Epidemiologia della TB nell'uomo

Marina Tadolini

UO Malattie Infettive

IRCCS Azienda Ospedaliero-Universitaria di Bologna

Dipartimento di Scienze Mediche e Chirurgiche

Alma Mater Studiorum Università di Bologna

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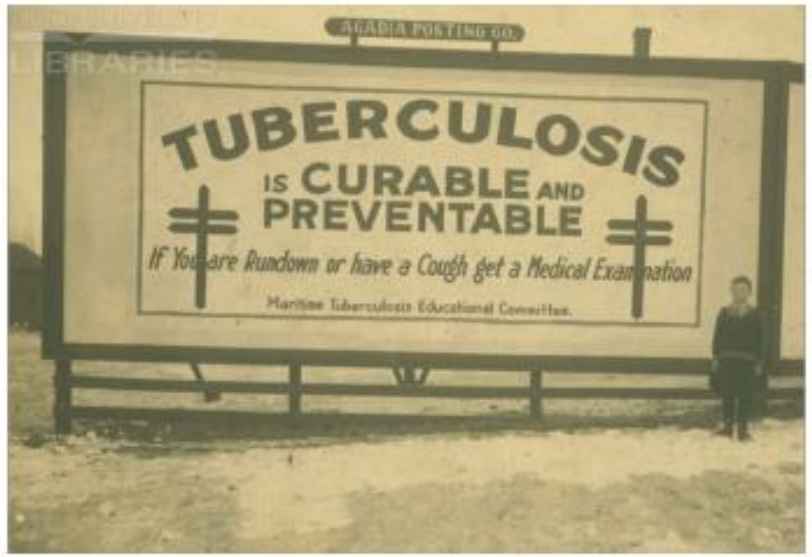
La tubercolosi sembra destinata a sparire…



Vengono smantellate in tutto il mondo le reti sanatoriali, in Italia a partire dalla fine degli anni 70.

World Health Organization

Nel 1993 l'OMS dichiarò la tubercolosi un'emergenza di salute pubblica globale

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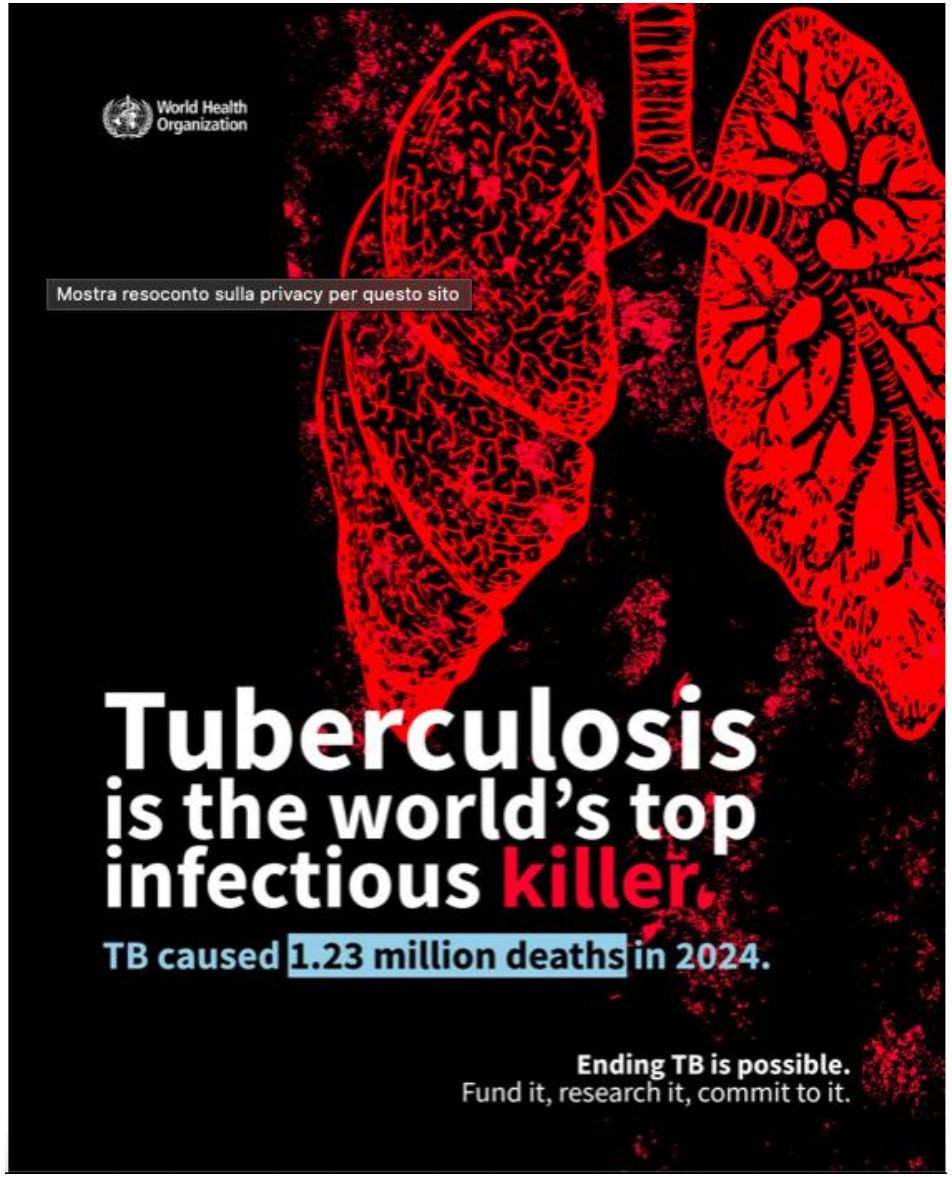
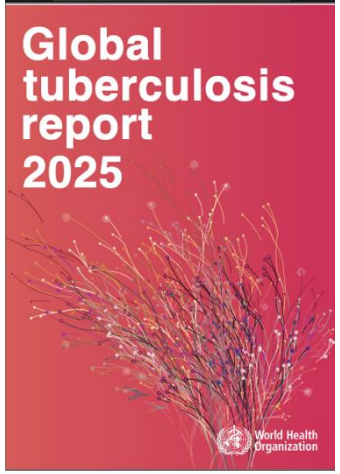


#1 CAUSE OF DEATH FROM A SINGLE INFECTIOUS AGENT

TB is one of the top 10 causes of death worldwide.

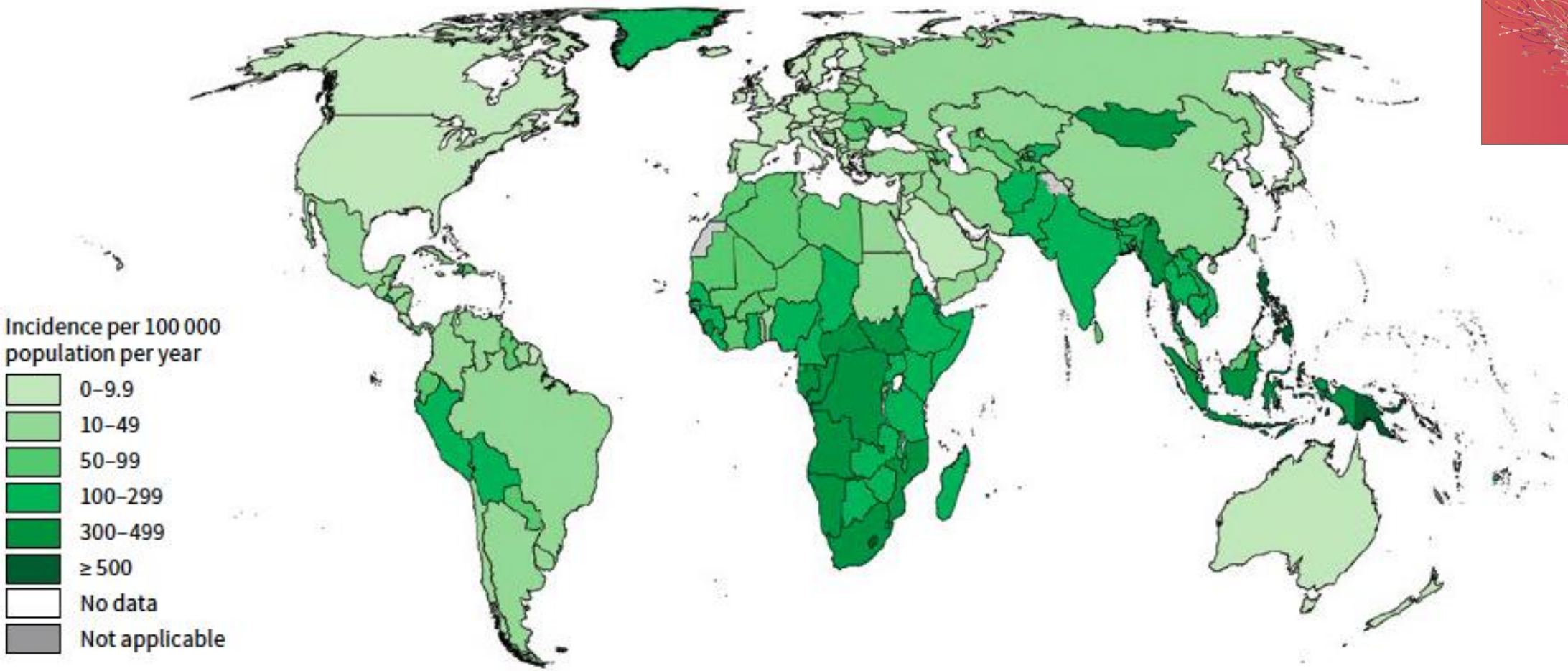


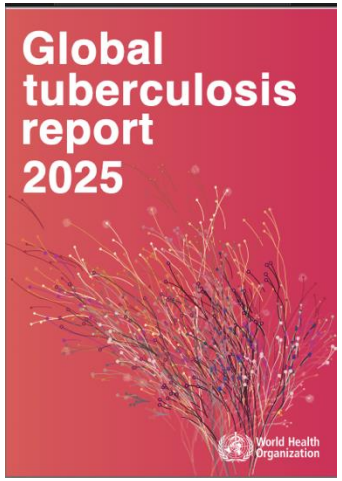
The Global Burden of TB, latest estimates 2024

	Estimated number of incident cases	Estimated number of deaths
All forms of TB	10.7 million [95%UI 9.9-11.5 million] Rate 131/100,000	1.23 million* [95% UI 1.13-1.33 million]
HIV-associated TB	0.63 million (5.8%) [95% UI 600,000-660,000]	150,000 [95% UI 120,000-183,000]
MDR/RR-TB	390,000 [95% UI: 360,000-430,000]	
TB infection	~1.7 billion	

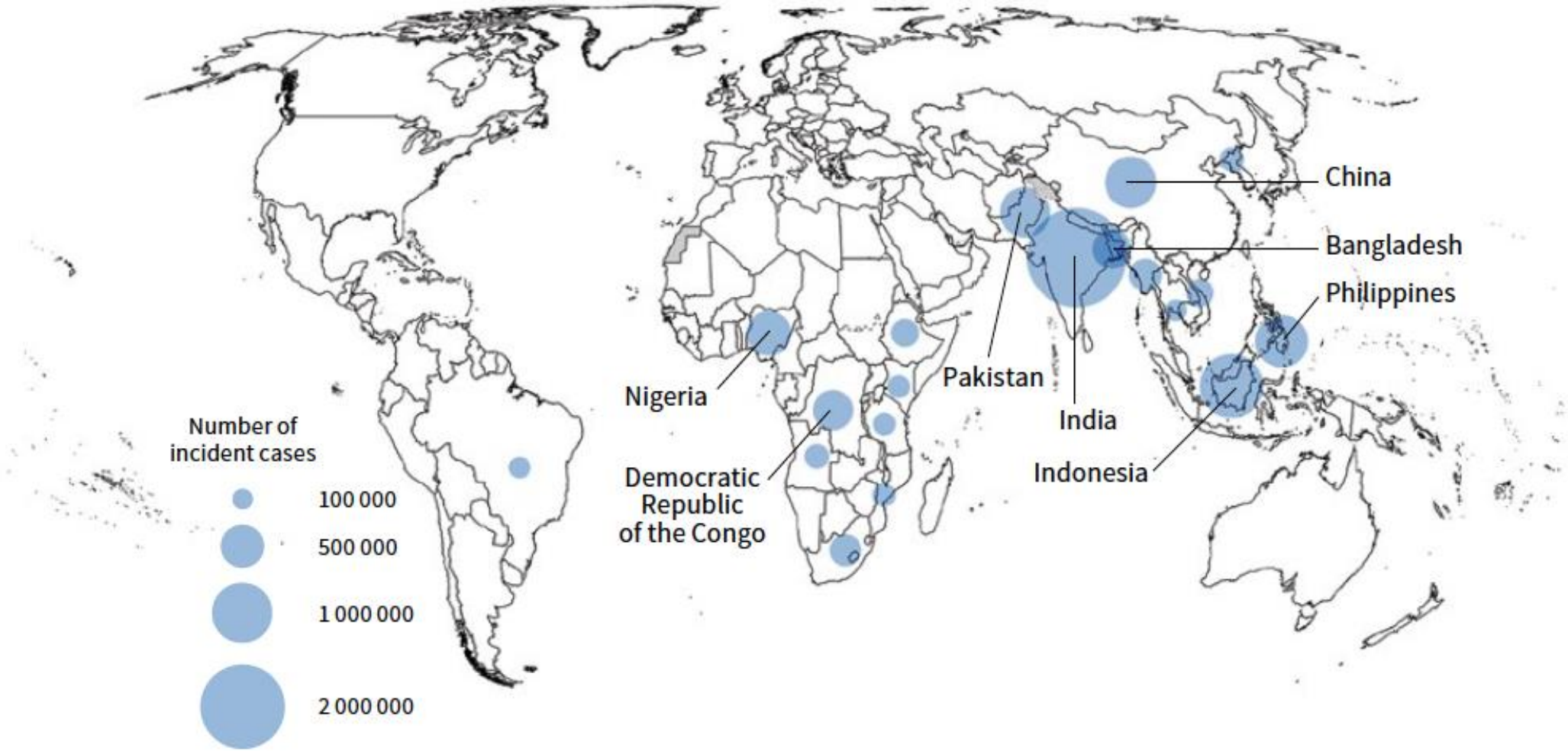
** Including deaths attributed to HIV/TB*

Estimated TB incidence rates at country level, 2024



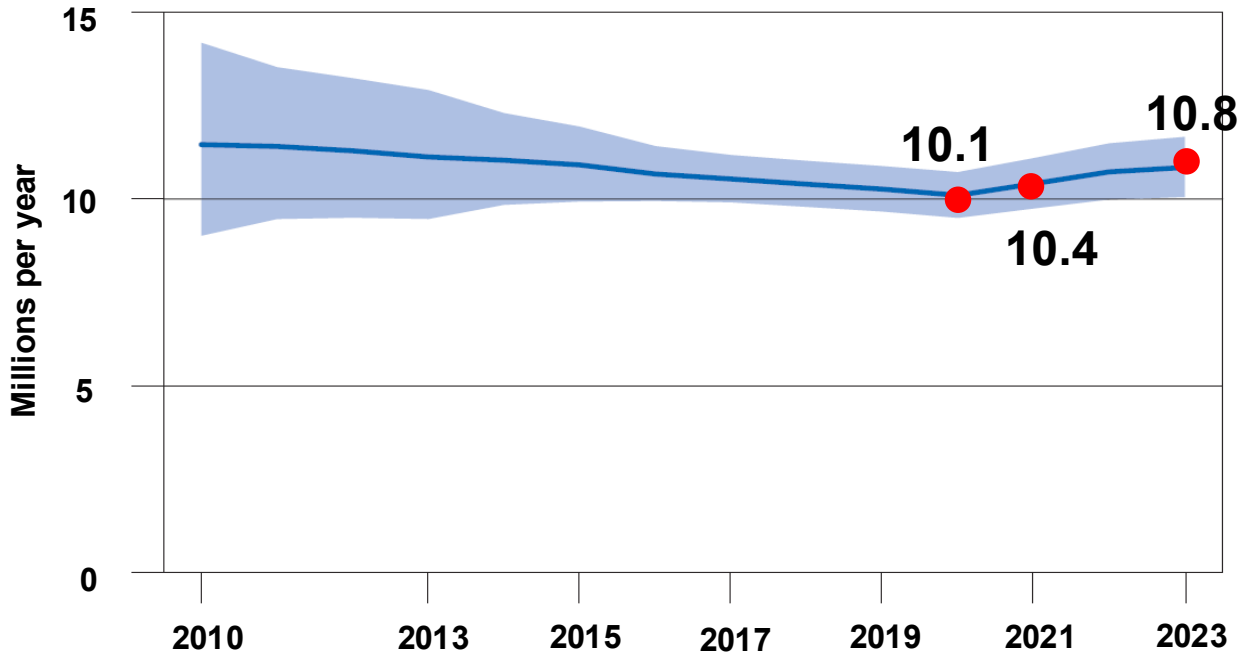


Estimated number of incident TB cases for countries with at least 100 000 incident cases, 2024[a]



Global rise in TB incidence slowing, starting to stabilize

Best estimate of 10.8 million in 2023, small rise from 10.7 million in 2022

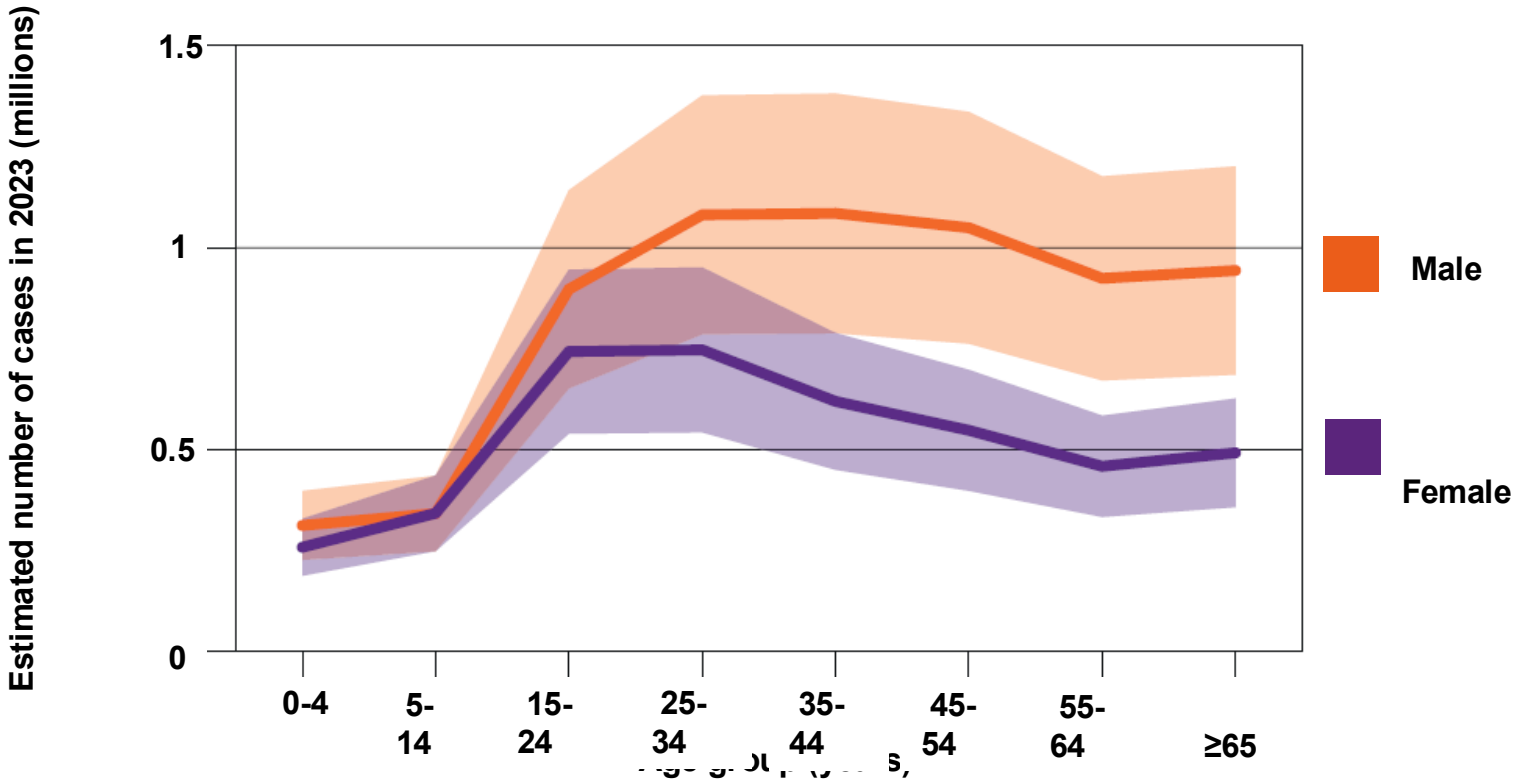


Most of the increase between 2022 and 2023 due to population growth

Shaded area shows 95% uncertainty interval

Most TB cases among adults, more men than women

55% men, 33% women, 12% children and young adolescents (<15 years)



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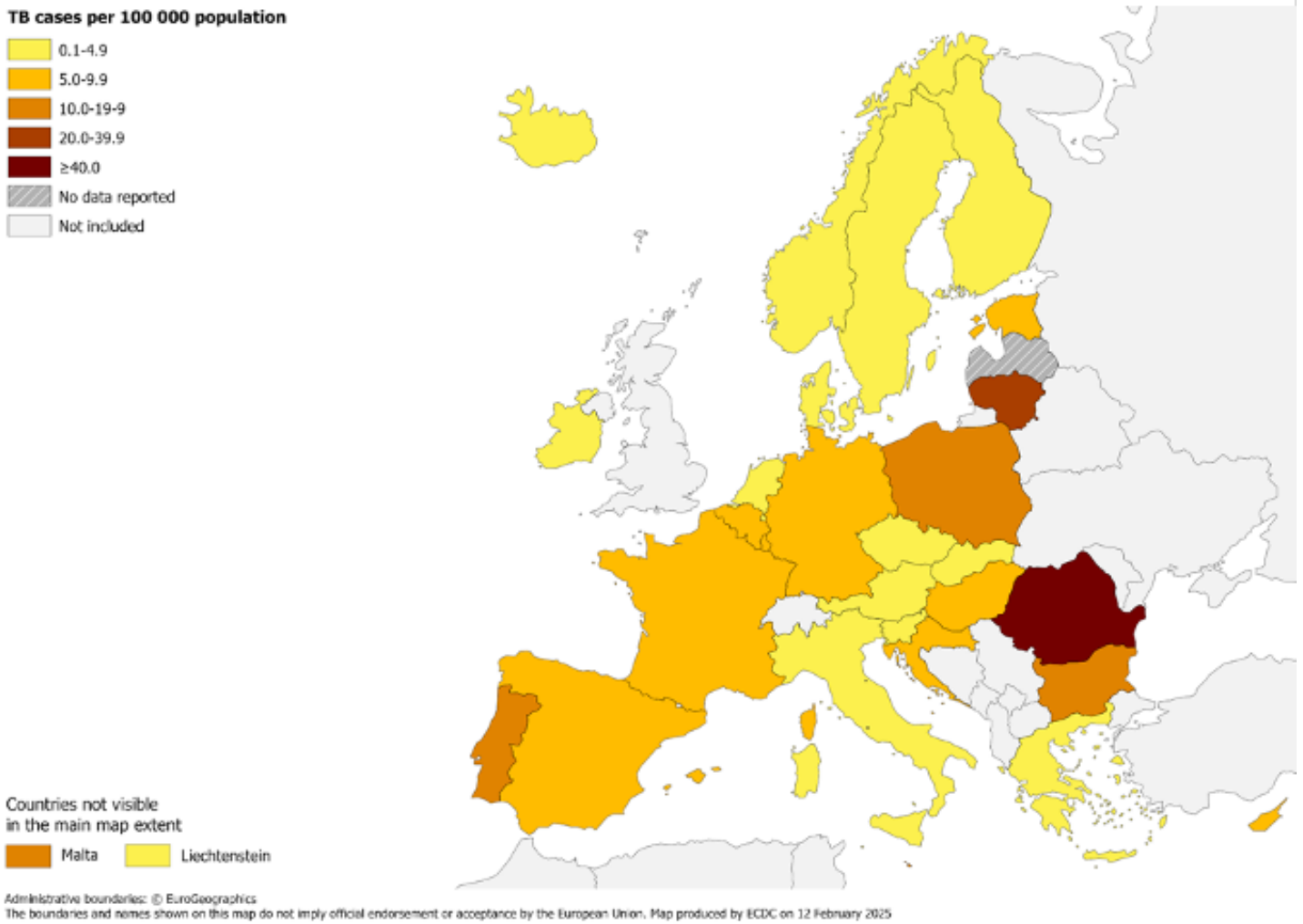
TB notifications, EU/EEA, 2023

38 993 TB cases notified in 29 EU/EEA countries

Notification rate **8.6** per 100 000 population (range 2.5 – 49.9)

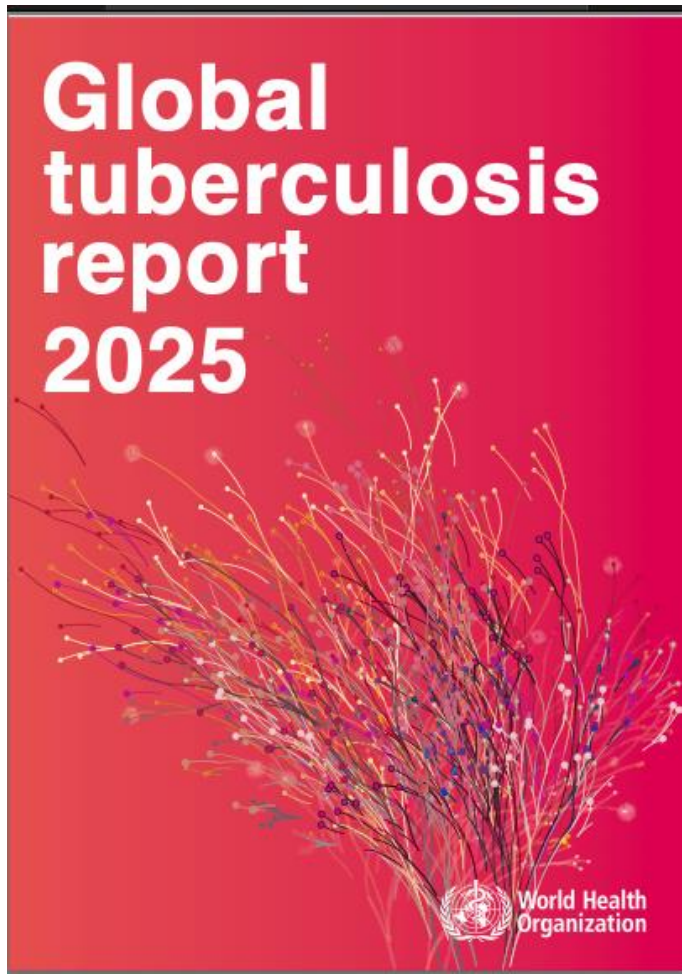


Source: ECDC/WHO (2025). Tuberculosis surveillance and monitoring in Europe 2025–2023 data

Tuberculosis surveillance and monitoring in Europe

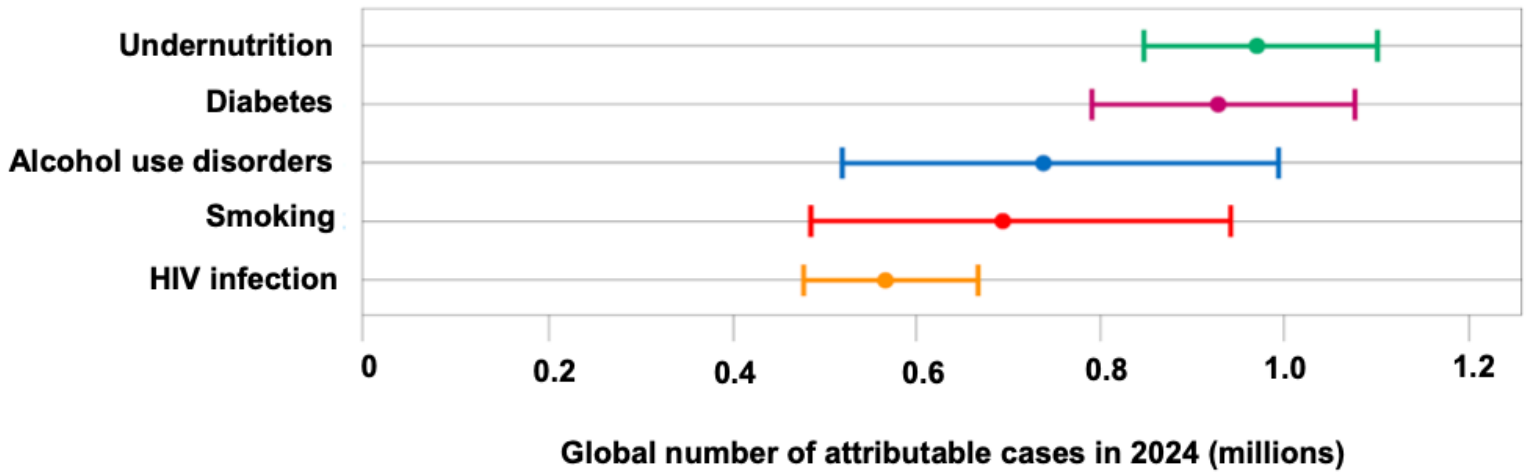
2025

2023 data



A large number of new TB cases are attributable to five risk factors:

undernutrition, diabetes*, alcohol use, smoking, HIV infection



*Estimates higher for diabetes compared with those published in 2024, due to updated estimates of the prevalence of diabetes in the general population

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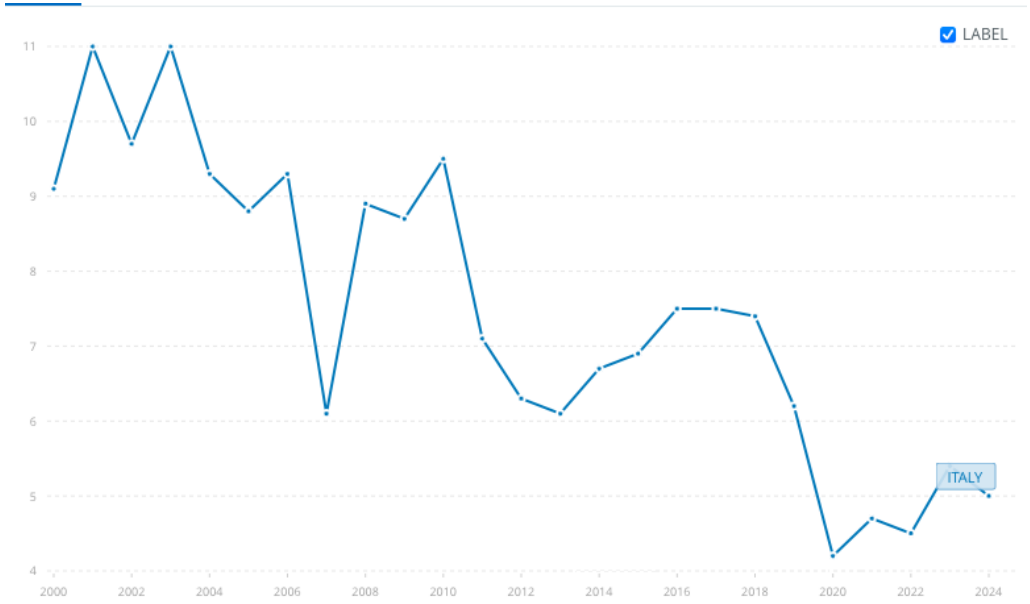
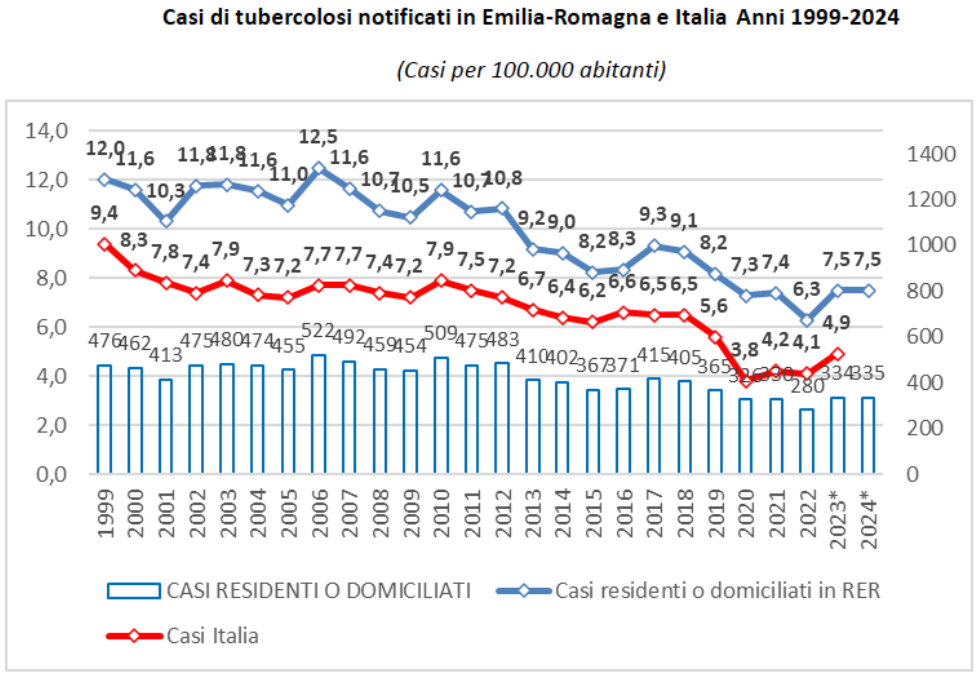
TB IN ITALIA

- Vengono notificati circa 3000 casi/anno
- Incidenza: 5 casi/100.000 abitanti/anno
- Situazione molto differenziata tra le diverse regioni
- La maggior parte dei casi notificati in Lombardia, Piemonte, Emilia Romagna, Lazio





Patogenesi e storia naturale

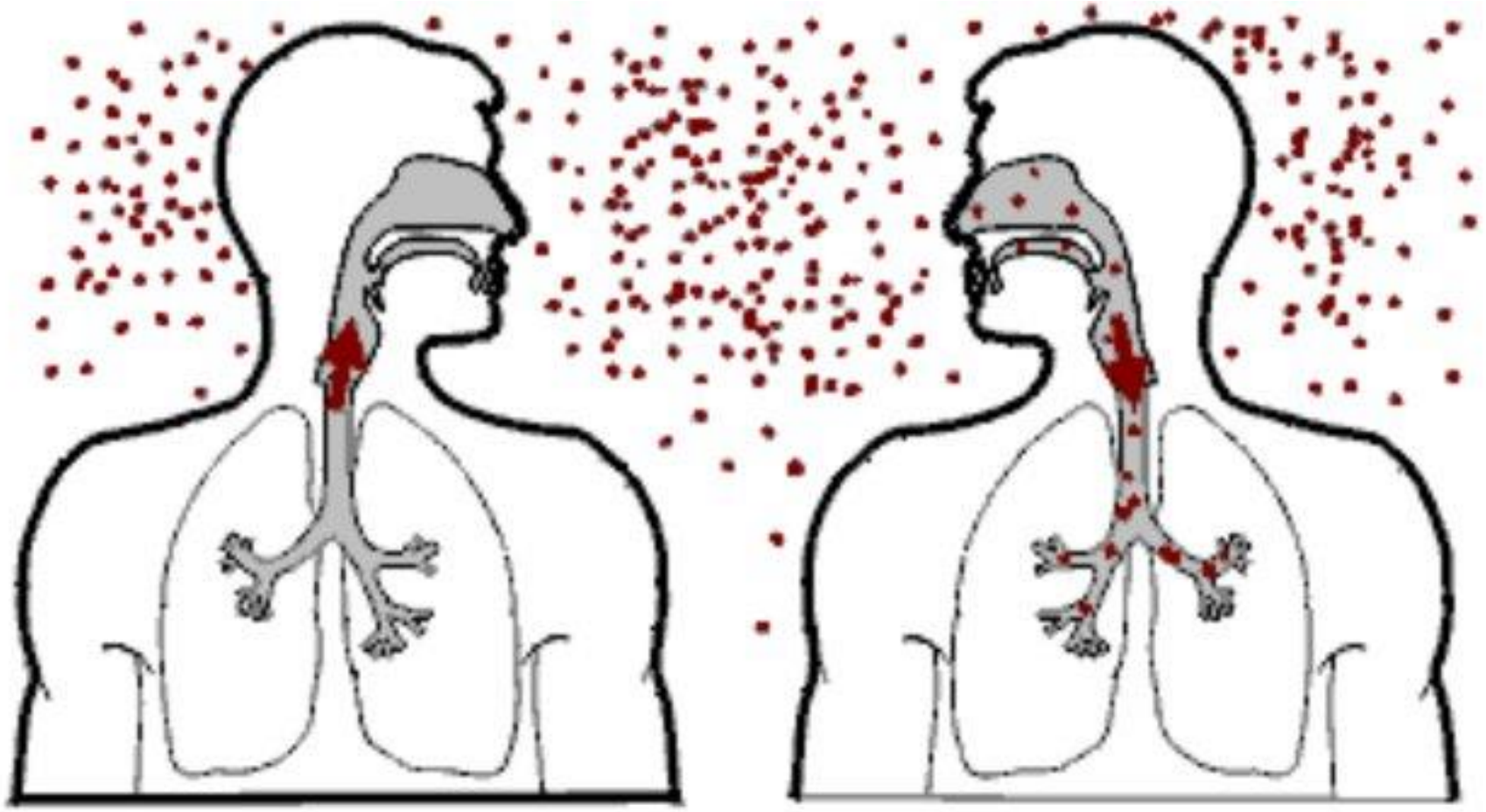
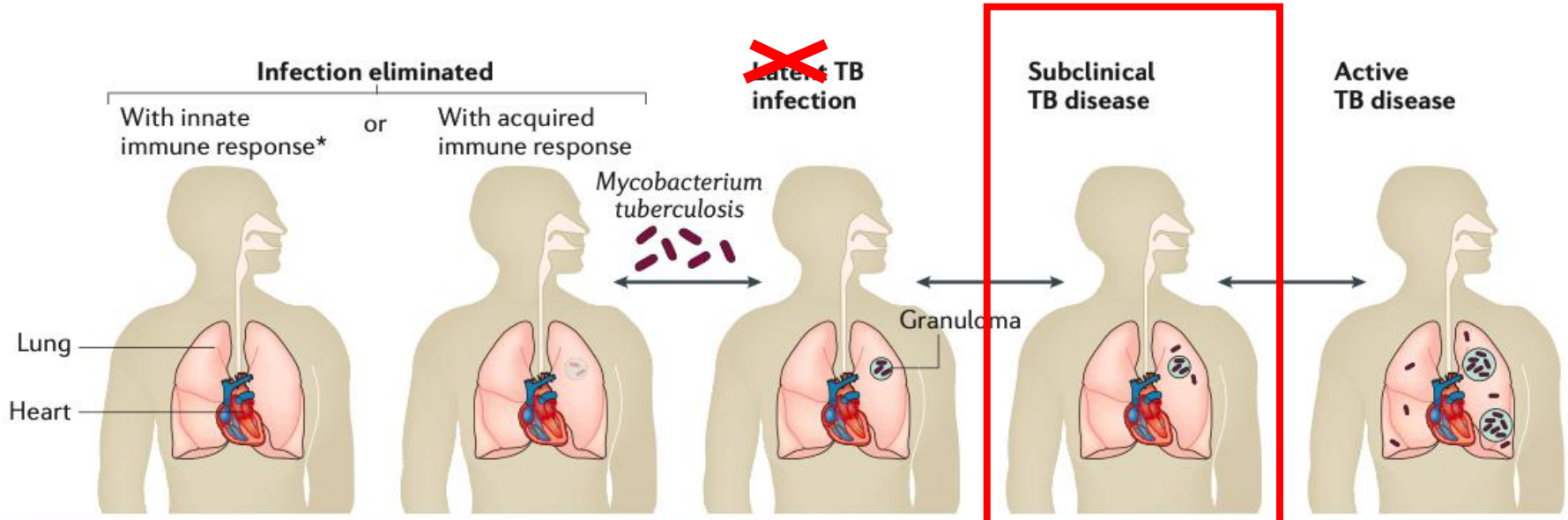


Table 1 | **Routes, sources and modes of *Mycobacterium tuberculosis* complex transmission**

Route of transmission	Mode of transmission and source of infection	Refs
Common routes		
Inhalation (airborne) (>95% cases)	Inhalation of *Mtb*-infected droplets from cough of patients with active pulmonary TB	5,6,53
Oral (ingestion)	Consumption of dairy products infected with *Mycobacterium bovis* from cattle with active bovine TB	27,28,30
Uncommon routes		
Congenital or neonatal	Possible mechanisms: transplacental transmission; via bloodstream or lymphatics from mother with active TB disease; directly from placenta with miliary TB; or aspiration or ingestion of Mtb-infected amniotic fluid during birth	54–59
Parenteral (injection)	Intravesical instillation of live BCG *M. bovis* vaccine strain as adjuvant treatment of carcinoma in situ of the bladder leads to local or invasive disease (bladder, epididymis, penis, prostate and renal TB have been described); BCG vaccination in HIV-infected (immunosuppressed) individuals causes disseminated BCG disease	65,67–72
Sexual	Direct contact with active genital TB lesions or exudates containing *Mtb*; sexual transmission of *Mtb* (*Mtb* has been isolated from semen of men with TB of the prostate)	61,62,81,305

BCG, bacillus Calmette–Guérin; *Mtb*, *Mycobacterium tuberculosis*; TB, tuberculosis.

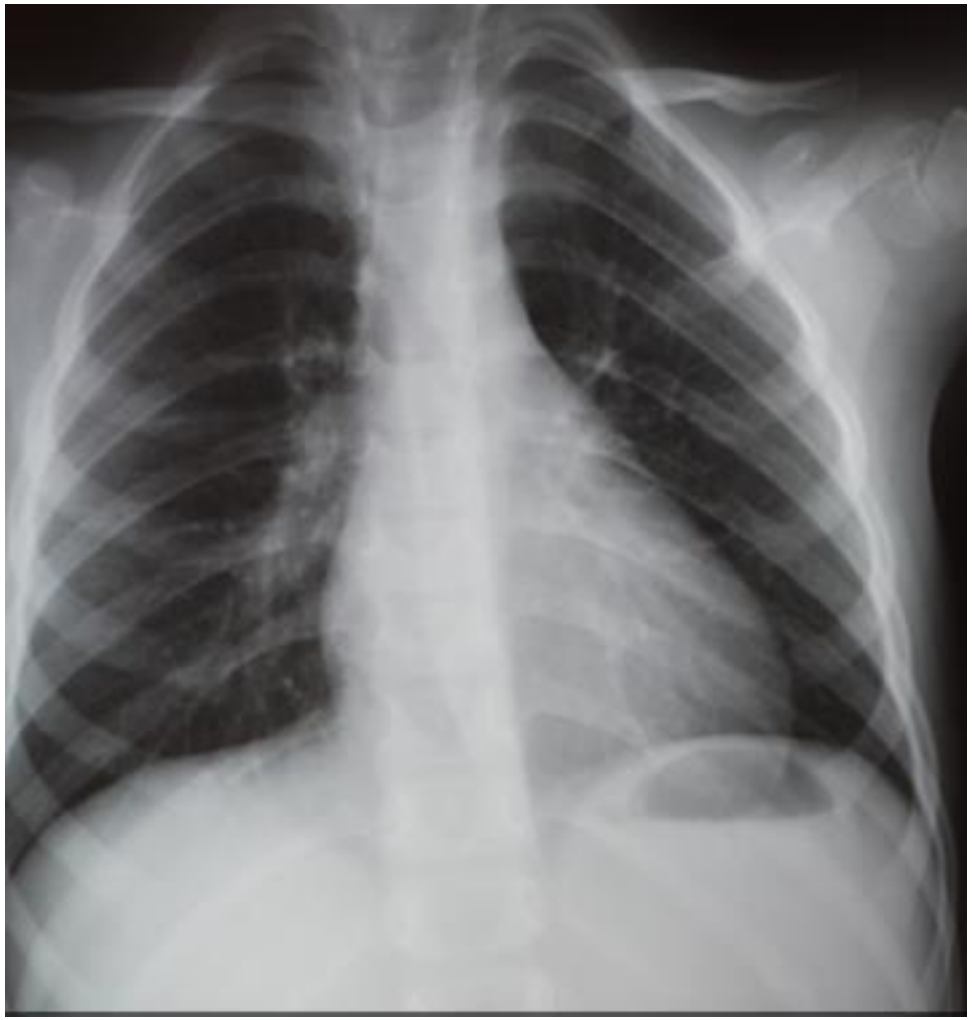
Tuberculosis

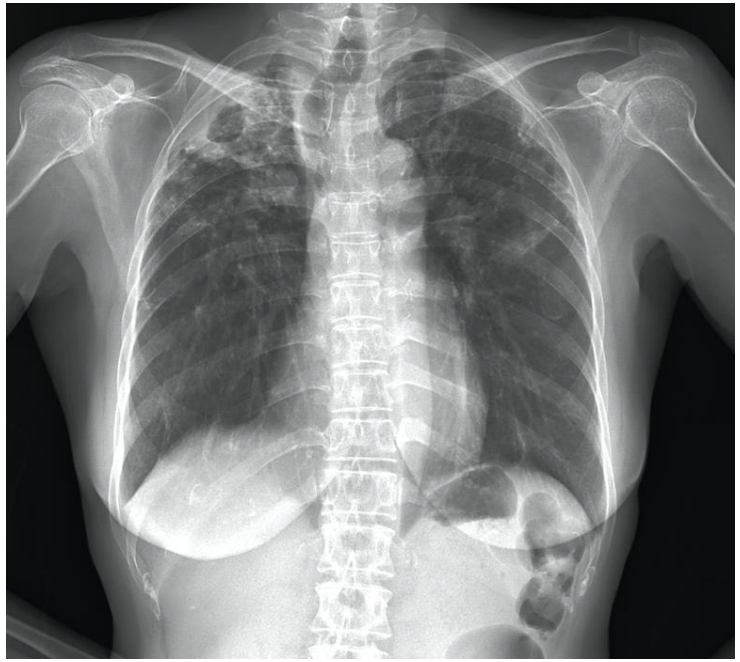


TST	Negative	Positive	Positive	Positive	Usually positive
IGRA	Negative	Positive	Positive	Positive	Usually positive
Culture	Negative	Negative	Negative	Intermittently positive	Positive
Sputum smear	Negative	Negative	Negative	Usually negative	Positive or negative
Infectious	No	No	No	Sporadically	Yes
Symptoms	None	None	None	Mild or none	Mild to severe
Preferred treatment	None	None	Preventive therapy	Multidrug therapy	Multidrug therapy

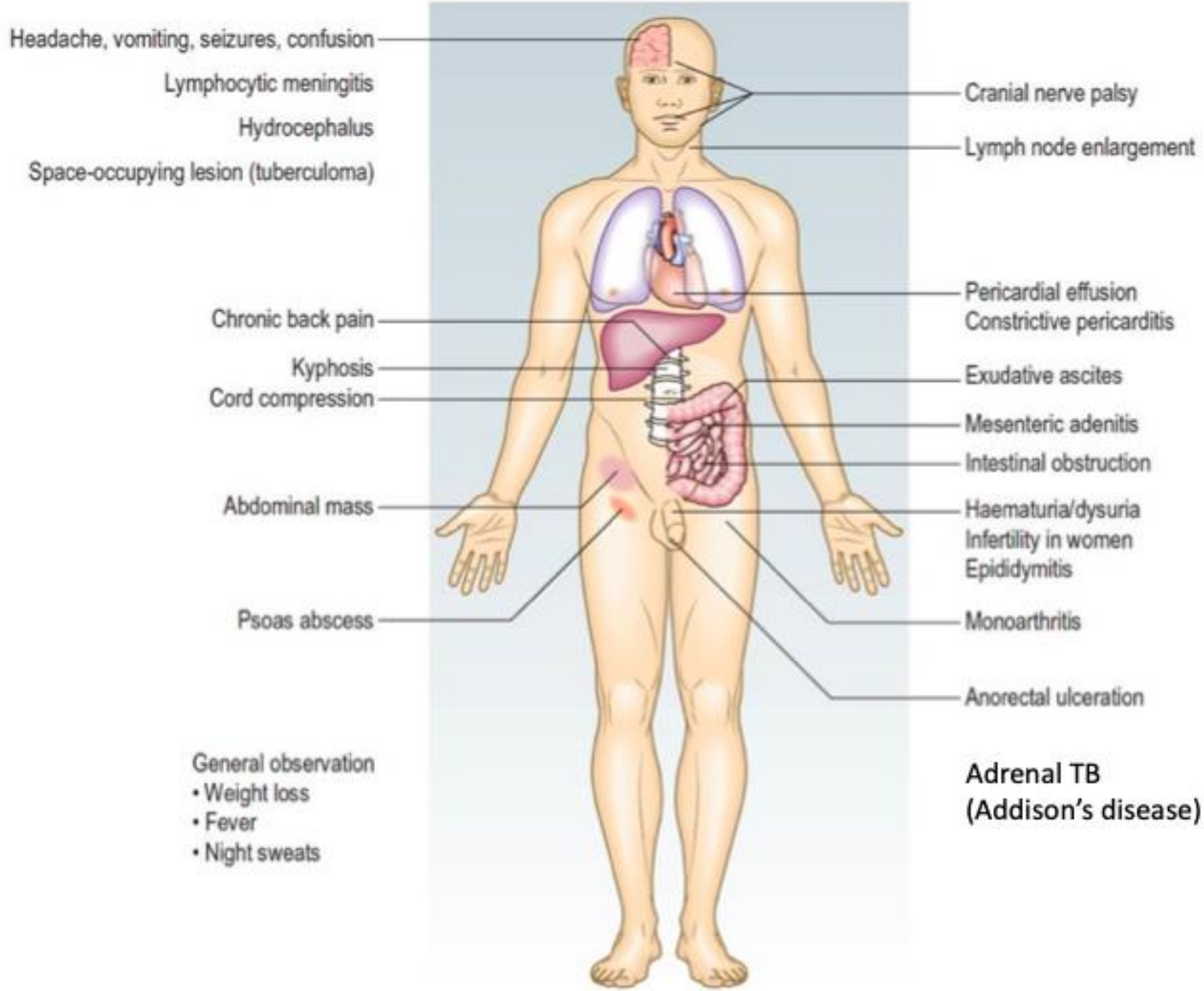
M Pai, MA Behr, D Dowdy, K Dheda, et Al. Nature Reviews 2016

90%

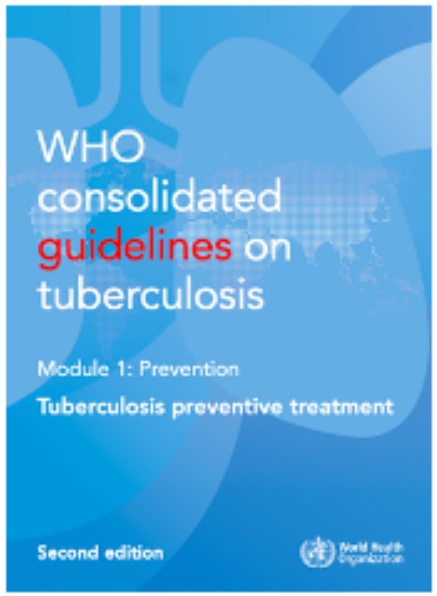




Symptoms of Extrapulmonary TB depend on affected site



Who is at risk of progressing from TB infection to active TB?



Populations that SHOULD BE SYSTEMATICALLY TESTED AND TREATED for TB infection

- People with HIV
- Household contacts of people with TB
- People who are initiating anti-TNF treatment
- People receiving dialysis
- Subjects preparing for an organ or haematological transplant
- Individuals who have silicosis

Systematic testing and treatment for TB infection MAY BE CONSIDERED for:

- Prisoners
- Health workers
- Immigrants from countries with a high TB burden
- Homeless people and people who use drugs.

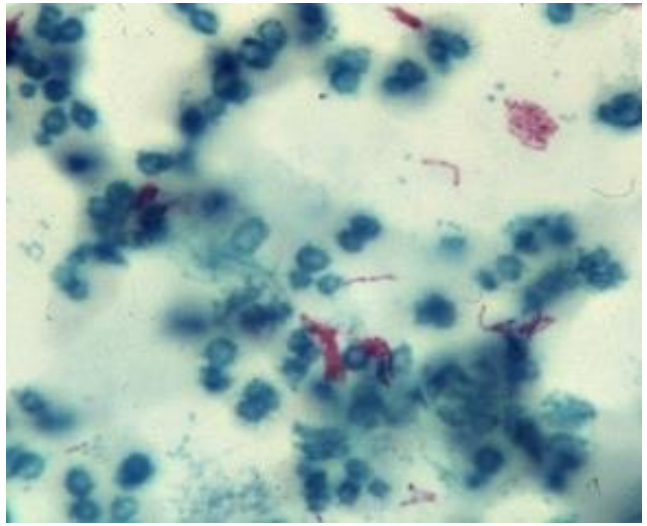
Diagnosi

- Anamnesi e clinica
- Imaging
- **Test microbiologici: conferma diagnostica**
- Istologia
- *Indagini immunologiche (Mantoux e IGRA)*

Conferma microbiologica

Obiettivo principale anche davanti ad un quadro fortemente suggestivo

- Esame microscopico: presenza di BAAR
- Test rapidi molecolari: PCR per BK
- Esame colturale per micobatteri: **gold standard per diagnosi di certezza**



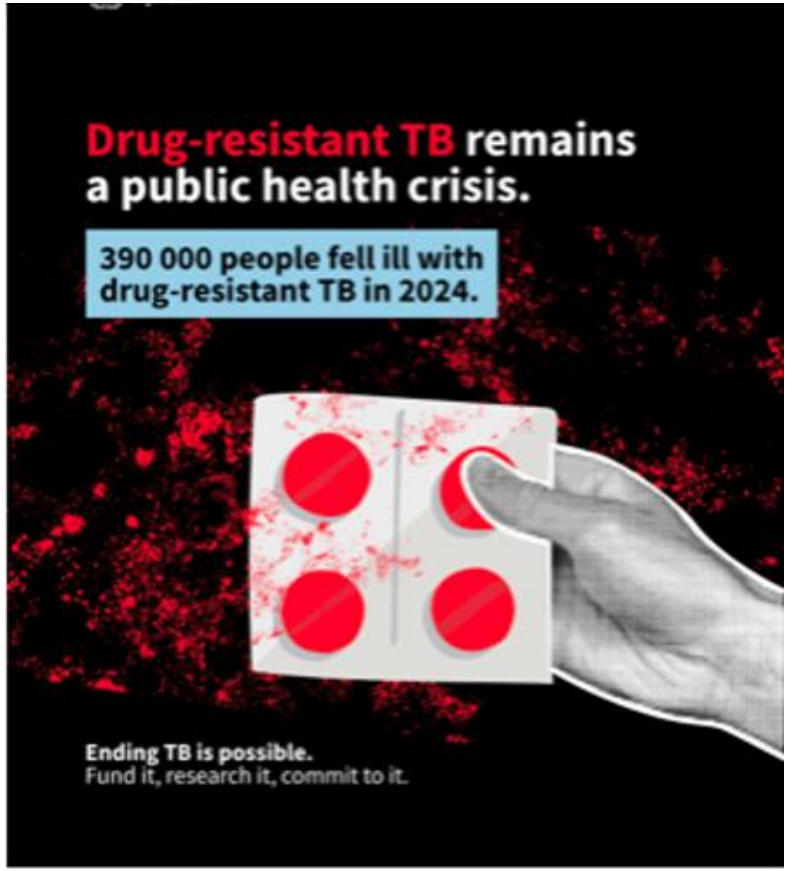
Quali sono i casi contagiosi?

- **FORME POLMONARI BACILLIFERE: presenza di bacilli all'esame microscopico nei campioni respiratori**

- FORME POLMONARI NON BACILLIFERE con esame microscopico negativo, ma colturale positivo (anche se assai meno contagiose delle bacillifere)

Terapia della tubercolosi

- Il regime standard contiene 4 farmaci (RHZE)
- La durata del trattamento: almeno 6 mesi (fino a 12)
- Il trattamento: fase intensiva (2 mesi a 4 farmaci) e fase di mantenimento (4 mesi a 2 farmaci)
- Farmaci per os
- Importanza aderenza terapeutica!!



Zoonotic TB

- Current definitions: A form of tuberculosis in people caused by *Mycobacterium bovis*

  - *M. bovis* is clinically, radiographically, and pathologically indistinguishable from *M. tuberculosis* in humans
  - Higher proportion of extrapulmonary disease
  - TST and IGRAs don't distinguish *M. bovis* from *M. tuberculosis*
  - PZA mono-resistant - Think *M. bovis* or *M. bovis BCG* (Vaccine)

  - Prevent by pasteurizing (Heating) dairy products before consumption

Extrapulmonary TB due to *M. bovis*

Cutaneous TB caused by M. bovis in Veterinarian exposed to infected alpaca, *Veterinary Record* 2010

Zoonotic tuberculosis in the 21st century

There are an estimated 140 000 cases of zoonotic tuberculosis each year that result in approximately 11 400 deaths.[1] However, these estimates are subject to certain caveats, one of which is the definition of zoonotic tuberculosis. WHO, World Organisation for Animal Health (formerly Office International des Epizooties), the Food and Agriculture Organization of the United Nations, and The Union (International Union Against Tuberculosis and Lung Disease) define zoonotic tuberculosis as a form of tuberculosis in people caused by *Mycobacterium bovis* (panel), a pathogen characterised as the cause of bovine tuberculosis in the late 19th century.[5] However, our understanding of the *M tuberculosis* complex (MTBC) has evolved, revealing various distinct lineages capable of causing tuberculosis in both animals and humans. The evolving knowledge highlights the need to reconsider our definitions and deepen our understanding of the true risks and burden of zoonotic tuberculosis.

In South Asia, which carries approximately 37% of all tuberculosis cases, recent evidence has shown that *M orygis* is the predominant cause of zoonotic tuberculosis, with *M bovis* being nearly absent.[6,7] *M caprae* frequently spills over from infected goats and other livestock predominantly in Europe. *M pinnipedii* causes disease in people in close contact with seals and sea lions[8] and caused tuberculosis in people in pre-colonial South America, before the introduction of *M tuberculosis*.[9] Several reports have shown that human-associated lineages of tuberculosis (*M tuberculosis sensu stricto*) can cause tuberculosis in livestock in countries (eg, Ethiopia),[10] such that back transmission of these human-associated lineages from animals to humans might occur, as was observed with SARS-CoV-2 from farmed mink. Collectively, these findings show that the currently narrow definition of zoonotic tuberculosis as human tuberculosis due to *M bovis* does not capture the full spectrum of tuberculosis derived from animals.

Flickr – I. Yakubovich

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New evidence

- *M orygis* is the predominant cause of zoonotic tuberculosis in South Asia

The currently narrow definition of zoonotic tuberculosis as human tuberculosis due to *M bovis* does not capture the full spectrum of tuberculosis derived from animals

seals and sea lions and caused tuberculosis in people in pre-colonial South America

- Several reports have shown that human- associated lineages of tuberculosis (*M tuberculosis sensu stricto)* can cause tuberculosis in livestock in countries (eg, Ethiopia)

Panel: Definitions of zoonotic tuberculosis

WHO, World Organisation of Animal Health, Food and Agriculture Organization of the United Nations, and International Union Against Tuberculosis and Lung Disease definitions:

- "Zoonotic TB [tuberculosis] is a form of tuberculosis in people caused by *Mycobacterium bovis*, which belongs to the *M. tuberculosis* complex"[2]
- "Zoonotic TB is a form of TB in people predominantly caused by a closely related species, *M. bovis*, which belon to the *M. tuberculosis* complex"[3]

World Organisation of Animal Health definition:

- "Zoonotic tuberculosis is a less common form of human tuberculosis that is caused by a related member of the *Mycobacterium tuberculosis* complex (*M. bovis*)"[4]

Proposed formal definition:

- "Zoonotic tuberculosis is a form of human tuberculosis acquired from an animal source"

Proposed pragmatic definition:

- "Zoonotic tuberculosis is diagnosed based on epidemiological evidence of relevant animal or environmental exposure, and/or microbiological confirmation of a Mycobacterium tuberculosis complex subspecies usually found in animals"

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Contents lists available at ScienceDirect

Tuberculosis

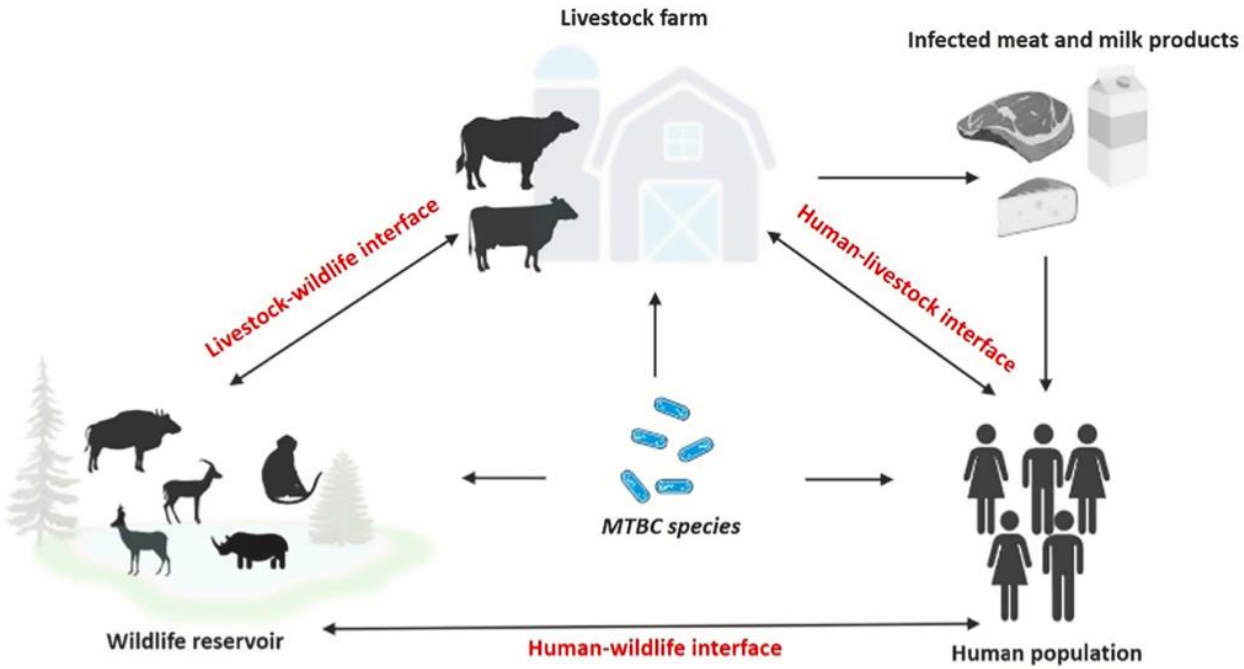
journal homepage: www.elsevier.com/locate/tube

Review

Reverse zoonosis in bovine tuberculosis: The neglected threat of *Mycobacterium tuberculosis* infection in cattle

Vaishnavi Vivekanandan [a], Arun K [a], Sindhu Hasini Doredla [a], Harini Ramanujam [a], Ranjani Singaraj [a], Kannan Palaniyandi [a,b,*]

[a] Department of Immunology, ICMR-National Institute for Research in Tuberculosis, Chetpet, Chennai, India
[b] Faculty of Medical Research, Academy of Scientific and Innovative Research (AcSIR), India



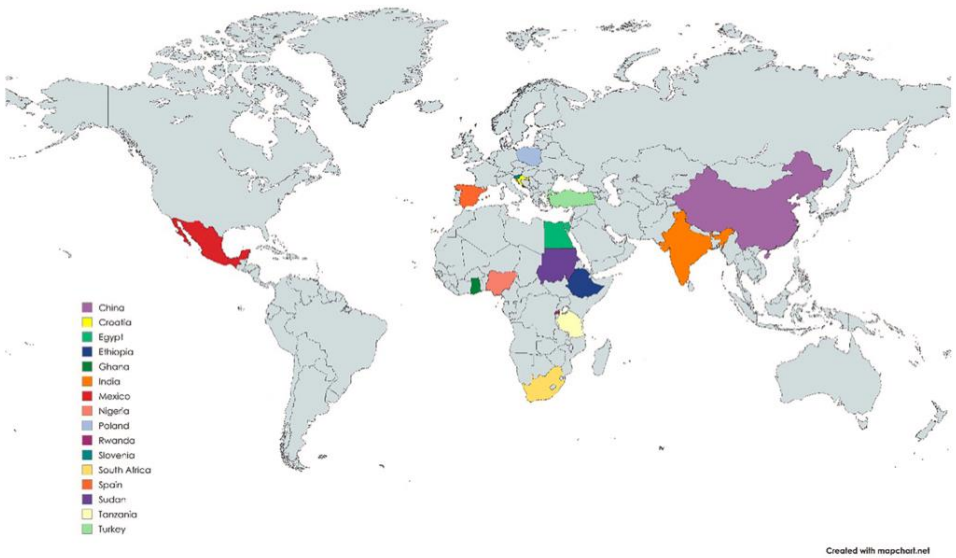


Fig. 3. Global distribution of Tuberculosis in Cattle Caused by *M. tuberculosis*
This map highlights countries where *M. tuberculosis* infections have been reported in cattle, based on published case reports and surveillance studies. The coloured regions represent confirmed detections across diverse geographic settings, predominantly in areas with close human–animal interactions and a high human TB burden.

Message received from WHO colleague in Feb 2025:

…A WHO colleague from Pakistan is asking if they can rapidly source 200,000 tablets to treat 2 elephants with TB!!

Photo taken on May 16, 2025 shows Ali Baloch, right, a minder, preparing medicated meals for Madhubala and Malika, elephants who have tuberculosis, at the Safari Park in Karachi. A team of Pakistani doctors is treating them at least 400 pills each a day.

Grazie per l'attenzione!

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