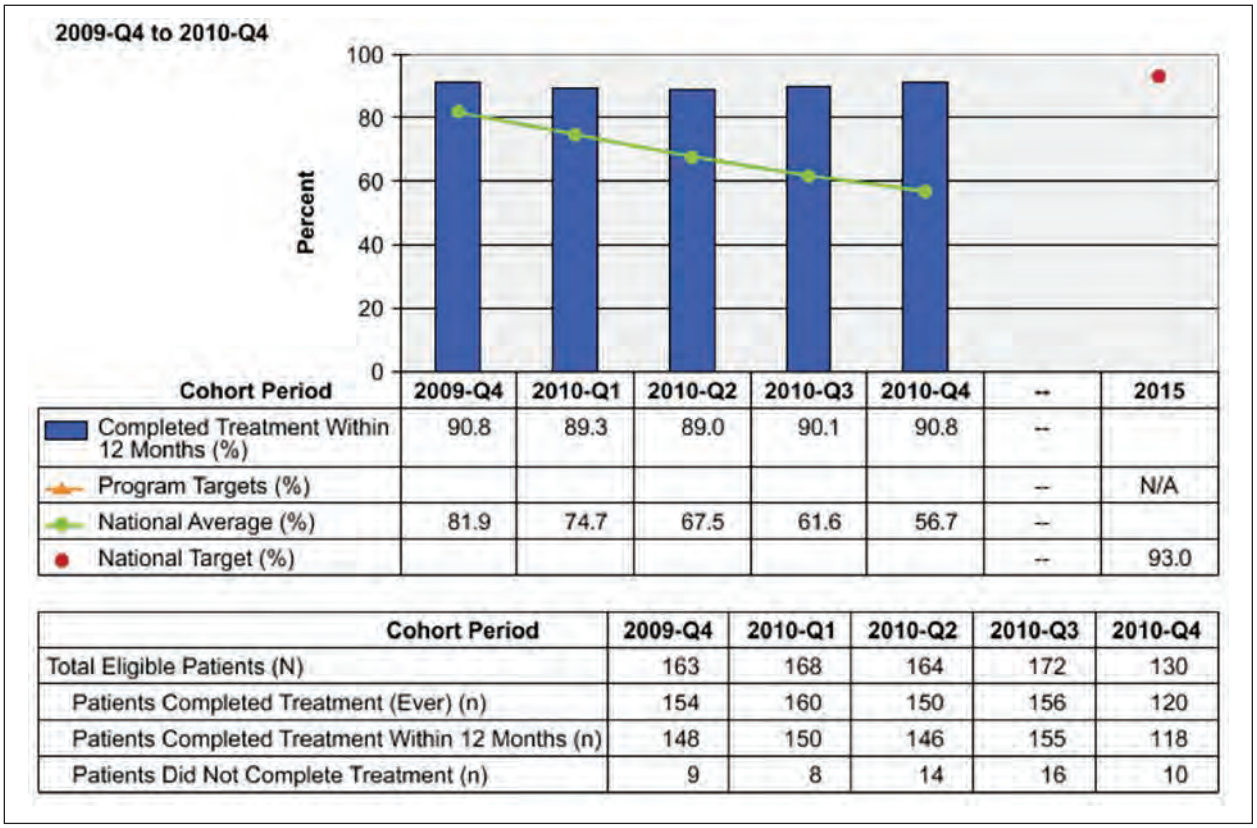
* Alternative colors on the chart indicate that the data is incomplete.

Cohort Period	2003	2004	2005	2006	2007
Total Eligible Patients (N)	288	280	270	295	245
Patients Completed Treatment (Ever) (n)	265	217	213	274	228
Patients Completed Treatment Within 12 Months (n)	229	184	184	241	201
Patients Did Not Complete Treatment (n)	23	63	57	21	17

Quarterly Trends

Utility of NTIP is in large part affected by on-time reporting to CDC. The timing of reporting can be observed and monitored through NTIP. Understanding the timeline for case management, data collection, and reporting helps one interpret the graph for this purpose. Using Completion of Therapy as an example, the NTIP reports can be examined by quarters to assess the promptness of surveillance data reporting. For the Completion of Therapy indicator, eligible cases should complete treatment within 12 months. For example, most cases that were diagnosed with TB and counted in the fourth quarter of 2010 [2010-Q4] should have completed treatment by the 4th quarter of the following year [2011-Q4]. Because time is required for treatment completion data to be collected, reported to state TB programs, and transmitted to CDC, data may be delayed by the time they reach NTIP. Monitoring the completeness and promptness of surveillance data is in many ways similar to monitoring the progress of the individual program with respect to the indicator. From the perspective of evaluating a program that has kept their data collection and reporting in sync with their case management process, the cohort period that most cases would have completed treatment for the first quarter of 2012 is the 4th quarter 2010. The blue bar graph in **Figure 6.5** and **Figure 6.6** illustrate this point. In **Figure 6.5**, data for Completion of Therapy appears to be almost complete. The blue bars show that more than 90% of the data for Date Therapy Stopped is available for each quarter in 2010. However, since there may be many patients still on therapy during 2011, the purple bars in **Figure 6.6** show that the data for Date Therapy Stopped fall below 90%. The height of the bars in the trend graph indicated that Completion of Therapy has suffered as well.

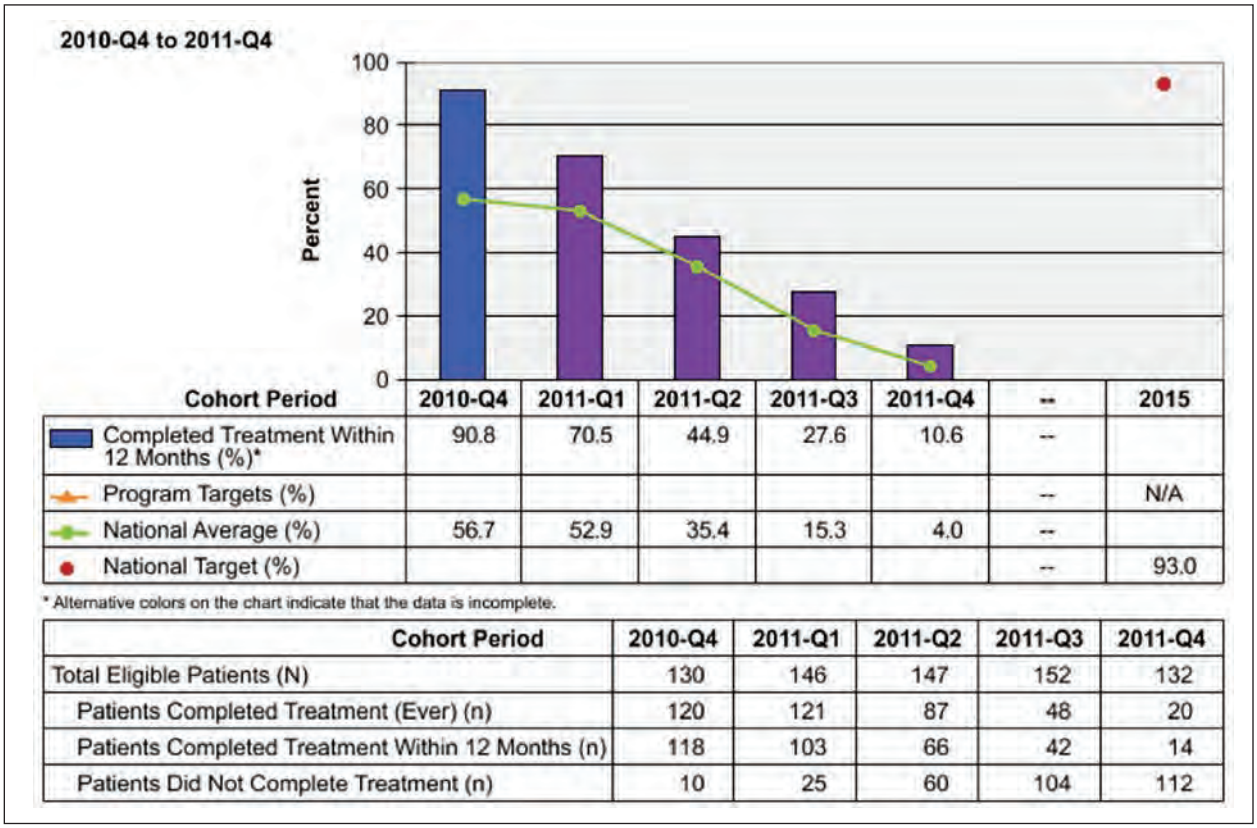
Figure 6.5: Completion of Therapy Trend Graph, by Quarter, 2009-Q4 to 2010-Q4



Cohort Period	2009-Q4	2010-Q1	2010-Q2	2010-Q3	2010-Q4	--	2015
Completed Treatment Within 12 Months (%)	90.8	89.3	89.0	90.1	90.8	--	
Program Targets (%)						--	N/A
National Average (%)	81.9	74.7	67.5	61.6	56.7	--	
National Target (%)						--	93.0

Cohort Period	2009-Q4	2010-Q1	2010-Q2	2010-Q3	2010-Q4
Total Eligible Patients (N)	163	168	164	172	130
Patients Completed Treatment (Ever) (n)	154	160	150	156	120
Patients Completed Treatment Within 12 Months (n)	148	150	146	155	118
Patients Did Not Complete Treatment (n)	9	8	14	16	10

Figure 6.6: Completion of Therapy Trend Graph, by Quarter, 2010-Q4 to 2011-Q4



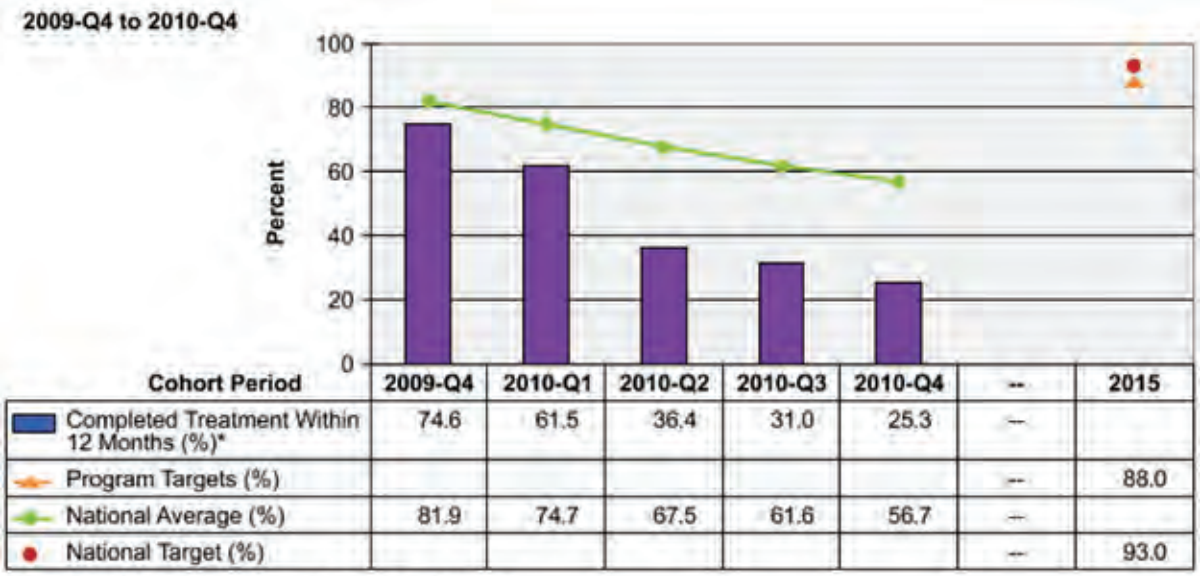
Cohort Period	2010-Q4	2011-Q1	2011-Q2	2011-Q3	2011-Q4	--	2015
Completed Treatment Within 12 Months (%)*	90.8	70.5	44.9	27.6	10.6	--	
Program Targets (%)						--	N/A
National Average (%)	56.7	52.9	35.4	15.3	4.0	--	
National Target (%)						--	93.0

* Alternative colors on the chart indicate that the data is incomplete.

Cohort Period	2010-Q4	2011-Q1	2011-Q2	2011-Q3	2011-Q4
Total Eligible Patients (N)	130	146	147	152	132
Patients Completed Treatment (Ever) (n)	120	121	87	48	20
Patients Completed Treatment Within 12 Months (n)	118	103	66	42	14
Patients Did Not Complete Treatment (n)	10	25	60	104	112

In a program that has been transmitting data to CDC on a continuous basis as patients complete treatment, a curve reflecting the continued receipt of cases completing treatment within 12 months can be observed (see **Figure 6.7**). In contrast, a program that has not been updating or transmitting data on a regular basis may be missing large amounts of data (see **Figure 6.8**). Delays in data reporting can also be observed when comparing programs' indicator status to corresponding state or national averages.

Figure 6.7: Completion of Therapy Trend Graph Illustrating Continuous Data Transmission

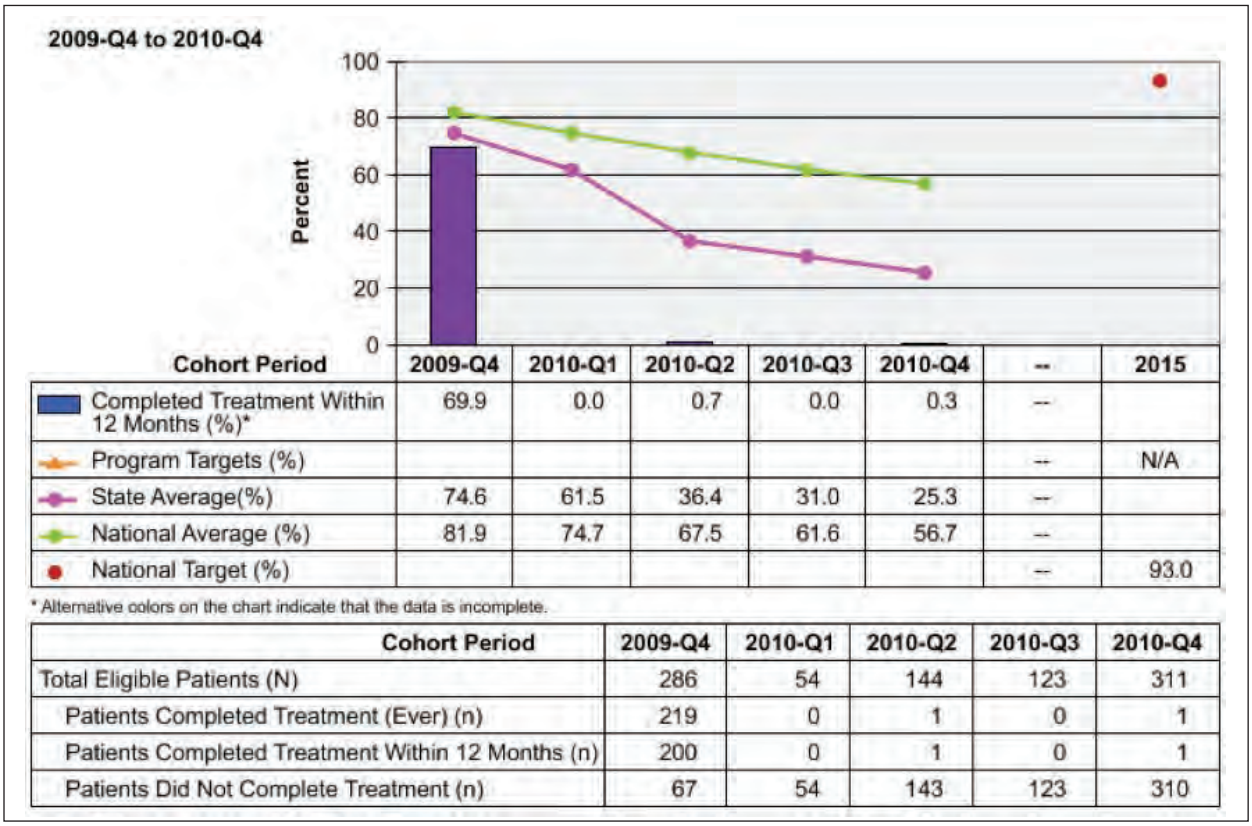


Cohort Period	2009-Q4	2010-Q1	2010-Q2	2010-Q3	2010-Q4	--	2015
Completed Treatment Within 12 Months (%)*	74.6	61.5	36.4	31.0	25.3	--	
Program Targets (%)						--	88.0
National Average (%)	81.9	74.7	67.5	61.6	56.7	--	
National Target (%)						--	93.0

* Alternative colors on the chart indicate that the data is incomplete.

Cohort Period	2009-Q4	2010-Q1	2010-Q2	2010-Q3	2010-Q4
Total Eligible Patients (N)	712	387	500	522	700
Patients Completed Treatment (Ever) (n)	578	252	202	175	192
Patients Completed Treatment Within 12 Months (n)	531	238	182	162	177
Patients Did Not Complete Treatment (n)	134	135	298	347	508

Figure 6.8: Completion of Therapy Trend Graph Illustrating Delayed Data Transmission



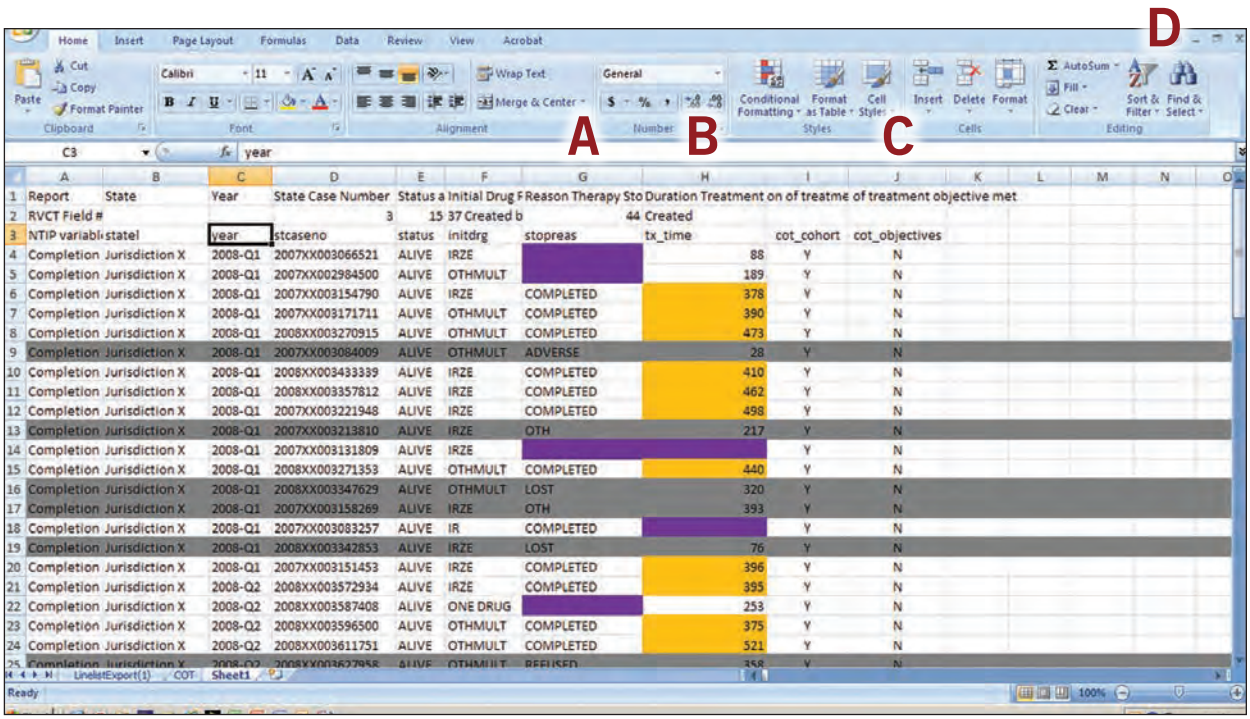
Cohort Period	2009-Q4	2010-Q1	2010-Q2	2010-Q3	2010-Q4	--	2015
Completed Treatment Within 12 Months (%)*	69.9	0.0	0.7	0.0	0.3	--	
Program Targets (%)						--	N/A
State Average(%)	74.6	61.5	36.4	31.0	25.3	--	
National Average (%)	81.9	74.7	67.5	61.6	56.7	--	
National Target (%)						--	93.0

* Alternative colors on the chart indicate that the data is incomplete.

Cohort Period	2009-Q4	2010-Q1	2010-Q2	2010-Q3	2010-Q4
Total Eligible Patients (N)	286	54	144	123	311
Patients Completed Treatment (Ever) (n)	219	0	1	0	1
Patients Completed Treatment Within 12 Months (n)	200	0	1	0	1
Patients Did Not Complete Treatment (n)	67	54	143	123	310

Line-Listed Data

In assisting programs with data validation, NTIP provides line lists of cases that are summarized in the aggregate indicator reports. Program staff members can use the line list to help them find missing data in variables used to calculate the indicators that have contributed to cases being misclassified in the cohort eligibility criteria or for not meeting the indicator objective. The screenshot below shows an example of a line list:



Report	State	Year	State Case Number	Status a	Initial Drug F	Reason Therapy Sto	Duration Treatment	on of treatme	of treatment objective met
RVCT Field #			3	15	37 Created b		44 Created		
NTIP variabl	statel	year	stcaseno	status	initdrg	stopreas	tx_time	cot_cohort	cot_objectives
Completion	Jurisdiction X	2008-Q1	2007XX003066521	ALIVE	IRZE		88	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX002984500	ALIVE	OTHMULT		189	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003154790	ALIVE	IRZE	COMPLETED	378	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003171711	ALIVE	OTHMULT	COMPLETED	390	Y	N
Completion	Jurisdiction X	2008-Q1	2008XX003270915	ALIVE	OTHMULT	COMPLETED	473	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003084009	ALIVE	OTHMULT	ADVERSE	28	Y	N
Completion	Jurisdiction X	2008-Q1	2008XX003433339	ALIVE	IRZE	COMPLETED	410	Y	N
Completion	Jurisdiction X	2008-Q1	2008XX003357812	ALIVE	IRZE	COMPLETED	462	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003221948	ALIVE	IRZE	COMPLETED	498	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003213810	ALIVE	IRZE	OTH	217	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003131809	ALIVE	IRZE			Y	N
Completion	Jurisdiction X	2008-Q1	2008XX003271353	ALIVE	OTHMULT	COMPLETED	440	Y	N
Completion	Jurisdiction X	2008-Q1	2008XX003347629	ALIVE	OTHMULT	LOST	320	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003158269	ALIVE	IRZE	OTH	393	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003083257	ALIVE	IR	COMPLETED		Y	N
Completion	Jurisdiction X	2008-Q1	2008XX003342853	ALIVE	IRZE	LOST	76	Y	N
Completion	Jurisdiction X	2008-Q1	2007XX003151453	ALIVE	IRZE	COMPLETED	396	Y	N
Completion	Jurisdiction X	2008-Q2	2008XX003572934	ALIVE	IRZE	COMPLETED	395	Y	N
Completion	Jurisdiction X	2008-Q2	2008XX003587408	ALIVE	ONE DRUG		253	Y	N
Completion	Jurisdiction X	2008-Q2	2008XX003596500	ALIVE	OTHMULT	COMPLETED	375	Y	N
Completion	Jurisdiction X	2008-Q2	2008XX003611751	ALIVE	OTHMULT	COMPLETED	521	Y	N

A **Incomplete/Missing Data:** Cells highlighted in purple are missing information for reason therapy stopped and duration of treatment.

B **Treatment Duration > 366 Days:** Cases with treatment duration over 366 days do not meet the objective for completing treatment within 1 year. However, they may be included in the indicator cohort.

C **Objective Met or Not Met:** The cases (rows) highlighted in gray have been correctly classified as not meeting the completion of treatment objective (reason therapy stopped is not COMPLETED).

D **Tools:** The 'Sort & Filter' and 'Find & Select' tools can be used to sort and filter the spreadsheet to examine the data using specific criteria.

Appendix A: National TB Program Objectives and Performance Targets

Please refer to CDC website, **http://www.cdc.gov/tb/programs/Evaluation/Indicators/ProgramObjectives.pdf**, for updates.

Goals for Reducing TB Incidence	2020 Targets
TB Incidence Rate Reduce the incidence of TB disease.	1.4 cases per 100,000
U.S.-Born Persons Decrease the incidence of TB disease among U.S.-born persons.	0.4 cases per 100,000
Foreign-Born Persons Decrease the incidence of TB disease among foreign-born persons.	11.1 cases per 100,000
U.S.-Born Non-Hispanic Blacks or African Americans Decrease the incidence of TB disease among U.S.-born non-Hispanic blacks or African Americans.	1.5 cases per 100,000
Children Younger than 5 Years of Age Decrease the incidence of TB disease among children younger than 5 years of age.	0.3 cases per 100,000

Objectives on Case Management and Treatment	2020 Targets
Known HIV Status Increase the proportion of TB patients who have a positive or negative HIV test result reported.	98%
Treatment Initiation For TB patients with positive acid-fast bacillus (AFB) sputum-smear results, increase the proportion who initiated treatment within 7 days of specimen collection.	97%
Recommended Initial Therapy For patients whose diagnosis is likely to be TB disease, increase the proportion who are started on the recommended initial 4-drug regimen.	97%
Sputum Culture Result Reported For TB patients ages 12 years or older with a pleural or respiratory site of disease, increase the proportion who have a sputum culture result reported.	98%
Sputum Culture Conversion For TB patients with positive sputum culture results, increase the proportion who have documented conversion to negative results within 60 days of treatment initiation.	73%
Completion of Therapy For patients with newly diagnosed TB disease for whom 12 months or less of treatment is indicated, increase the proportion who complete treatment within 12 months.	95%

Objectives on Laboratory Reporting	2020 Targets
Turnaround Time — Culture For TB patients with cultures of respiratory specimens identified with *M. tuberculosis* complex (MTBC), increase the proportion reported by the laboratory within 25 days from the date the specimen was collected. **NOTE:** *25 days includes 21 days for culture to grow and 4 days for specimen collection and delivery to lab.*	78%
Turnaround Time — Nucleic Acid Amplification (NAA) For TB patients with respiratory specimens positive for MTBC by nucleic acid amplification (NAA), increase the proportion reported by the laboratory within 6 days from the date the specimen was collected. **NOTE:** *6 days includes 2 days for detection and 4 days for specimen collection and delivery to lab.*	92%
Drug-Susceptibility Result For TB patients with positive culture results, increase the proportion who have initial drug-susceptibility results reported.	100%
Universal Genotyping For TB patients with a positive culture result, increase the proportion who have a MTBC genotyping result reported.	100%

Objectives on Contact Investigations	2020 Targets
Contact Elicitation For TB patients with positive AFB sputum-smear results, increase the proportion who have contacts elicited.	100%
Examination For contacts to sputum AFB smear-positive TB cases, increase the proportion who are examined for infection and disease.	93%
Treatment Initiation For contacts to sputum AFB smear-positive TB cases diagnosed with latent TB infection, increase the proportion who start treatment.	91%
Treatment Completion For contacts to sputum AFB smear-positive TB cases who have started treatment for latent TB infection, increase the proportion who complete treatment.	81%

Objectives on Examination of Immigrants and Refugees	2020 Targets
Examination Initiation For immigrants and refugees with abnormal chest radiographs (X-rays) read overseas as consistent with TB, increase the proportion who initiate a medical examination within 30 days of notification.	84%
Examination Completion For immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB, increase the proportion who complete a medical examination within 90 days of notification.	76%
Treatment Initiation For immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with latent TB infection or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) on the basis of examination in the U.S. and who are recommended for treatment, increase the proportion who start treatment.	93%
Treatment Completion For immigrants and refugees with abnormal chest X-rays read overseas as consistent with TB who are diagnosed with latent TB infection or have radiographic findings consistent with prior pulmonary TB (ATS/CDC Class 4) on the basis of examination in the U.S. and recommended for treatment, and who have started on treatment, increase the proportion who complete treatment.	98%

Objectives on Data Reporting	2020 Targets
RVCT Ensure the completeness of each core Report of Verified Case of Tuberculosis (RVCT) data item reported to CDC, as described in the TB cooperative agreement announcement.	100%
ARPE Ensure the completeness of each core Aggregate Reports for Tuberculosis Program Evaluation (ARPE) data items reported to CDC, as described in the TB cooperative agreement announcement.	100%
EDN Ensure the completeness of each core Electronic Disease Notification (EDN) system data item reported to CDC, as described in the TB cooperative agreement announcement.	93%

Objectives on Program Evaluation
Evaluation Activities Increase program evaluation activities by monitoring program progress and tracking evaluation status of TB cooperative agreement recipients.
Evaluation Focal Point Increase the percent of TB cooperative agreement recipients that have an evaluation focal point.

Objectives on Human Resource Development
Development Plan Increase the percent of TB cooperative agreement recipients who submit a program-specific human resource development plan (HRD) and a yearly update of progress, as outlined in the TB cooperative agreement announcement.
Training Focal Point Increase the percent of TB cooperative agreement recipients that have a TB training focal point.

Appendix B: Glossary

For a complete list of terms and definitions, please refer to CDC Tuberculosis Surveillance Data Training, Report of Verified Case of Tuberculosis (RVCT): Instruction Manual, June 2009. **http://www.cdc.gov/tb/programs/rvct/InstructionManual.pdf**

Term	Definition
Acid-fast bacilli (AFB)	Microorganisms that when stained, retain color even after they have been washed in an acid alcohol solution; may be detected under a microscope in stained smear.
Active TB disease	An illness, caused by bacteria called *Mycobacterium tuberculosis*, in which tuberculosis (TB) bacteria are multiplying and attacking parts of the body, most commonly the lungs. A person with active TB disease is capable of spreading the disease to others if the TB bacteria are active in the lungs or throat. The symptoms of active TB disease include weakness, weight loss, fever, no appetite, chills, and night sweats. Other symptoms may include a bad cough, pain in the chest, and coughing up blood.
Adherence to treatment	Following the recommended course of treatment by taking all the prescribed medications for the entire length of time necessary.
Adverse effect	Negative side effect resulting from the use of a drug (for example, hepatitis, nausea, headache).
Aggregate Reports for Tuberculosis Program Evaluation (ARPE) - Contacts	A national summary report tool that helps evaluate non-case finding and non-case holding TB prevention activities. These prevention activities include contact tracing, targeted testing, and treating latent tuberculosis infection.
Bronchoscopy	A procedure used to obtain pulmonary secretions or lung tissue with an instrument called a bronchoscope.
Case management	A system in which a specific health department employee is assigned primary responsibility for the patient, systematic regular review of patient progress is conducted, and plans are made to address any barriers to adherence.
Incidence rate	The number of cases that occur during a certain time period, divided by the size of the population during that time period; the incidence rate is often expressed in terms of a population size of 100,000 persons.
Case reporting	Informing the state or local health department when a new case (an occurrence) of TB disease has been diagnosed or is suspected.
Cavity	A hollow space within the lung, visible on a chest X-ray or CT scan.
Contact investigation	A procedure for interviewing a person who has TB disease to determine who may have been exposed to TB. People who have been exposed to TB are tested for latent TB infection (LTBI) and TB disease.

Term	Definition
Contacts	Persons who were exposed to someone with infectious TB disease, generally including family members, roommates or housemates, close friends, coworkers, classmates, and others.
Country of birth	The country where a person was born.
Culture	To grow organisms on media (substances containing nutrients) so that the micro-oorganisms or the product of this process can be identified.
Daily regimen	A treatment schedule in which the patient takes a dose of each prescribed medication every day.
Diagnostic evaluation	An evaluation used to diagnose TB disease: includes a medical history, a chest X-ray, the collection of specimens for bacteriologic examination, and possibly a tuberculin skin test or an interferon-gamma release assay such as the QuantiFERON®-TB Gold test.
Directly observed therapy (DOT)	A designated person watches the TB patient swallow each dose of the prescribed drugs.
Drug susceptibility test	A laboratory method for finding drug resistance in a microorganism.
Drug-resistant TB	TB caused by organisms that are able to grow in the presence of a particular drug; TB that is resistant to at least one first-line antituberculosis drug.
Electronic Disease Notification (EDN) System	A system that notifies state and local public health officials of immigrant and refugee arrivals into their jurisdiction who have been found to have suspected TB during their overseas medical examination.
Ethambutol (EMB)	A drug used to treat TB disease; may cause vision problems. Ethambutol should be used cautiously in children who are too young to be monitored for changes in their vision.
Extrapulmonary TB	TB disease that occurs in places other than the lungs, such as the lymph nodes, the pleura, the brain, the kidneys, or the bones; most types of extrapulmonary TB are not infectious.
First-line TB drugs	The initial drugs used for treating TB disease. Includes isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB).
Foreign-born persons	People born outside of the United States.
HIV	Human immunodeficiency virus: the virus that causes AIDS.
Isolate	A sample from a specimen that was identified as a certain organism such as *M. tuberculosis* complex.
Isoniazid (INH)	A drug that is used for treating LTBI and one of the drugs used to treat TB disease.
Latent TB infection (LTBI)	Refers to the condition when a person is infected with tubercle bacilli, but TB disease has not developed. Persons with LTBI do not have TB disease symptoms and they cannot spread TB germs to others. Persons with LTBI usually have a positive result to the Mantoux tuberculin skin test or an interferon-gamma release assay.

Term	Definition
LTBI treatment	Medication that is given to people who have latent TB infection to prevent them from developing TB disease.
Mantoux tuberculin skin test (TST)	A method of testing for TB infection; a needle and syringe are used to inject 0.1 ml of 5 tuberculin units of tuberculin solution between the layers of the skin (intradermally), usually on the forearm, the reaction to this test, a palpable swollen area (induration), is measured 48 to 72 hours after the injection and is interpreted as positive or negative depending on the size of the reaction and the patient's risk factors for TB.
Miliary TB	Miliary TB is a serious type of tuberculosis disease. It is a histological or radiologic finding, rather than a site of disease. It appears on radiograph as a great number of small, well-defined nodules that look like millet seeds scattered throughout the lungs, hence the name "miliary."
Multidrug-resistant TB (MDR TB)	TB disease resistant to at least the drugs isoniazid and rifampin: MDR TB is more difficult to treat than drug-susceptible TB.
***Mycobacterium tuberculosis* complex**	A group of closely related mycobacteria that cause active TB (e.g., *M. tuberculosis, M. bovis*, and *M. africanum*). Most TB in the United States is caused by *M. tuberculosis*.
National Tuberculosis Surveillance System (NTSS)	The National TB Surveillance System collects information on each newly reported case of tuberculosis (TB) disease in the U.S. The program is a cooperative effort of CDC and state and local health departments.
Nucleic acid amplification (NAA)	A technique that amplifies (copies) DNA or RNA segments, in order to directly detect microorganisms in patient specimens.
Pyrazinamide (PZA)	A drug used to treat TB disease.
Pulmonary TB	TB disease that occurs in the lungs, typically causing a cough and an abnormal chest X-ray. Most TB cases reported in the United States are pulmonary TB.
Report of Verified Case of Tuberculosis (RVCT)	The national tuberculosis surveillance data reporting form. All jurisdictions report these data to CDC on each newly reported case of TB. The results are used for determining the TB morbidity incidence rates for the United States, U.S. Territories, and Affiliated Islands.
Rifabutin	A drug used to treat TB disease.
Rifampin	A drug used to treat TB disease; also used for LTBI treatment.
Rifapentine	A drug used to treat TB disease.
Smear	A specimen that has been smeared onto a glass slide, stained, washed in an acid alcohol solution, and then placed under the microscope for examination: used to detect acid-fast bacilli in a specimen.
Specimen	A sample collected from a person for testing.
Sputum	Phlegm from deep in the lungs, collected in a sterile container for processing and examination.

Term	Definition
Susceptibility	An micro-organism's ability to be killed by a particular drug.
Suspect	A patient for whom there is a high index of suspicion for active TB (e.g., a known contact to an active TB case or to a person with signs or symptoms consistent with TB) who is currently under evaluation for TB disease.
TB cases	Instances where patients have been diagnosed with TB disease.
TB Follow-up Worksheet	A worksheet used to document the medical examination of an immigrant or refugee arrived in the U.S. with a TB Class Condition.