

Module 2: Epidemiology of Tuberculosis

Facilitation Tips

Background

Epidemiology is the study of diseases and other health problems in groups of people. Epidemiologists determine the frequency and pattern of health problems in different communities. In other words, they find out who has a specific health problem, how often the problem occurs, and where the problem occurs. Using this information about who, when, and where, epidemiologists try to determine why the health problem is occurring.

Public health officials use epidemiologic information to design ways to prevent and control diseases in the community. By finding out who is at risk for a specific health problem, they can target their prevention and control strategies to people who are at risk.

This module examines recent trends in TB in the United States and describes groups of people who are at higher risk for latent TB infection (LTBI) and TB disease. Groups of people who are at higher risk for TB varies from area to area; state and local health departments are responsible for determining specifically who is at risk in their area.

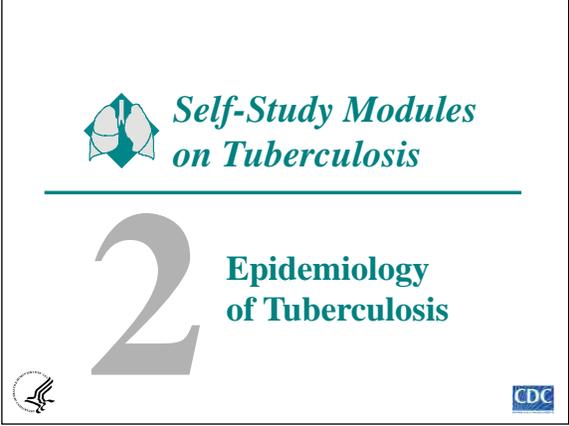
Learning Objectives

After this presentation, participants will be able to

1. Describe how the number of TB cases reported in the United States has changed over the last 50 years
2. List five factors that contributed to the increase in the number of TB cases between 1985 and 1992
3. List three improvements TB programs were able to make with increased federal, state, and other funds and resources that have contributed to a decrease in TB cases since 1993
4. List the groups of people who are more likely to be exposed to or infected with *M. tuberculosis*
5. List the groups of people who are more likely to develop TB disease once infected with *M. tuberculosis*

Module Overview

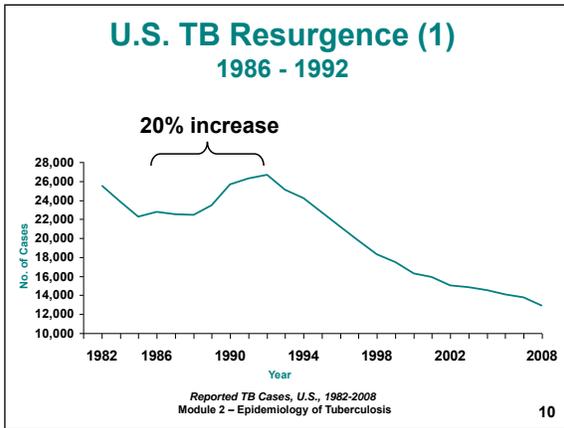
Time	Activity	Content	Slides
5 min.	Presentation	Introduction	Slides 1-3
10 min.	Presentation	Epidemiology of TB	Slides 4-19
5 min.	Presentation	TB Case Rate	Slides 20-25
25 min.	Presentation	People at High Risk for Becoming Infected with <i>Mycobacterium tuberculosis</i>	Slides 26-53
10 min.	Presentation	People at High Risk for Developing TB Disease After Infection with <i>Mycobacterium tuberculosis</i>	Slides 54-64
5 min.	Case Studies	Case Studies	Slides 65-67
60 min.	Total Time		

		Facilitation Tips
Slide 1		<ul style="list-style-type: none"> - Introduce Module 2 - Ask participants if they know what epidemiology is
Slide 2	<p>Module 2: Objectives</p> <p>At completion of this module, learners will be able to:</p> <ol style="list-style-type: none"> 1. Describe how the number of TB cases reported in the U.S has changed over the last 50 years 2. List 5 factors that contributed to the increase of TB cases between 1985 and 1992 3. List 3 improvements TB programs made with increased funds that have contributed to a decrease in TB cases since 1993 4. List groups of people who are more likely to be exposed to or infected with <i>M. tuberculosis</i> 5. List groups of people who are more likely to develop TB disease once infected with <i>M. tuberculosis</i> <p><small>Module 2 – Epidemiology of Tuberculosis 2</small></p>	<ul style="list-style-type: none"> - State objectives of presentation <p><i>Background and Objectives - Module 2, p. 1</i></p>
Slide 3	<p>Module 2: Overview</p> <ul style="list-style-type: none"> • Epidemiology of TB • TB Case Rate • People at High Risk for Becoming Infected with <i>M. tuberculosis</i> • People at High Risk for Developing TB Disease after Infection with <i>M. tuberculosis</i> • Case Studies <p><small>Module 2 – Epidemiology of Tuberculosis 3</small></p>	<ul style="list-style-type: none"> - Review slide content

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 4</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <h2 style="color: #008080; text-decoration: underline;">Epidemiology of TB</h2> <p style="text-align: right; font-size: small;">4</p> </div>	<ul style="list-style-type: none"> - Introduce section <p style="text-align: right; font-style: italic; font-size: small;">Epidemiology of TB - Module 2, pp. 3-5</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 5</p>	<div style="border: 1px solid black; padding: 10px;"> <h3 style="color: #008080; text-align: center;">Epidemiology (1)</h3> <p style="text-align: center;">Epidemiology is the study of the distribution and causes of disease and other health problems in different groups of people.</p> <p style="text-align: center; font-size: x-small;">Module 2 – Epidemiology of Tuberculosis</p> <p style="text-align: right; font-size: x-small;">5</p> </div>	<ul style="list-style-type: none"> - Ask for a volunteer to read the definition of epidemiology <p style="text-align: right; font-style: italic; font-size: small;">Epidemiology - Module 2, p. 2</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 6</p>	<div style="border: 1px solid black; padding: 10px;"> <h3 style="color: #008080; text-align: center;">Epidemiology (2)</h3> <ul style="list-style-type: none"> • Epidemiologists: <ul style="list-style-type: none"> – Determine frequency and pattern of health problems in communities – Try to figure out why health problems are occurring <p style="text-align: center; font-size: x-small;">Module 2 – Epidemiology of Tuberculosis</p> <p style="text-align: right; font-size: x-small;">6</p> </div>	<ul style="list-style-type: none"> - Review slide content <p style="text-align: right; font-style: italic; font-size: small;">Epidemiology - Module 2, p.1</p>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 7</p>	<div style="border: 1px solid black; padding: 10px;"> <h3 style="text-align: center;">Global Epidemiology of TB</h3> <ul style="list-style-type: none"> • TB is one of the leading causes of death due to infectious disease in the world • Almost 2 billion people are infected with <i>M. tuberculosis</i> • Each year about: <ul style="list-style-type: none"> – 9 million people develop TB disease – 2 million people die of TB <p style="font-size: small; text-align: center;">Module 2 – Epidemiology of Tuberculosis 7</p> </div>	<ul style="list-style-type: none"> - Before showing slide, ask how many people in the world are infected with TB - State that 1/3 of the world’s population is infected with TB - Review slide content <p style="text-align: right;"><i>Global Epidemiology of TB - Module 2, p.3</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 8</p>	<div style="border: 1px solid black; padding: 10px;"> <h3 style="text-align: center;">TB Reporting in U.S.</h3> <ul style="list-style-type: none"> • The Report of Verified Case of Tuberculosis (RVCT) is the national TB surveillance data collection form and is used for reporting all verified TB cases to CDC <ul style="list-style-type: none"> – The 50 states, District of Columbia, New York City, Puerto Rico, and 7 other jurisdictions in the Pacific and Caribbean report TB cases to CDC • Health care providers are required by law to report TB cases to state or local health departments <p style="font-size: small; text-align: center;">Module 2 – Epidemiology of Tuberculosis 8</p> </div>	<ul style="list-style-type: none"> - Review slide content <p style="text-align: right;"><i>Note: Information regarding the RVCT is not provided in the Self-Study Modules. For more information, please visit: www.cdc.gov/tb/publications/factsheets/statistics/rvct.htm</i></p> <p style="text-align: right;"><i>TB Reporting in the U.S. - Module 2, p. 3</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 9</p>	<div style="border: 1px solid black; padding: 10px;"> <h3 style="text-align: center;">U.S. Epidemiology of TB 1953 - 1986</h3> <ul style="list-style-type: none"> • 1953: <ul style="list-style-type: none"> – More than 84,000 cases of TB • 1953-1984: <ul style="list-style-type: none"> – TB cases declined about 6% each year • 1985: <ul style="list-style-type: none"> – TB cases reached a low of 22,201 • 1986: <ul style="list-style-type: none"> – Significant increase in TB cases began <p style="font-size: small; text-align: center;">Module 2 – Epidemiology of Tuberculosis 9</p> </div>	<ul style="list-style-type: none"> - Review slide content - Emphasize that from 1953-1984 TB cases were declining - Explain that one of the main reasons for this decline was that TB treatment drugs were discovered in the 1940s and 1950s <p style="text-align: right;"><i>U.S. Epidemiology of TB - Module 2, p. 3</i></p>

Slide 10



- Review slide content
- Call attention to the increase in TB cases on the graph (1980s)
- Ask participants why they think there was 20% increase in TB cases in the 1980s

U.S. TB Resurgence - Module 2, p. 4

Slide 11

U.S. TB Resurgence (2)
1986 - 1992

- **Contributing factors:**
 - Inadequate funding for TB control programs
 - HIV epidemic
 - Increased immigration from countries where TB is common
 - Spread of TB in homeless shelters and correctional facilities
 - Increase and spread of multidrug-resistant TB (MDR TB)

Module 2 - Epidemiology of Tuberculosis

- Explain that there were several contributing factors to the TB resurgence in the U.S.
- Review slide content

U.S. TB Resurgence - Module 2, p. 4

Slide 12

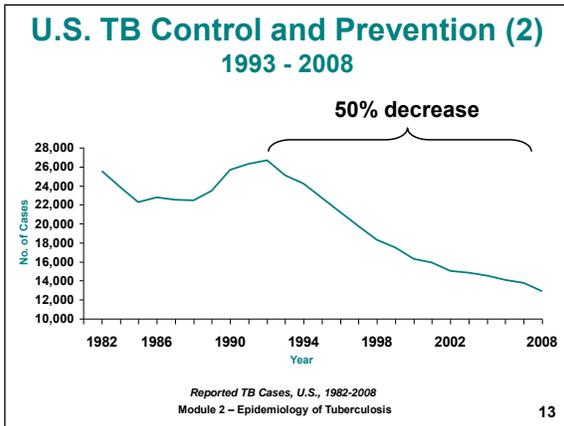
U.S. TB Control and Prevention (1)
1993 - 2008

- **1993-2008:**
 - Number of TB cases reported annually in U.S. steadily declined
- **Increased federal funds and other resources allowed TB programs to improve control efforts to:**
 - Promptly identify persons with TB
 - Start appropriate initial treatment for TB cases
 - Ensure patients complete treatment

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- Review slide content
- Stress that prevention and control efforts must be maintained in order to prevent another resurgence

U.S. TB Control and Prevention - Module 2, p. 5



- Call attention to the decrease in TB cases on the graph (after 1993)
- Explain that TB cases have steadily declined each year since 1993
- State that there were 12,904 TB cases in the U.S. in 2008

U.S. TB Control and Prevention - Module 2, p. 5

Continuing Challenges in TB Control

- TB is reported in almost every state and is increasing in some areas
- More than half of all TB cases in the U.S. are among foreign-born residents
- TB affects racial/ethnic minorities disproportionately
- MDR TB and extensively drug-resistant TB (XDR TB)

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- Explain that despite national trends reflecting a steady decline in the number of TB cases reported annually, there remain several areas of ongoing challenges in TB control
- Review slide content

Continuing Challenges in TB Control - Module 2, p. 5

**Epidemiology of TB
Study Question 2.1**

What happened to the number of TB cases in the United States between 1953 and 1984?
(pg. 6)

From 1953 - 1984, the number of TB cases reported in the U.S. decreased by an average of 6% each year.

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- Introduce study questions
- Ask participants to turn to p. 6 (if participants have print-based modules)
- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 26

Slide 16

Epidemiology of TB Study Question 2.2

What happened to the number of TB cases in the United States between 1985 and 1992?

(pg. 6)

From 1985 - 1992, the number of new TB cases increased by 20%.

Module 2 – Epidemiology of Tuberculosis

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- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 26

Slide 17

Epidemiology of TB Study Question 2.3

Name 5 factors that may have contributed to the increase in the number of TB cases between 1985 and 1992. (pg. 6)

- Inadequate funding for TB control and other public health efforts
- HIV epidemic
- Increased immigration from countries where TB is common
- Spread of TB in certain settings (e.g., correctional facilities and homeless shelters)
- Spread of MDR TB

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- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 26

Slide 18

Epidemiology of TB Study Question 2.4

What has been happening to the number of TB cases in the United States since 1993?

(pg. 6)

Since 1993, there has been a steady decline in the number of TB cases reported annually in the United States.

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- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 26

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 19</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">Epidemiology of TB Study Question 2.5</p> <p>Name 3 improvements TB programs were able to make with increased federal funds that contributed to the decrease in TB cases since 1993. (pg. 6)</p> <ul style="list-style-type: none"> • Promptly identify persons with TB • Start appropriate initial treatment for TB cases • Ensure patients complete treatment <p style="font-size: small; text-align: center;">Module 2 – Epidemiology of Tuberculosis 19</p> </div>	<ul style="list-style-type: none"> - Ask for a volunteer to read question - Ask participants for answers <p style="text-align: right;"><i>Answers - Module 2, p. 26</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 20</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p style="font-size: 2em;">TB Case Rate</p> <hr style="width: 50%; margin: auto;"/> <p style="font-size: small; text-align: right;">20</p> </div>	<ul style="list-style-type: none"> - Introduce section - Ask what a TB case rate is and how it is calculated <p style="text-align: right;"><i>TB Case Rate - Module 2, pp. 7-8</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 21</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">TB Case Rate (1)</p> <ul style="list-style-type: none"> • A case rate is the number of TB cases at a certain place and time, divided by size of the population at that time • Often expressed in terms of a population size of 100,000 persons <p style="font-size: small; text-align: center;">Module 2 – Epidemiology of Tuberculosis 21</p> </div>	<ul style="list-style-type: none"> - Review slide content <p style="text-align: right;"><i>TB Case Rate - Module 2, p. 7</i></p>

TB Case Rate (2)

Example:

- In the U.S. in 2008, there were 12,904 new TB cases in a population size of 304,059,724

$$\frac{12,904}{304,059,724} \times 100,000 = 4.2$$

- In 2008, the U.S. TB case rate was 4.2 TB cases per 100,000 persons

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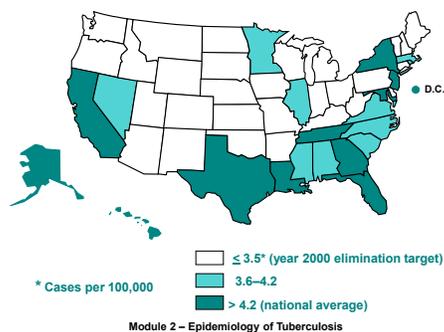
22

- Use the example on slide to demonstrate how to calculate a case rate

Note: Slide reflects 2008 surveillance data.

TB Case Rate - Module 2, p. 7

TB Case Rates by State, 2008



- Explain that this map shows TB case rates by state
- Ask which states had higher rates and which had lower rates
- Point out the case rates for your area

Note: Slide reflects 2008 surveillance data.

TB Case Rate - Module 2, p. 7

TB Case Rate (3)

- Health departments, CDC, and others can compare the occurrence of TB in different places, time periods, and groups of people using case rates
- Comparisons have shown that rates of TB are higher in certain groups than in others
 - Groups with higher rates of TB are considered “high-risk” groups

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- Review slide content
- Ask which groups have higher TB case rates

TB Case Rate - Module 2, p. 8

Slide 25

High-Risk Groups

- High-risk groups can be divided into two categories:
 - High risk for becoming infected with *M. tuberculosis*
 - High risk for developing TB disease after infection with *M. tuberculosis*

Module 2 – Epidemiology of Tuberculosis 25

- Review slide content

High-Risk Groups - Module 2, p. 8

Slide 26

People at High Risk for Becoming Infected with *Mycobacterium tuberculosis*

26

- Introduce section
- Ask participants who they think should be considered at high risk for TB infection

People at High Risk for Becoming Infected with Mycobacterium tuberculosis - Module 2, pp. 9-15

Slide 27

People at High Risk for TB Infection

- Close contacts
- Foreign-born persons
- Low-income groups and homeless persons
- Individuals who live and/or work in special settings
- Health care workers who serve high-risk groups
- Racial and ethnic minorities
- Infants, children, and adolescents
- People who inject drugs

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- Review slide content

People at High Risk for TB Infection - Module 2, p. 8

Slide 28

High-Risk Groups for TB Infection (1) Close Contacts

- Close contacts are people who spend time with someone who has infectious TB disease
- May include:
 - Family members
 - Coworkers
 - Friends
- On average, 20 – 30% of close contacts become infected with TB



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- Review slide content

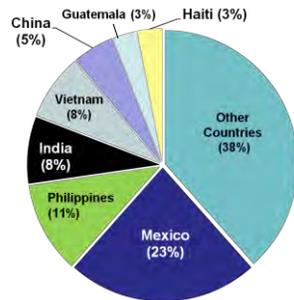
Close Contacts – Module 2, p. 9

Slide 29

High-Risk Groups for TB Infection (2) Foreign-Born/Immigrants

In the U.S., LTBI and TB disease often occur among people born in areas of the world where TB is common:

- Asia
- Africa
- Russia
- Eastern Europe
- Latin America



Module 2 – Epidemiology of Tuberculosis

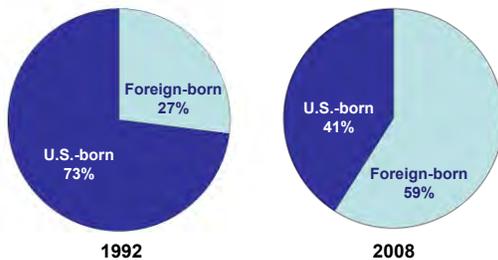
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- Review slide content
- Explain that the pie chart shows the overall distribution of the countries of birth of foreign-born persons reported with TB in 2008 in the U.S. The top 7 countries are highlighted.
- Ask which of these foreign-born groups live in the participants' areas

Foreign-Born/Immigrants – Module 2, p. 9

Slide 30

High-Risk Groups for TB Infection (3) Foreign-Born/Immigrants



Cases of TB in foreign-born and U.S.-born, 1992 and 2008

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- Explain that the two pie charts show the percentage of TB cases by foreign-born and U.S. born persons in 1992 and 2008
- Explain that the percentage of TB cases in the U.S. that are among foreign-born persons has increased over the years (27% in 1992 vs. 59% in 2008)

Note: Slide reflects 2008 surveillance data.

Foreign-Born/Immigrants – Module 2, p. 9

Slide 31

High-Risk Groups for TB Infection (4) Foreign-Born/Immigrants

- To address high rates of TB in foreign-born persons, CDC and other public health organizations are:
 - Improving the screening process for immigrants and refugees
 - Strengthening the notification system that alerts health departments about the arrival of immigrants and refugees with suspected TB disease
 - Testing recent arrivals from countries where TB is common for LTBI and ensuring completion of treatment

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- Review slide content

Foreign-Born/Immigrants – Module 2, pp. 9-10

Slide 32

High-Risk Groups for TB Infection (5) Foreign-Born/Immigrants

- Individuals applying for immigration and refugee status from overseas:
 - Must be screened for TB by panel physicians before entering U.S.
 - Must have completed treatment before entering U.S. if diagnosed with active TB

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- Review slide content
- Explain that health departments are notified of immigrants who are suspected of having TB. This notification system allows health departments to assist patients to receive a medical evaluation.

Foreign-Born/Immigrants – Module 2, p. 10

Slide 33

High-Risk Groups for TB Infection (6) Foreign-Born/Immigrants

- Immigrants in U.S. applying for permanent residence or citizenship:
 - Must be tested for LTBI and evaluated for TB disease by U.S.- based civil surgeons



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- Review slide content

Foreign-Born/Immigrants – Module 2, p. 10

Slide 34

High-Risk Groups for TB Infection (7) Low-Income and Homeless

- Low-income is linked to higher risk of exposure
- Possible reasons include factors associated with low-income:
 - Inadequate living conditions
 - Crowding
 - Malnutrition
 - Poor access to health care
- In 2008, about 6% of TB patients were homeless



Module 2 – Epidemiology of Tuberculosis

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- Before showing slide, ask why low-income and homelessness put people at high risk for TB infection
- Review slide content

Low-Income and Homeless – Module 2, p.10

Slide 35

High-Risk Groups for TB Infection (8) Special Settings

- Special settings include congregate and residential settings:
 - Nursing homes
 - Correctional facilities
 - Health care facilities
 - Homeless shelters
 - Drug treatment centers

Module 2 – Epidemiology of Tuberculosis

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- Review slide content

Special Settings – Module 2, p. 11

Slide 36

High-Risk Groups for TB Infection (9) Special Settings

- Risk of exposure to TB is higher than in other settings
- Risk is higher if facility is crowded

Module 2 – Epidemiology of Tuberculosis

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- Review slide content

Special Settings – Module 2, p. 11

Slide 37

High-Risk Groups for TB Infection (10) Correctional Facilities

- Higher risk in correctional facilities may be due to:
 - Inmates who already have TB infection are at higher risk to develop TB disease
 - Increasing number of inmates are infected with HIV
 - Overcrowded facilities promoting the spread of TB

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- Before showing slide, ask why groups in correctional settings are at higher risk for TB infection
- Review slide content
- Explain that being infected with HIV puts individuals at a higher risk of developing TB disease

Correctional Facilities – Module 2, p. 11

Slide 38

High-Risk Groups for TB Infection (11) People Who Inject Drugs

- People who inject drugs are more likely to be exposed to TB, become infected, and develop disease due to certain risk factors:
 - Being in correctional facilities or drug treatment centers
 - Having poor access to health care
 - Having a higher risk of HIV infection
 - Having a weak immune system due to injecting drugs

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- Review slide content

People Who Inject Drugs – Module 2, p. 11-12

Slide 39

High-Risk Groups for TB Infection (12) Health Care Workers

- Might be exposed to TB at work
- Risk depends on:
 - Number of persons with TB in facility
 - Job duties
 - Infection control procedures



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- Before showing slide, ask participants which factors can increase the risk for health care workers
- Review slide content
- Explain that facilities with a high risk of TB transmission should ensure appropriate TB prevention and control measures are taken
- Note that infection control procedures are discussed more in Module 5

Health Care Workers – Module 2, p. 12

High-Risk Groups for TB Infection (13) Children and Adolescents

- High risk if exposed to adults in high-risk groups
- If a child has TB infection or disease, it suggests that:
 - TB was transmitted recently
 - Person who transmitted TB to child may still be infectious
 - Others may have been exposed



Module 2 – Epidemiology of Tuberculosis

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- Review slide content
- Note that the number of reported TB cases in children have been decreasing since 1993

Note: In Module 2, print-based version, Children and Adolescents are after the Racial and Ethnic Minorities section.

Children and Adolescents – Module 2, p. 15

High-Risk Groups for TB Infection (14) Racial and Ethnic Minorities

- TB affects certain racial and ethnic minorities disproportionately
- In 2008, about 83% of TB cases in U.S. were among racial and ethnic minorities
- Percentage of TB cases in racial and ethnic minorities is higher than expected based on percentage of these minorities in U.S. population

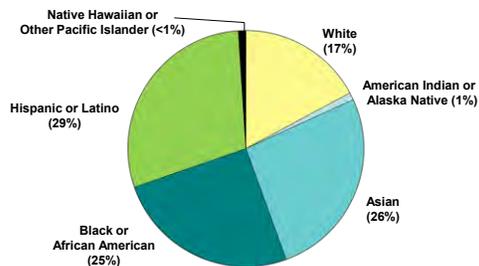
Module 2 – Epidemiology of Tuberculosis

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- Review slide content
- Ask why TB rates might be higher for certain racial and ethnic minorities

Racial and ethnic minorities – Module 2, p. 12

High-Risk Groups for TB Infection (15) Racial and Ethnic Minorities



Reported TB cases by race and ethnicity, U.S., 2008*

*All races are non-Hispanic. Persons reporting two or more races accounted for less than 1% of all cases.

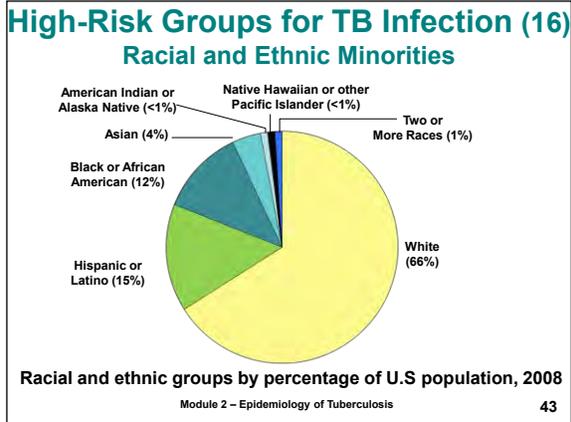
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- Explain that this pie chart shows the reported TB cases in the U.S. in 2008 by race and ethnicity
- Ask participants which groups made up the greatest percentage of TB cases, and which groups made up the least

Note: Slide reflects 2008 surveillance data.

Racial and Ethnic Minorities – Module 2, p. 13

Slide 43



- Explain that this pie chart shows the U.S. population broken down by race and ethnicity
- Ask participants what they notice when comparing this pie chart to the one of the previous slide (e.g., even though non-Hispanic whites make-up more than 60% of the U.S. population, they only account for 17% of the TB cases)
- Explain that this means that the percentage of TB cases that occur in minorities is higher than expected based on their percentages in the U.S. population

*Note: Slide reflects 2008 surveillance data
Racial and Ethnic Minorities – Module 2, p. 13*

Slide 44

High-Risk Groups for TB Infection (17) Racial and Ethnic Minorities

- Disparities may exist due to racial and ethnic minorities having other risk factors for TB, such as:
 - Birth in a country where TB is common
 - HIV infection
 - Low socioeconomic status
 - Exposure to TB in high-risk settings

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- Review slide content

Racial and Ethnic Minorities – Module 2, p. 15

Slide 45

Relative Risk for TB (1)

Relative risk is a ratio of the probability of disease occurring in one group versus another group.

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- Ask for a volunteer to read the definition of relative risk

Relative Risk for TB - Module 2, p. 14

Relative Risk for TB (2)

Example:

- The case rate for Asians is 25.6 compared to 1.1 for non-Hispanic whites. Therefore, the relative risk for Asians is about 23 times higher than non-Hispanic whites

$$\frac{25.6 \text{ (TB case rate for Asians)}}{1.1 \text{ (TB case rate for non-Hispanic whites)}} = 23$$

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- Use the example on slide to demonstrate how to calculate relative risk

Note: Slide reflects 2008 surveillance data

Relative Risk for TB – Module 2, p. 14

Relative Risk for TB (3) Race and Ethnicity, 2008

Race/Ethnicity	TB Case Rate (# of cases for every 100,000 persons)	Relative Risk
Asians	25.6	23
Native Hawaiians or Other Pacific Islanders	15.9	14
Blacks or African Americans	8.8	8
Hispanics or Latinos	8.1	7
American Indians or Alaskan Natives	6	5
Non-Hispanic Whites	1.1	1

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- Explain that in this table all case rates are compared to the case rate for non-Hispanic whites because non-Hispanic whites have the lowest case rate

Note: Slide reflects 2008 surveillance data

Relative Risk for TB – Module 2, p. 14

High-Risk Groups for TB Infection Study Question 2.6

Name 8 groups of people who are more likely to be exposed or infected with *M. tuberculosis*. (pg. 16)

- Close contacts of people known/suspected to have TB
- People who came to the U.S. within last 5 years from countries where TB is common
- Low-income groups
- People who live or work in residential facilities
- People who inject drugs
- Health care workers who serve high-risk clients
- High-risk racial or ethnic minority populations
- Infants, children, and adolescents exposed to adults in high-risk groups

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- Introduce study questions
- Ask participants to turn to p. 16 (if participants have print-based modules)
- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 27

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 49</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">High-Risk Groups for TB Infection Study Question 2.7</p> <p>What are public health agencies doing to address the high rate of TB in foreign born persons? (pg. 16)</p> <ul style="list-style-type: none"> • Improving overseas and domestic screening process of immigrants and refugees • Strengthening the current notification system that alerts health departments about immigrants or refugees with suspected TB • Testing recent arrivals from countries where TB is common for LTBI and ensuring completion of treatment <p style="font-size: small;">Module 2 – Epidemiology of Tuberculosis 49</p> </div>	<ul style="list-style-type: none"> - Ask for a volunteer to read question - Ask participants for answers <p style="text-align: right;"><i>Answers - Module 2, p. 27</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 50</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">High-Risk Groups for TB Infection Study Question 2.8</p> <p>Why is the risk of being exposed to TB higher in certain settings, such as nursing homes or correctional facilities? (pg. 16)</p> <ul style="list-style-type: none"> • Many people in these facilities are at risk for TB disease • Risk of exposure is higher if facility is crowded <p style="font-size: small;">Module 2 – Epidemiology of Tuberculosis 50</p> </div>	<ul style="list-style-type: none"> - Ask for a volunteer to read question - Ask participants for answers <p style="text-align: right;"><i>Answers - Module 2, p. 27</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 51</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">High-Risk Groups for TB Infection Study Question 2.9</p> <p>What are some reasons why rates of TB disease are higher in correctional facilities? (pg. 16)</p> <ul style="list-style-type: none"> • Many inmates already have TB infection and are at a higher risk to develop TB disease • An increasing number of inmates are infected with HIV, which means they are more likely to develop TB disease if they become infected with TB • Overcrowded facilities promotes the spread of TB <p style="font-size: small;">Module 2 – Epidemiology of Tuberculosis 51</p> </div>	<ul style="list-style-type: none"> - Ask for a volunteer to read question - Ask participants for answers <p style="text-align: right;"><i>Answers - Module 2, p. 27</i></p>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 52</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">High-Risk Groups for TB Infection Study Question 2.10</p> <p>Which racial and ethnic groups are disproportionately affected by TB? (pg. 17)</p> <ul style="list-style-type: none"> • Asians • Native Hawaiians or Other Pacific Islanders • Non-Hispanic blacks • Hispanics • American Indians or Alaska Natives <p style="font-size: small; text-align: center;">Module 2 – Epidemiology of Tuberculosis 52</p> </div>	<ul style="list-style-type: none"> - Ask for a volunteer to read question - Ask participants for answers <p style="text-align: right;"><i>Answers - Module 2, p. 27</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 53</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">High-Risk Groups for TB Infection Study Question 2.11</p> <p>When a child has TB infection or disease, what does it tell us about the spread of TB in the child’s home or community? Name 3 things. (pg. 17)</p> <ul style="list-style-type: none"> • TB was transmitted recently • Person who transmitted TB to the child may still be infectious • Other adults and children in the home or community have probably been exposed to TB <p style="font-size: small; text-align: center;">Module 2 – Epidemiology of Tuberculosis 53</p> </div>	<ul style="list-style-type: none"> - Ask for a volunteer to read question - Ask participants for answers <p style="text-align: right;"><i>Answers - Module 2, p. 28</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Slide 54</p>	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">People at High Risk for Developing TB Disease After Infection with <u>Mycobacterium tuberculosis</u></p> <p style="text-align: right; font-size: small;">54</p> </div>	<ul style="list-style-type: none"> - Introduce section - Ask who is at high risk for developing TB disease after infection <p style="text-align: right;"><i>People at High Risk for Developing TB Disease After Infection with Mycobacterium tuberculosis – Module 2, pp. 19-20</i></p>

Slide 55

High-Risk Groups for TB Disease (1)

- People living with HIV
- People with medical conditions known to increase the risk for TB
- People infected with *M. tuberculosis* within past 2 years
- Infants and children younger than 4 years old
- People who inject drugs

Module 2 – Epidemiology of Tuberculosis

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- Explain that anyone who has LTBI can develop TB disease, but that some people are at higher risk than others
- Review slide content

High Risk Groups for TB Disease – Module 2, p. 19

Slide 56

High-Risk Groups for TB Disease (2) People Living with HIV

- HIV is the strongest known risk factor for developing TB disease
- TB is the leading cause of death for people with HIV/AIDS
- Risk of developing TB disease is 7% - 10% each year for people who are infected with both TB and HIV

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- Review slide content
- Explain that because HIV weakens the immune system, people with TB infection and HIV infection are at a **very high risk** of developing TB disease
- Explain that the risk of developing TB disease is only 10% over a lifetime for people infected only with *M. tuberculosis*

People Living With HIV – Module 2, p. 19-20

Slide 57

High-Risk Groups for TB Disease (3) Individuals with Certain Medical Conditions

- Prolonged therapy with corticosteroids, and other immunosuppressive therapy, such as tumor necrosis factor-alpha [TNF- α] antagonists
- Silicosis
- Diabetes

Module 2 – Epidemiology of Tuberculosis

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- Review slide content

Individuals with Certain Medical Conditions – Module 2, p. 19

Slide 58

High-Risk Groups for TB Disease (4) Individuals with Certain Medical Conditions

- Severe kidney disease
- Certain types of cancer
- Certain intestinal conditions

Module 2 – Epidemiology of Tuberculosis

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- Review slide content

*Individuals with Certain Medical Conditions –
Module 2, p. 19*

Slide 59

High-Risk Groups for TB Disease (5) Recently Infected

- Individuals infected within the past 2 years are more likely to develop TB disease
- Risk of developing disease in first 2 years is 5%
- Risk over entire lifetime is 10%

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- Review slide content

Recently Infected –Module 2, p. 19

Slide 60

High-Risk Groups for TB Disease (6) Infants and Children Younger than 4 Years

- Higher risk due to underdeveloped immune system



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- Review slide content

Infants and Children –Module 2, p. 19

Slide 61

High-Risk Groups for TB Disease (7) People Who Inject Drugs

- Higher risk of developing TB disease once infected due to:
 - Greater possibility of HIV infection
 - Injecting drugs may weaken immune system

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- Review slide content

People Who Inject Drugs –Module 2, p. 19

Slide 62

High-Risk Groups for TB Disease Study Question 2.12

Name 5 groups of people who are more likely to develop TB disease once infected. (pg. 21)

- People living with HIV infection
- People with certain medical conditions
- People infected with *M. tuberculosis* within the past 2 years
- Infants and children younger than 4 years old
- People who inject drugs

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- Introduce study questions
- Ask participants to turn to p. 21 (if participants have print-based modules)
- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 28

Slide 63

High-Risk Groups for TB Disease Study Question 2.13

What is the strongest known risk factor for the development of TB disease? (pg. 21)

HIV infection is the strongest known risk factor for developing TB disease. HIV infection weakens the body's immune system, making it more likely for a person who has TB infection to develop TB disease.

Module 2 – Epidemiology of Tuberculosis

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- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 28

High-Risk Groups for TB Disease Study Question 2.14

If a person is infected with both *M. tuberculosis* and HIV, what are his or her chances of developing TB disease? How does this compare to the risk for people who are infected only with *M. tuberculosis*? (pg. 21)

- 7% - 10% each year if infected with both *M. tuberculosis* and HIV
- 10% over a lifetime if only infected with *M. tuberculosis*

Module 2 – Epidemiology of Tuberculosis

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- Ask for a volunteer to read question
- Ask participants for answers

Answers - Module 2, p. 28

Case Studies

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- Introduce case studies

Module 2: Case Study 2.1

For each of the following people, indicate the factor(s) known to increase the risk of being exposed to or infected with TB (p. 18)

Person	Factors
a) Mr. LeFevre	<input checked="" type="checkbox"/> Works at a nursing home <input checked="" type="checkbox"/> Immigrated from Russia <input type="checkbox"/> Rides the subway every day
b) Ms. Montoya	<input checked="" type="checkbox"/> Was born in Latin America <input checked="" type="checkbox"/> Has a father who had pulmonary TB disease
c) Ms. Parker	<input checked="" type="checkbox"/> Volunteers in the emergency room of an inner-city hospital <input type="checkbox"/> Works in a day care center
d) Mr. Dudley	<input checked="" type="checkbox"/> Was released from prison last year <input checked="" type="checkbox"/> Sleeps in a homeless shelter

Module 2 – Epidemiology of Tuberculosis

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- Ask participants to turn to p. 18 (if participants have print-based modules)
- Read case study
- Ask participants which factors would be considered risk factors for each person

Answers – Module 2, p. 29

Module 2: Case Study 2.2

For each of the following people, indicate the factor(s) known to increase the risk of developing TB disease once infected (p. 22)

Person	Factors
a) Mr. Sims	<input checked="" type="checkbox"/> Injects heroin <input checked="" type="checkbox"/> Is infected with HIV
b) Mr. Allen	<input checked="" type="checkbox"/> Has diabetes <input type="checkbox"/> Has high blood pressure
c) Ms. Li	<input checked="" type="checkbox"/> Has chest x-ray findings suggestive of previous TB disease <input type="checkbox"/> Has heart problems
d) Mr. Vinson	<input type="checkbox"/> Is obese <input checked="" type="checkbox"/> Became infected with <i>M. tuberculosis</i> 6 months ago

Module 2 – Epidemiology of Tuberculosis

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- Ask participants to turn to p. 22 (if participants have print-based modules)
- Read case study
- Ask participants which factors would be considered risk factors for each person
- Ask if there are any questions about Module 2 before moving on to Module 3

Answers – Module 2, p. 30