

Module 1

Overview: Tuberculosis, the Global Emergency

Learning Objectives

At the end of this module, the participant will be able to

- Explain the TB epidemic and annual global TB burden
- Describe the forms of TB and how it is transmitted
- Define and compare various methods of TB diagnosis noting where each is most effective
- Explain the term NTP
- Describe the DOTS component of the STOP TB strategy
- Explain the importance of AFB microscopy in the DOTS program
- Describe levels of TB laboratory services

Content Overview

- What is TB?
- Transmission and Forms of TB
- Risk of Disease
- TB Diagnosis
- Role of the National TB Program
- DOTS component of the STOP TB Strategy
- Building and Enhancing DOTS within the framework of the STOP TB strategy
- The importance of AFB microscopy in DOTS programs
- Organization of laboratory services

Global Emergency

**Tuberculosis kills 5,000 people
a day !**

2.3 million die each year !

Disturbing Statistics

- 1/3 of world's population is infected with TB
- 8 Million people develop active TB every year
- TB kills more young women than any other disease
- More than 100,000 children will die from TB this year
- Hundreds of thousands of children will become TB orphans



Country Specific TB Burden

- **Customize**

What is TB?

TB is an infectious disease that affects mainly the lungs (pulmonary TB or PTB) but can also attack any part of the body (extra-pulmonary TB or EPTB)

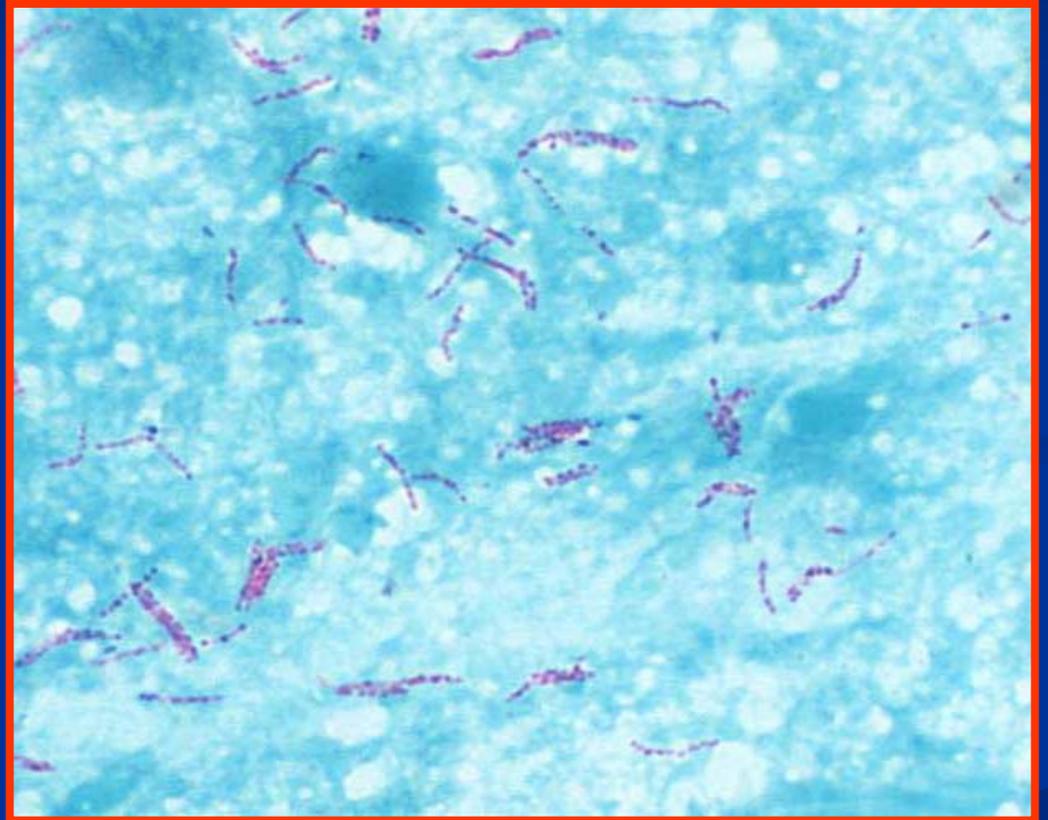
A person with PTB is infectious to others!

The Cause of TB

- *Mycobacterium tuberculosis*
- *Mycobacterium bovis*

Staining Characteristics

- Mycobacteria are called Acid-Fast Bacilli (AFB) due to their microscopic appearance after decolorizing.
- Organisms appear red on a blue background





TB Transmission (infection)

Person to person

via

Airborne transmission

in

Confined environment

Risk Factors for Infection

- Exposure to TB bacilli
- Duration of exposure to a person with PTB
- Intensity of exposure
- Untreated AFB smear positive PTB cases are the most infectious

Risk Factors for Disease

- Development of disease depends on individual susceptibility
- HIV increases the risk of getting TB disease
 - 10% Life time risk of TB in HIV negative
 - 10% Annual risk of TB in HIV positive

Diagnosis of TB

- Direct demonstration of AFB in sample
- Growth of TB bacilli in culture
- Skin Test
- X-Ray

Advantages of AFB Smear Microscopy

- Microscopy is a simple convenient test
- Requires minimal infrastructure and equipment
- Highly accurate, inexpensive and fast
- Accessible to the majority of patients
- Prioritizes infectious cases

Limitations of Microscopy

- Can not distinguish between dead or live bacteria
- High bacterial load >3000–5000 AFB /mL is required for detection
- Can not do species identification
- Can not perform DST

Limitations of Culture

- Greater need for
 - infrastructure, qualified staff, equipment, and additional safety measures
- Increased time: weeks for result
- More sensitive to technical deficiencies
- Expensive

National Tuberculosis Control Program (NTP)

- Objectives
 - Reduce mortality, morbidity and disease transmission and avoid the development of drug resistance
 - In the long term, to eliminate suffering due to TB

Goals of the NTP

- Detect at least 70% of the infectious cases
- Cure at least 85% of newly detected cases of smear-positive TB
- Reduce prevalence of and deaths due to TB

What is **STOP TB Strategy**

1. Pursuing quality DOTS expansion and enhancement
2. Addressing TB/HIV and MDR-TB
3. Contributing to health system strengthening
4. Engaging all care providers
5. Empowering patients and communities
6. Enabling and promoting research

DOTS Component of STOP TB Strategy

- Political commitment to TB control
- Case detection by quality assured bacteriology
- Regular, uninterrupted supply of high quality anti-TB drugs
- Standardized treatment with supervision and patient support
- Standardised recording and reporting

Benefits of DOTS

- Produces cure rates of up to 95 %
- Prevents new infections
- Prevents the development of MDR-TB
- Cost effective

Role of Laboratory

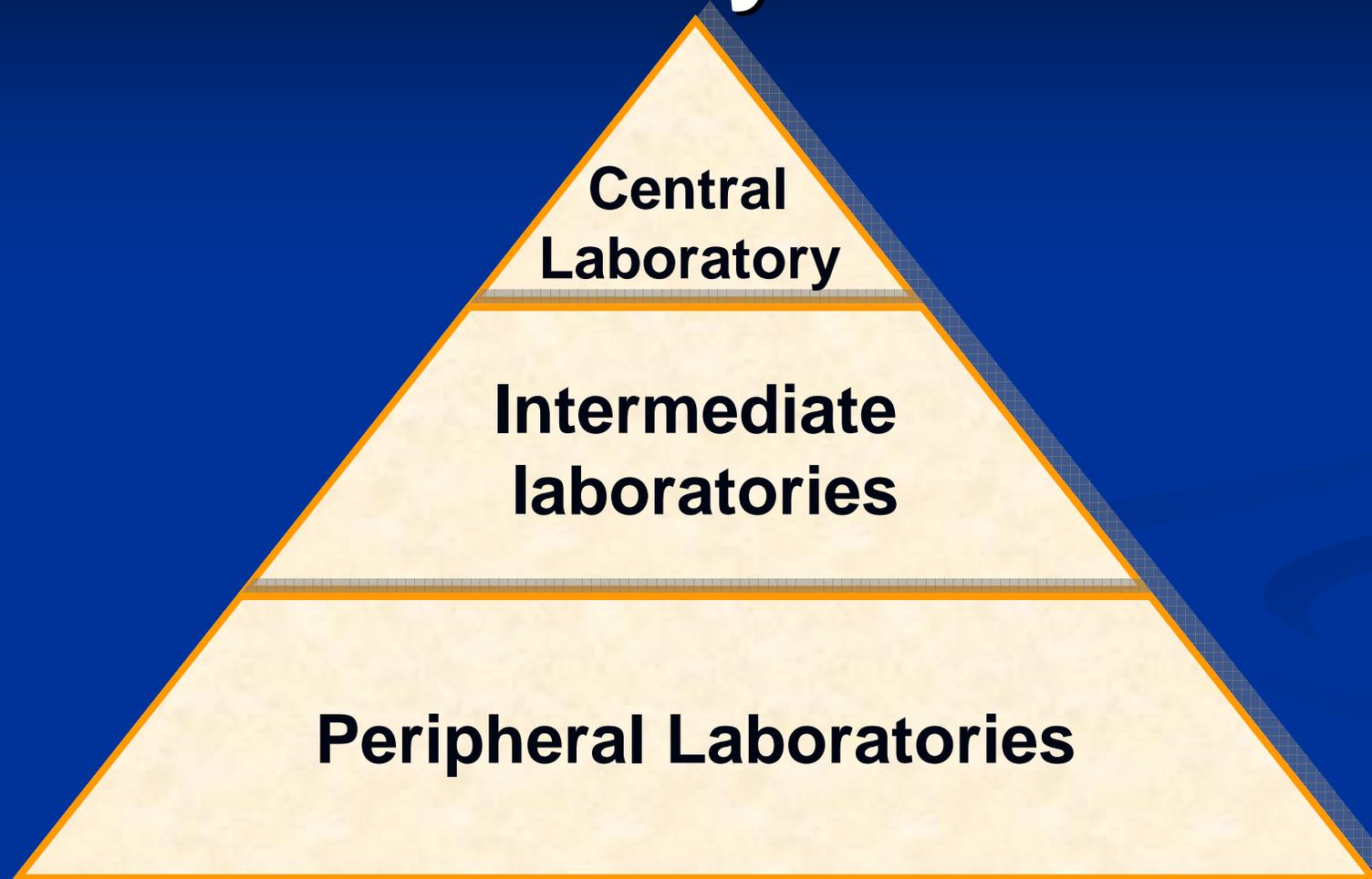
- **Detection of infectious cases**
- **Monitoring of treatment progress**
- **Documentation of cure**

**Detection and treatment
of infectious cases
reduces the spread of
Tuberculosis!**

Pulmonary Positive Patients

- AFB smear-positive patients are usually sick and seek treatment.
- AFB smear-positive patients are much more likely to die if untreated.
- Untreated, an AFB smear-positive patient may infect 10–15 persons/year.

Laboratory Network



Peripheral Laboratory

- Located within a general dispensary, clinic or hospital
- Limited services for TB diagnosis
 - Sputum specimen collection
 - AFB sputum smear microscopy

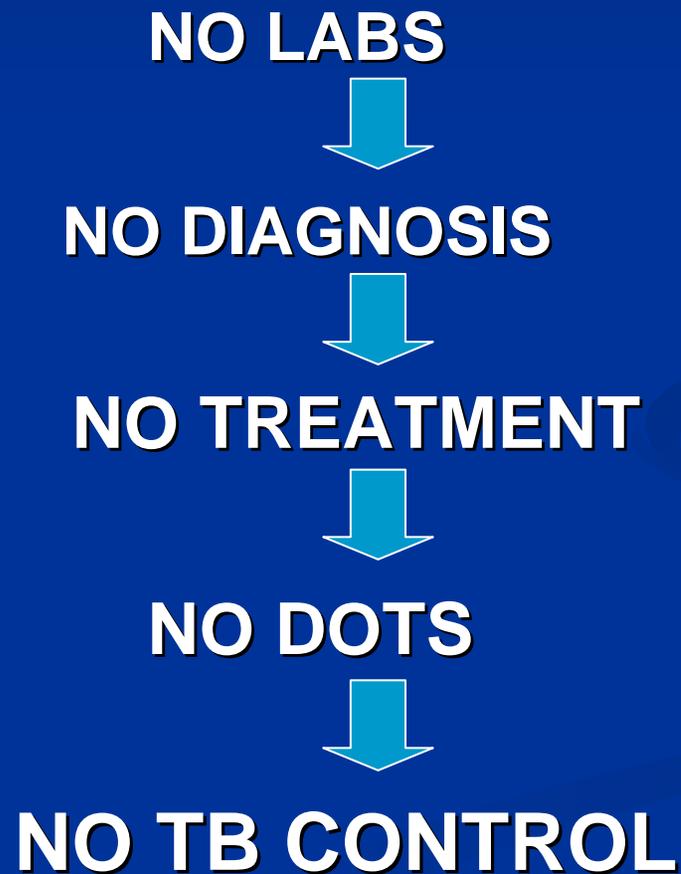
Intermediate Laboratory

- Regional or large hospital
- Services for TB diagnosis
 - Sputum specimen collection
 - Sputum smear microscopy
 - Culture and identification of *MTB*
- Support for peripheral laboratories
 - Supply of reagents and materials
 - Training, supervision, EQA of sputum smear microscopy

Central Laboratory

- Country, provincial or state level
- Services for TB diagnosis
 - Sputum smear microscopy
 - Culture and identification of MTB
 - Drug susceptibility testing of TB
- Support for the laboratory network
 - Advice on procurement
 - Organization and participation in training, supervision, EQA of sputum smear microscopy
- Other activities
 - Participation in operational research
 - Drug resistance surveillance

Laboratory is the key Component in TB Control



Summary

- What is TB and how it is transmitted?
- What are the goals of NTP?
- Why is microscopy an effective diagnostic technique?
- What is DOTS?
- What is the role of the laboratory in TB control?