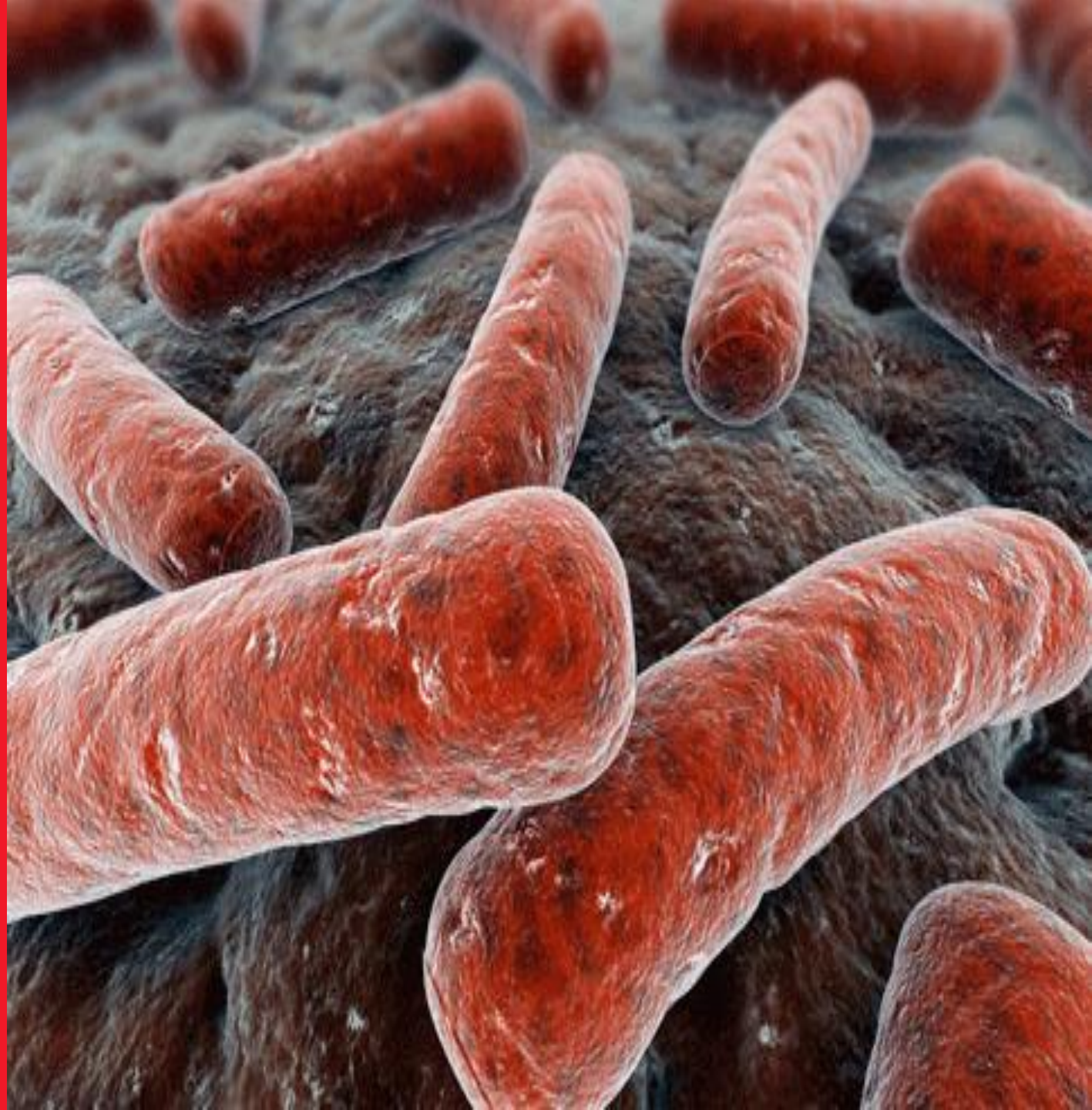


# Tuberculosis

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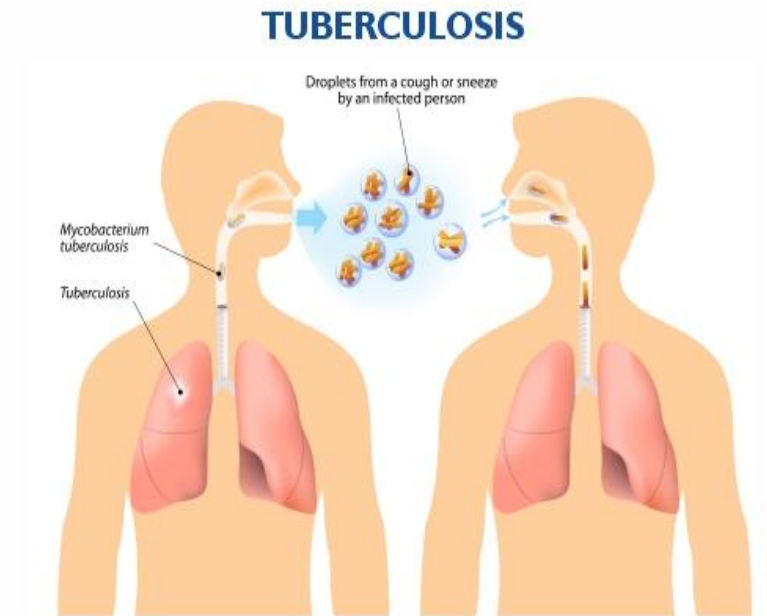


# Outline

- Introduction
- Symptoms and diagnosis
- Epidemiology
- Case definition
- Management and treatment
- Multidrug-resistant tuberculosis (TB)
- Global impact of tuberculosis
- TB and HIV
- Prevention

# Introduction

- Tuberculosis (TB) is caused by bacteria (**Mycobacterium tuberculosis complex (MTBC)**) that most often affect the lungs. It is **curable and preventable**.
- Worldwide, TB is the **13th leading cause of death** and the second leading infectious killer after COVID-19 (above HIV/AIDS).
- TB is spread from person to person **through the air**. When people with lung TB cough, sneeze or spit, they propel the TB germs into the air. A person needs **to inhale only a few** of these germs to become infected.
- TB is present in all countries and age groups.



# Who is at most risk?

People infected with HIV (18 times more likely to develop active TB)

Malnutrition (3 times more at risk)

Prison inmates

Migrants

Alcohol use disorder and tobacco smoking (3.3 and 1.6 times)

Persons suffering from other conditions that impair immune system

# Symptoms and diagnosis

- **Chest radiography (X-Ray), computed tomography (CT)**
- **Tuberculin skin test**
- **Interferon- $\gamma$  release assay (IGRA)** for the individuals 3 years and older
- **rapid molecular diagnostic tests** (Xpert MTB/RIF Ultra and Truenat assays)  
- the initial diagnostic test in all persons with signs and symptoms of TB as they have high diagnostic accuracy and will lead to major improvements in the early detection of TB and drug-resistant TB
- **Sputum-smear microscopy**

## TUBERCULOSIS

signs and symptoms



BLOOD COUGH



FEVER



CHEST PAIN



CHILLS



LONG-TERM COUGH



WEIGHT LOSS



FATIGUE



NIGHT SWEATS

# Epidemiology

- **Human** is the main reservoir of M.tuberculosis.
- Cases of TB can occur sporadically in monkey population and some other mammals.
- **Aerogenic** transmission and rarely by contaminated milk from the cow with TB of the udder.
- The level of contagiousness of TB patients depends on:
  1. The **concentration** of bacteria in sputum
  2. **Severity of cough**
  3. **A coughing hygiene** practiced by a person.

The closer and/or more frequent the contact, the higher the chance of transmission. Living conditions have an important role as well (size of the room, ventilation, etc.)

**The incubation period** varies between **8 weeks to a lifetime**.

**Primary infection** remains undiagnosed in the majority of cases, as symptoms are mild, non-specific and usually self-resolving.

# Case definition

## Clinical criteria

- Any person with the following **two**:
  - ✓ Signs, symptoms and/or radiological findings consistent with active TB in any site **AND**
  - ✓ A clinician's decision to treat the person with a full course of anti-TB therapy **OR**
  - ✓ A case discovered post-mortem with pathological findings consistent with active TB that would have indicated anti-TB treatment had the patient been diagnosed before dying

## Laboratory criteria

### *For case confirmation*

At least **one** of the following two:

- ✓ Isolation of *Mycobacterium tuberculosis* complex (excluding *Mycobacterium bovis*-BCG) from a clinical specimen
- ✓ Detection of *Mycobacterium tuberculosis* complex nucleic acid in a clinical specimen **AND** positive microscopy for acid-fast bacilli or equivalent fluorescent staining bacilli on light microscopy

# Case definition

## – Laboratory criteria for a probable case

- ✓ At least one of the following three:
- ✓ Microscopy for acid-fast bacilli or equivalent fluorescent staining bacilli on light microscopy
- ✓ Detection of *Mycobacterium tuberculosis* complex nucleic acid in a clinical specimen
- ✓ Histological appearance of granulomata

## Epidemiological criteria

### Possible case

Any person meeting clinical criteria

### Probable case

Any person meeting the clinical criteria and the laboratory criteria for a probable case

### Confirmed case

Any person meeting the clinical and the laboratory criteria for the case confirmation



# Management and treatment

- **Contact investigation** (identify secondary cases of TB and/or newly infected persons and reduce further transmission).
- Active, drug-susceptible TB disease is treated with a standard **6-month course of 4 antimicrobial drugs**.
- Since 2000, an estimated **66 million lives** were saved through TB diagnosis and treatment.
- **TB preventive treatment** can be given to stop the onset of disease.

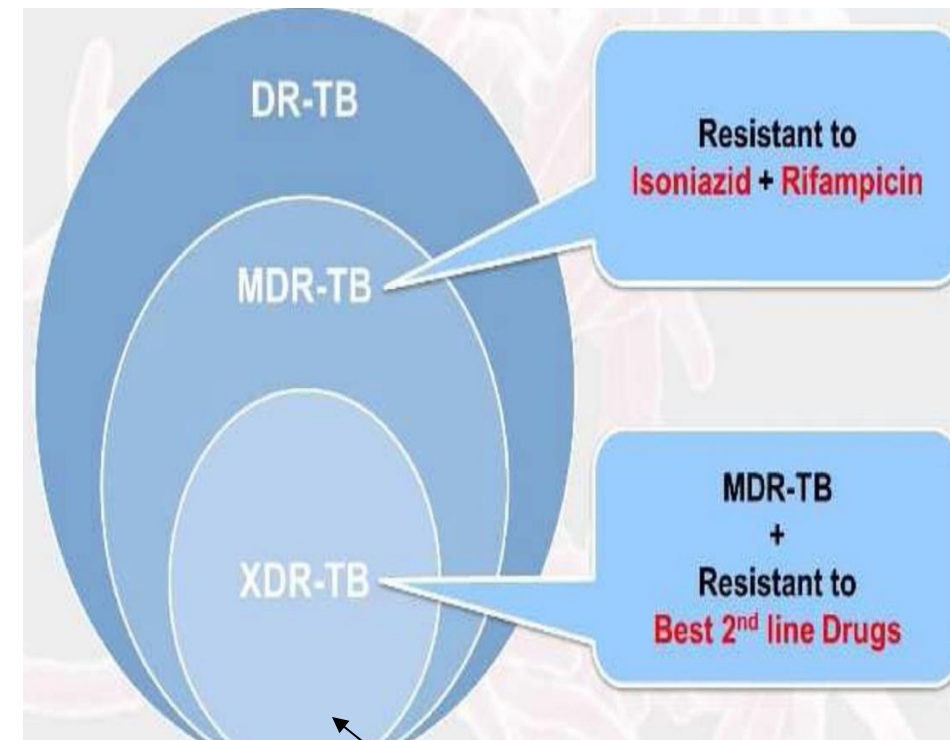
# Multidrug-resistant TB

- Multidrug-resistant tuberculosis (MDR-TB) is a form of TB caused by bacteria that do not respond to **isoniazid and rifampicin**, the 2 most effective first-line anti-TB drugs.
- MDR-TB is treatable and curable by using **second-line drugs**.
- TB caused by bacteria that do not respond to the most effective second-line anti-TB drugs can leave patients without any further treatment options.
- Worldwide in 2018, the treatment success rate of MDR/RR TB patients was **59%**.



# Multidrug-resistant TB – WHO guidelines

- Detection of MDR/RR-TB requires **bacteriological confirmation** of TB and testing for drug resistance using **rapid molecular tests, culture methods** or sequencing technologies.
- Treatment requires a course of second-line drugs for at least 9 months and up to 20 months, supported by counselling and monitoring for adverse events. WHO recommends expanded access to all-oral regimens.



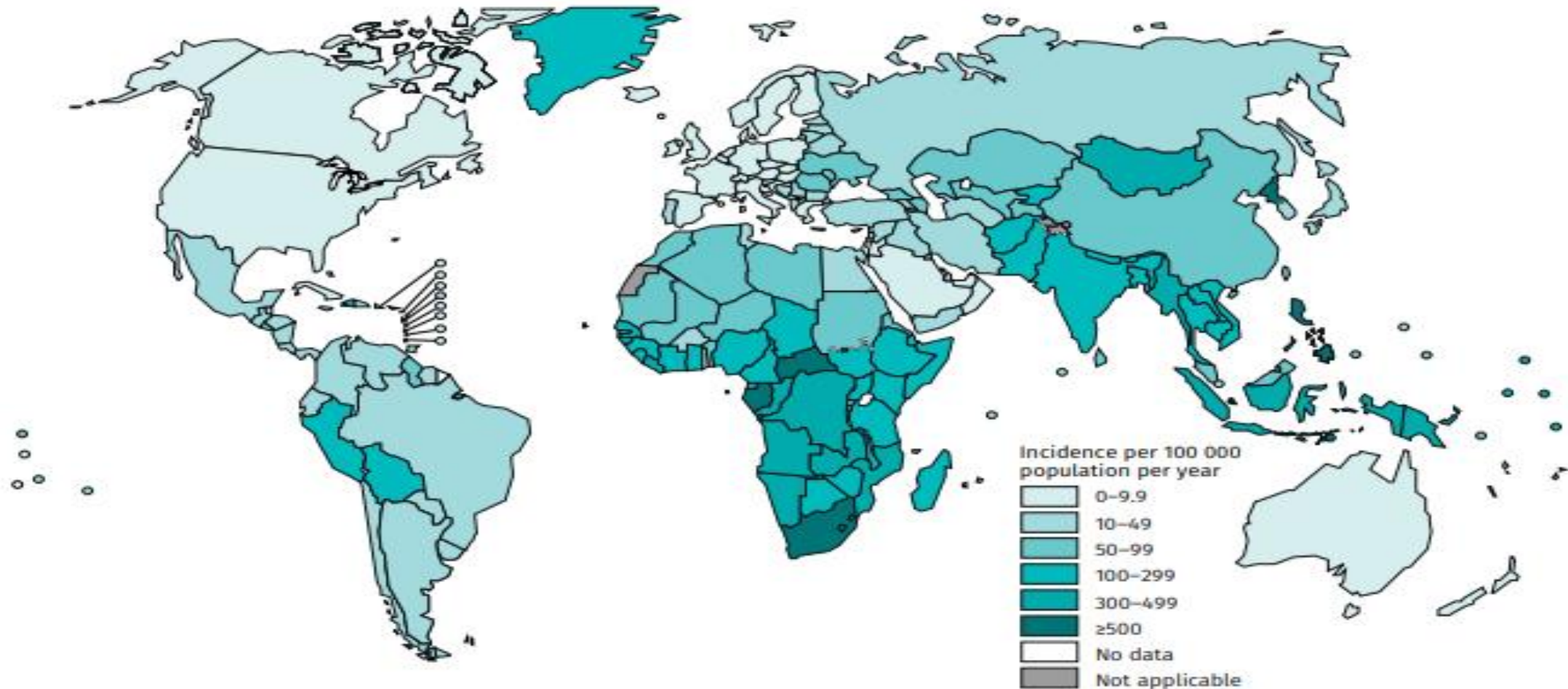
**Extensively drug resistant TB**

# Global impact of TB

- TB occurs in every part of the world.
- In 2020, the largest number of new TB cases occurred in the WHO South-East Asian Region, with 43% of new cases, followed by the WHO African Region, with 25% of new cases and the WHO Western Pacific with 18%.
- In 2020, 86% of new TB cases occurred in the 30 high TB burden countries. **Eight countries accounted for two thirds of the new TB cases: India, China, Indonesia, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa.**
- TB country, regional and global profiles
- WHO publishes [a Global Tuberculosis report](#) every year.

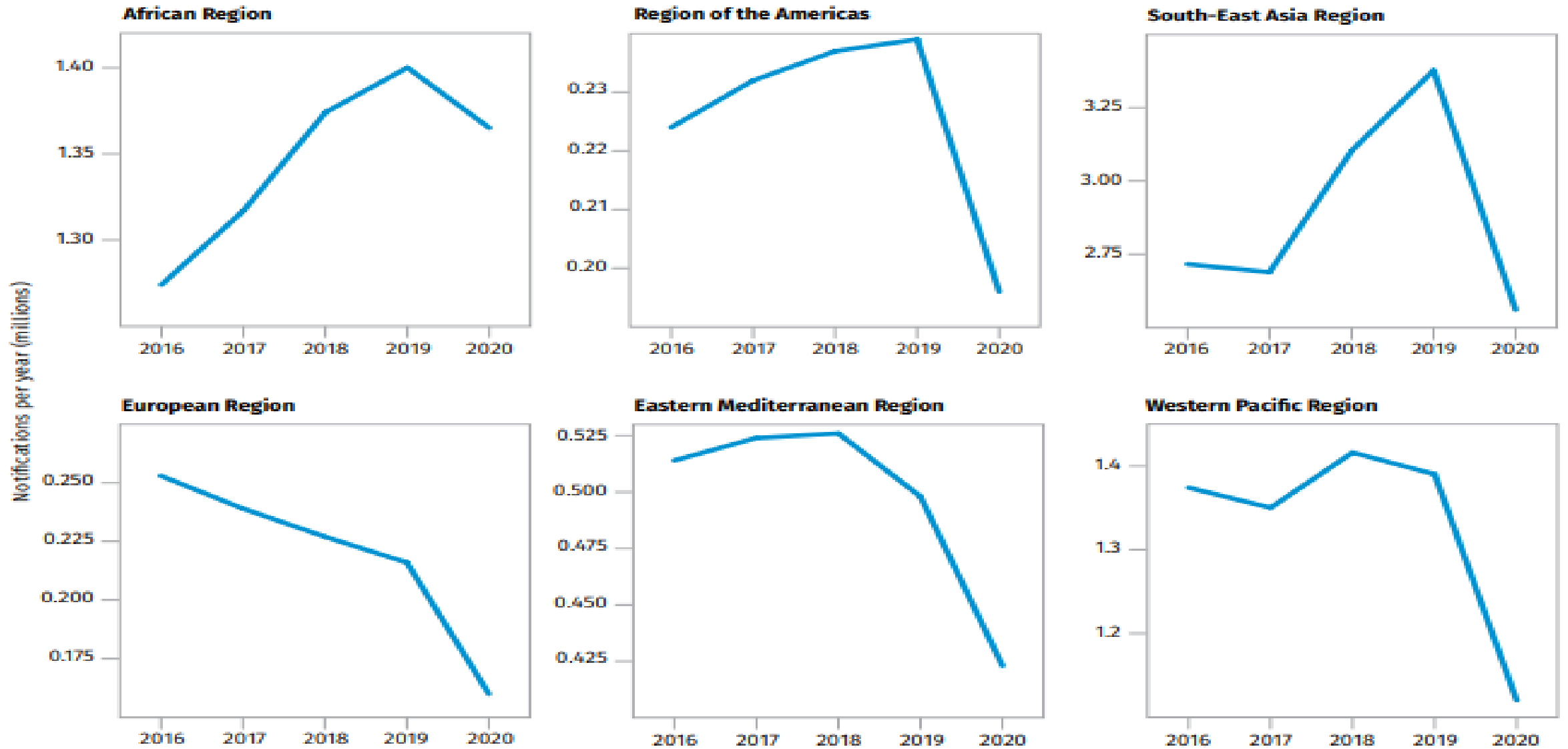
# Estimated tuberculosis (TB) incidence rates, 2020

Estimated TB incidence rates, 2020



Source: World health organization. Global Tuberculosis Report, 2021.

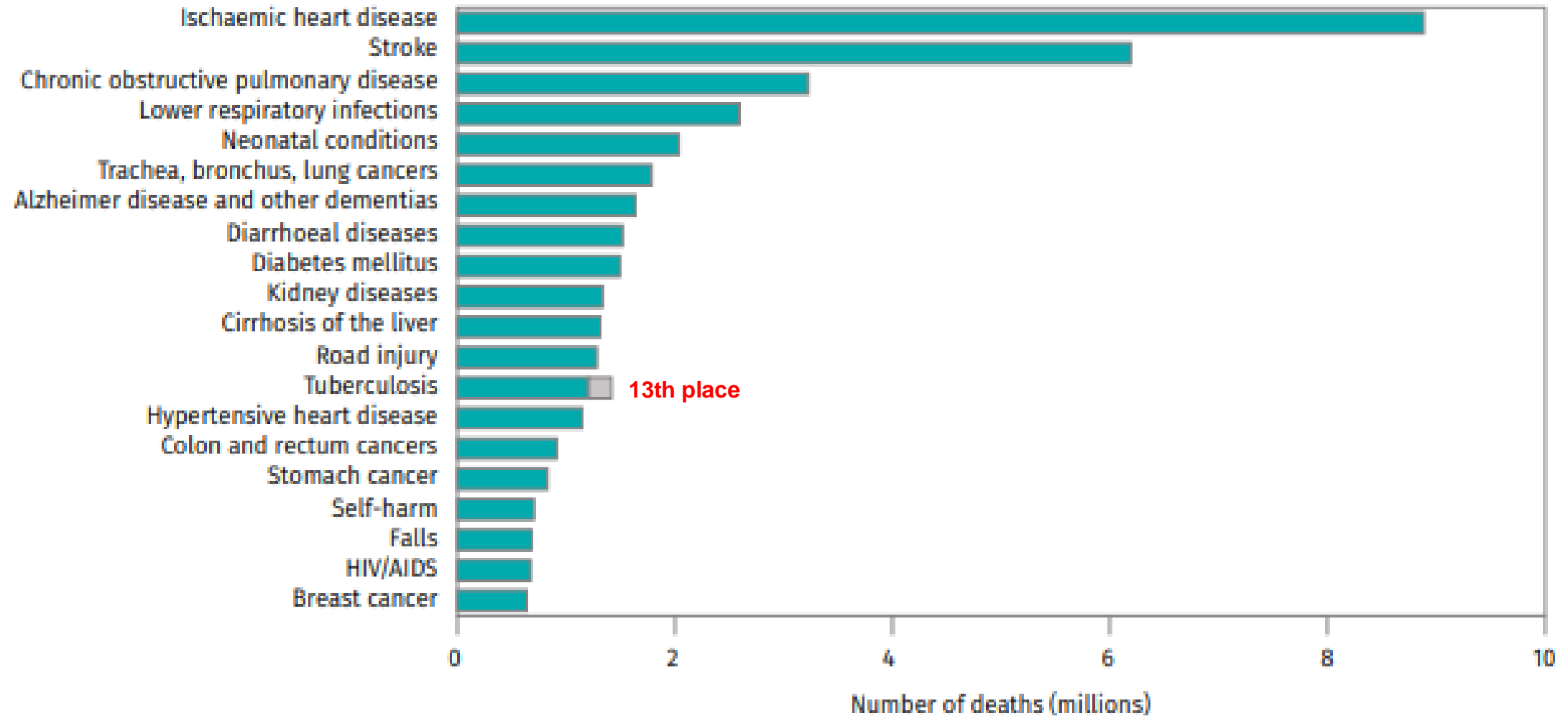
# Trends in case notifications of people newly diagnosed with TB by WHO region, 2016–2020



Source: World health organization. Global Tuberculosis Report, 2021.

# Top causes of death worldwide in 2019<sup>a,b</sup>

Deaths from TB among HIV-positive people are shown in grey.



Source: World health organization. Global Tuberculosis Report, 2021.

# Czech Republic

## Tuberculosis profile: Czechia

Population 2020: 11 million

### Estimates of TB burden\*, 2020

	Number	(Rate per 100 000 population)
Total TB incidence	410 (350-480)	3.9 (3.3-4.5)
HIV-positive TB incidence	3 (2-5)	0.03 (0.02-0.05)
HIV-negative TB mortality	23 (22-23)	0.21 (0.21-0.21)
HIV-positive TB mortality	1 (0-1)	0.01 (0-0.01)

### Universal health coverage and social protection\*

TB treatment coverage (notified/estimated incidence), 2020	87% (75-100)
TB patients facing catastrophic total costs	
TB case fatality ratio (estimated mortality/estimated incidence), 2020	6% (5-7)

Source: World health organization. Global Tuberculosis Report, 2021.



# TB and HIV

HIV and TB form a **lethal combination**, each speeding the other's progress.

In 2020, about **215 000** people died of HIV-associated TB.

The percentage of notified TB patients who had a documented HIV test result in 2020 was only 73%, up from 70% in 2019.

In the WHO **African Region**, where the burden of HIV-associated TB is highest, **85% of TB patients had a documented HIV test result.**

Overall, in 2020, **88%** of TB patients known to be living with HIV were on **ART.**

# TB and HIV (global overview)

Source: World health organization. Global Tuberculosis Report, 2021.

## Tuberculosis profile: Global

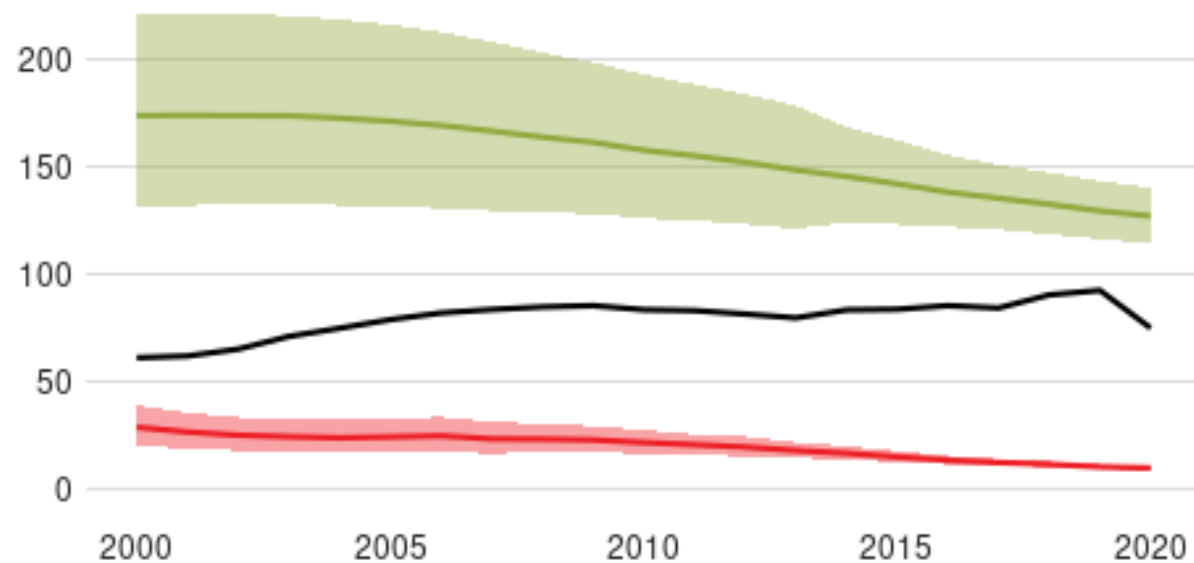
Population 2020: 7 768 million

### Estimates of TB burden\*, 2020

	Number	(Rate per 100 000 population)
Total TB incidence	9 870 000 (8 880 000-10 900 000)	127 (114-140)
HIV-positive TB incidence	787 000 (701 000-879 000)	10 (9-11)
HIV-negative TB mortality	1 280 000 (1 210 000-1 360 000)	17 (16-18)
HIV-positive TB mortality	214 000 (187 000-242 000)	2.7 (2.4-3.1)

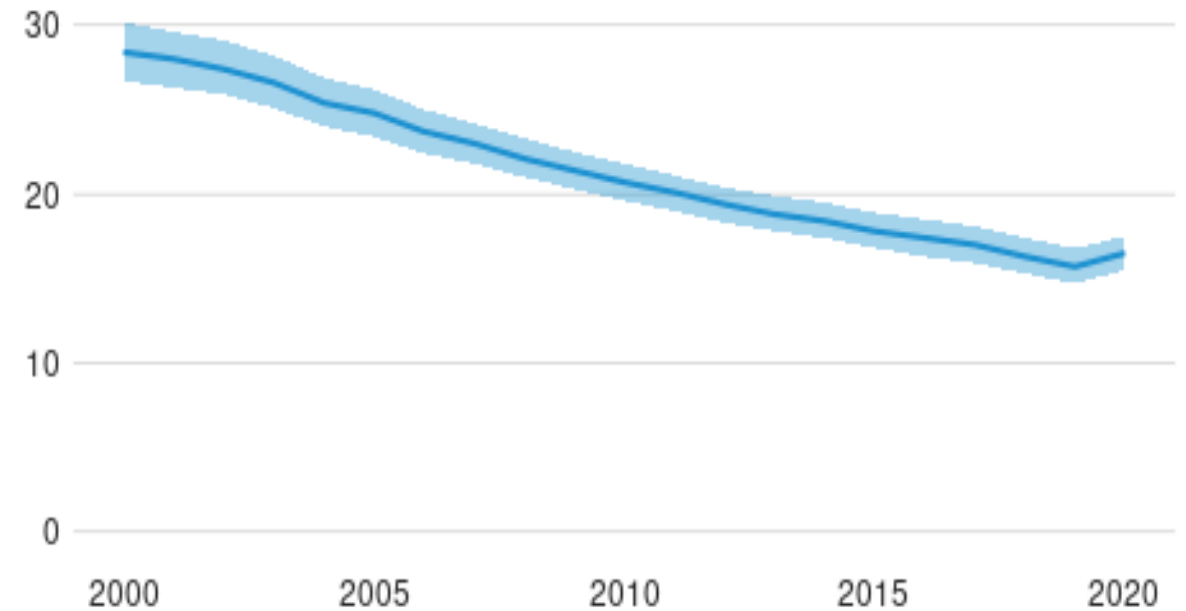
## Incidence, New and relapse TB cases notified, HIV-positive TB incidence

(Rate per 100 000 population per year)



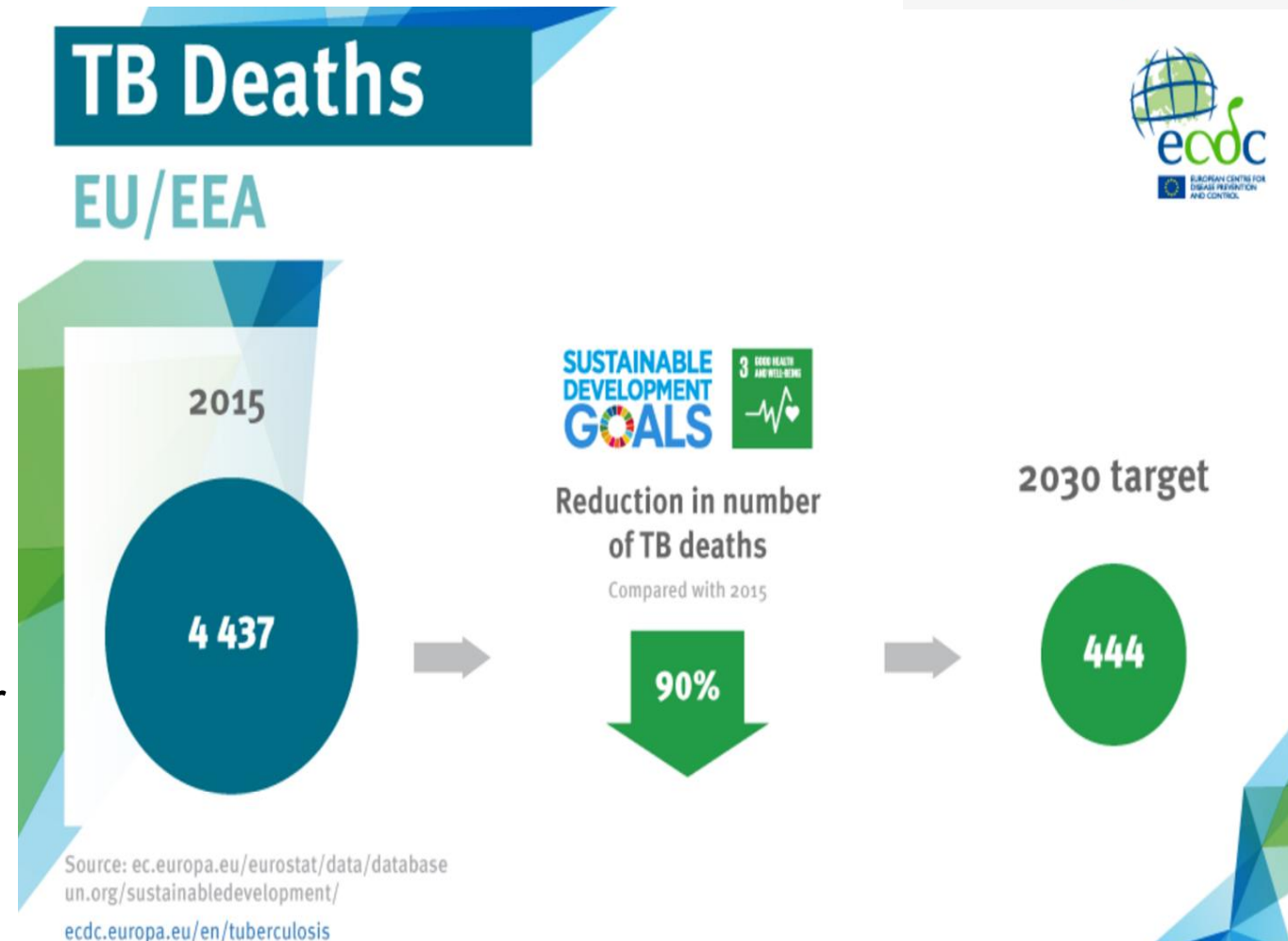
## HIV-negative TB mortality

(Rate per 100 000 population per year)



# Global commitments

- SDG Target 3.3 includes ending the TB epidemic by 2030.
- The targets for 2030 are a **90% reduction** in the number of **TB deaths** and an **80% reduction in the TB incidence rate** (new cases per 100 000 population per year) compared with levels in 2015.
- Globally, TB incidence is falling at about 2% per year and between 2015 and 2020 the cumulative reduction was 11%. This was over half way to the End TB Strategy milestone of 20% reduction between 2015 and 2020.



3 GOOD HEALTH AND WELL-BEING



# WHO Global Tuberculosis Programme

- The WHO Global Tuberculosis Programme works towards the goal of a **world free of TB**, with **zero deaths**, disease and suffering due to the disease. The team’s mission is to lead and guide the global effort to end the TB epidemic through universal access to people-centred prevention and care, multisectoral action and innovation.
- There are 3 pillars: integrated, patient-centered TB care and prevention, bold policies and supportive systems, intensified research and innovation.

	TARGETS			
	MILESTONES		SDG*	END TB
	2020	2025	2030	2035
<i>Reduction in number of TB deaths</i> compared with 2015 (%)	35%	75%	90%	95%
<i>Reduction in TB incidence rate</i> compared with 2015 (%)	20%	50%	80%	90%
<i>TB-affected families facing catastrophic costs due to TB (%)</i>	0%	0%	0%	0%

# Bacille Calmette-Guérin (BCG) vaccination and COVID-19

- BCG is a **live**, weakened strain of M.Bovis.
- There is **no evidence** that the Bacille Calmette-Guérin vaccine (BCG) protects people against infection with COVID-19 virus. WHO **does not recommend** BCG vaccination for the prevention of COVID-19.
- BCG vaccination prevents severe forms of tuberculosis in children and diversion of local supplies may result in neonates not being vaccinated, resulting in an increase of disease and deaths from tuberculosis.
- **Neonatal BCG vaccination** in countries or settings with a high incidence of tuberculosis is **recommended**.
- BCG vaccination is **not recommended** to immunosuppressed patients (HIV, chemotherapy) and during pregnancy.
- **High efficacy of 70%–80%** against childhood tuberculosis, namely meningitis and miliary tuberculosis.



**Thank you for your attention!**

