

# Tuberculosis

## Objectives

- Understand the epidemiology and global burden of TB
- List the sign and symptoms and risk factors of different types of TB, with emphasis on pulmonary TB
- Describe trends and state reasons for resurgence of pulmonary TB
- List population subgroups at risk for pulmonary TB
- Draw the cycle of infection of pulmonary TB
- Outline procedures for community diagnosis of pulmonary TB with emphasis on the limitation of each procedure
- Describe measures for prevention and control for pulmonary TB
- Describe the role of WHO to address the global burden of TB, particularly directly observed therapy short course (DOTS) for pulmonary TB

## Resources

Doctors slides and notes

Done by:

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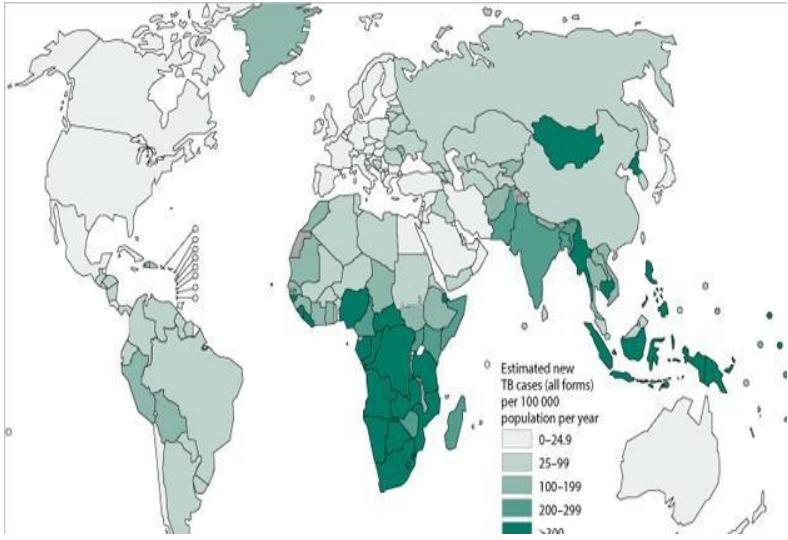
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[Editing file](#) | [feedback](#)

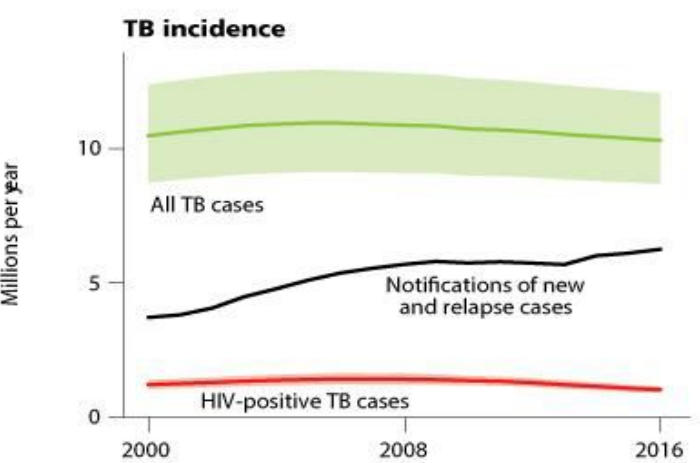
**Important** | extra | notes



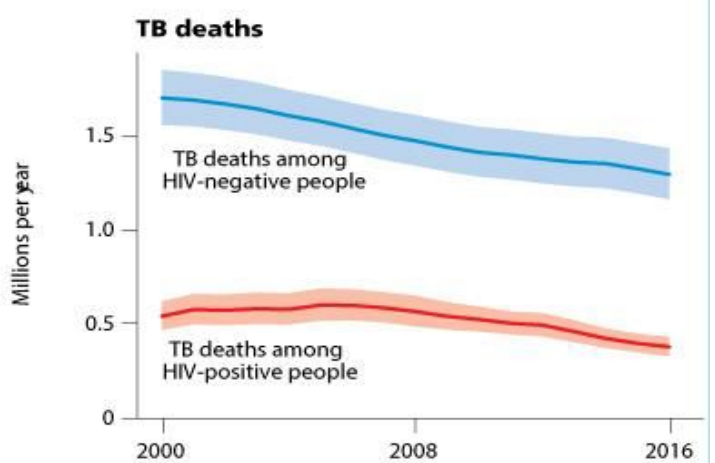
# Estimated TB incidence rate, 2017



\*Green areas shows very high incidence of Tb

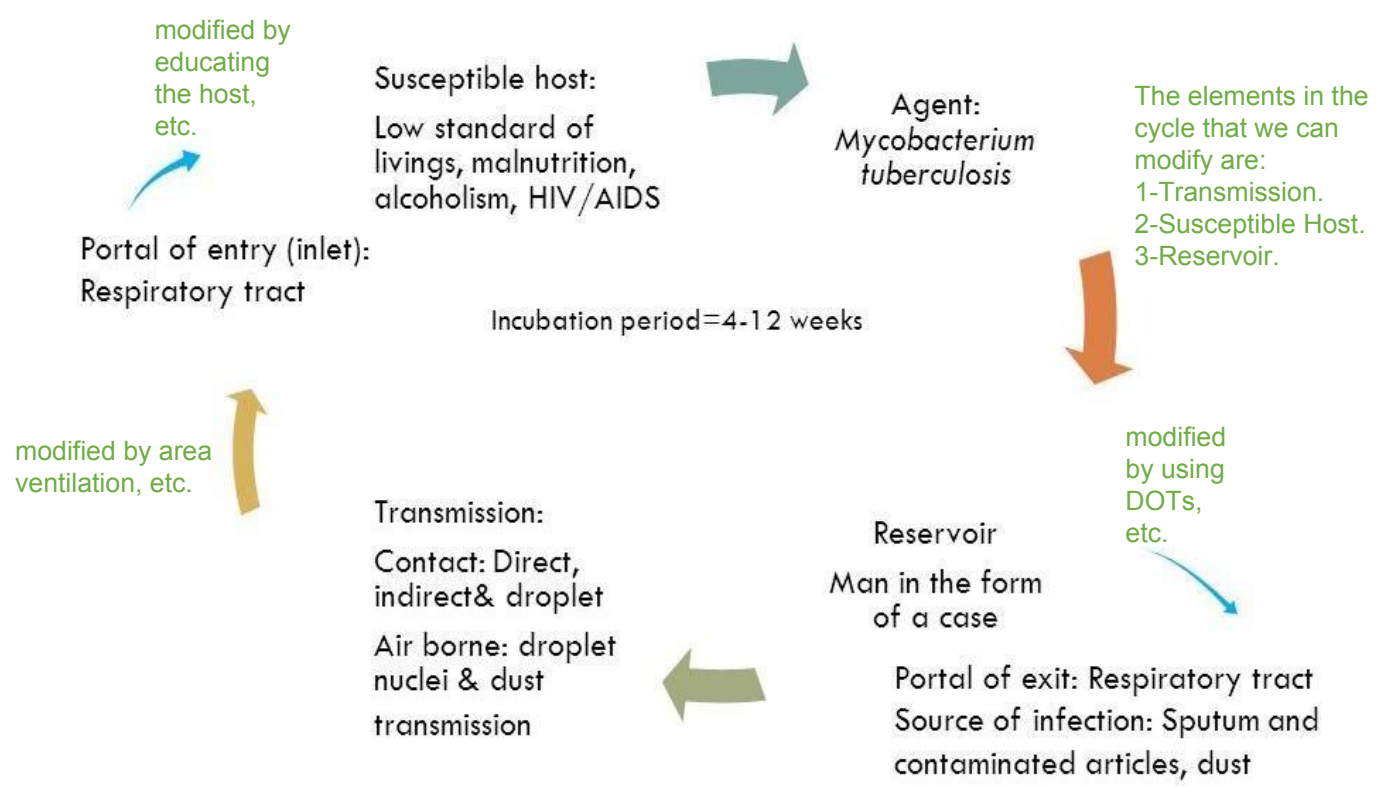


Incident is plateau, why? because HIV is not going down thus TB is not going down also



Mortality is decreasing, why? because of Preventive Measures

## Cycle of infection of pulmonary T.B



## Transmission of *M. tuberculosis*

- Spread by droplet nuclei
- Expelled when person with infectious TB coughs, sneezes, speaks, or sings
- Close contacts at highest risk of becoming infected
- Transmission occurs from person with infectious TB disease (not latent TB infection)

why is TB coming back?  
1- the spread of HIV.  
2-antibiotic resistance.  
3-hajj (specific for Saudi Arabia)

## Probability TB Will Be Transmitted

- Infectiousness of person with TB ( is the disease active.. is the patient coughing ? is he coughing huge amount?)
- Environment in which exposure occurred
- Duration of exposure
- Virulence of the organism ( 1- is the patient vaccinated against TB? if yes the virulence will be low, 2- immunity : if he has good immunity ( no chronic diseases, no chemotherapy, good nutrition, making the virulence will be low).

## Conditions That Increase the Risk of Progression to TB Disease

- **HIV infection**
- Substance abuse
- Recent infection
- Chest radiograph findings suggestive of previous TB
- Diabetes mellitus
- Silicosis
- Prolonged corticosteroid therapy
- Other immunosuppressive therapy

## Common Sites of TB Disease

- Lungs (first organ gets affected by TB) ( especially Apices of the lung (imp.)
- Pleura
- Central nervous system
- Lymphatic system
- Genitourinary systems
- Bones and joints
- Disseminated (miliary TB) (when it spreads everywhere , it is hard to be removed)
- TB can affect any parts of the body.

## Persons at Higher Risk for Exposure to or Infection with TB

- Close contacts of persons known or suspected to have TB
- Residents and employees of high-risk congregate settings
- Health care workers (HCWs) who serve high-risk Clients
- Medically underserved, low-income populations
- Children exposed to adults in high-risk categories
- Persons who inject illicit drugs

## Latent TB vs. TB Disease

### Latent TB Infection (LTBI) (Goal = prevent future active disease):

- has TB infection
- No Disease
- NOT SICK
- NOT INFECTIOUS
- Usually positive TB skin test reaction or positive TB blood test
- May develop TB disease if they do not receive treatment for latent TB infection
- people who have a weak immune system, the bacteria become active, multiply, and cause TB disease.

The bacteria in someone who has latent TB infection becomes opportunistic (if the patient's immunity becomes weak he/she will get sick).

### TB Infection (Goal = treat to cure, prevent transmission)

- SICK (usually)
- INFECTIOUS if PULMONARY (usually)
- NOT INFECTIOUS if not PULMONARY (usually)

### Diagnosing Latent TB Infection & Disease

- Most people, but not everyone, with TB disease have one or more symptoms of TB disease
- All people with either symptoms or a positive TB test result should be evaluated for TB disease
- If a person has symptoms, but a negative TB test result, they should still be evaluated for TB disease

### Diagnosis of Latent TB Infection:

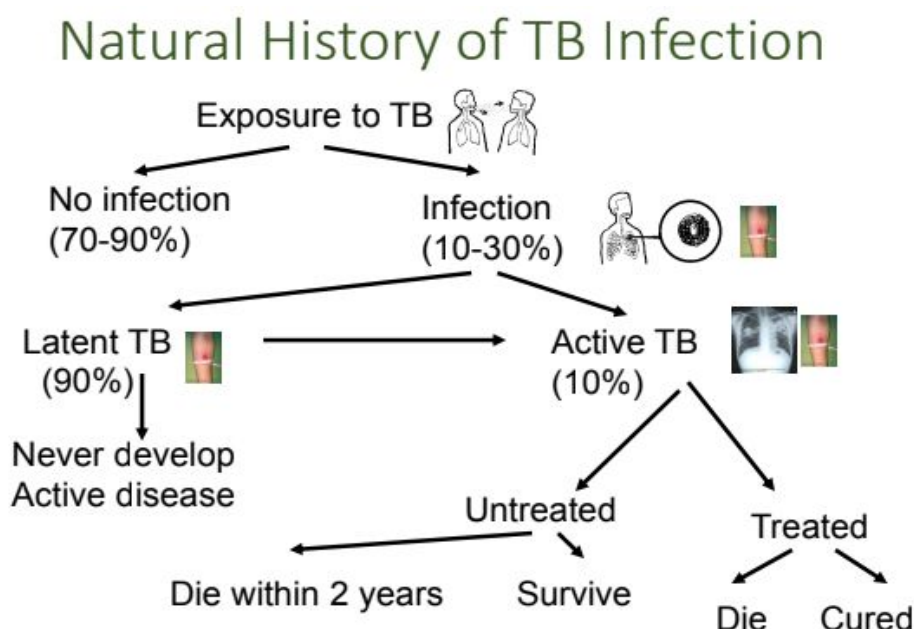
person has a positive TB test result and a medical evaluation does not indicate TB disease.

### When should we treat for latent TB infection?

We have to look at the chances of developing TB disease by considering their risk factors:

- People who have been recently infected with TB bacteria
- People with medical conditions that weaken the immune system

Overall, about 5 to 10% of infected persons who do not receive treatment for latent TB infection will develop TB disease at some time in their live.



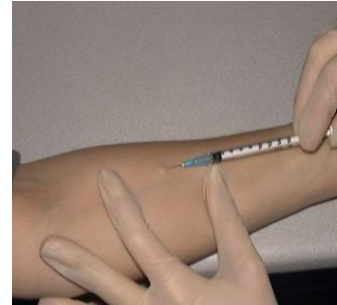
# Testing for TB Disease and Infection

## 1 Administering the Tuberculin Skin Test

- Inject intradermally 0.1 ml of 5 TU PPD tuberculin
- Produce wheal 6 mm to 10 mm in diameter
- Do not recap, bend, or break needles, or remove needles from syringes
- Follow universal precautions for infection control

### Reading the Tuberculin Skin Test

- 1-Read reaction 48-72 hours after injection
- 2-Measure only induration
- 3-Record reaction in millimeters



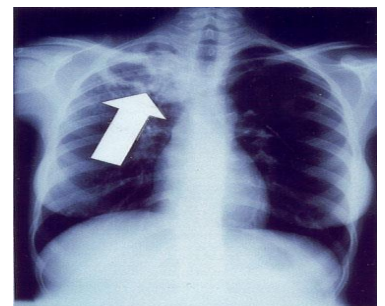
## Factors that May Affect the Skin Test Reaction

- **False-positive:**  
Nontuberculous mycobacteria BCG vaccination
- **False-negative:**
  - Recent TB infection
  - Very young age (< 6 months old)
  - Live-virus vaccination

If a patient's skin test is positive yet he/she isn't presented with any symptoms then we have to make sure if the patient is vaccinated or has latent TB infection.

## 2 Chest Radiograph

- Abnormalities often seen in apical or posterior segments of upper lobe or superior segments of lower lobe
- May have unusual appearance in HIV-positive persons
- Cannot confirm diagnosis of TB



## 3 Sputum Specimen Collection

- Obtain 3 sputum specimens for smear examination and culture
- Persons unable to cough up sputum, induce sputum, bronchoscopy or gastric aspiration
- follow infection precautions during specimen collection

### Smear Examination

- Strongly consider TB in patients with smears containing acid-fast bacilli (AFB)
- Results should be available within 24 hours of specimen collection
- Presumptive diagnosis of TB

### Cultures

- Use to confirm diagnosis of TB
- Culture all specimens, even if smear negative
- Results in 4 to 14 days when liquid medium systems used
- **don't wait for the result here just start empiric treatment**

#### 4 Medical History ( it is very imp. diagnosis can be made 90% depending on the history )

- Symptoms of disease
- History of TB exposure, infection, or disease
- Past TB treatment
- Demographic risk factors for TB
- Medical conditions that increase risk for TB disease

#### Evaluation for TB

- Medical history
- Physical examination
- Mantoux tuberculin skin test
- Chest radiograph
- Bacteriologic or histologic exam

#### Symptoms of Pulmonary TB

- Productive, prolonged cough
- (duration of >3 weeks)
- Chest pain
- Hemoptysis

#### Systemic Symptoms of TB

- Fever
- Chills
- Night sweats
- Appetite loss
- Weight loss
- Easy fatigability

### Treatment of TB Infection

#### Directly Observed Therapy (DOTs)

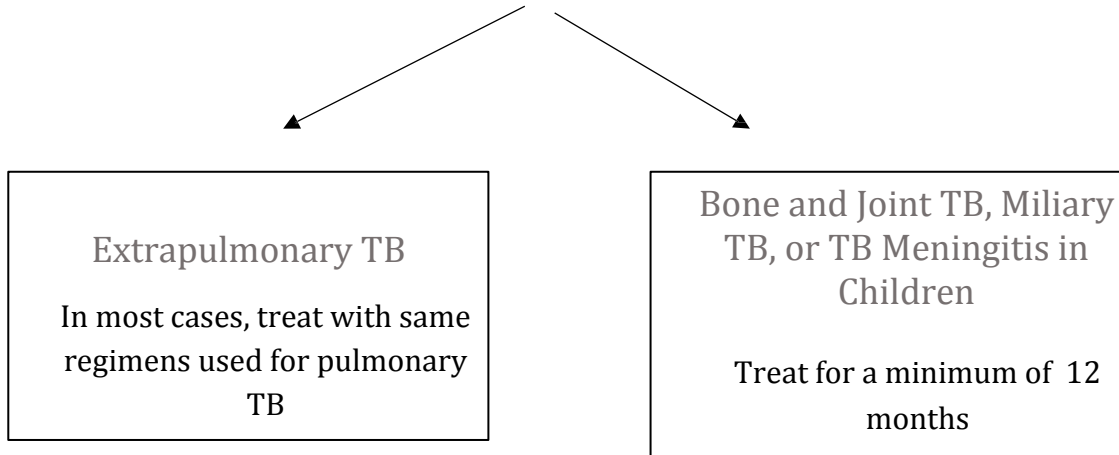
- Health care worker watches patient swallow each dose of medication
- Consider DOT for all patients
- DOT can lead to reductions in relapse and acquired drug resistance
- Use DOT with other measures to promote adherence

#### The five elements of DOTS ( doctor skipped this)

- Political commitment with increased and sustained financing
- Case detection through quality-assured bacteriology
- Standardized treatment, with supervision and patient support
- An effective drug supply and management system
- Monitoring and evaluation system, and impact measurement

## Treatment of TB for HIV-Negative Persons

- Include four drugs in initial regimen
  - Isoniazid (INH)
  - Rifampin (RIF)
  - Pyrazinamide (PZA)
  - Ethambutol (EMB) or streptomycin (SM)

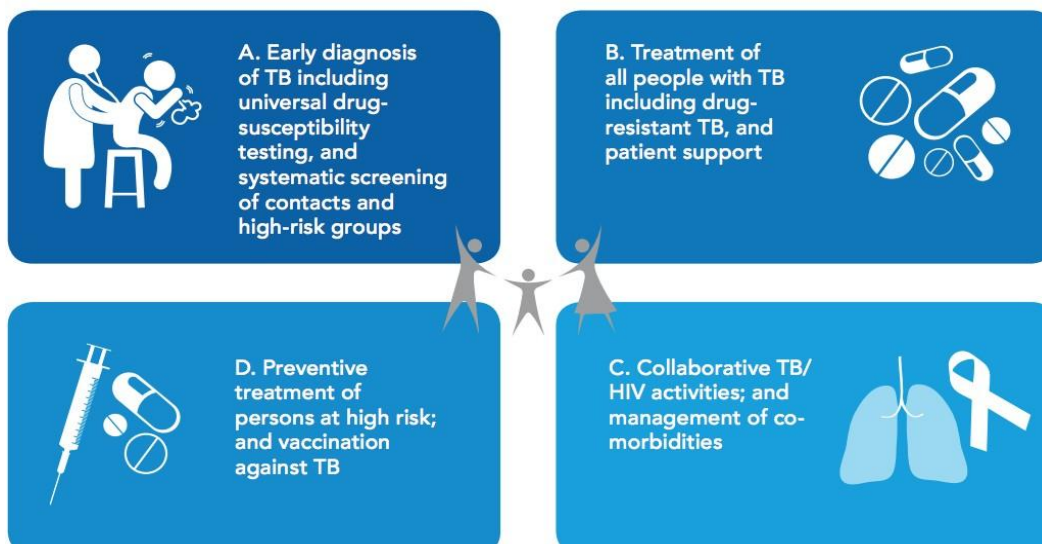


## Multidrug-Resistant TB (MDR TB)

- Presents difficult treatment problems
- Treatment must be individualized
- Clinicians unfamiliar with treatment of MDR TB should seek expert consultation
- Always use DOT to ensure adherence

# INTEGRATED, PATIENT-CENTRED CARE AND PREVENTION

## How pillar 1 works : Key actions



# Community TB Control

WHO provide free treatment for TB so others won't have to worry about getting infected.

## Preventing and Controlling TB

- Three priority strategies:
  - 1-Identify and treat all persons with TB disease
  - 2-Identify contacts to persons with infectious TB; evaluate and offer therapy
  - 3-Test high-risk groups for LTBI; offer therapy as appropriate
- the current WHO recommended tuberculosis control strategy is BCG vaccination who are at risk of having TB? pregnant and children.
- what drug can be used as prophylaxis ? INH

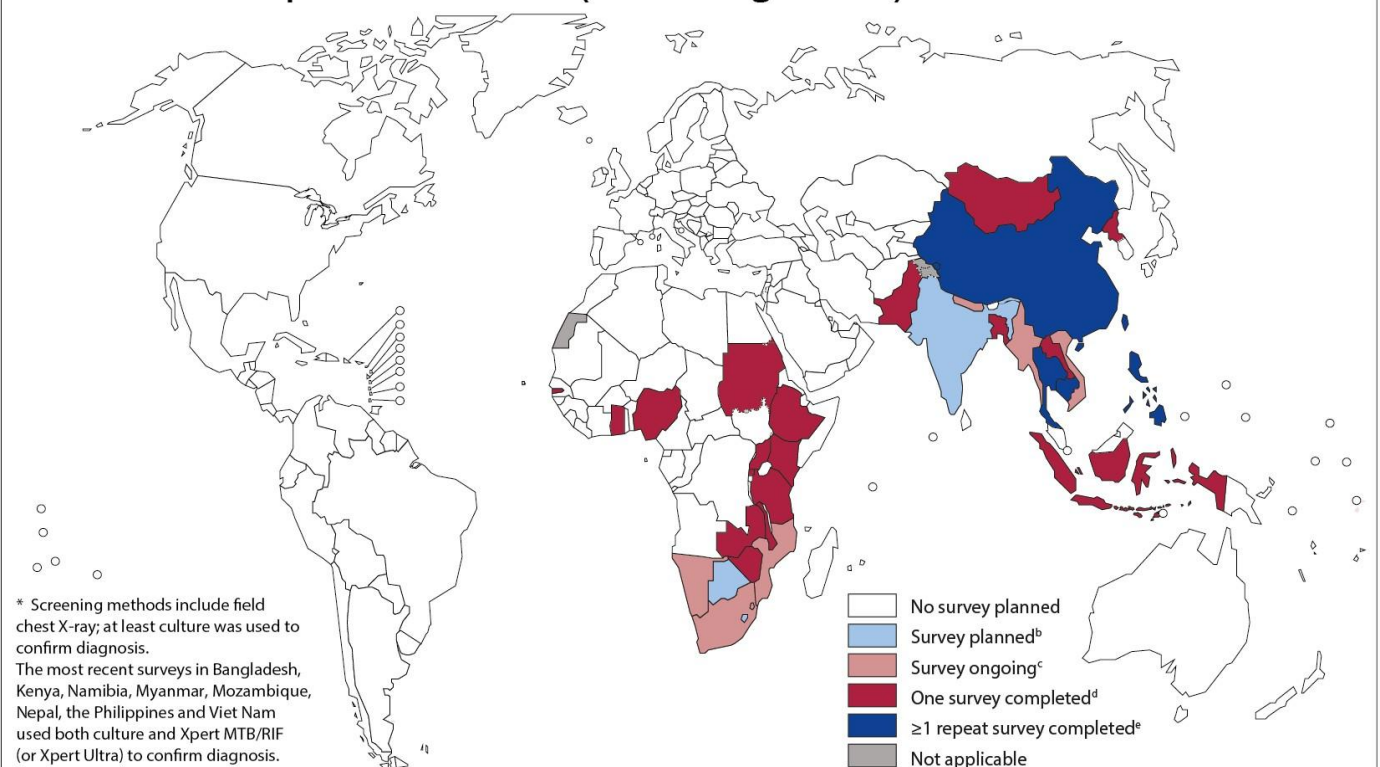
## Health care providers should work with health department in the following areas

- Overall planning and policy development
- Identification of persons with clinically active TB
- Management of persons with disease or TB suspects
- Identification and management of persons with TB
- Laboratory and diagnostic services
- Data collection and analysis
- Training and education

## Data Collection and Analysis

- TB reporting required in every state
- All new cases and suspected cases promptly reported to health department
- All drug susceptibility results sent to health department

### Countries in which national population-based surveys of the prevalence of TB disease have been implemented using currently recommended screening and diagnostic methods\* since 2000 or are planned in the future (status in August 2018)



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: *Global Tuberculosis Report 2018*. WHO, 2018.

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## Training and Education

- TB control programs should
- Provide training for program staff
- Provide leadership in TB education to the community
- Ensure community leaders, clinicians, and policymakers are knowledgeable about TB
- Educate the public

### Why is it a concern for Saudi Arabia?

\*people with DM have 3 times risk of having TB than a normal person



World Health  
Organization

[www.who.int/tb](http://www.who.int/tb)

# TUBERCULOSIS & DIABETES

## THE DUAL EPIDEMIC OF TB AND DIABETES

### DEADLY LINKAGES

- People with a weak immune system, as a result of chronic diseases such as diabetes, are at a higher risk of progressing from latent to active tuberculosis.
- Diabetes triples a person's risk of developing TB. About 15% of TB cases globally may be linked to diabetes
- TB can temporarily cause impaired glucose tolerance which is a risk factor for developing diabetes
- The likelihood that a person with TB will die or relapse is significantly higher if the person also has diabetes.
- A large proportion of people with diabetes as well as TB are not diagnosed, or are diagnosed too late.

### KEY ACTIONS

- Early detection can help improve care and treatment outcomes of both diseases. All people with TB should be systematically screened for diabetes. Systematic screening for TB in people with diabetes should be considered in settings with high TB prevalence.
- WHO-recommended treatments should be rigorously implemented for people with TB/diabetes.
- It is important that proper care for diabetes is provided to minimize the risk of TB.
- Diabetes prevention on population level also helps prevent TB.
- A joint response is needed to ensure coordinated clinical management and address common health system bottlenecks and social determinants



World Health  
Organization

[www.who.int/tb](http://www.who.int/tb)

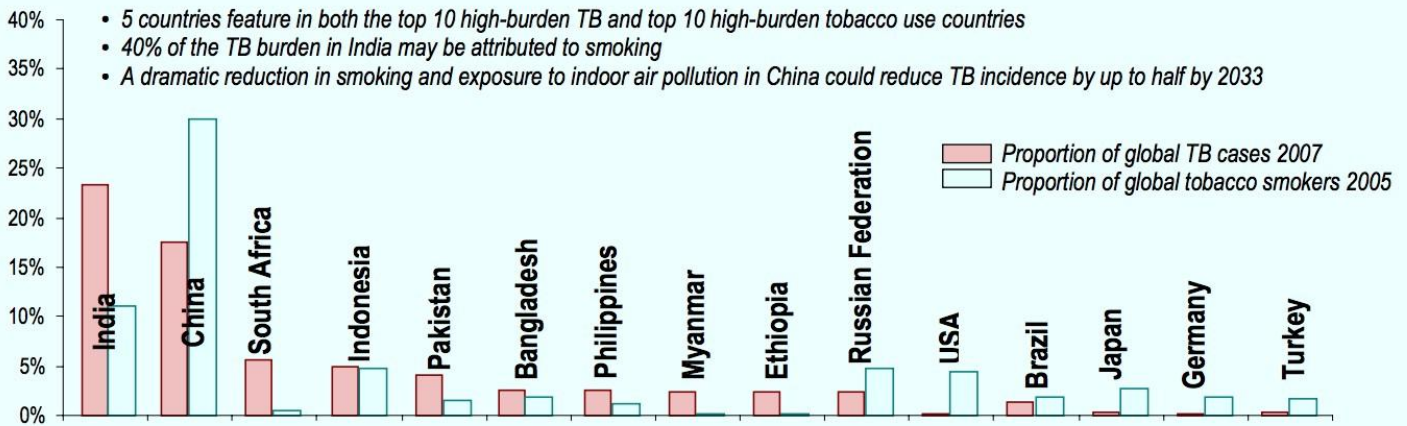
[www.who.int/tobacco](http://www.who.int/tobacco)

# TUBERCULOSIS & TOBACCO

## A strong association

- Smoking substantially increases the risk of tuberculosis (TB) and death from TB
- More than 20% of global TB incidence may be attributable to smoking
- Controlling the tobacco epidemic will help control the TB epidemic
- Smoking is a risk factor for TB, independent of alcohol use and other socioeconomic risk factors
- Smoking increases the risk of TB disease by more than two-and-a-half times
- The [WHO monograph on TB and tobacco](#) describes other linkages and evidence

## Correlation of high-burden TB and high-burden tobacco-use countries



### THE TUBERCULOSIS EPIDEMIC

- 2 billion people are infected with the TB bacilli
- TB is a disease of poverty with the vast majority of deaths occurring in low- and middle-income countries with more than half of all deaths occurring in Asia
- 9.27 million new TB cases in 2007
- 1.75 million people died from TB in 2007
- 5% of all TB cases have multidrug-resistant TB

### THE TOBACCO EPIDEMIC

- More than 1 billion people smoke with nearly 70% of them living in low- and middle-income countries
- Tobacco use is the leading preventable cause of death
- More than 5 million people die per year from tobacco use. Unchecked, the epidemic will kill more than 8 million people per year by 2030

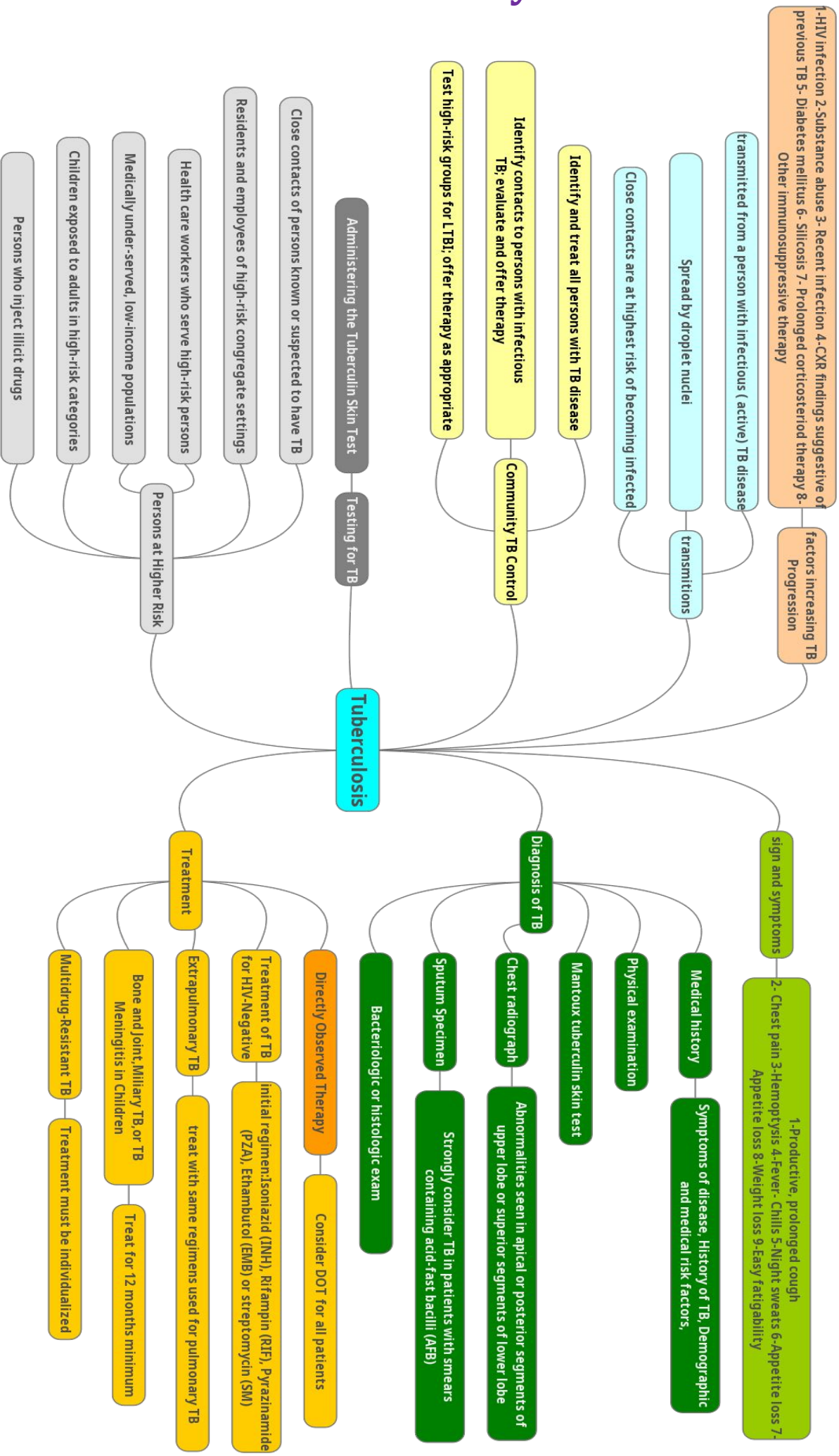
-developed countries have lower prevalence of TB

-those countries with high tobacco consumption have high TB prevalence.

-why tobacco consumption increases TB prevalence?

Vulnerability of immune system

# Summary





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# THE END

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