Understanding Tuberculosis epidemiology and challenges to End TB in Nepal

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Presentation Outline

- GLOBAL AND NATIONAL BURDEN OF TB
- UNDERSTANDING TB
- TOWARDS TB FREE NEPAL: A DAUNTING TASK
- ENDING TB: THE POSSIBILITY

Historical Timeline

6700–6200 B.C.E.

The oldest known cases of tuberculosis appear in the Neolithic-era village of Atlit Yam in modern-day Israel.

400 B.C.E.

Hippocrates coins the term "phthisis," a disease of the lung manifesting with fever and cough. Phthisis, meaning to waste away, is believed to be in reference to

384–322 B.C.E.

The Greek philosopher Aristotle is

2006

First report of extensively multidrug-resistant tuberculosis in Africa.

2010

Rapid molecular testing for the diagnosis of tuberculosis is launched with the introduction of GeneXpert.

2012

Bedaquiline becomes the first new treatment for tuberculosis in four decades.

2018

The WHO reports 10 million cases of tuberculosis worldwide, leading to 1.5 million deaths

1882

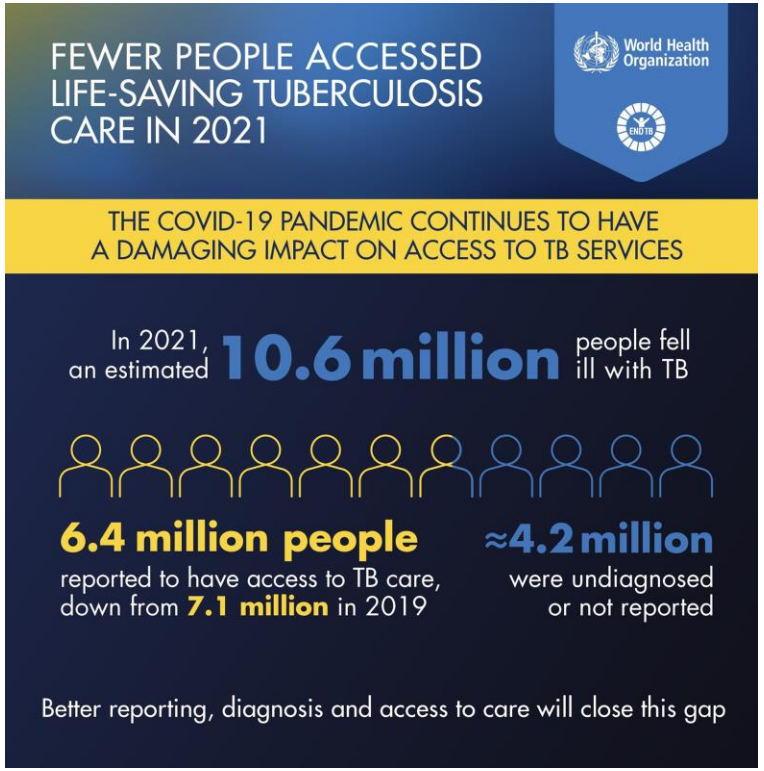
Koch discovers the tubercle and presents his findings to n Physiological Society. In receives the Nobel Prize in gy or Medicine for his y.

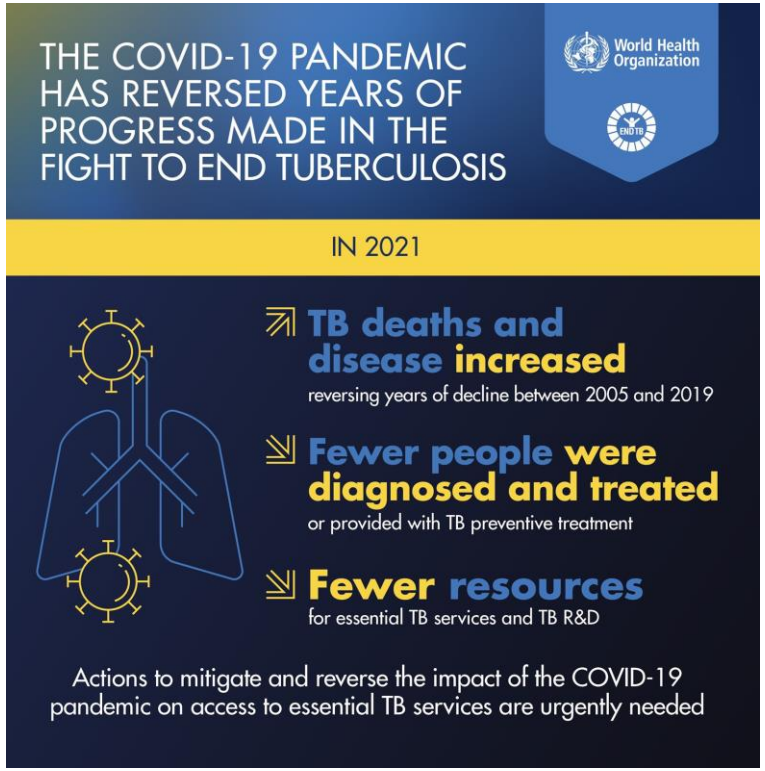
1890

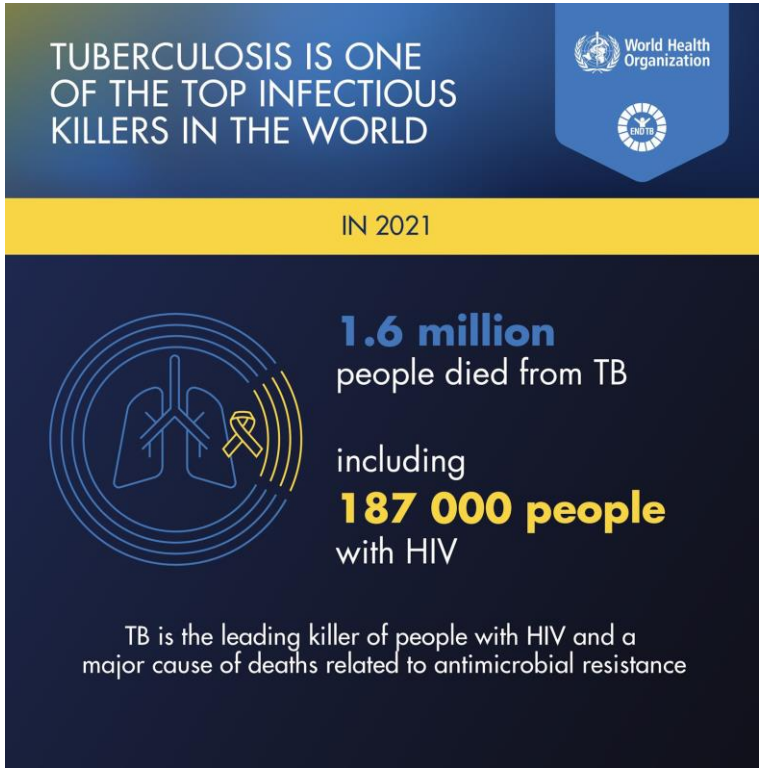
Robe tuber

Burden of Tuberculosis

- TB continues to one of the top infectious killers in the world
- COVID-19 pandemic has reversed years of progress made in the fight against TB







Burden of TB in Nepal- 2021/22

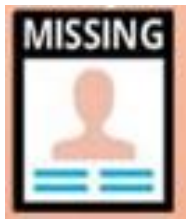
37,861 DSTB cases and 659 DRTB cases Notified

TB is the major leading causes of death in Nepal

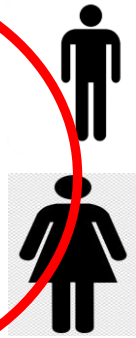
Almost half of Nepal's population are infected with TB (Latent Infection)

Every Year (DSTB Estimated)

69,000 New TB Cases



31000 TB cases Missed



Male: **67%**

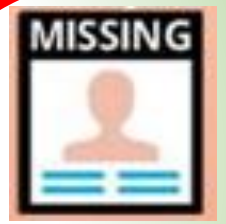
Female: **33%**

17,000 Death

Every Year (DRTB Estimated)

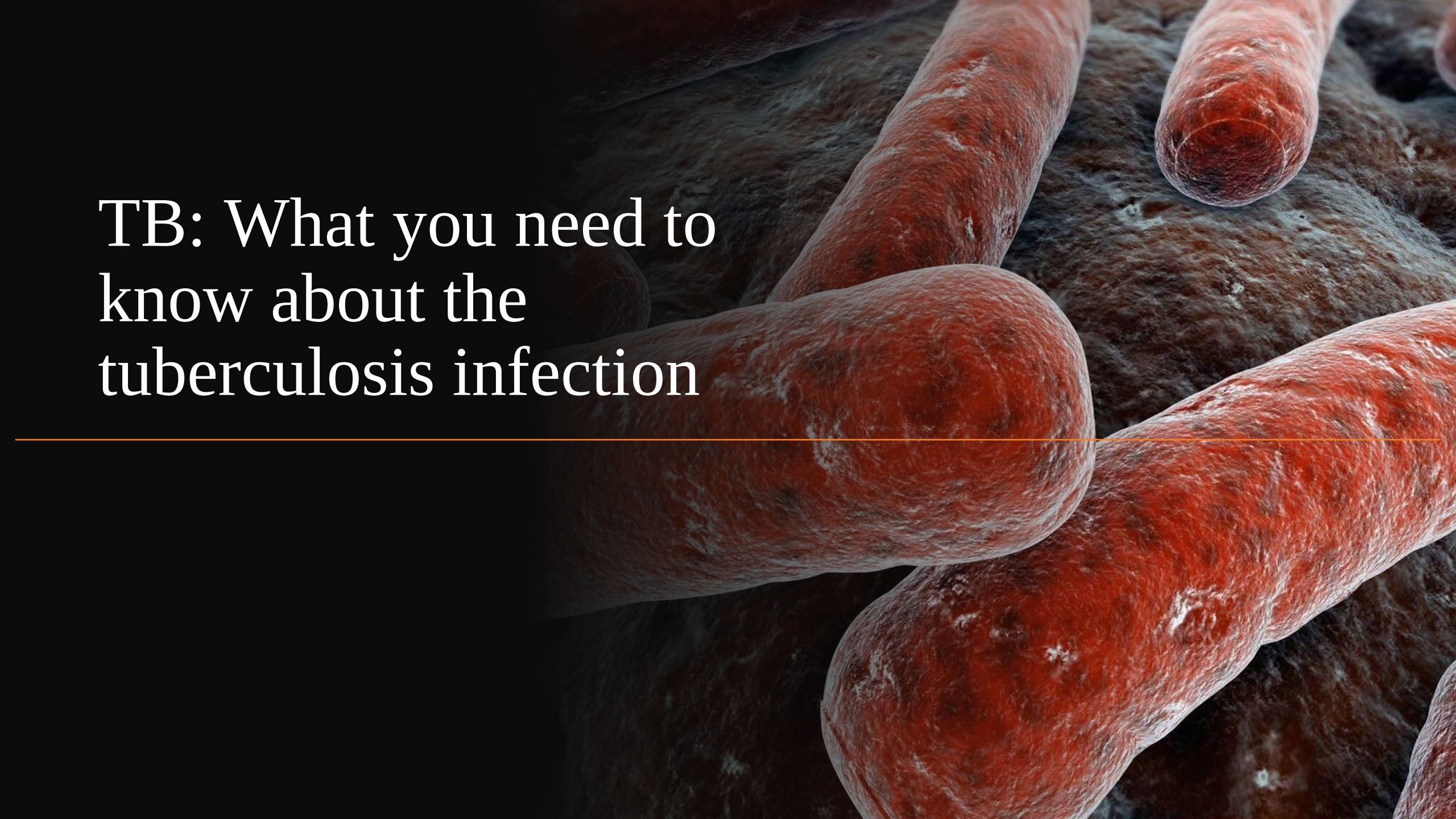
Nepal is a High Burden Country

2800 New DRTB cases



>2000 DR TB cases Missed

TB: What you need to know about the tuberculosis infection



What is TB?

- TB is a disease caused by a bacterium called Mycobacterium tuberculosis (M. tuberculosis).
- The bacteria usually attack the lungs but can attack any part of the body such lymph nodes, bones and joints, the brain, and other organs.
- If TB is treated properly, most people can be cured of TB
- If TB is NOT treated properly, people can die from TB or develop drug-resistant forms of TB

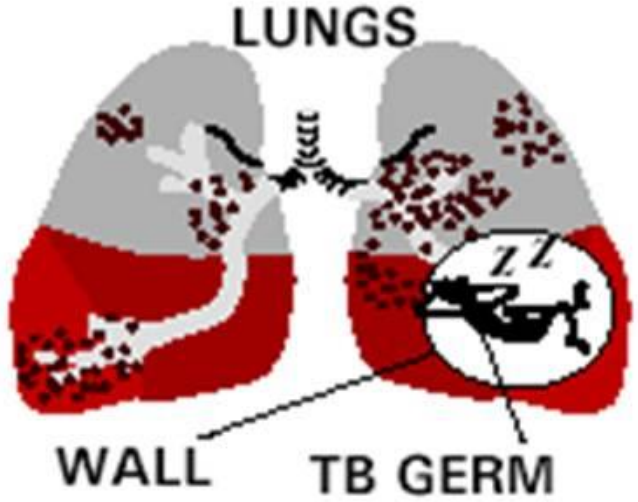
How is TB transmitted?

- TB is spread through the air from person to person. TB may be expelled into the air when a person with infectious TB :
    - Coughs
    - Sneezes
    - Speaks
    - Sings

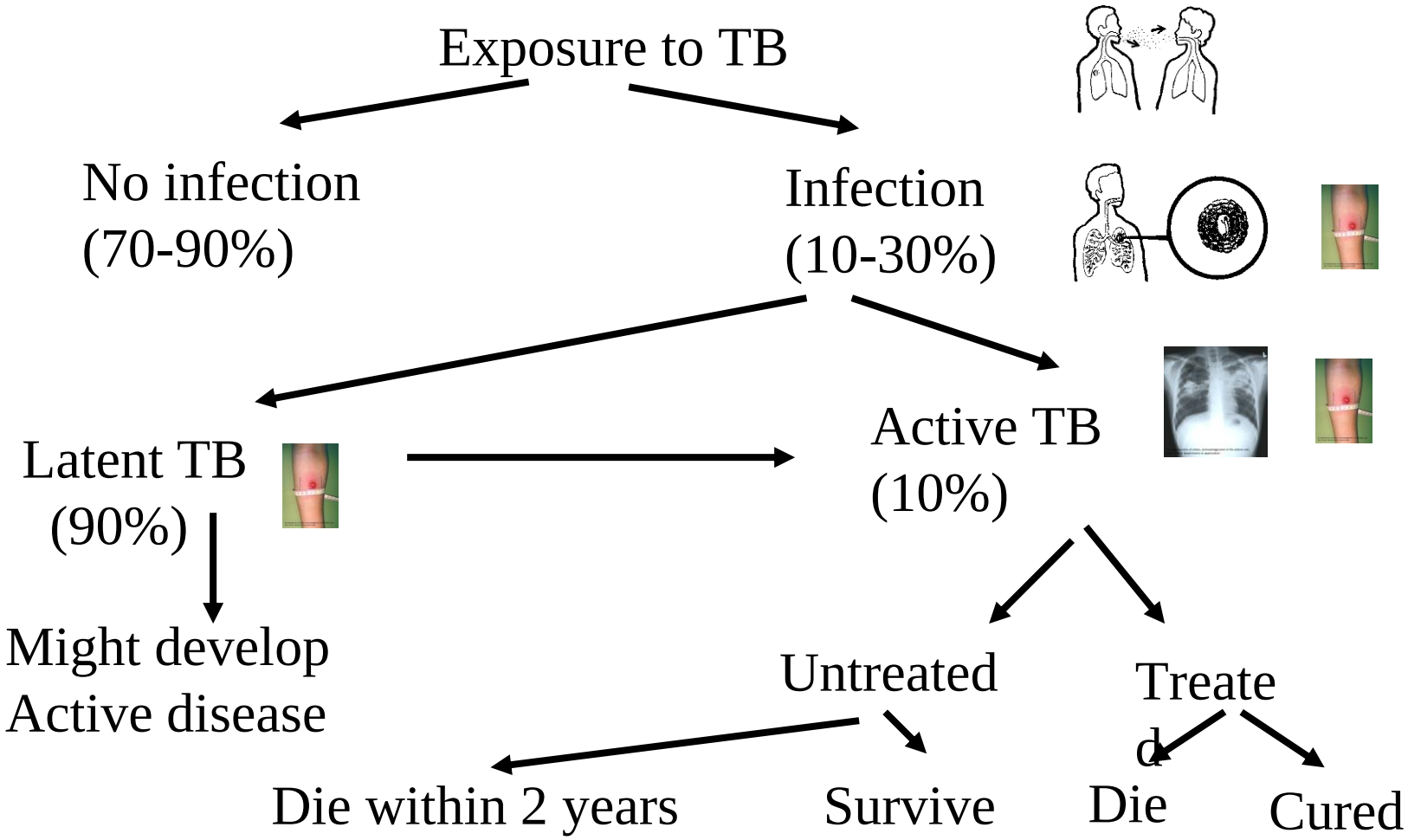
- Once the TB bacteria are inhaled, they push their way into the lungs

Not all TB infections lead to TB disease

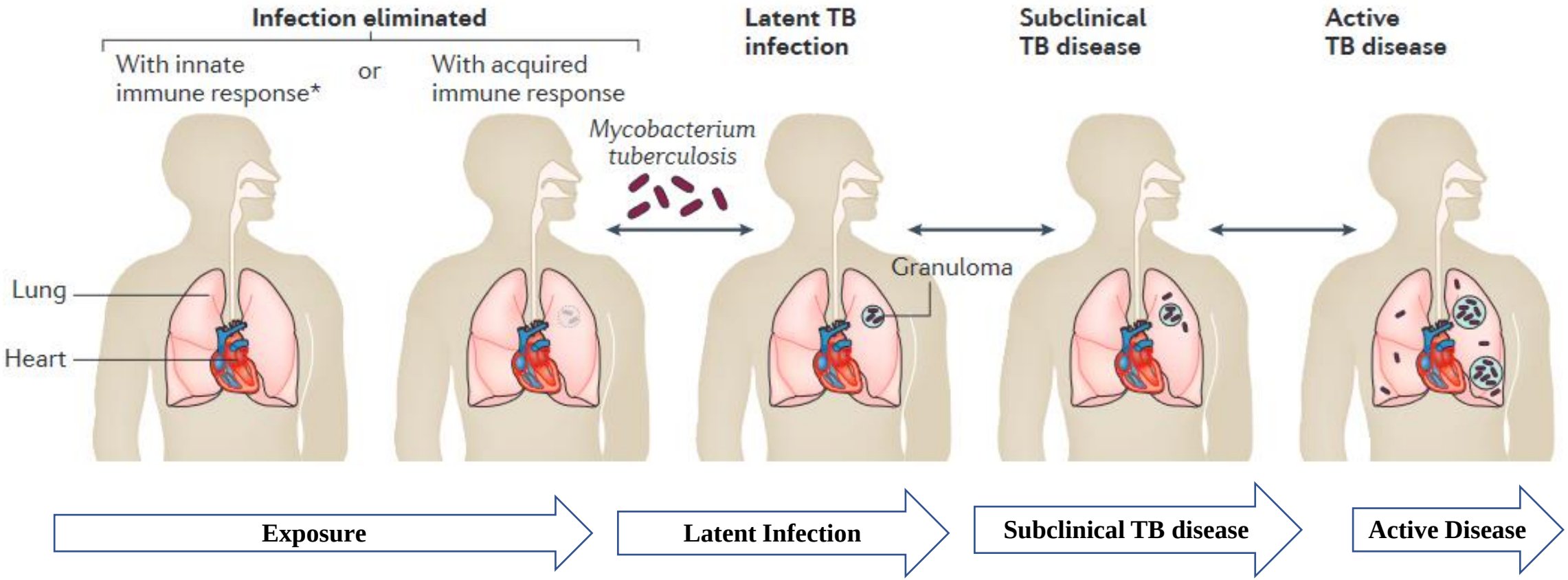
- Latent TB infection (aka LTBI) occurs when the immune system has contains TB and prevents disease.
- Active TB disease refers to the time when TB breaks out and causes disease.

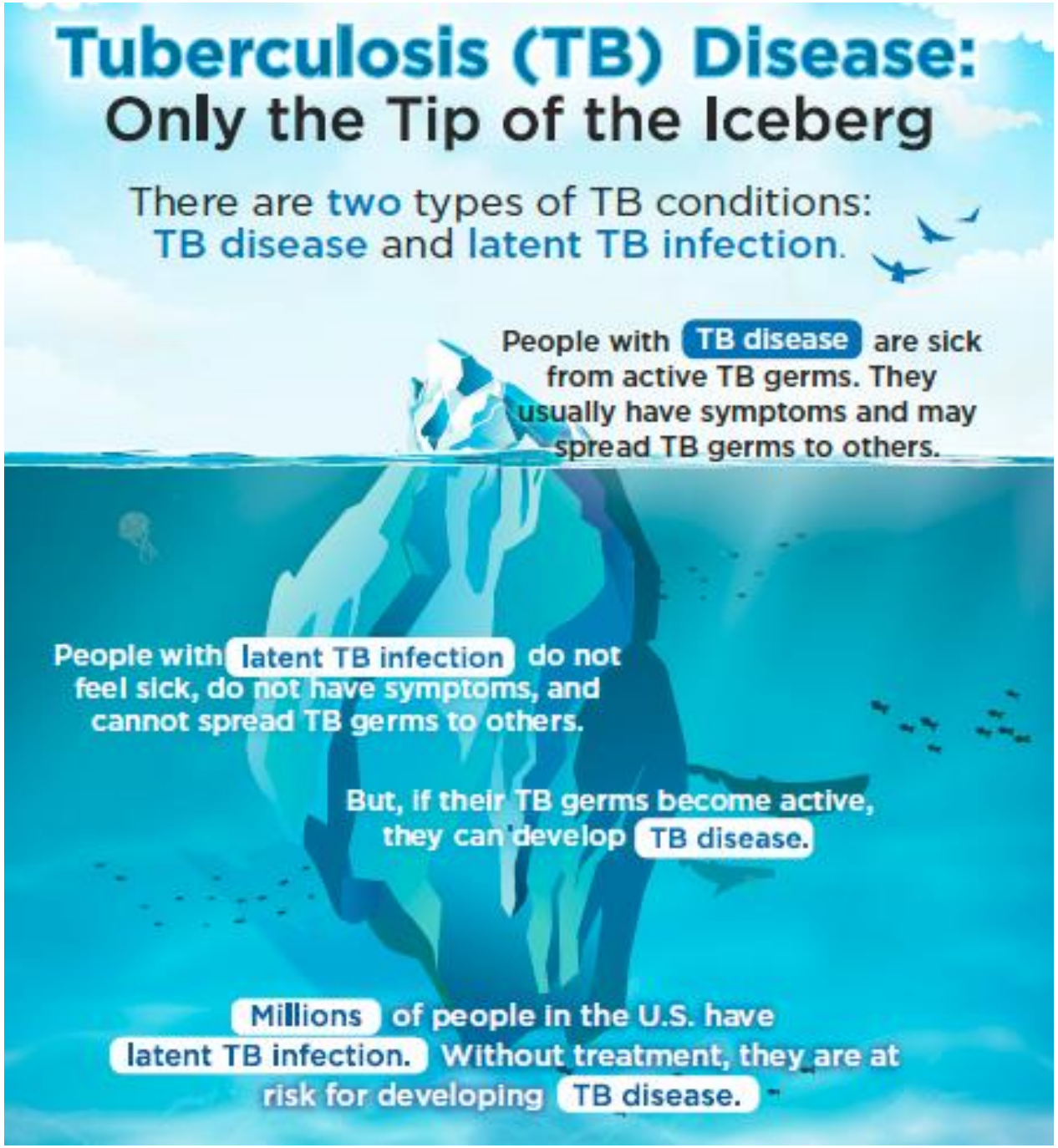


Natural History of TB Infection



Spectrum of Tuberculosis in Host




Tuberculosis (TB) Disease:
Only the Tip of the Iceberg
There are two types of TB conditions:
TB disease and latent TB infection.
People with TB disease are sick from active TB germs. They usually have symptoms and may spread TB germs to others.
People with latent TB infection do not feel sick, do not have symptoms, and cannot spread TB germs to others.
But, if their TB germs become active, they can develop TB disease.
Millions of people in the U.S. have latent TB infection. Without treatment, they are at risk for developing TB disease.

TB Disease

The TB germ can "wake up" at any time (usually within 1-2 years) and make a person sick

More likely to get TB disease when a persons body is weakened from:

- HIV
- Diabetes
- Poor Nutrition
- Cancer medications
- Steroids
- Drug use
- Smoking
- Old Age

Risk of Developing TB

Risk of Developing TB Disease

Risk Factor	Risk of Developing TB	Description
TB infection and no risk factors	 About 10% over a lifetime	For people with TB infection, **no risk factors**, and no treatment, the risk is about 5% in the first 2 years after infection and about 10% over a lifetime.
TB infection and diabetes	 About 30% over a lifetime	For people with TB infection and **diabetes**, and with no treatment, the risk is three times as high, or about 30% over a lifetime.
TB infection and HIV infection	 About 7% to 10% PER YEAR	For people with TB infection and **untreated HIV infection** and with no LTBI treatment, the risk is about 7% to 10% PER YEAR, a very high risk over a lifetime.

What are symptoms of TB disease?

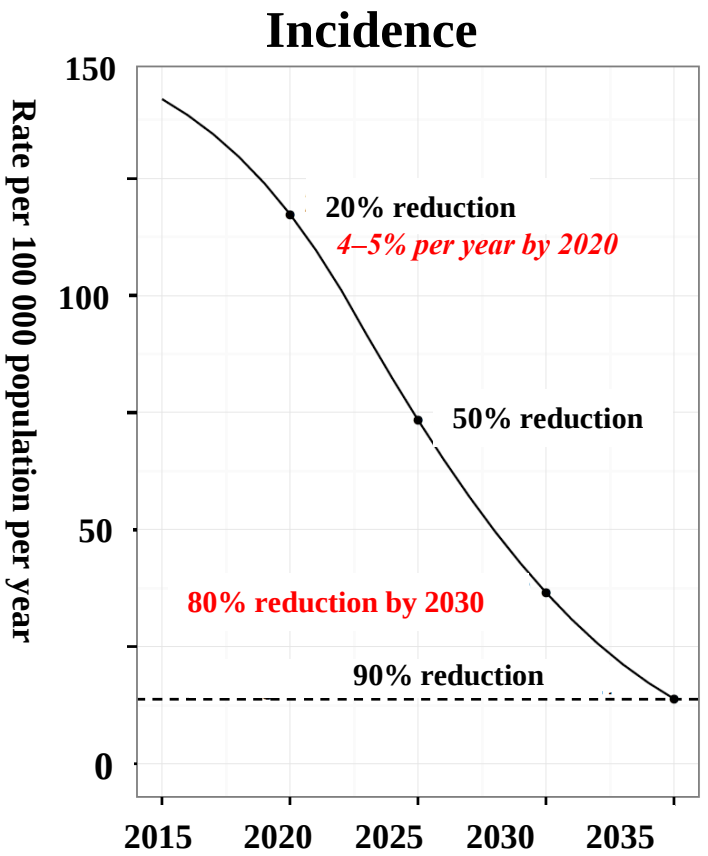
Due to general infection and immune response

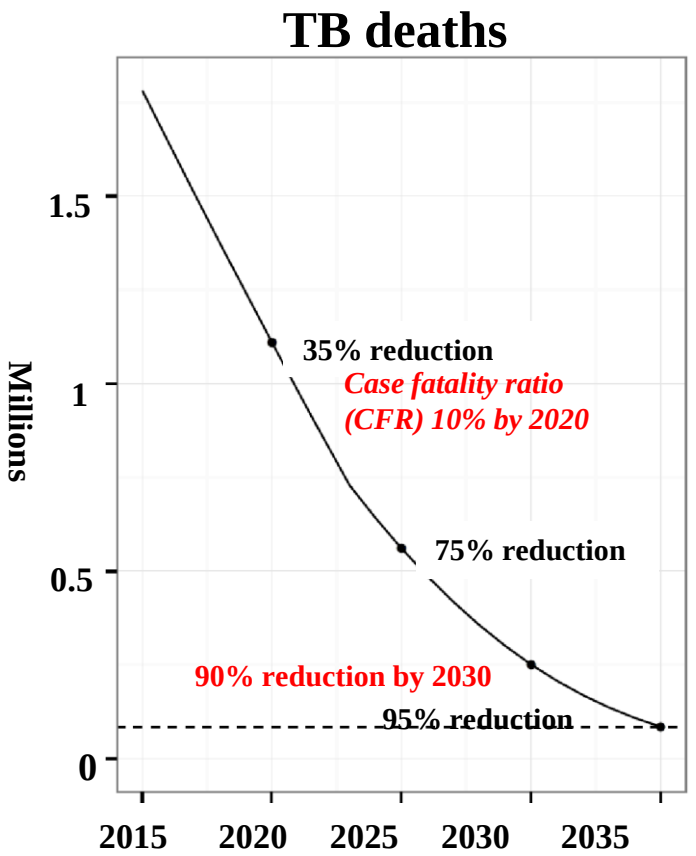
- Fever
- Night sweats
- Weight loss

Due to direct damage

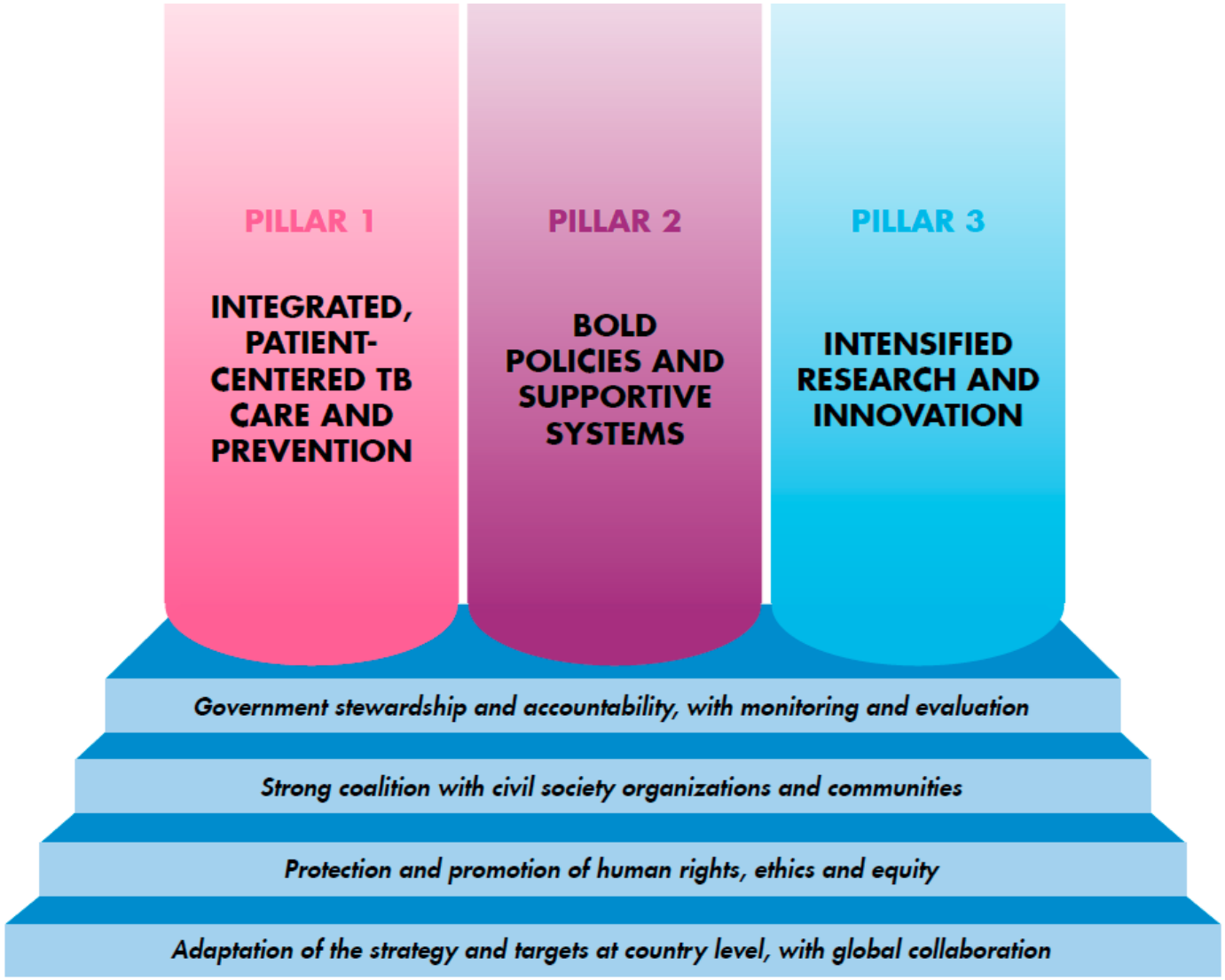
- Pulmonary TB
  - Cough
  - Sputum – white, grey, green, red
- Extrapulmonary
  - Just about anything…..depending on site

End TB Strategy- The Impacts
Specific targets (2030, 2035) and milestones (2020, 2025)



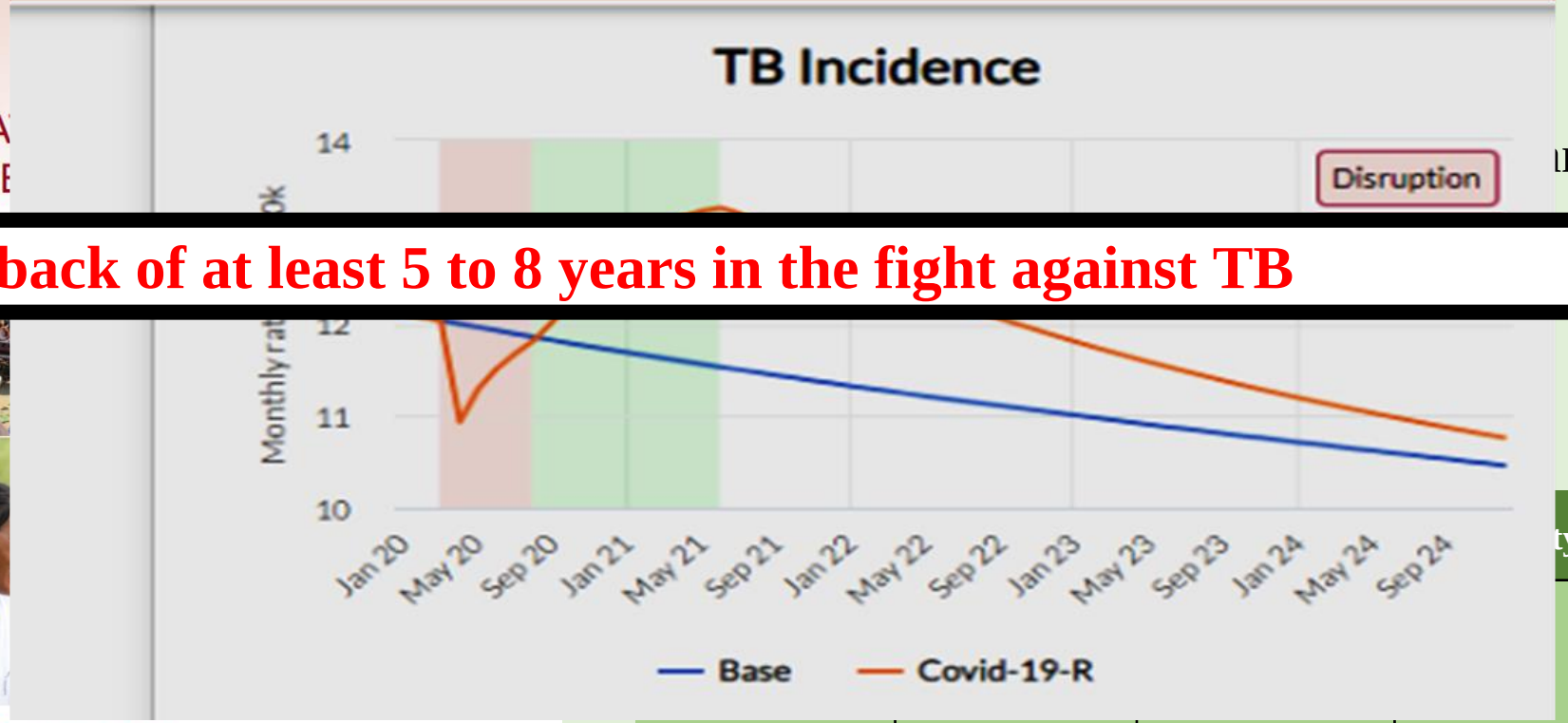


Towards TB free Nepal: A daunting task

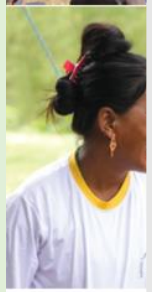


Challenge 1: Revised TB Burden and impact of Covid-19 pandemic

Impact of COVID-19 on Nepal's TB program



Setback of at least 5 to 8 years in the fight against TB



Government of Nepal
Ministry of Health and Population
Department of Health Services
National Tuberculosis Control Center

Challenge 2: Integrated, Patient centered Care And Prevention

Are individuals with TB at heart of service delivery?

- Limited coverage of case finding intervention in vulnerable and high burden settings.
- Reliance in sputum microscopy test and under utilization of molecular diagnostics
- TB preventive treatment only being provided to PLHIV and contact children under 5 years
- No functioning collaborative activities with other diseases like HIV, Diabetes, NCDs
- Children, especially those aged 0-4 years, are underserved by the NTP – case detection is too low (6%)
- Most MDR-TB patients were undetected; many of those who were diagnosed were not treated, and if treated, not properly supported

Challenge 3: Bold Policies And Supportive Systems

Is there intense participation across government, communities and private stakeholders.

- Frequent change in NTP leadership.
- The NTC's cadre of technical staff has been hollowed out and experienced district and regional TB staff have already been transferred.
- Disintegrated supervision from NTC to Province, and Province to Palika
- The current NSP (2016-2021) is underfunded: annual budget allocations have been 85% of the budgets.
- The private sector is massive, heterogeneous, and growing and difficult to manage
- Lack of meaningful engagement of CSO and other key stakeholders in the NTP

Source	Budget(USD)-In Million						%
	2021/22	2022/23	2023/24	2024/25	2025/26	Total	
Total costs for TB control	**37.27**	**37.29**	**38.65**	**37.51**	**41.12**	**191.84**	**100%**
GoN	8.23	10.05	17.00	17.05	18.46	70.78	**36.9%**
Global Fund	10.50	6.00	3.99	9.04	9.04	38.56	**20.1%**
WHO	0.10	0.04	0.03	-	-	0.17	**0.1%**
Estimated/Available	**18.83**	**16.09**	**21.02**	**26.08**	**27.49**	**109.52**	**57.1%**
Funding GAP	**18.44**	**21.20**	**17.62**	**11.43**	**13.63**	**82.32**	**42.9%**

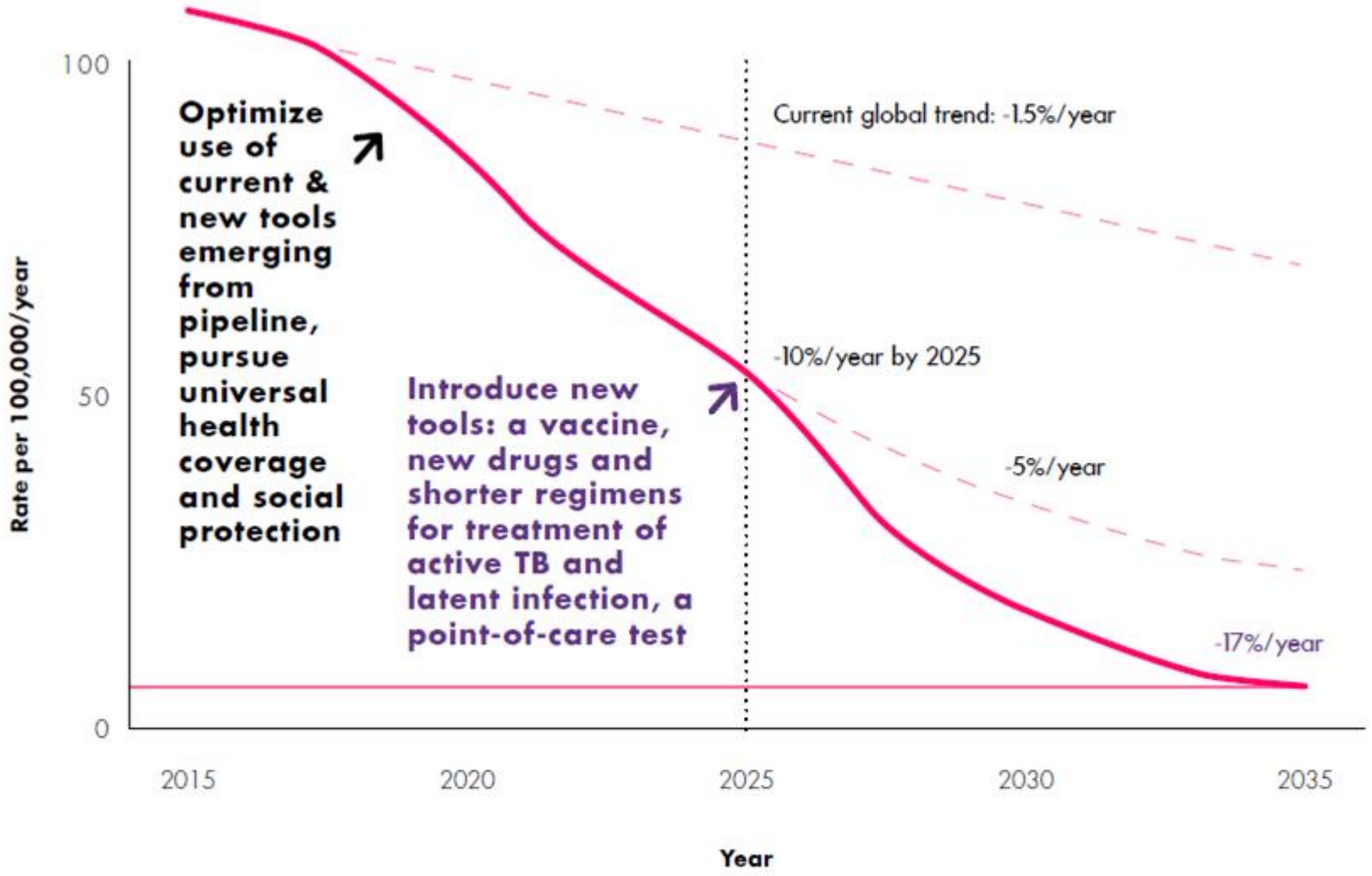
http://nepalntp.gov.np/pub_cat/worldtbday2023/

Challenge 3: Intensified Research And Innovation

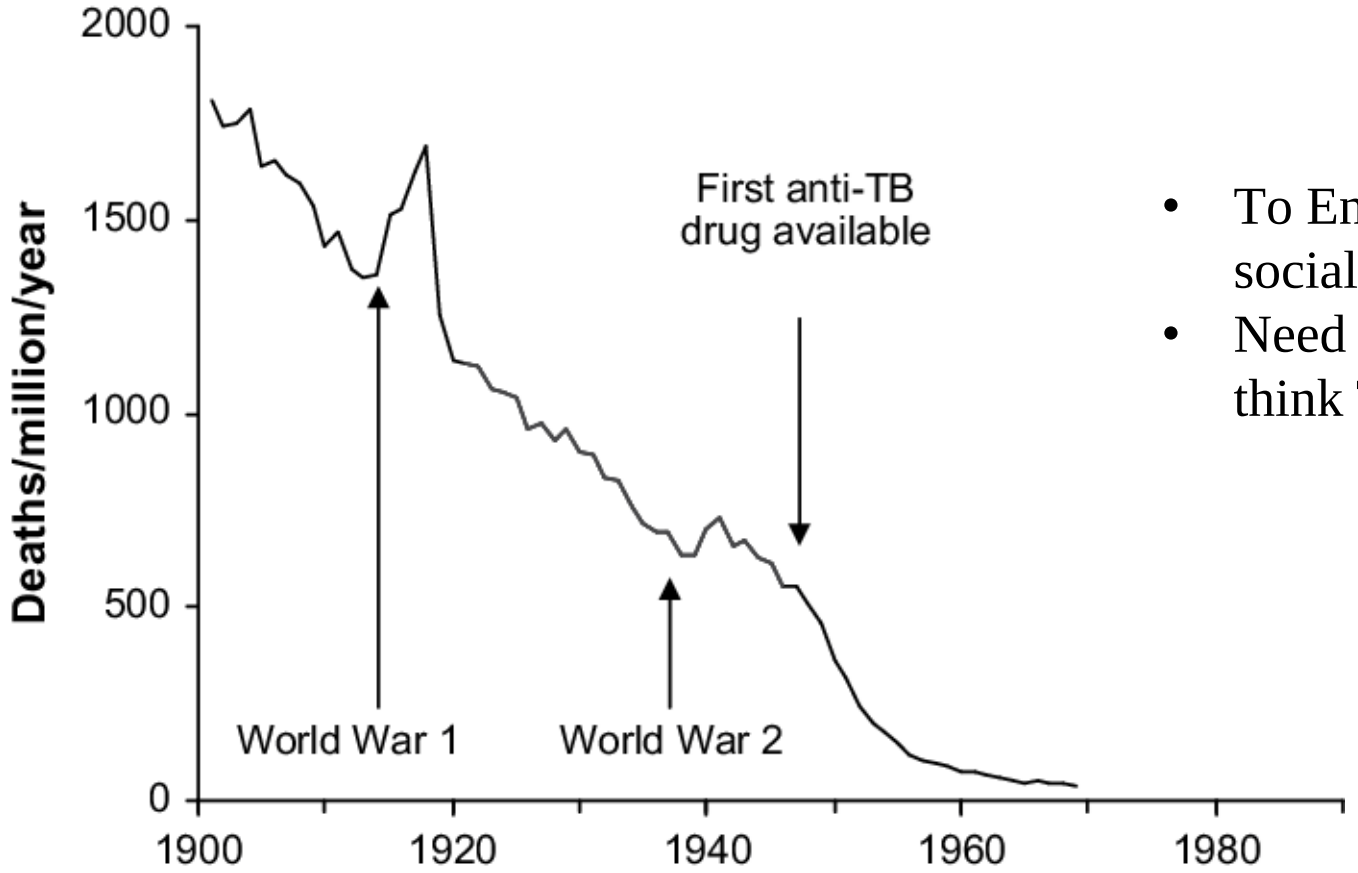
If there focus on research as it is critical to break the trajectory of the epidemic and reach the global targets.

- Less program focus on research to optimize implementation and impact; and promote innovation
- Delay in uptake of new tools, intervention and strategies (3HP for TB prevention, BPAL for treatment of drugs resistant, AI for screening of TB)

Ending TB: The possibility



What does this picture highlights?



- To End TB we need to address all social determinants
- Need to have bigger picture and think TB beyond disease

Decline in TB mortality in England and Wales and its association in time with the two World Wars, and the introduction of chemotherapy against TB

Lonnroth et.al., Drivers of tuberculosis epidemics: The role of risk factors and social determinants

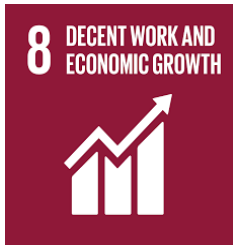
Bigger Picture: TB beyond disease

Sustainable Development Goals and the End TB strategy

Target 3.3: **By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases**

Goal: End the global TB epidemic

Common aim: end the global TB epidemic



Poor Living and working conditions

Food insecurity

Stigma, discrimination, marginalization

At risk behavior

Crowding, Poor Ventilation

Silica, Indoor air Pollution

Mal-nutrition

Vulnerable groups Incl. Children, woman, migrant, prison etc.

HIV/AIDS

NCD
Diabetic, Smoking, Alcohol

Conducive environment for transmission

Impaired Host defense/ Susceptibility

Exposure

Latent Infection

Active Disease

Suffering and death

UHC TB Services

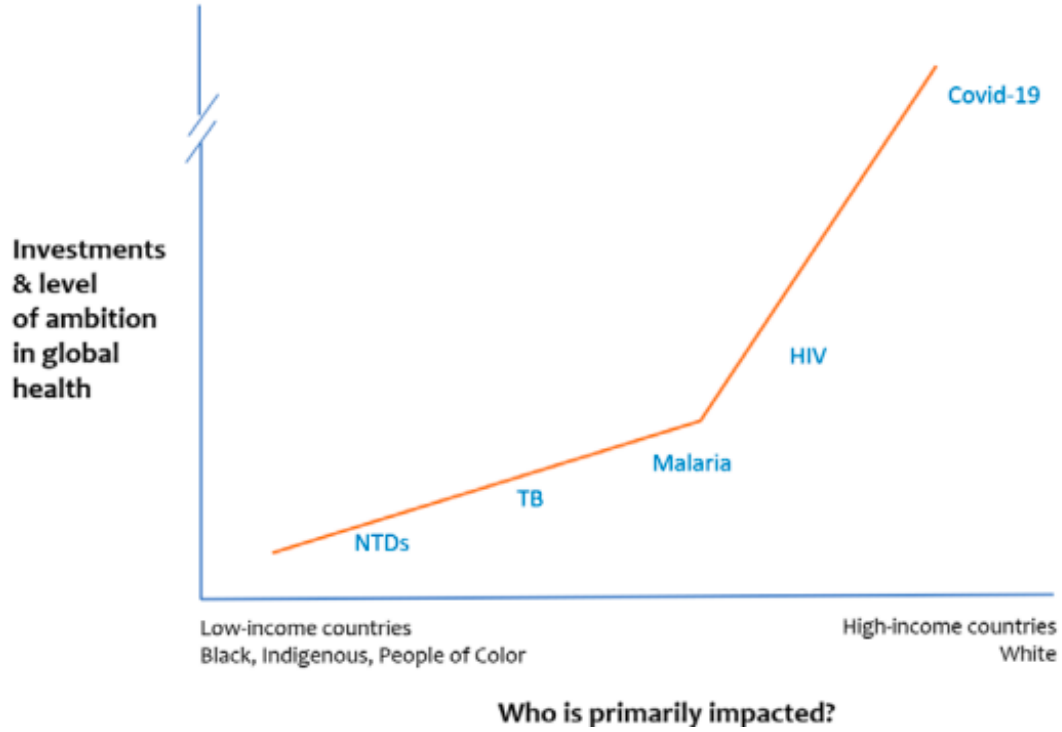
TB Care

Goal 1: Social Protection when ill

Can TB achieve the level of attention that COVID-19 received?

Where will we get resources to pull this off?

Centre international de TB McGill
McGill International TB Centre
A PAHO/WHO Collaborating Centre for Tuberculosis Research



Centre international de TB McGill | McGill International TB Centre

A PAHO/WHO Collaborating Centre for Tuberculosis Research

Covid-19 (in 1 year)

$10B+ investments in 1 year

92 vaccines in trials, 28 in final stages

8 approved vaccines with 70 – 95% efficacy

Coronavirus Vaccine Tracker

By Carl Zimmer, Jonathan Corum and Sui-Lee Wee Updated May 29, 2021

U.S.A. | World | Health

PHASE 1	PHASE 2	PHASE 3	AUTHORIZED	APPROVED	ABANDONED
51	36	28	7	8	4
Vaccines testing safety and dosage	Vaccines in expanded safety trials	Vaccines in large-scale efficacy tests	Vaccines in early or limited use	Vaccines approved for full use	Vaccines abandoned after trials

Tuberculosis (in 1 century)

$100M/yr investment

1 vaccine with ~0% efficacy*

0 new vaccines in Phase 3 trials

* in adults in LMICs

Science is NOT the rate limiting step for any global health challenge

Neglect is….

Dr. Madhukar Pai

Thank you