



Tuberculosis- global & public health perspective

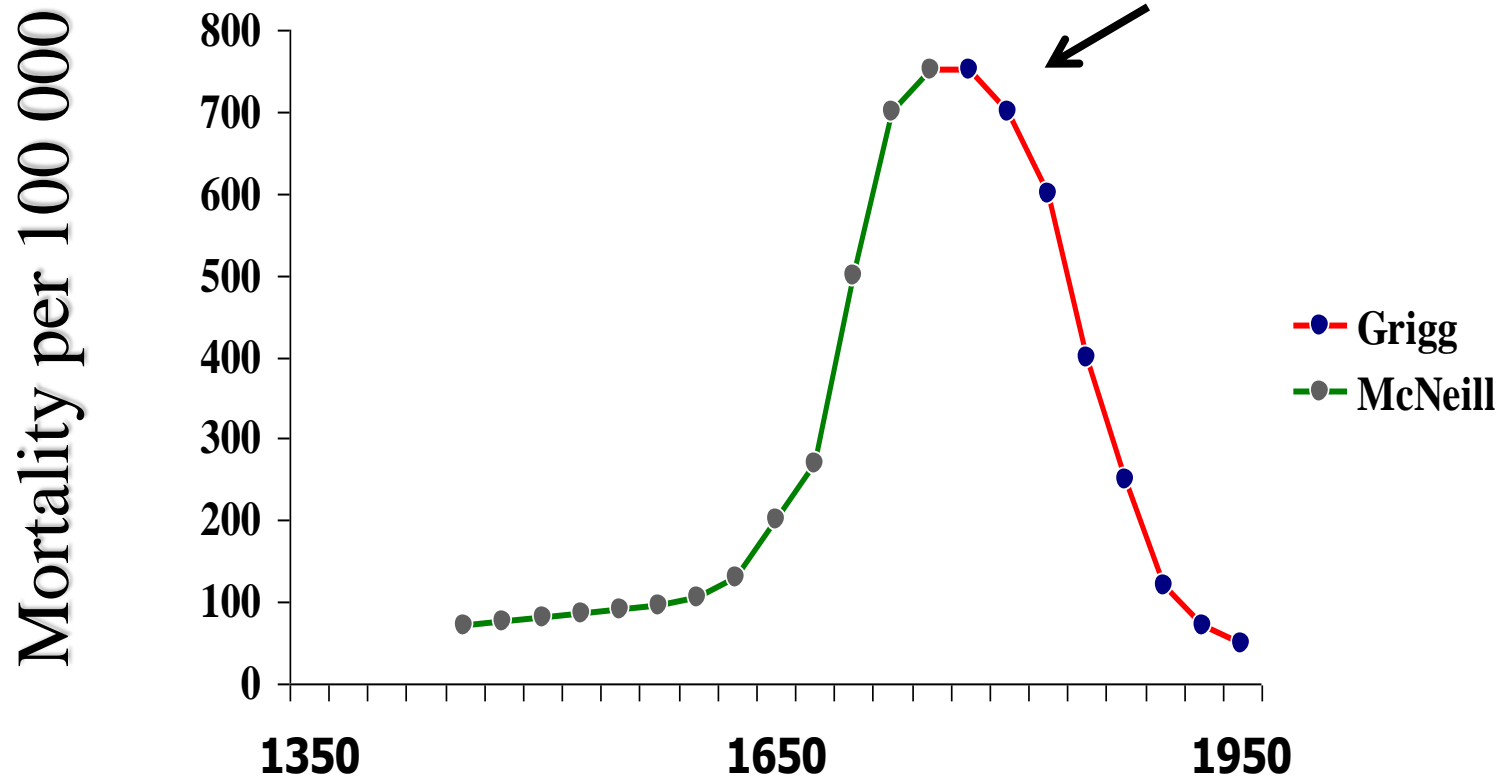
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Overview

- Global TB burden
- Factors contributing towards global TB increase
- Mutidrug resistant TB
- TB preventive/control strategies
- Case study

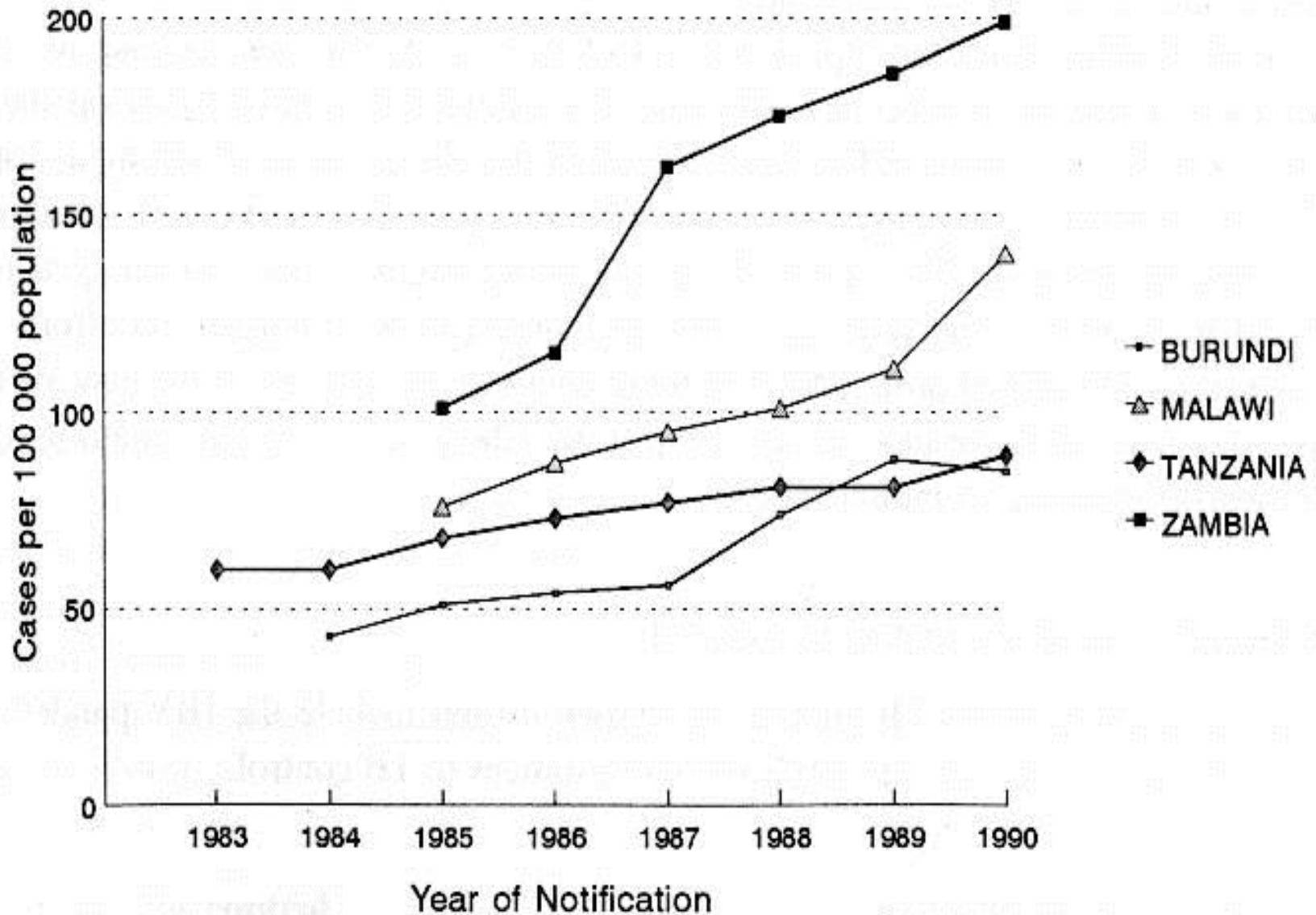
Hypothetical Course of the Tuberculosis Epidemic in Europe



Asia- early 20th century
Africa- late 20th century

(source: Donald Enarson)

Tide turns -1990s

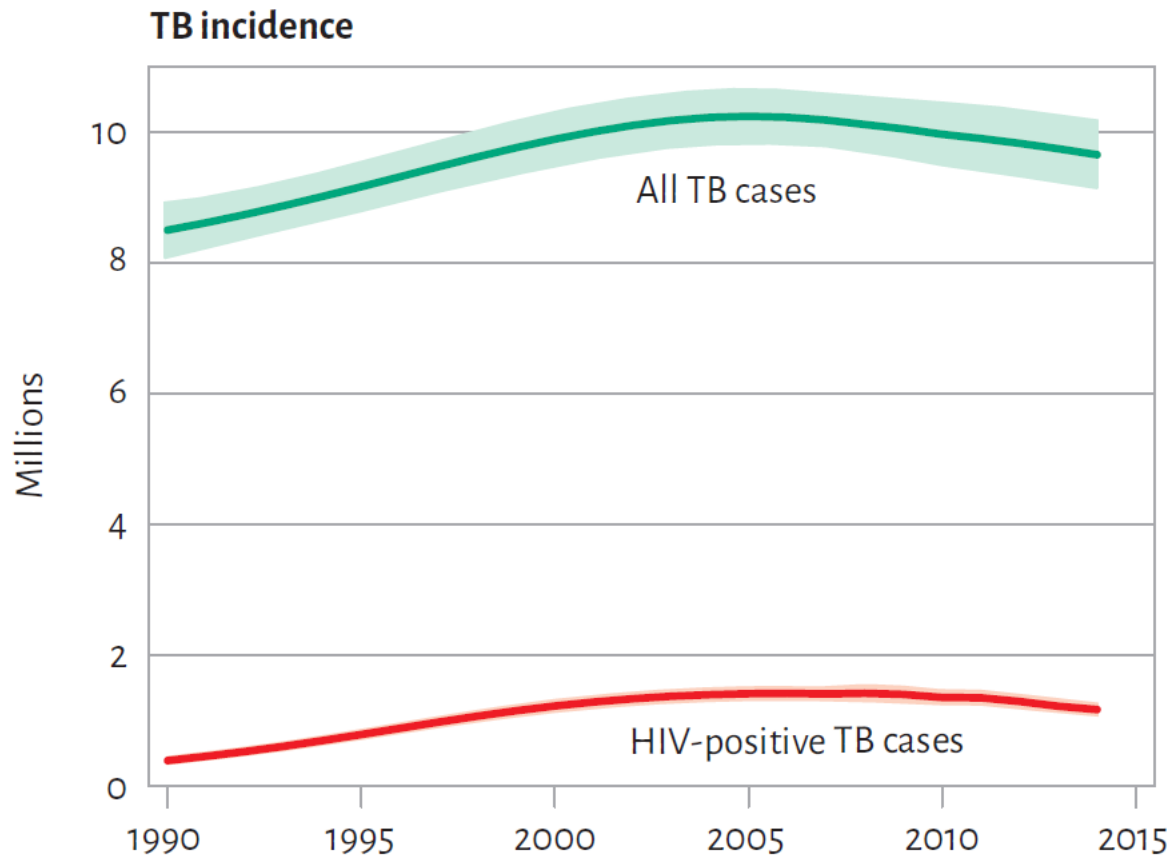


TB placed on global agenda!

- 1993- WHO declared emergency
- 1993- The Directly Observed Treatment Short-course (DOTS) Strategy developed
- 2005-2015 StopTB strategy
- 2015-2035 EndTB strategy

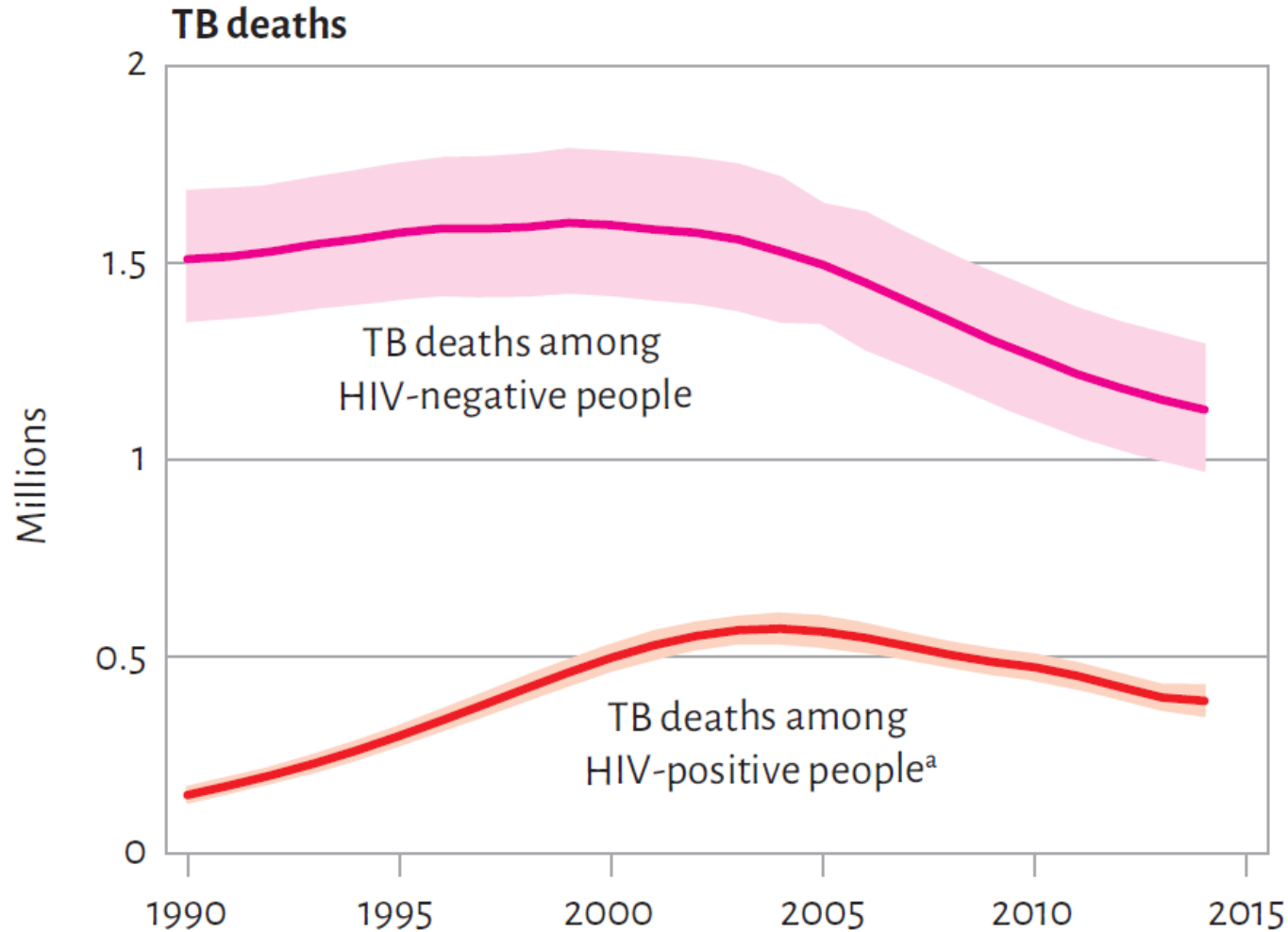


Global TB incidence declining



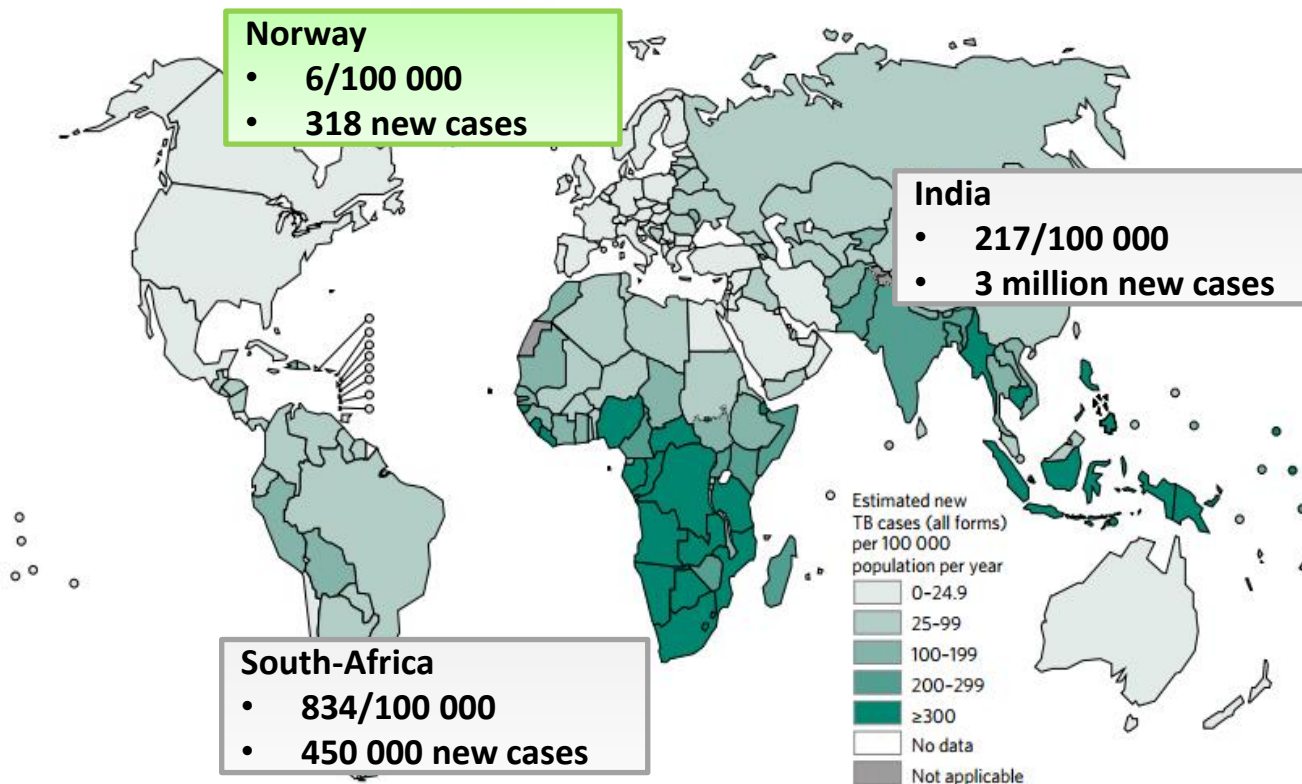
- The African Region accounted for 74% of the estimated number of HIV- positive incident TB cases

Global TB mortality is declining



TB is not uniformly distributed

Inter- & intra-country variation



Six countries-60% of global burden

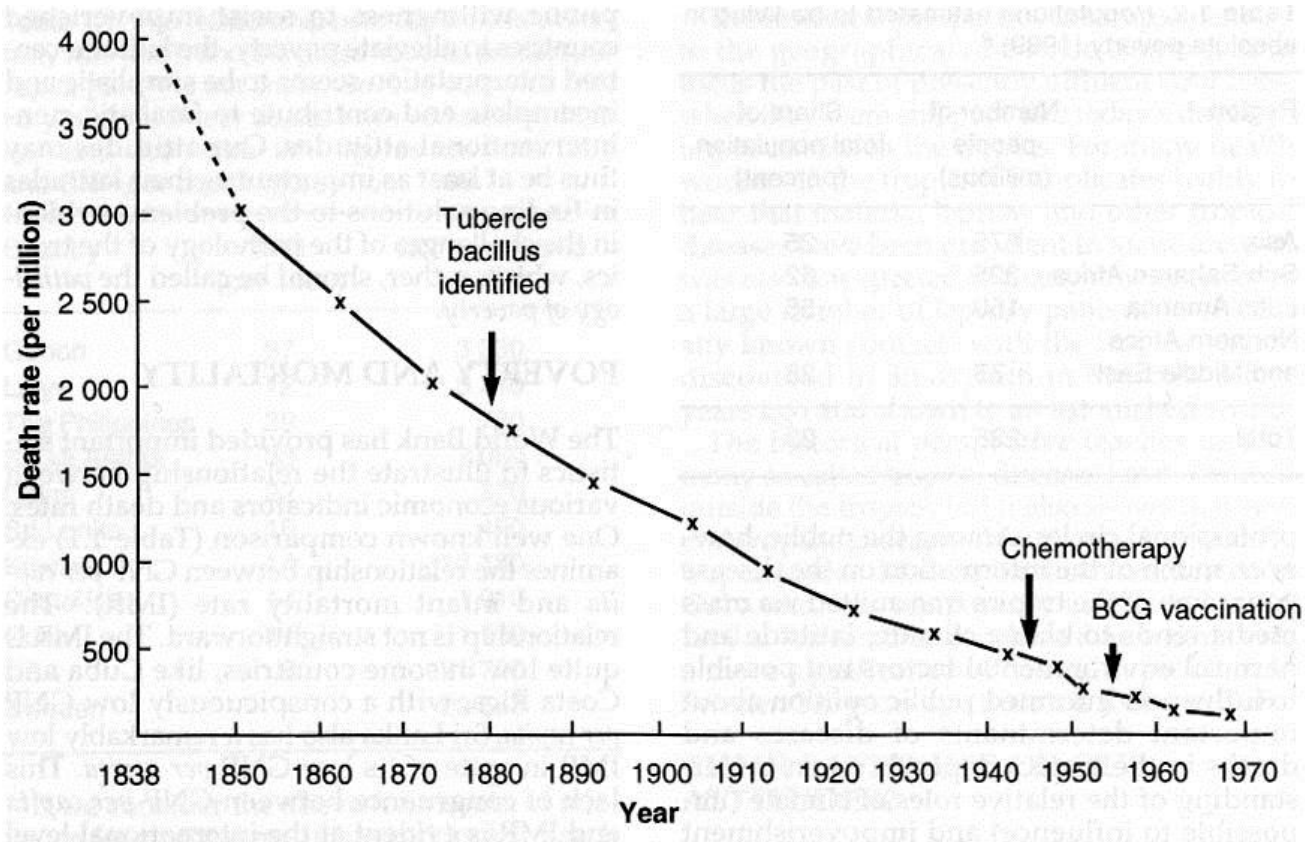
- India
- Indonesia
- China
- Nigeria
- Pakistan
- South Africa

Major factors contributing towards Global TB burden



TB & Social aspects

- TB mortality in England and Wales over the last 2 centuries



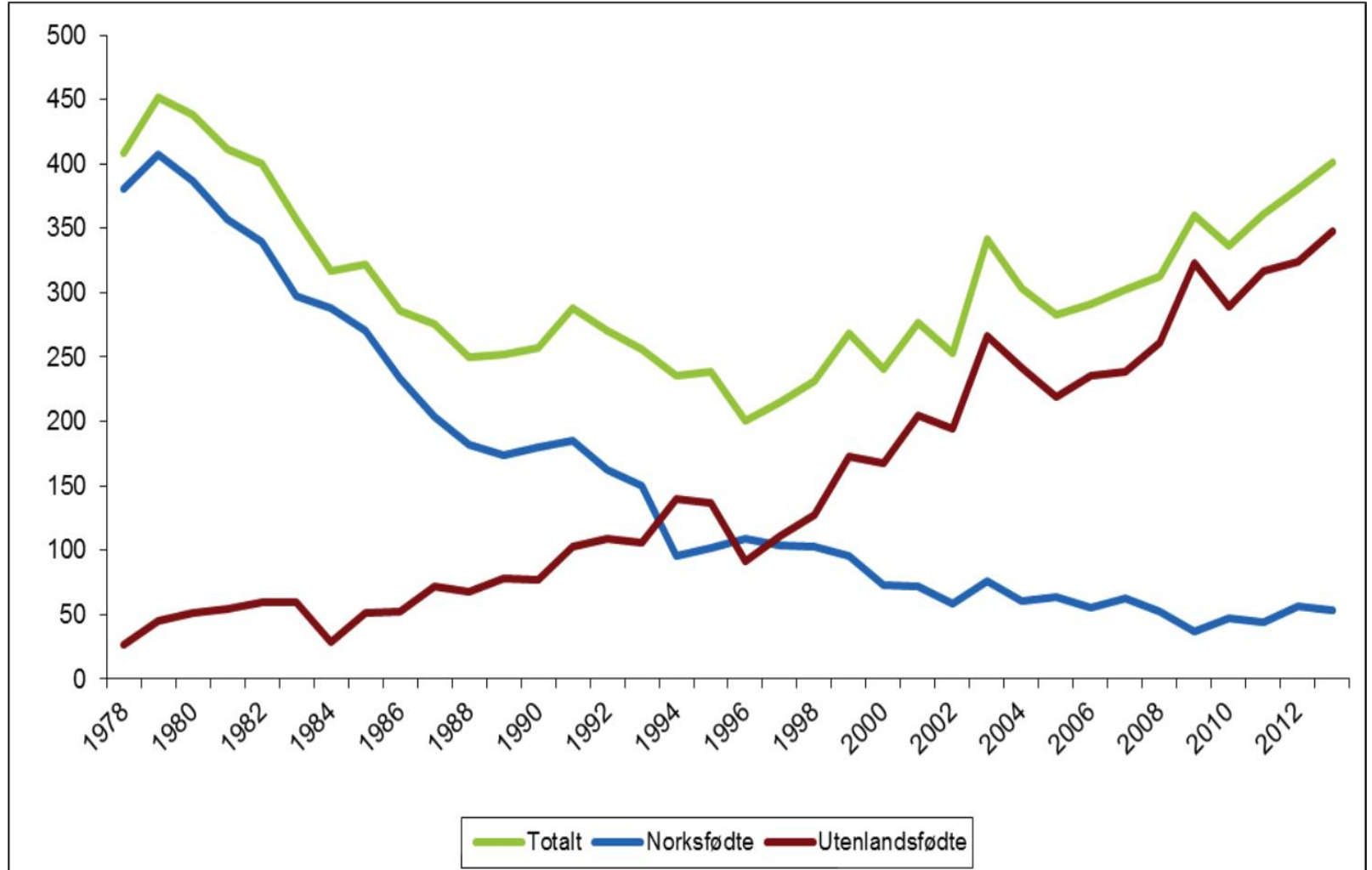
TB & social aspects

- TB effects mainly marginalized groups, aboriginals, prisoners, refugees, IDP, exploited workers
- Chronic stress lead to TB
- Social programs for the poor and equity in public health services - effective TB control
- Social Disease- *Mycobacterium tuberculosis* - cofactor

Global Migration

- o Foreign labor
- o Asylum seekers, refugees
- o Internally displaced persons

TB incidence in Norway



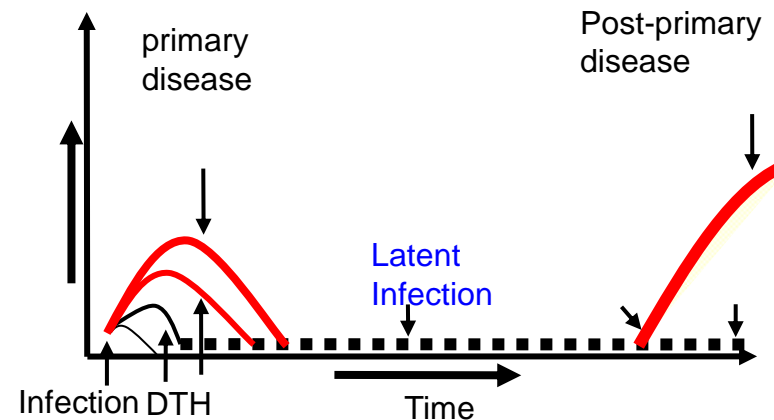
HIV-TB co-infection

HIV & TB

- HIV compromises host cellular immune response involved in the immunity against TB

- Direct effect: Increased susceptibility:

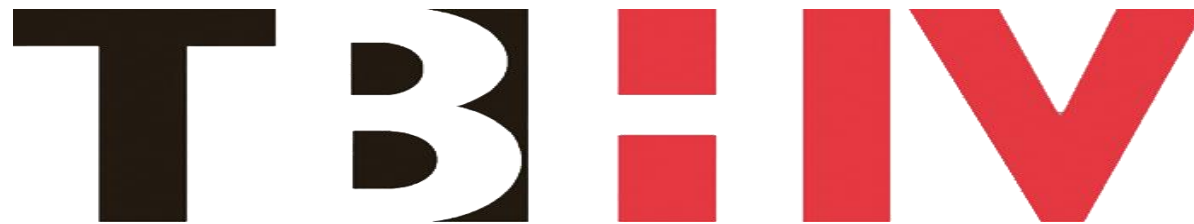
- primary infection
- Progression to disease
- Reactivation of latent infection
- Re-infection



- Indirect: Transmission to the HIV negative population

- After infection

- HIV neg: 10% lifetime risk-TB
- HIV pos: **10% annual risk- TB**



Collaborative TB/HIV activities 2010

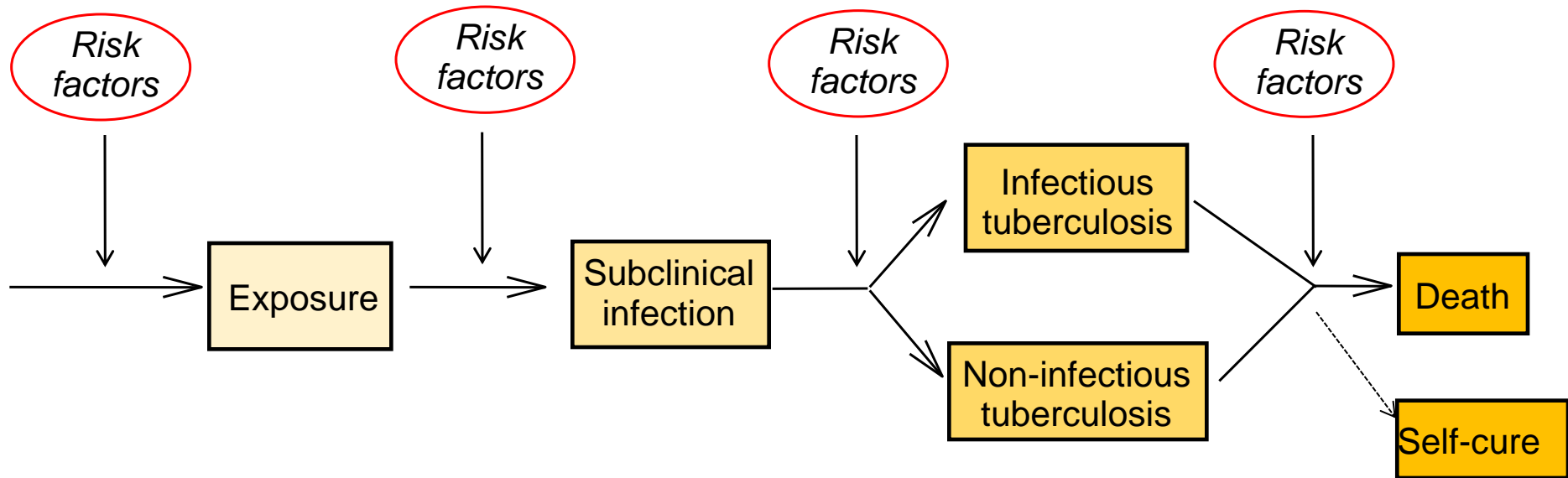
Source: Global Tuberculosis Control 2011 Report

- All TB patients should be tested for HIV
- All HIV patients should be tested for TB- preventive TB treatment

Deteriorating public Health systems
contributes towards increase in TB

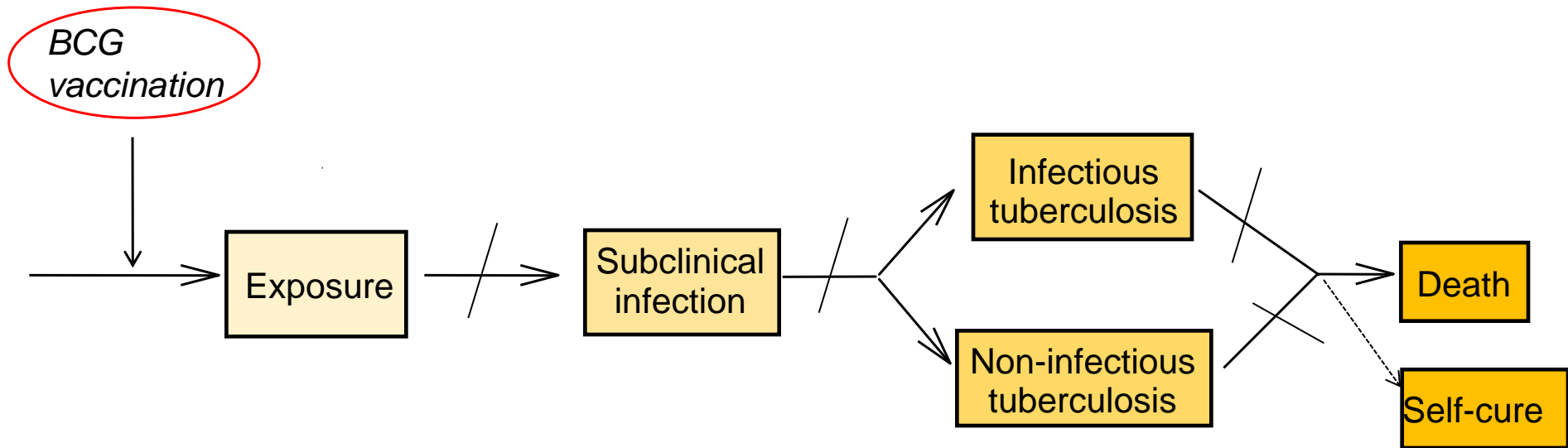
TB preventive/Control strategies

A Model for the Epidemiology of Tuberculosis



Rieder HL. *Infection* 1995;23:1-4

Intervention Strategies



BCG Vaccine

can

- Prevent childhood TB - severe (disseminated) TB, TB meningitis
-- efficacy ~ 80%
- Give max effect when given at birth before infection takes place- included in EPI

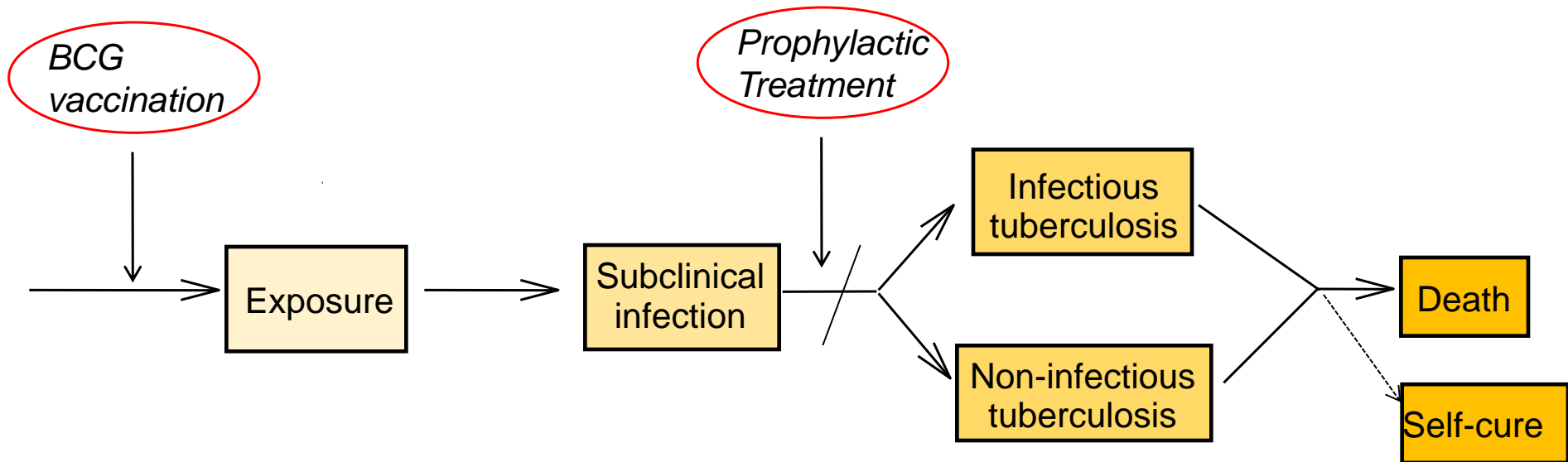
cannot

- prevent infection (and thus establishment of latent TB)
- eradicate latent TB
- prevent reactivation
 - Has no effect on transmission

Risk factors for exposure to *M. tuberculosis*

- Incidence of infectious tuberculosis
- Duration of infectiousness
- Duration of exposure
 - Household member > community member
- Living conditions
 - direct sunlight kills M.tuberculosis
- Production of Infectious droplets
 - Cough>>> talking

Intervention Strategies



Preventive treatment of latent TB in low-endemic countries

- Preventive treatment-balanced- natural decline in latent infection
- Targeted testing and treatment of high risk groups

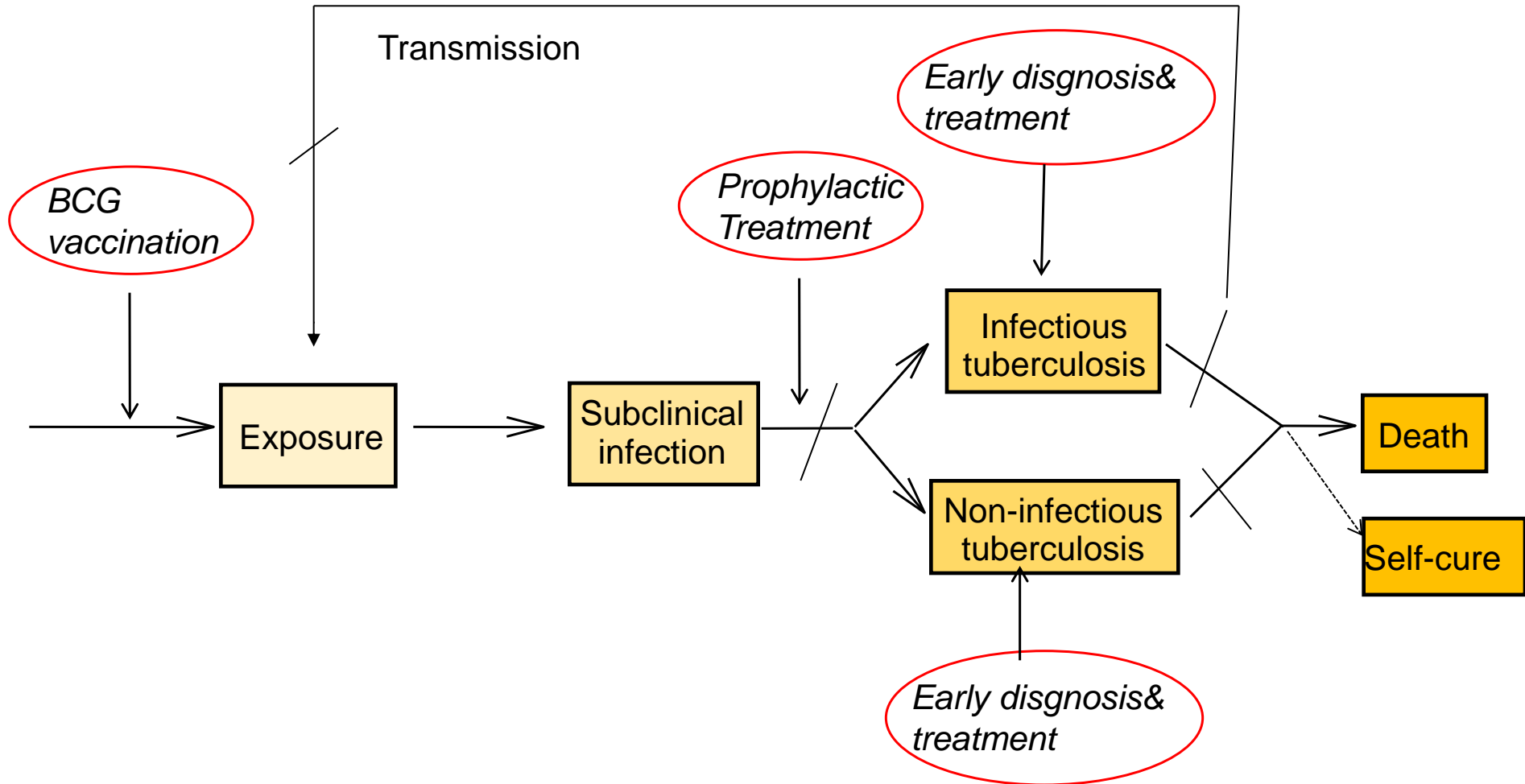
Preventive treatment of latent TB in high endemic countries

- Resources should be used on diagnosis and treatment of active TB

Following groups should be considered for preventive treatment :






- Contacts of sputum+ TB cases- children under 5 years of age
- HIV-TB co-infection

Intervention Strategies



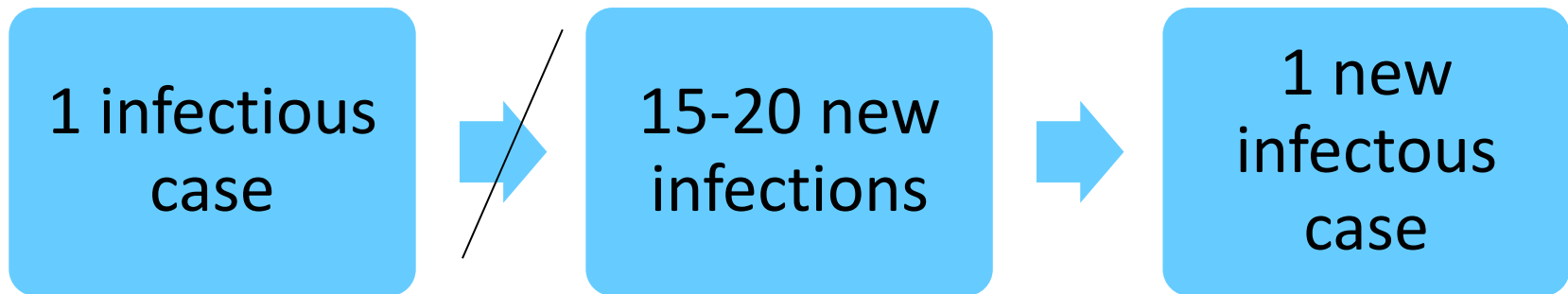
Treatment of TB disease

DOTS (Directly observed treatment- short course)

- Political commitment 
- Diagnosis and follow up by **sputum microscopy** 
- Secure system of Drug supplies 
- **Direct observation** 
- Proper recording and reporting 

Microscopy- acid fast stain

- Detects infectious cases- reduces transmission
- Low-cost- 0.50 USD
- Fast

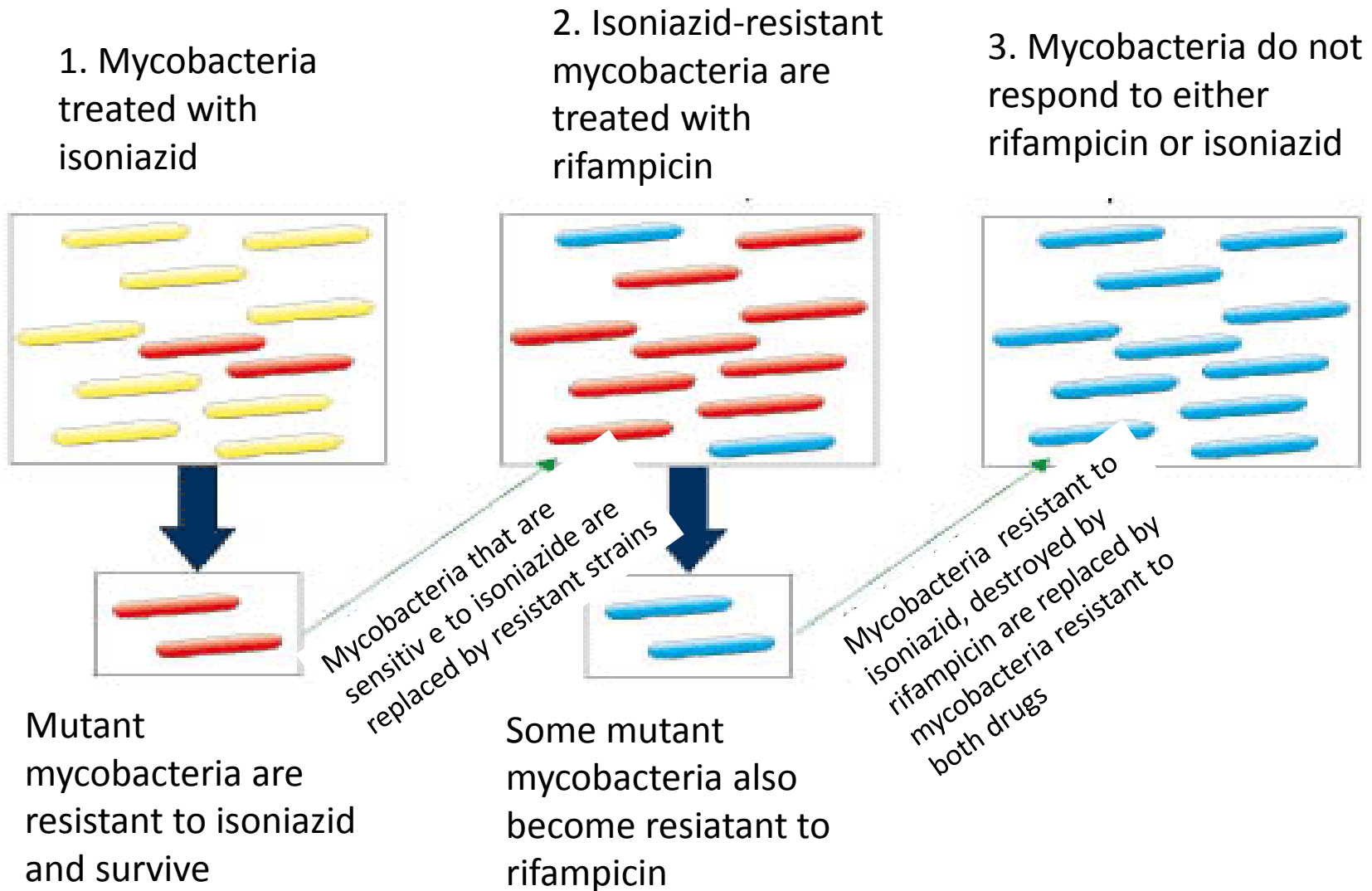


Drug resistance

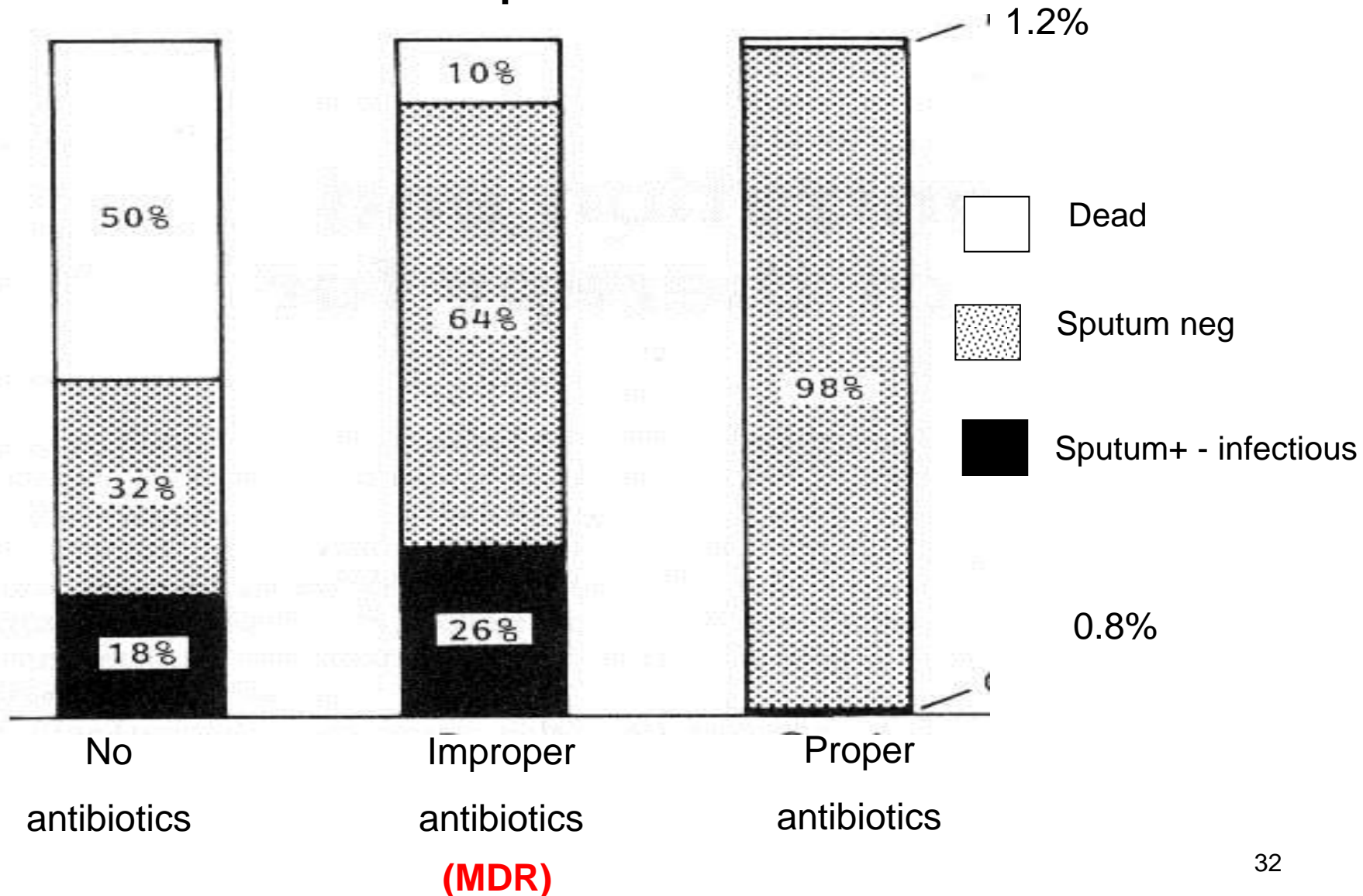
Drug resistance

- Patients with cavitation- smear positives
 - have the largest (10^6 - 10^{12}) populations of bacilli
 - Bacilli naturally resistant to one drug
 - Monotherapy (inadequate) leads to selection of resistant bacilli

Monotherapy leads to selection of resistant bacilli



Consequences of improper management of smear-positive TB cases



Multidrug resistant-TB

Challenges in MDR-TB Treatment

- prolonged treatment-two years (new- 9 months)
- less effective, more toxic
- drugs more expensive
- Successful outcome achieved in 50 %
- formidable challenge to global TB control

MDR's weak point

Two possibilities only:

- Mtb develops resistance through episodes of monotherapy (adherence problems)
«Acquired MDR»
- MDR-TB infects susceptible persons
(nococomial infection) «Primary MDR»

MDR-TB- nosocomial infection



What can be done?

MDR conclusion

- Mostly due to infection rather than acquisition
 - Look for «hot spots»
- Most likely nosocomial
 - New TB pats. exposed while waiting for DOT
- Decentralize and organize DOT
 - DOT distribution sites at health post level
 - Fixed appointments
 - Home treatment

Major obstacles in fighting the TB epidemic

- Poverty, war, breakdown of social structures
- Deficiencies in health infrastructure
- Deficiencies in staff
- Non-compliance of private sector
- Weak political commitment

Which organs can be effected by tuberculosis?

Main sites of Extrapulmonary tuberculosis

Central nervous system

- Meningitis



Lymphatics

- Scrofula (of the neck)



Pleura

- Tuberculosis pleurisy

Disseminated

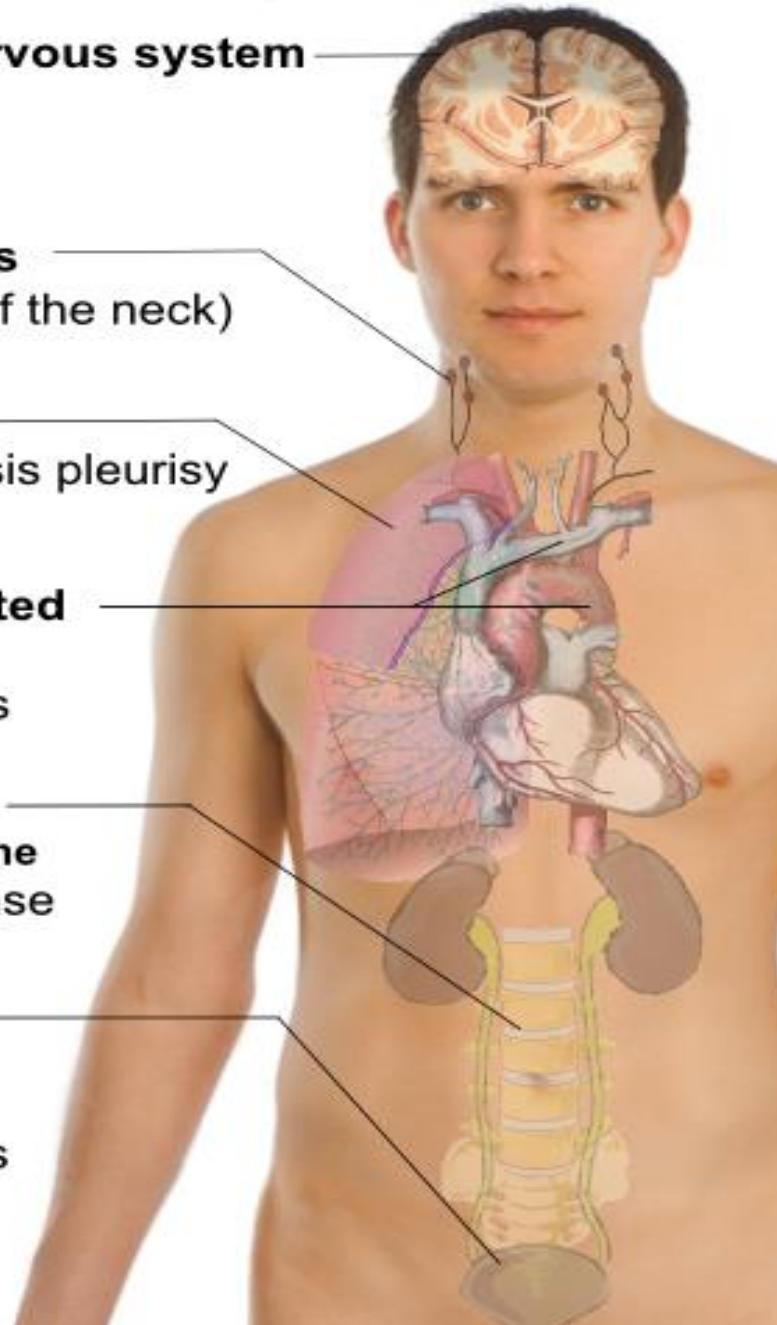
- Miliary tuberculosis

Bones and joints of spine

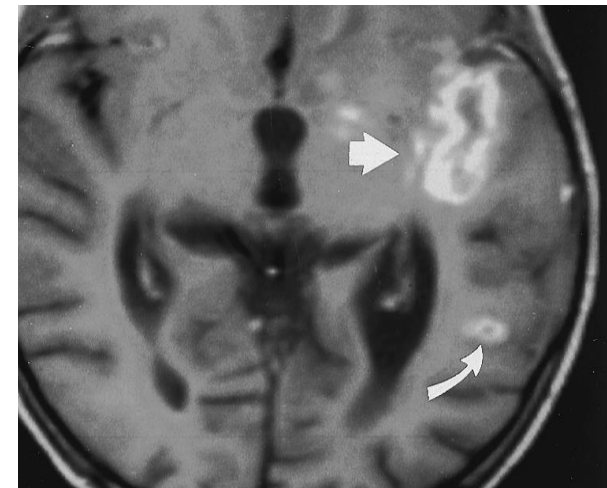
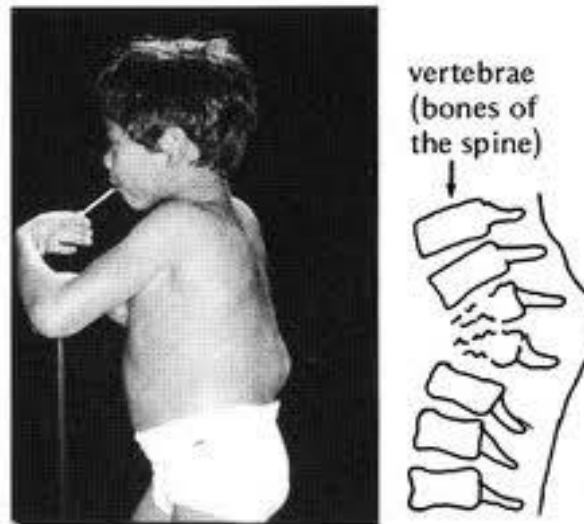
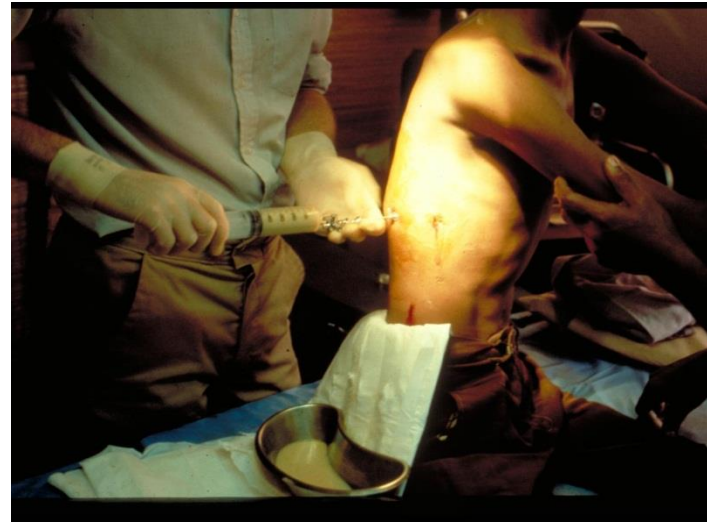
- Pott's disease

Genito-urinary

- Urogenital tuberculosis



Extrapulmonary tuberculosis



Quizz

- Which form of TB is contagious?
 - TB of neck glands
 - TB of lung
 - TB of Brain

Case

- Kari, 70 years old, weakened in immunity after getting treatment for breast cancer. She develops productive cough, low grade fever, loss of appetite. No effect of antibiotics
 - She was tuberculin test positive
 - What is the next test?
-
- Sputum samples was negative for acid-fast bacilli
 - Induced sputum samples collected using hypertonic saline solution delivered by an ultrasonic nebulizer.



Picture Source: Ingunn Haarstad, NTNU

Case

- Induced sputum samples were collected on 3 consecutive days
- Positive (+++) for Acid fast bacilli (AFB).
- Culture confirmed TB
- What kind of TB?

- What else would you like to know from patient interview?
- Household members: husband
- Frequent visitors: 2 grandchildren and daughter

- One grand child is tuberculin skin test+, IGRA+. Thriving well. No alarming symptoms.
- What should be done?

